



RF Test Report

Product Name: Battery Intelligent Management System

Product Model: eBox-G

Report Number: SYBH(R)01075232EB-1

FCC ID: QISEBOXG

IC: 6369A-EBOXG

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 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, 6369A-2 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-3892, G-415, C-4361, and T-1348, and the accreditation numbers of test site No.2 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: Battery Intelligent Management System
Product Model: eBox-G

Date of Receipt Sample: 2013-09-13
Start Date of Test: 2013-10-29
End Date of Test: 2013-10-29

Test Result: Pass

Approved by Senior	2013-11-22	Zhang Xinghai	<i>Zhang Xing hai</i>
Engineer:	Date	Name	Signature

Prepared by:	2013-11-22	Zhang Weimin	<i>Zhang Weimin</i>
	Date	Name	Signature

Modification Record

No.	Last Report No.	Modification Description
1	SYBHZ(R)E013052010EB-2, SYBHZ(R)E013052010EB-3 (FCC ID: QISMG323)	The present product/model (#New) utilizes the same or similar radio design, shielding, interface, physical layout and so on as another product/model (#Ref). The differences and modifications between these two products/models are declared by the applicant and showed as below: ● The #Ref as wireless module is integrated into the #New to provide access services based on GSM/GPRS technologies. The #New has no change to the #Ref. ● Two types of antenna are used by #New (see clause 3.3 for detailed). ● All others are identical and not changed. Considering the differences and modifications as mentioned above, the re-assessments and/or additional measurements should be required, as follows, to demonstrate that the #New also comply with the relevant standard(s): ● The measurement of “Transmitter Output Power” is added. ● The measurement of “Field Strength of Spurious Radiation” is added. ● All other test results for the #New are directly derived from the test results for the #Ref. In addition, for the IC certification, all test results for FCC certification (containing both original tests and added tests) can be directly used to demonstrate the compliance.

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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2 (10-1-12 Edition)
47 CFR FCC Part 22 (10-1-12 Edition)
47 CFR FCC Part 24 (10-1-12 Edition)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02r01

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 Cellular Band (824-849 MHz paired with 869-894 MHz)

2.1.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Transmitter Output Power	§2.1046, §22.913	RSS-Gen,§4.8; RSS-132,§5.4	FCC	Base Station	ERP ≤ 500 W.	Annex 1A	Pass	TL1
				Subscriber Station	ERP ≤ 7 W.			
			IC	Base Station	● Avg EIRP ≤ 820 W. ● PAPR ≤ 13 dB.			
				Subscriber Station	● Avg EIRP ≤ 11.5 W. ● PAPR ≤ 13 dB.			
Bandwidth	§2.1049, §22.917	RSS-Gen,§4.6	FCC	● OBW: No limit. ● EBW (-26 dBc): No limit.		Annex 1B	Pass	TL1
			IC	OBW: No limit.				
Band Edges Compliance	§2.1051, §22.917	RSS-Gen,§4.9; RSS-132,§5.5	FCC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -26 dBc EBW)		Annex 1C	Pass	TL1
			IC	≤ -13 dBm/1%*OBW, in 1 MHz bands immediately outside and adjacent to the frequency block.				
Spurious Emission at Antenna Terminals	§2.1051, §22.917	RSS-Gen,§4.9; RSS-132,§5.5	≤ -13 dBm/100 kHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.			Annex 1D	Pass	TL1
Field Strength of Spurious Radiation	§2.1053, §22.917	RSS-Gen,§4.9; RSS-132,§5.5	≤ -13 dBm/100 kHz.			Annex 1E	Pass	TL1
Frequency Stability	§2.1055,	RSS-Gen,§4.7;	Base Station	≤ ±1.5 ppm.		Annex 1F	Pass	TL1



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
	§22.355	RSS-132,§5.3	Subscriber Station $\leq \pm 2.5$ ppm.			
Receiver Spurious Emissions (Note 1, 2)	---	RSS-Gen,§4.10; RSS-Gen,§6; RSS-132,§5.6	● 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 3rd harmonics.	Annex 1G	---	---
Photos of Test Setups	---	---	---	Annex 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: 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.						

2.1.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§22.905	RSS-132,§5.1	824-849 MHz paired with 869-894 MHz.	See technical specification description.	Comply
Modulation Characteristics	§2.1047	RSS-132,§5.2	Digital modulation.	See technical specification description.	Comply



2.2 PCS Band (1850-1915 MHz paired with 1930-1995 MHz)

2.2.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Transmitter Output Power	§2.1046, §24.232	RSS-Gen,§4.8; RSS-133,§6.4; RSS-133,§4.1	FCC	Base Station	- Avg EIRP Power ≤ 1640 W (for EBW ≤ 1 MHz). - Avg EIRP PD ≤ 1640 W/MHz (for EBW > 1 MHz). - PAPR ≤ 13 dB.	Annex 2A	Pass	TL1
				Subscriber Station	- Avg EIRP ≤ 2 W. - PAPR ≤ 13 dB.			
			IC	Base Station	- Avg EIRP Power ≤ 1640 W (for ChBW ≤ 1 MHz). - Avg EIRP PD ≤ 1640 W/MHz (for ChBW > 1 MHz). - Pcond ≤ 100 W. - PAPR ≤ 13 dB.			
				Subscriber Station	- Avg EIRP ≤ 2 W. - PAPR ≤ 13 dB.			
Bandwidth	§2.1049, §24.238	RSS-Gen,§4.6; RSS-133,§2.3	FCC	- OBW: No limit. - EBW (-26 dBc): No limit.		Annex 2B	Pass	TL1
			IC	- OBW: No limit, may in lieu of EBW (-20 dBc). - EBW (-20 dBc): No limit.				
Band Edges Compliance	§2.1051, §24.238	RSS-Gen,§4.9; RSS-133,§6.5	FCC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -26 dBc EBW)		Annex 2C	Pass	TL1
			IC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.				



Test Item	FCC Rule	IC Rule	Requirements				Test Result	Verdict	Test Location	
				(EBW is -20 dBc EBW, or OBW)						
Spurious Emission at Antenna Terminals	§2.1051, §24.238	RSS-Gen,§4.9; RSS-133,§6.5	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.				Annex 2D	Pass	TL1	
Field Strength of Spurious Radiation	§2.1053, §24.238	RSS-Gen,§4.9; RSS-133,§6.5	≤ -13 dBm/1 MHz.				Annex 2E	Pass	TL1	
Frequency Stability	§2.1055, §24.235	RSS-Gen,§4.7; RSS-133,§6.3	FCC	Within authorized frequency block.			Annex 2F	Pass	TL1	
			IC	Base Station	≤ ±1.0 ppm.					
				Subscriber Station	≤ ±2.5 ppm.					
Receiver Spurious Emissions	---	IC NOTICE 2012-DRS0126	---				Annex 2G	---	---	
Photos of Test Setups	---	---	---				Annex 2H	---	---	

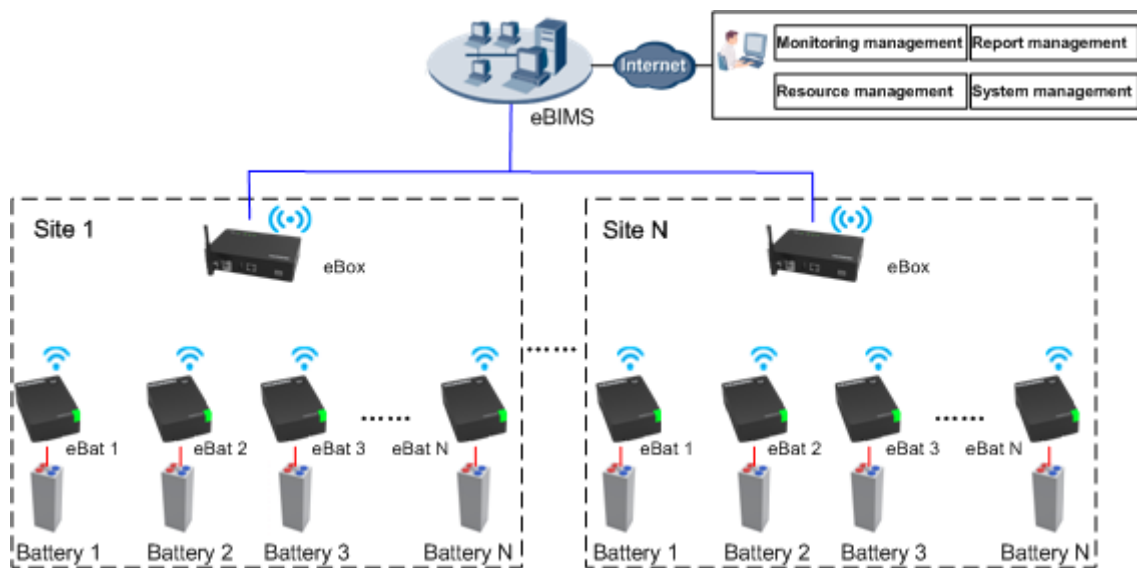
2.2.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	\$24.229	RSS-133,\$6.1	1850-1915 MHz paired with 1930-1995 MHz.	See technical specification description.	Comply
Modulation Characteristics	\$2.1047	RSS-133,\$6.2	Digital modulation.	See technical specification description.	Comply

3 Description of the Equipment under Test (EUT)

3.1 General Description

Batteries, an indispensable part of sites, are the O&M focus. The correctness of battery performance management, timeliness of battery fault rectification, and fix rate of network problems caused by battery faults have a large impact on network status. Therefore, low-cost automatic detection and analysis for batteries become key requirements of the management service center. The Huawei eBIMS fully meets battery maintenance requirements by remotely monitoring real-time battery status, detecting, predicting, and reporting battery faults, and identifying batteries reaching their replacement thresholds and guiding the battery replacement.



The eBIMS uses modular deployment. The typical configuration includes the software system, a set of matched hardware, multiple eBats, and one eBox. The number of eBats is determined by the eBox management capacity and the battery quantity. One eBat is used for each battery. There are 2 V and 12 V batteries

eBIMS product eBat and Box contain two kinds respectively:

- eBat-2: 2V Battery Monitor Unit eBat.
- eBat-12: 12V Battery Monitor Unit eBat.
- eBox-F: FE Battery Monitor Management Unit eBox.
- eBox-G: GPRS Battery Monitor Management Unit eBox.

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
JD02BMUA	Battery Monitor Unit
JD02BMUB	Battery Monitor Unit
JD02BMMAA	Battery Monitor Management Unit (FE)
JD02BMMAAB	Battery Monitor Management Unit (GPRS)

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Mechanical parts	EBAT	basismold	eBat Housing
Mechanical parts	EBOX	CLIP	eBox Housing

3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio ☒ GSM Access Technology (Single-RAT): ☐ UMTS ☐ LTE ☐ CDMA ☐ WiMAX Multi-Standard Radio (MSR): ☐ GSM & UMTS ☐ GSM & LTE ☐ GSM & UMTS & LTE ☐ WiMAX & LTE ☐ CDMA & LTE
Equipment Type	#1 ☐ Base Station ☒ Subscriber Station #2 ☒ Fixed Station ☐ Mobile Station ☐ Portable Station #3 ☒ Indoor Station ☐ Outdoor Station
Supported Frequency Range (Cellular Band)	Transmission (TX): 824 to 849 MHz Receiving (RX): 869 to 894 MHz
Supported Frequency Range (PCS Band)	Transmission (TX): 1850 to 1910 MHz Receiving (RX): 1930 to 1990 MHz
TX and RX Antenna Ports	TX & RX port: 1 TX-only port: 0 RX-only port: 0
Power Supply	Power Supply Type: ☐ External AC mains, ☐ External DC mains, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE) ☒ Others: External Battery Nominal Voltage, 48 VDC Input to EUT: Voltage Range, 36 to 72 VDC Input to EUT:
Antenna Assemblies (Type 1: Ant_#1)	Antenna Type: ☒ External ☐ Integrated Smart Antenna: ☐ MIMO ☒ Non MIMO Antenna Gain: 1.0 dBi (per antenna port, 824-960MHz) 2.5 dBi (per antenna port, 1710-2170MHz)



Characteristics	Description
	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.
Antenna Assemblies (Type 2: Ant_#2)	Antenna Type: ☒ External ☐ Integrated Smart Antenna: ☐ MIMO ☒ Non MIMO Antenna Gain: 1.0 dBi (per antenna port, 824-960MHz) 2.5 dBi (per antenna port, 1710-2170MHz) 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
TM 1	GSM/GPRS, Packet Data, Test Mode A, Max Power Setting.

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

4.2.2.1 Cellular Band

EUT Conf.	RF Ch.	TX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
TM1-B	B	824.2	0.2	33	TM 1
TM1-M	M	836.6	0.2	33	TM 1
TM1-T	T	848.8	0.2	33	TM 1

4.2.2.2 PCS Band

EUT Conf.	RF Ch.	TX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
TM1-B	B	1850.2	0.2	30	TM 1
TM1-M	M	1880.0	0.2	30	TM 1
TM1-T	T	1909.8	0.2	30	TM 1

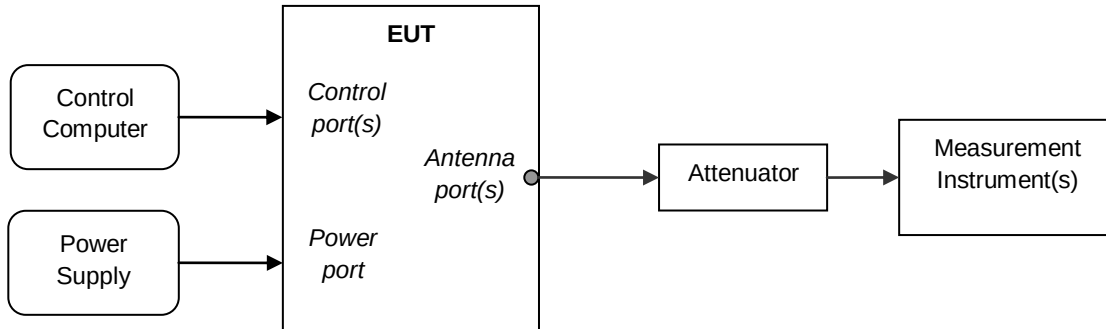


4.3 Test Environments

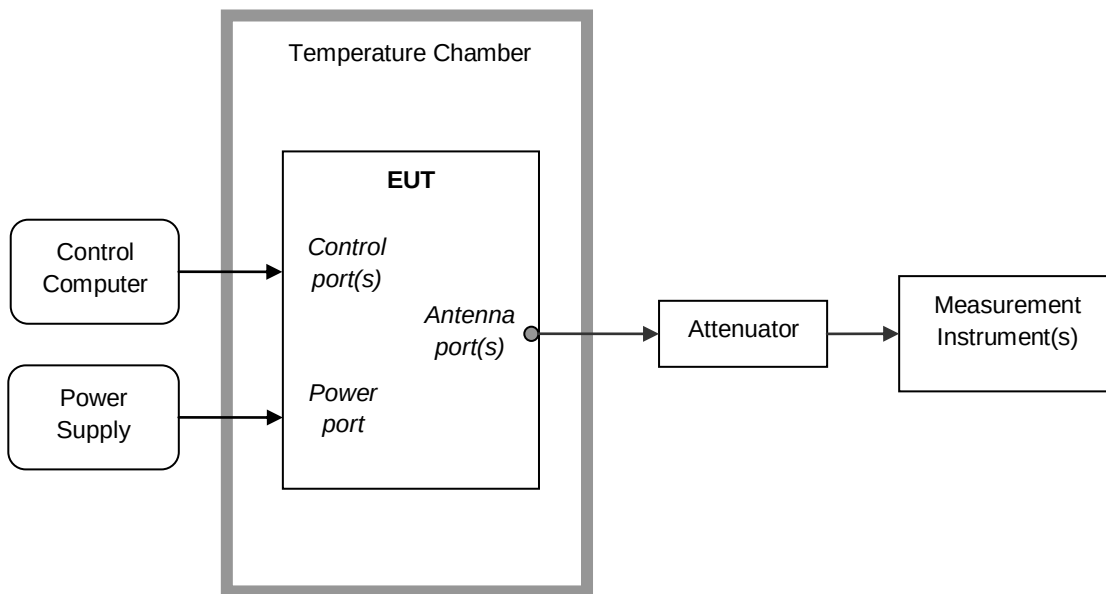
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	48 VDC	---

4.4 Test Setups

4.4.1 Test Setup 1



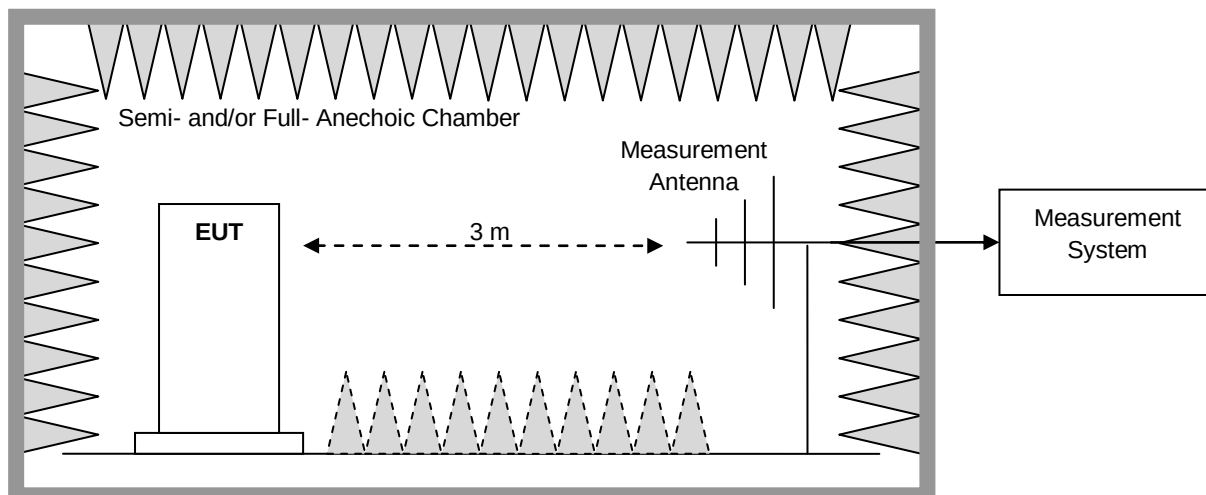
4.4.2 Test Setup 2



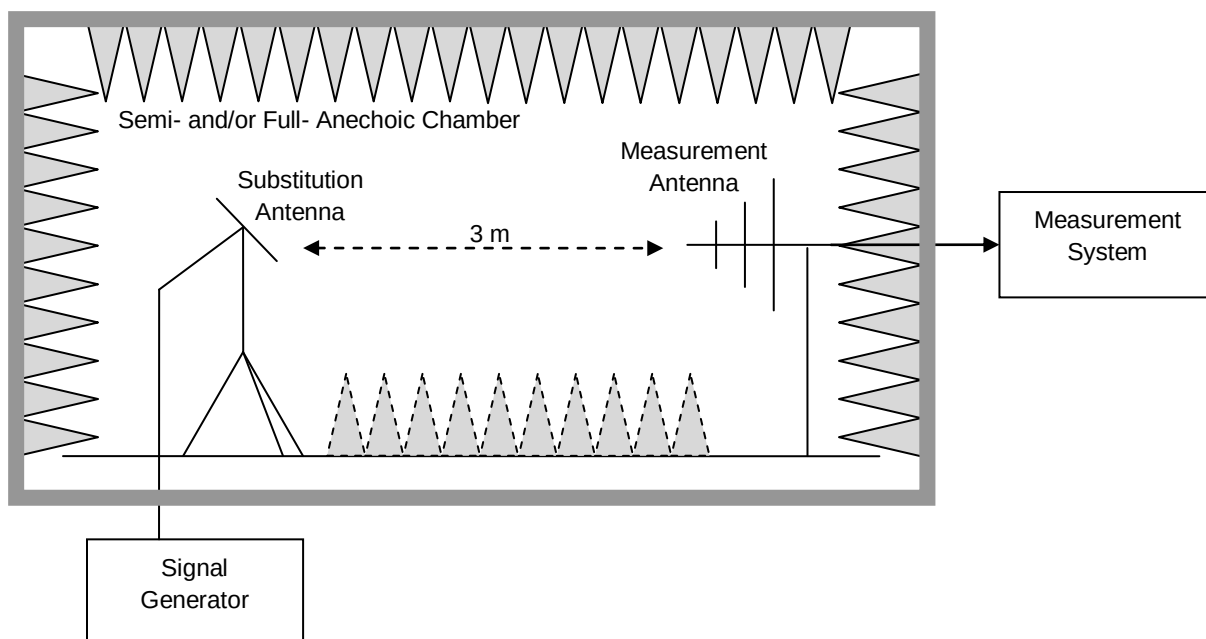
4.4.3 Test Setup 3

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 3
		EUT Conf.	TM1-B, TM1-M, TM1-T.
	Power Spectral Density (if required)	Test Env.	---
		Test Setup	---
		EUT Conf.	---
	Peak-to-Average Ratio (if required)	Test Env.	---
		Test Setup	---
		EUT Conf.	---
Bandwidth	Occupied Bandwidth	Test Env.	---
		Test Setup	---
		EUT Conf.	---
	Emission Bandwidth (if required)	Test Env.	---
		Test Setup	---
		EUT Conf.	---
Band Edges Compliance		Test Env.	---
		Test Setup	---
		EUT Conf.	---
Spurious Emission at Antenna Terminals		Test Env.	---
		Test Setup	---
		EUT Conf.	---
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		EUT Conf.	TM1-M.
Frequency Stability		Test Env.	---
		Test Setup	---
		EUT Conf.	---
Receiver Spurious Emissions		Test Env.	---
		Test Setup	---
		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 3				
EMI Test Receiver	R&S	FSV40	101022	2014-04-14
Bi-log Antenna	TESEQ	CBL6112B	2747	2015-02-01 (2y)
Horn Antenna	ETS-LINDGREN	3117	00062549	2015-03-22 (2y)

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