

RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3262

Report Number: SYBH(R)01667111EB-1

FCC ID: QISRRU3262

IC: 6369A-3262

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 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: RRU3262

Date of Receipt Sample: 2015-01-04
Start Date of Test: 2015-01-05
End Date of Test: 2015-01-15

Test Result: Pass

Approved by Senior Engineer:	2015-01-28	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2015-01-28	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 4, November 2014)
IC RSS-199 (Issue 2, October 2014)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02
(if applicable) FCC KDB 662911 D01 Multiple Transmitter Output v02r01
MILLIMETER WAVE TEST PROCEDURES (TCB council members & FCC lab)
TR 14-1001 MMW Measurements with Harmonic Mixers (FCC)

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



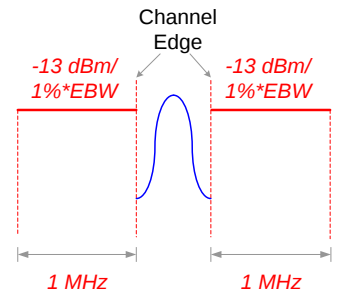
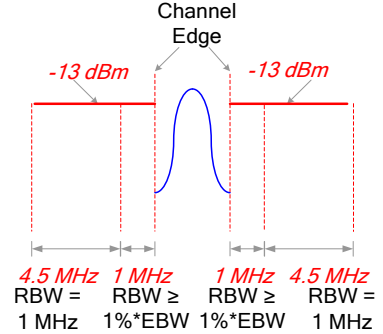
2 Test Summary

2.1 BRS&EBS Band (2496/2500-2690 MHz)

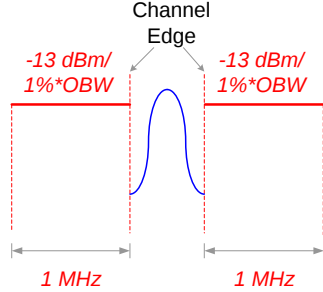
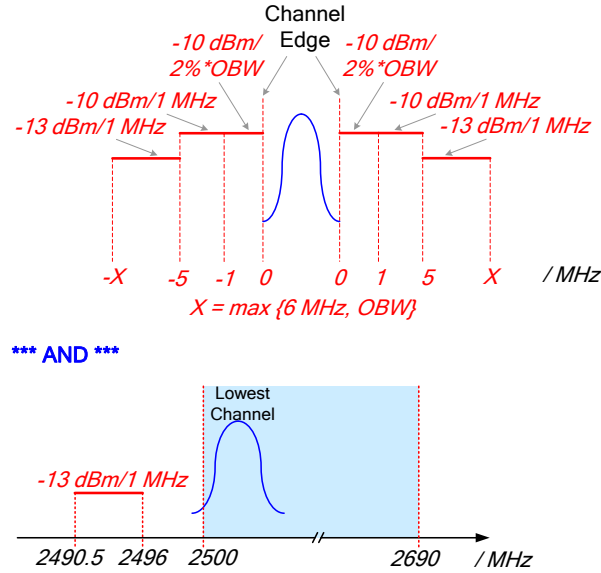
2.1.1 Measurement Technical Requirements

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 ≤ 33 dBW + 10 lg(X/Y) dBW + 10 lg(360/beamwidth) dBW, where X=ChBW(MHz), Y=5.5 or 6 MHz.	Annex A	Pass	TL1
				Mobile Subscriber Station	EIRP Power ≤ 2 W.			
				Subscriber Station	Conducted Power ≤ 2 W.			
			IC	Base Station	● HAAT ≤ 300 m: EIRP PD ≤ 1640 W/1 MHz. ● HAAT ≤ 2000 m: EIRP PD ≤ 164 W/1 MHz.			
				Mobile Subscriber	EIRP Power ≤ 2 W.			
				Fixed Subscriber	● EIRP Pwr ≤ 40 W. ● Condt. Pwr ≤ 2 W.			
Bandwidth	§2.1049, §27.53(m)	RSS-Gen,§4.6	FCC	● OBW: No limit. ● EBW (-26 dBc): No limit.		Annex B	Pass	TL1
			IC	OBW: No limit.				

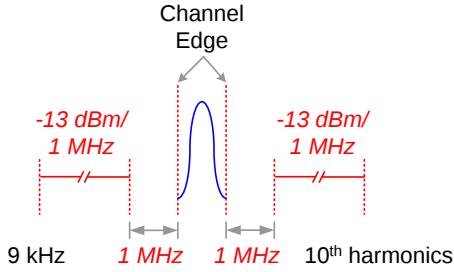
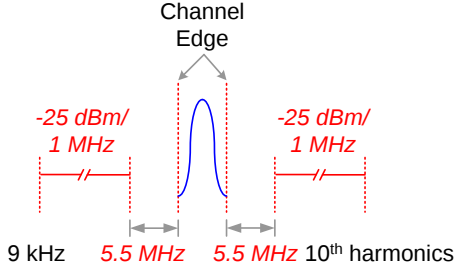
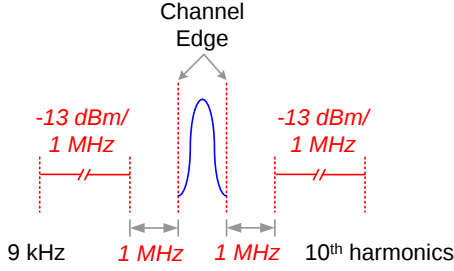


Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Band Edges Compliance / Emission Mask	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.6	FCC	Base Station / Fixed Subscriber Station	 (EBW is -26 dBc EBW)	Annex C	Pass	TL1
				Mobile Station	 (EBW is -26 dBc EBW)			



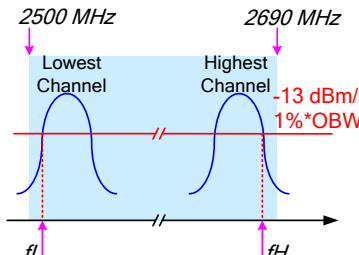
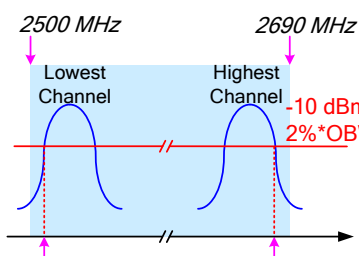
Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location
			IC	Base Station and Fixed Subscriber			
				Mobile Subscriber			



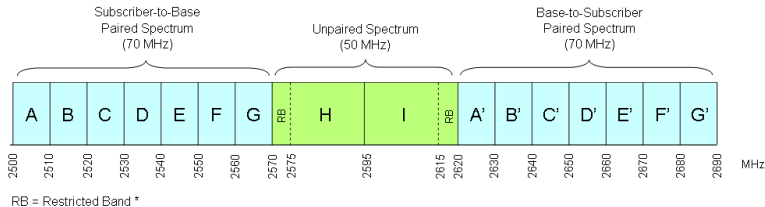
Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.6	FCC	Base Station / Fixed Subscriber Station		Annex D	Pass	TL1
				Mobile Station				
			IC	Base Station and Fixed Subscriber				



Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
				Mobile Subscriber				
Field Strength of Spurious Radiation / Radiated Spurious Emissions	§2.1053, §27.53(m)	RSS-Gen,§4.9; RSS-199,§4.6	Refer to requirements of "Spurious Emission at Antenna Terminals". (ERP level)			Annex E	Pass	TL1
Frequency Stability	§2.1055, §27.54	RSS-Gen,§4.7; RSS-199,§4.3	FCC	- 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	Base Station and Fixed Subscriber Equipment	- Step 1: f(offset): no limit. - Step 2: fL – f(offset) > 2500 MHz, fH + f(offset) < 2690 MHz.			

Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location
				 - Test conditions for Step 1: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. - Test conditions for Step 2: NTN.			
			Mobile Subscriber Equipment	 - Step 1: f(offset): no limit. - Step 2: $fL - f(\text{offset}) > 2500 \text{ MHz}$, $fH + f(\text{offset}) < 2690 \text{ MHz}$. - Test conditions for Step 1: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. - Test conditions for Step 2: NTN.			
Receiver Spurious Emissions	---	---	---		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; SRSP-517	FCC	2496-2690 MHz.	See technical specification description.	Comply
			IC	2500-2690 MHz.  RB = Restricted Band *		
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
Equipment with Multiple Antennas	---	RSS-199,§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 RRU3262 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 RRU3262 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
WD5BLRXC70	Ver.B	Transceiver Board
WD5DLRAC70	VER.B	Power Amplifier Board

3.2.2 Sub-Assembly

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



3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio ☐ GSM Access Technology ☐ UMTS (Single-RAT): ☒ LTE ☐ CDMA ☐ WiMAX Multi-Standard ☐ GSM & UMTS Radio ☐ GSM & LTE (MSR): ☐ GSM & UMTS & LTE ☐ WiMAX & LTE ☐ CDMA & LTE
Equipment Type	#1 ☒ Base Station ☐ CPE (Customer Premises Equipment) Station ☐ Subscriber Station (User Equipment) #2 ☒ Fixed Station ☐ Mobile Station ☐ Portable Station #3 ☐ Indoor Station ☒ 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: 2
Multiple Carrier Supported	3 carriers. Max
Maximum RF Bandwidth	60 MHz
TX Output Power	Max. 60 W (per antenna port) Max. 120 W (two 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	GSM system: Base-band: Not applicable Carrier: Not applicable UMTS system: Base-band: Not applicable Carrier: Not applicable LTE system: Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA

Characteristics	Description
	CDMA system: Base-band: Not applicable Carrier: Not applicable WiMAX system: Base-band: Not applicable Carrier: Not applicable
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: 4M47D9W, 9M04D9W, 13M6D9W, 17M9D9W CDMA system: Not applicable WiMAX system: Not applicable
Power Supply	Power Supply Type: ☐ External AC mains, ☒ External DC mains, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE) Nominal Voltage, Input to EUT: -48 VDC Voltage Range, Input to EUT: -36 to -57 VDC
Antenna Assemblies	Antenna Type: ☒ External ☐ Integrated 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 EUT Configurations

4.1.1 General

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.

4.1.2 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

4.1.3 Test Configurations

EUT Conf.	RF Ch.	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1L_5M_B	B	2622.5	--	5	47.8	E-TM1.1
1L_5M_M	M	2655	--	5	47.8	E-TM1.1
1L_5M_T	T	2687.5	--	5	47.8	E-TM1.1
1L_10M_B	B	2625	--	10	47.8	E-TM1.1
1L_10M_M	M	2655	--	10	47.8	E-TM1.1
1L_10M_T	T	2685	--	10	47.8	E-TM1.1
1L_15M_B	B	2627.5	--	15	47.8	E-TM1.1
1L_15M_M	M	2655	--	15	47.8	E-TM1.1
1L_15M_T	T	2682.5	--	15	47.8	E-TM1.1
1L_20M_B	B	2630	--	20	47.8	E-TM1.1
1L_20M_M	M	2655	--	20	47.8	E-TM1.1
1L_20M_T	T	2680	--	20	47.8	E-TM1.1
2L_5M_B	B	2622.5,2677.5	--	5,5	44.8,44.8	E-TM1.1
2L_5M_T	T	2632.5,2687.5	--	5,5	44.8,44.8	E-TM1.1
3L_5M_B	B	2622.5,2672.5,2677.5	--	5,5,5	43.0, 43.0,43.0	E-TM1.1



EUT Conf.	RF Ch.	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
3L_5M_T	T	2632.5,2682.5,2687.5	--	5,5,5	43.0, 43.0,43.0	E-TM1.1

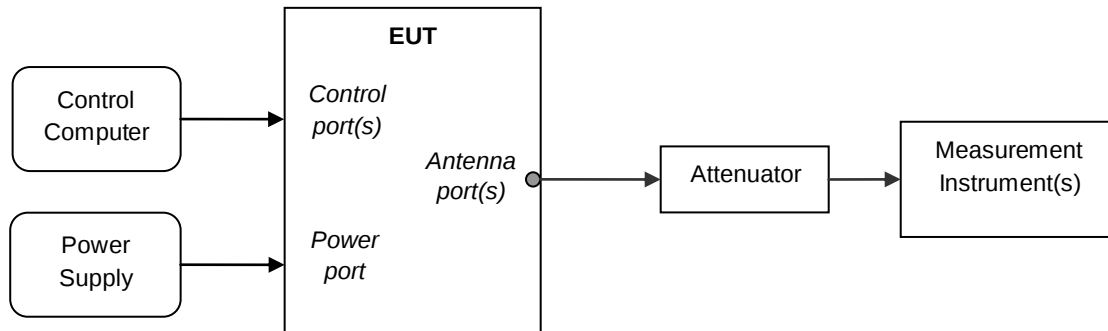


4.2 Test Environments

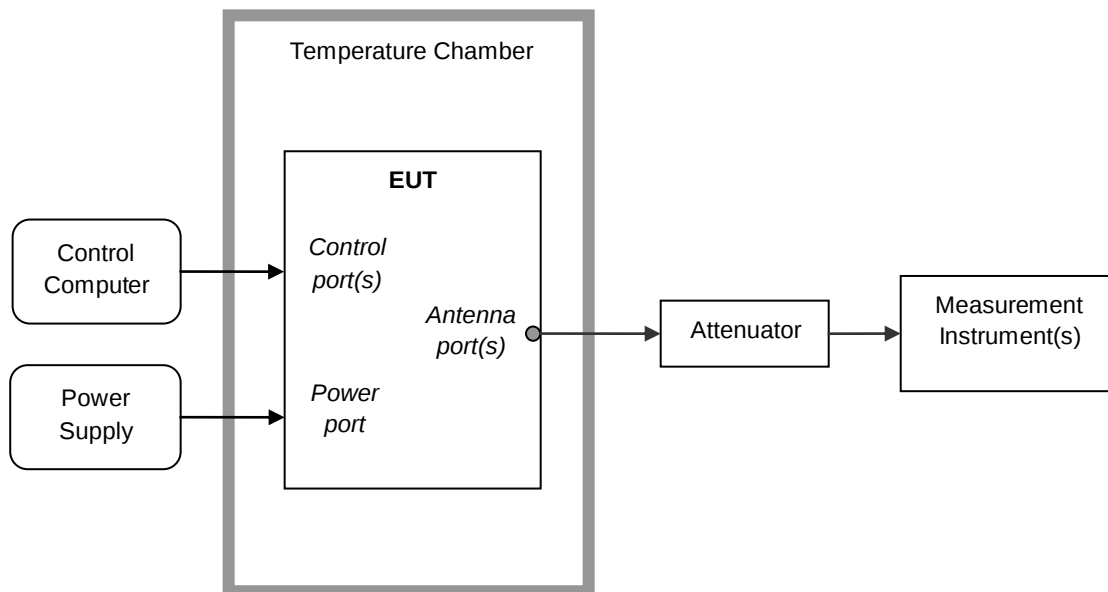
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate (See clause 1.3)	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.3 Test Setups

4.3.1 Test Setup 1



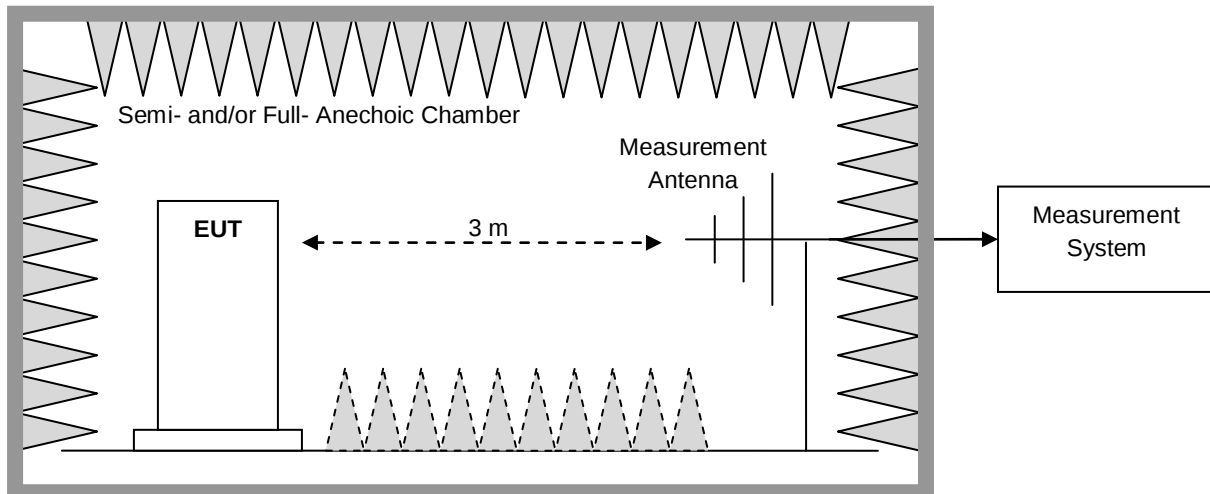
4.3.2 Test Setup 2



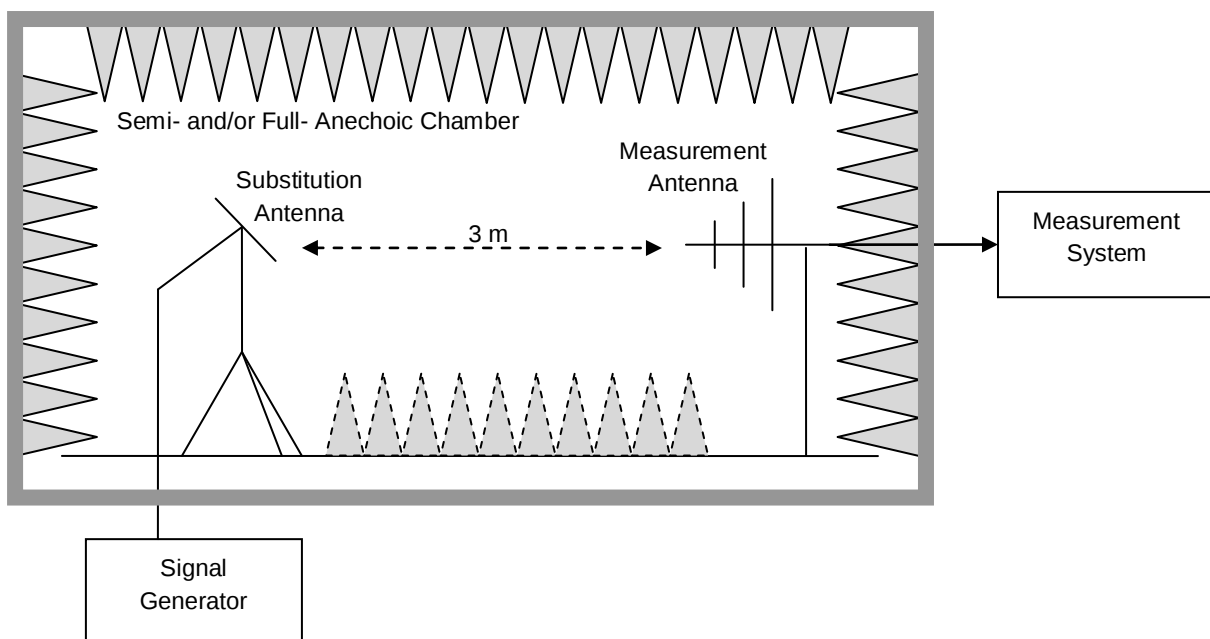
4.3.3 Test Setup 3

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

4.3.3.1 Step 1: Pre-test



4.3.3.2 Step 2: Substitution method to verify the maximum ERP



4.4 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, 3L_5M_B, 3L_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_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,
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	--
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 / Emission Mask		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,
Spurious Emission at Antenna Terminals		Test Type	☒ Conducted ☐ Radiated (go to test case of Field Strength of Spurious Radiation / Radiated Spurious Emissions) NOTE: According to FCC §2.1053 and KDB 971168 §6.1&§5.8



Test Case		Test Conditions	
			in the cases of the EUTs that are portable or hand-held devices utilizing one or more integral transmit antennas, measurements cannot be performed in a conducted measurement configuration, it becomes necessary to perform the described compliance measurements in a radiated test arrangement.
		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, 3L_5M_B, 3L_5M_T,
Field Strength of Spurious Radiation / Radiated Spurious Emissions		Test Type	☐ Field Strength of Spurious Radiation ☒ Radiated Spurious Emissions NOTE: According to FCC §2.1053 and KDB 971168, when antenna-port conducted measurements (i.e. Spurious Emission at Antenna Terminals measurement) are performed to demonstrate compliance to the applicable unwanted emission limits, a separate radiated measurement (i.e. this Field Strength of Spurious Radiation measurement) is required to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation (, and with the transmit antenna port(s) terminated). Note that when radiated measurements for spurious emissions at antenna terminals are performed to demonstrate compliance to the unwanted emission limits (e.g., an EUT with integral transmit antenna), the field strength of spurious radiation measurement is not required.
		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 Setup	Test Seup 2



Test Case		Test Conditions	
		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.	1L_5M_B, 1L_5M_T, 1L_10M_B, 1L_10M_T, 1L_15M_B, 1L_15M_T, 1L_20M_B, 1L_20M_T,
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	--



5 Main Test Instruments

NOTE 1: NCR = No calibration required, VOU = Verified on use.

NOTE 2: 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	2015-05-14
Spectrum Analyzer	Agilent	N9020A	MY51240619	2015-02-18
Climate Chamber	ESPEC	EW0470S	12113066	2015-10-20
Test Setup 3				
EMI test receiver	R&S	ESU40	100303/040	2016-01-12
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 / Radiated Spurious Emissions	Power [dBm] / Field Strength [dB μ V/m]	For 3 m Chamber: U = 4.15 dB (30 MHz-1 GHz) U = 3.64 dB (1 GHz-18 GHz) U = 3.26 dB (18 GHz-26.5 GHz) U = 3.83 dB (26.5 GHz-40 GHz) For 10 m Chamber: U = 4.8 dB (30MHz to 1GHz) U = 4.3 dB (1 GHz to 26.5GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21 ppm

END