



# RF Test Report

**Product Name: Micro BTS**

**Product Model: BTS3902E WCDMA**

**Report Number: SYBH(R)01250692EB-1**

**FCC ID: QISBTS3902E-U850**

**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.
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:** Micro BTS  
**Product Model:** BTS3902E WCDMA

**Date of Receipt Sample:** 2014-02-17  
**Start Date of Test:** 2014-02-20  
**End Date of Test:** 2014-03-07

**Test Result:** Pass

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

<b>Prepared by:</b>	2014-03-11	Huang Yuanqiu	<i>Huang yuanqiu</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 (10-1-12 Edition)  
47 CFR FCC Part 22 (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	Requirements		Test Result	Verdict	Test Location	
Transmitter Output Power	§2.1046, §22.913	FCC	Base Station	ERP Power ≤ 500 W.	Annex A	Pass	TL1
			Mobile Station	ERP Power ≤ 7 W.			
Bandwidth	§2.1049, §22.917	FCC	<ul style="list-style-type: none"> <li>OBW: No limit.</li> <li>EBW (-26 dBc): No limit.</li> </ul>		Annex B	Pass	TL1
Band Edges Compliance	§2.1051, §22.917	FCC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -26 dBc EBW)		Annex C	Pass	TL1
Spurious Emission at Antenna Terminals	§2.1051, §22.917			≤ -13 dBm/100 kHz, from 9 kHz to 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges/sub-bands.	Annex D	Pass	TL1
Field Strength of Spurious Radiation	§2.1053, §22.917			≤ -13 dBm/100 kHz.	Annex E	Pass	TL1
Frequency Stability	§2.1055, §22.355	FCC	Base Station	<ul style="list-style-type: none"> <li>Test method: <math>(F_c\_meas - F_c\_rated) / F_c\_rated \leq \pm 1.5</math> ppm.</li> <li>Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV.</li> </ul>	Annex F	Pass	TL1
			Mobile Station	<ul style="list-style-type: none"> <li>Test method: <math>(F_c\_meas - F_c\_rated) / F_c\_rated \leq \pm 2.5</math> ppm.</li> <li>Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV.</li> </ul>			



Test Item	FCC Rule	Requirements	Test Result	Verdict	Test Location
Receiver Spurious Emissions (Note 1, 2)	---	<ul style="list-style-type: none"><li>● Radiated limit: RSS-Gen, §6.1 field strength limit.</li><li>● Conducted limit: <math>\leq -57</math> dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and <math>\leq -53</math> dBm/1 MHz (AV), from 1 GHz to 3rd harmonics.</li></ul>	Annex G	Pass,	TL1,
Photos of Test Setups	---	---	Annex H	---	---

### 2.1.2 Non-measurement Technical Requirements

Description	FCC Rule	Requirements	Test Result	Verdict
Modulation Characteristics	§2.1047	Digital modulation.	See technical specification description.	Comply

### 3 Description of the Equipment under Test (EUT)

#### 3.1 General Description

As shown in Figure 1, BTS3902E WCDMA is an integrated base station with the following main units: transmission interface unit, main processing unit, baseband processing unit, and RF unit.

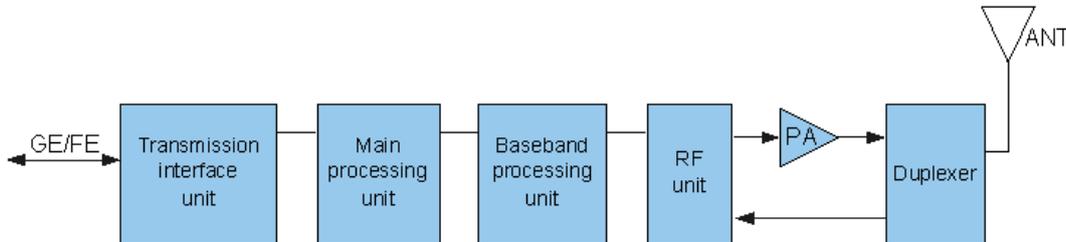


Figure 1 BTS3902E WCDMA Structure

The function of each unit is as follows:

- Transmission interface unit

Provide ports for communication with the Evolved Packet Core (EPC) and the operation and maintenance (O&M) channels to LMT or M2000.

- Main processing unit

Manages the entire BTS3902E WCDMA in a centralized manner in terms of O&M and signaling processing. Also, provides the system clock.

- Baseband processing unit

Schedules and processes the uplink and downlink user-plane data on the lub interface.

- RF unit

Modulates, demodulates, processes, and combines and divides baseband signals and RF signals.

- Power Amplifier (PA)

Amplifies low-power 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
WD6BWMXC50	VerB	Transceiver Board
WD61WMBUB	VerD	Baseband Unit
WD5AWMAC50	VerA	Power Amplify



### 3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
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### 3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio <input type="checkbox"/> GSM Access Technology (Single-RAT): <input checked="" type="checkbox"/> UMTS <input type="checkbox"/> LTE <input type="checkbox"/> CDMA <input type="checkbox"/> WiMAX Multi-Standard Radio (MSR): <input type="checkbox"/> GSM & UMTS <input type="checkbox"/> GSM & LTE <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)
Supported Frequency Range	Transmission (TX): 869 to 894 MHz Receiving (RX): 824 to 849 MHz
TX and RX Antenna Ports	TX & RX port: 1 TX-only port: 0 RX-only port: 1
Multiple Carrier Supported	2
Maximum RF Bandwidth	25 MHz
TX Output Power	10 W
Supported Channel Bandwidth	GSM system: <input type="checkbox"/> 200 kHz UMTS system: <input checked="" type="checkbox"/> 5 MHz LTE system: <input type="checkbox"/> 1.4 MHz, <input type="checkbox"/> 3 MHz, <input type="checkbox"/> 5 MHz, <input 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: -- UMTS system: Base-band: QPSK, 16QAM, 64QAM Carrier: CDMA LTE system: -- 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: 4M15F9W LTE system: -- CDMA system: -- WiMAX system: --



Characteristics	Description
Power Supply	Power Supply Type: <input checked="" type="checkbox"/> External AC mains, <input type="checkbox"/> External DC mains, <input type="checkbox"/> AC/DC Adapter, <input type="checkbox"/> Powered over Ethernet (PoE) Nominal Voltage, Input to EUT: 120 VAC, 60 Hz
Antenna Assemblies	Antenna Type: <input checked="" type="checkbox"/> External <input type="checkbox"/> Integrated Smart Antenna: <input type="checkbox"/> MIMO <input checked="" type="checkbox"/> Non MIMO Antenna Gain: 5 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
UMTS/TM1	UMTS system, 3GPP TS 25.141 clause 6.1.1, Test Model 1, QPSK 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]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1U_TM1_B	B	1*U(10W) @TRXA	871.4	826.4	5,	40	UMTS/TM1
1U_TM1_M	M	1*U(10W) @TRXA	881.4	856.4	5	40	UMTS/TM1
1U_TM1_T	T	1*U(10W) @TRXA	891.6	866.6	5	40	UMTS/TM1
2U_TM1_B	B	2*U(5W) @TRXA	871.4, 876.4	826.4, 831.4	5, 5	37, 37	UMTS/TM1
2U_TM1_M	M	2*U(5W) @TRXA	878.8, 883.8	853.8, 858.8	5, 5	37, 37	UMTS/TM1
2U_TM1_T	T	2*U(5W) @TRXA	886.6, 891.6	861.6, 866.6	5, 5	37, 37	UMTS/TM1

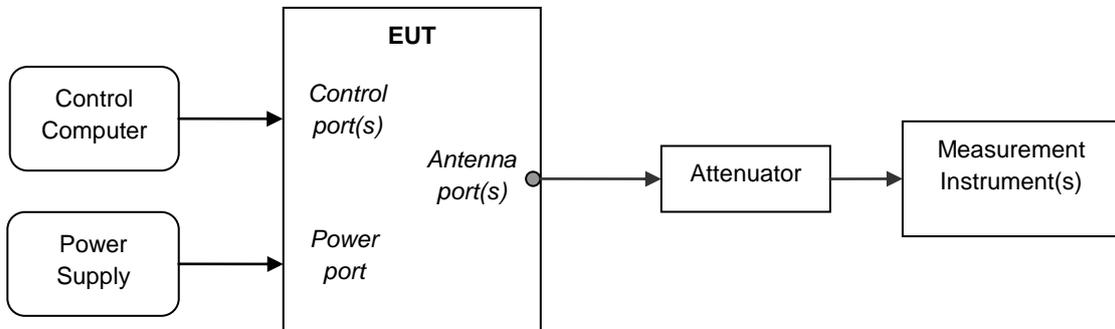


### 4.3 Test Environments

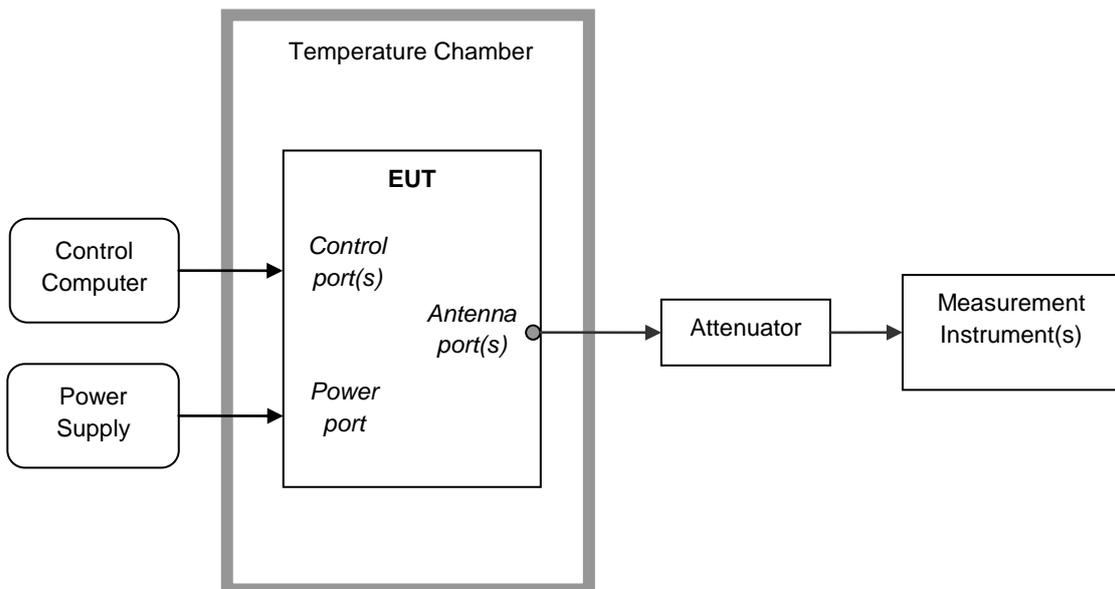
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	120 VAC,60 Hz	---

## 4.4 Test Setups

### 4.4.1 Test Setup 1



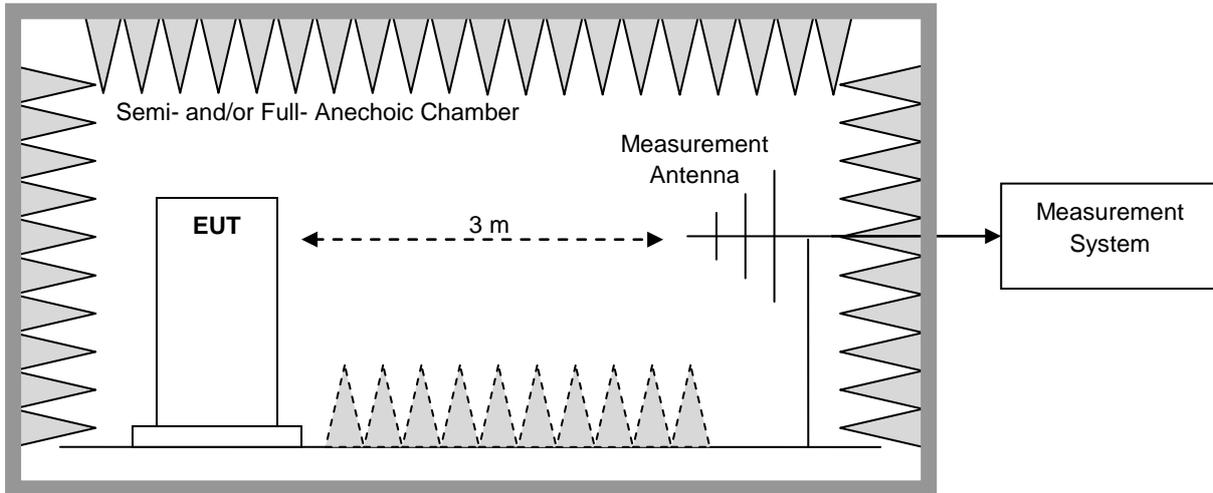
### 4.4.2 Test Setup 2



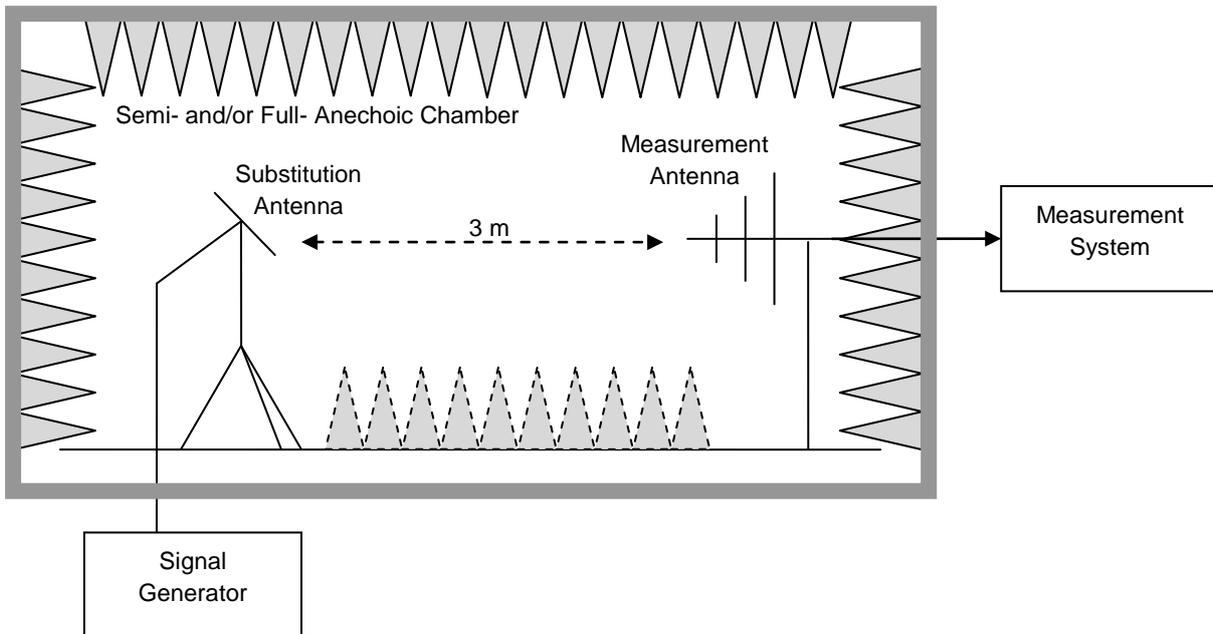
### 4.4.3 Test Setup 3

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.	1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 2U_TM1_B, 2U_TM1_M, 2U_TM1_T
	Peak-to-Average Ratio	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1U_TM1_B, 1U_TM1_M, 1U_TM1_T
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1U_TM1_B, 1U_TM1_M, 1U_TM1_T
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 2U_TM1_B, 2U_TM1_M, 2U_TM1_T
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1U_TM1_B, 1U_TM1_T, 2U_TM1_B, 2U_TM1_T
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		EUT Conf.	1U_TM1_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
		EUT Conf.	1U_TM1_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.	1U_TM1_M
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1U_TM1_B, 1U_TM1_M, 1U_TM1_T



## 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	E4440A	MY49420179	2014-08-30
Power Meter	Agilent	E4417A	GB41292113	2014-05-12
Temperature Chamber	ESPEC	EW0470S	12113066	2014-12-25
Test Setup 3				
EMI Test receiver	R&S	ESMI	829179/008	2014-10-14
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