

# RF Test Report

**Product Name: Remote Radio Unit**

**Product Model: RU3260**

**Report Number: SYBH(R)01486578EB-1**

**FCC ID: QISRU3260**

**IC ID: 6369A-RU3260**

**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.
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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:** RU3260

**Date of Receipt Sample:** 2013-07-05  
**Start Date of Test:** 2013-07-06  
**End Date of Test:** 2014-09-05

**Test Result:** Pass

**Approved by Senior  
Engineer:**

2014-09-11

Date

Zhang Xinghai

Name

*Zhang Xing hai*

Signature

**Prepared by:**

2014-09-11

Date

Li Guo

Name

*Li Guo*

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)<br>47 CFR FCC Part 27 (10-1-13 Edition)<br>IC RSS-Gen (Issue 3, December 2010)<br>IC RSS-199 (Issue 1, January 2010)                                                           |
| Test Method:   | FCC KDB 971168 D01 Power Meas License Digital Systems v02r01<br>FCC KDB 662911 D01 Multiple Transmitter Output v01r02 (if applicable)<br>FCC KDB 662911 D02 MIMO with Cross-Polarized Antennas v01 (if applicable) |

### 1.2 Test Location

|                  |                                                                                                                                |
|------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Test Location 1: | Reliability Laboratory of Huawei Technologies Co., Ltd.                                                                        |
| Address:         | Administration Building, Headquarters of Huawei Technologies Co., Ltd.,<br>Bantian, Longgang District, Shenzhen, 518129, P.R.C |

### 1.3 Test Environment Condition

|                            |                |
|----------------------------|----------------|
| Ambient Temperature:       | 19.5 to 25 °C  |
| Ambient Relative Humidity: | 45 to 55 %     |
| Atmospheric Pressure:      | Not applicable |

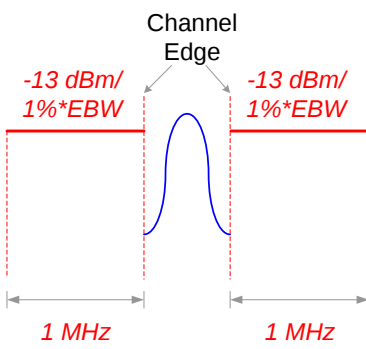
## 2 Test Summary

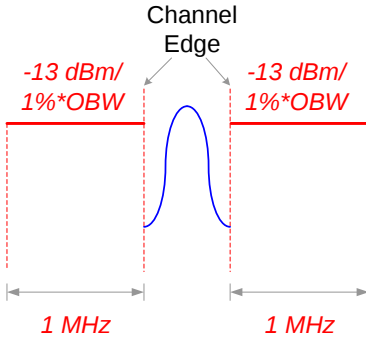
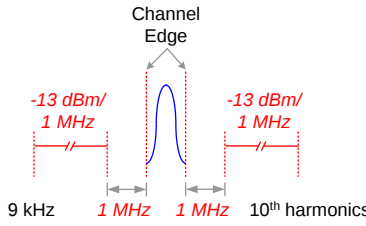
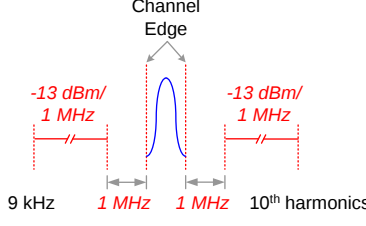
### 2.1 BRS&EBS Band (2620-2690 MHz with 2500-2570 MHz)

#### 2.1.1 Non-measurement Technical Requirements

| Description                                                | FCC Rule No. | IC Rule No.   | Requirements        | Test Result                              | Verdict (NOTE) |
|------------------------------------------------------------|--------------|---------------|---------------------|------------------------------------------|----------------|
| Modulation Characteristics                                 | §2.1047      | RSS-199, §4.1 | Digital modulation. | See technical specification description. | Comply         |
| Channel Bandwidth                                          | ---          | RSS-199, §4.2 | ChBW $\geq 1$ MHz.  | See technical specification description. | Comply         |
| NOTE: For the verdict, the "N/A" denotes "not applicable". |              |               |                     |                                          |                |

#### 2.1.2 Base Station

| Test Item                          | FCC Rule No.       | IC Rule No.                                 | Requirements                                                                                                | Test Result | Verdict (NOTE 2)    |
|------------------------------------|--------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------|---------------------|
| Effective Isotropic Radiated Power | §2.1046, §27.50(h) | RSS-Gen, §4.8; RSS-199, §4.4                | FCC: EIRP $\leq 33$ dBW + 10 lg(X/Y) dBW + 10 lg(360/beamwidth) dBW.<br>IC: EIRP $\leq 33.3$ W/100 kHz.     | NA          | No integral antenna |
| RF Power Output-Conduct            | §2.1046, §27.50(h) | RSS-Gen, §4.8; RSS-199, §4.4                | FCC: $\leq 33$ dBW + 10 lg(X/Y) dBW.<br>IC: $\leq 33.3$ W/100 kHz.                                          | Appendix A  | Pass                |
| Bandwidth                          | §2.1049            | RSS-Gen, §4.6                               | OBW: No limit.<br>EBW: No limit.                                                                            | Appendix B  | Pass                |
| Band Edges Compliance(NOTE 3)      | §2.1051, §27.53(m) | RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2 | <p>FCC:</p>  <p>IC:</p> | Appendix C  | Pass                |

| Test Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | FCC Rule No.       | IC Rule No.                                 | Requirements                                                                                                                                                                                                | Test Result | Verdict (NOTE 2) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                                             |                                                                                                                           |             |                  |
| Spurious Emission at Antenna Terminals(NOTE 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | §2.1051, §27.53(m) | RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2 |                                                                                                                           | Appendix D  | Pass             |
| Field Strength of Spurious Radiation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | §2.1053, §27.53(m) | RSS-Gen, §4.9; RSS-199, §4.5                |                                                                                                                          | Appendix E  | Pass             |
| Frequency Stability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | §2.1055, §27.54    | RSS-Gen, §4.7; RSS-199, §4.3                | Within authorized bands of operation/frequency block.                                                                                                                                                       | Appendix F  | Pass             |
| Receiver Spurious Emissions (NOTE 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ---                | RSS-Gen, §4.10; RSS-Gen, §6; RSS-199, §4.6  | Radiated limit: RSS-Gen, §6.1 field strength limit.<br>Conducted limit: $\leq -57$ dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and $\leq -53$ dBm/1 MHz (AV), from 1 GHz to 3 <sup>rd</sup> harmonics. | Appendix G  | N/A              |
| <p>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.</p> <p>NOTE 2: For the verdict, the "N/A" denotes "not applicable". According to the RSS- GEN, the receiver is not classified Category I Equipment Receivers.</p> <p>NOTE 3&amp;NOTE 4: For the EUT has two TRX ports, which supports MIMO, so the total limit is -13dBm and the limit for each port is <math>-13\text{dBm}-10\lg 2=-16\text{dBm}</math>;</p> |                    |                                             |                                                                                                                                                                                                             |             |                  |

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

#### 3.1 General Description

The RU3260 is the outdoor remote radio unit which is powered by a power cabinet. It is the radio frequency (RF) module of the distributed eNodeB and is installed close to the antenna.

#### 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       |
| RU3260     | Remote Radio Unit |

##### 3.2.2 Sub-Assembly

| Sub-Assembly      |       |              |                          |
|-------------------|-------|--------------|--------------------------|
| Sub-Assembly Name | Model | Manufacturer | Description              |
| LBBP              | --    | Huawei       | LTE baseband Unit        |
| LMPT              | --    | Huawei       | LTE Main Processing Unit |



### 3.3 Technical Specification

| Characteristics                                                                                                                                                                 | Description                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio System Type                                                                                                                                                               | Single Radio Access Technology (Single-RAT):                                                                                                                                                                                 | <input type="checkbox"/> GSM<br><input type="checkbox"/> UMTS<br><input checked="" type="checkbox"/> LTE<br><input type="checkbox"/> CDMA<br><input type="checkbox"/> WiMAX                                                                        |
|                                                                                                                                                                                 | Multi-Standard Radio (MSR):                                                                                                                                                                                                  | <input type="checkbox"/> GSM & UMTS<br><input type="checkbox"/> GSM & LTE<br><input type="checkbox"/> GSM & UMTS & LTE<br><input type="checkbox"/> WiMAX & LTE<br><input type="checkbox"/> CDMA & LTE                                              |
| Equipment Type                                                                                                                                                                  | <input checked="" type="checkbox"/> Base Station, <input type="checkbox"/> Subscriber Station,<br><input type="checkbox"/> Fixed Station, <input type="checkbox"/> Mobile Station, <input type="checkbox"/> Portable 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                                                                                                                                                      | 2                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Maximum RF Bandwidth                                                                                                                                                            | 50 MHz                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                    |
| TX Output Power                                                                                                                                                                 | Max. 40 W (per antenna port)<br>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,<br><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                                                                                                                                                                 | LTE system:                                                                                                                                                                                                                  | QPSK, 16QAM, 64QAM                                                                                                                                                                                                                                 |
| Designation of Emissions<br>(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:                                                                                                                                                                                                                 | ---                                                                                                                                                                                                                                                |
|                                                                                                                                                                                 | LTE system:                                                                                                                                                                                                                  | 5M00D9W, 10M0D9W, 15M0D9W, 20M0D9W                                                                                                                                                                                                                 |
|                                                                                                                                                                                 | CDMA system:                                                                                                                                                                                                                 | ---                                                                                                                                                                                                                                                |
|                                                                                                                                                                                 | WiMAX system:                                                                                                                                                                                                                | ---                                                                                                                                                                                                                                                |
| Power Supply                                                                                                                                                                    | Power Supply Type:                                                                                                                                                                                                           | <input type="checkbox"/> External AC mains,<br><input checked="" type="checkbox"/> External DC mains,<br><input type="checkbox"/> AC/DC Adapter,<br><input type="checkbox"/> Powered over Ethernet (PoE)                                           |



| Characteristics | Description                       |                |
|-----------------|-----------------------------------|----------------|
|                 | Nominal Voltage,<br>Input to EUT: | -48 VDC        |
|                 | Voltage Range,<br>Input to EUT:   | -36 to -57 VDC |



## 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 |
| LTE/TM2   | LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 2   |
| LTE/TM3.1 | LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 3.1 |

## 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. ANTA, TXA or similar) of the EUT, and</li> <li>- All RX tests are ONLY performed at the main RX antenna port (e.g. ANTA, 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

The RU3260 supports dual single mode and MIMO mode. All modes have been included when several settings were tested to find the worst case setting, and Tx MIMO was used for the Tx measurements.

The settings below were found to be representative for all traffic scenarios to find the worst case setting.

| EUT Conf.            | RF Ch. | TX Freq.<br>[MHz]  | RX Freq.<br>[MHz] | Ch. BW<br>[MHz] | Power Level<br>[dBm] | Test Mode |
|----------------------|--------|--------------------|-------------------|-----------------|----------------------|-----------|
| TX_1L_5M_B_TM1_ANTA  | B      | 2622.5             | --                | 5               | 46                   | LTE/TM1.1 |
| TX_1L_5M_M_TM1_ANTA  | M      | 2655               | --                | 5               | 46                   | LTE/TM1.1 |
| TX_1L_5M_T_TM1_ANTA  | T      | 2687.5             | --                | 5               | 46                   | LTE/TM1.1 |
| TX_1L_10M_B_TM1_ANTA | B      | 2625               | --                | 10              | 46                   | LTE/TM1.1 |
| TX_1L_10M_M_TM1_ANTA | M      | 2655               | --                | 10              | 46                   | LTE/TM1.1 |
| TX_1L_10M_T_TM1_ANTA | T      | 2685               | --                | 10              | 46                   | LTE/TM1.1 |
| TX_1L_15M_B_TM1_ANTA | B      | 2627.5             | --                | 15              | 46                   | LTE/TM1.1 |
| TX_1L_15M_M_TM1_ANTA | M      | 2655               | --                | 15              | 46                   | LTE/TM1.1 |
| TX_1L_15M_T_TM1_ANTA | T      | 2682.5             | --                | 15              | 46                   | LTE/TM1.1 |
| TX_1L_20M_B_TM1_ANTA | B      | 2630               | --                | 20              | 46                   | LTE/TM1.1 |
| TX_1L_20M_M_TM1_ANTA | M      | 2655               | --                | 20              | 46                   | LTE/TM1.1 |
| TX_1L_20M_T_TM1_ANTA | T      | 2670               | --                | 20              | 46                   | LTE/TM1.1 |
| TX_2L_5M_B_TM1_ANTA  | B      | 2622.5,<br>2627.5, | --                | 5, 5            | 43, 43               | LTE/TM1.1 |
| TX_2L_5M_M_TM1_ANTA  | M      | 2652.5, 2657.5     | --                | 5, 5            | 43, 43               | LTE/TM1.1 |
| TX_2L_5M_T_TM1_ANTA  | T      | 2687.5, 2682.5     | --                | 5, 5            | 43, 43               | LTE/TM1.1 |
| TX_2L_20M_B_TM1_ANTA | B      | 2630, 2650         | --                | 20, 20          | 43, 43               | LTE/TM1.1 |
| TX_2L_20M_M_TM1_ANTA | M      | 2645, 2665,        | --                | 20, 20          | 43, 43               | LTE/TM1.1 |
| TX_2L_20M_T_TM1_ANTA | T      | 2670, 2650,        | --                | 20, 20          | 43, 43               | LTE/TM1.1 |
| TX_1L_5M_B_TM1_ANTB  | B      | 2622.5             | --                | 5               | 46                   | LTE/TM1.1 |
| TX_1L_5M_M_TM1_ANTB  | M      | 2655               | --                | 5               | 46                   | LTE/TM1.1 |



| EUT Conf.            | RF Ch. | TX Freq.<br>[MHz]  | RX Freq.<br>[MHz] | Ch. BW<br>[MHz] | Power Level<br>[dBm] | Test Mode |
|----------------------|--------|--------------------|-------------------|-----------------|----------------------|-----------|
| TX_1L_5M_T_TM1_ANTB  | T      | 2687.5             | --                | 5               | 46                   | LTE/TM1.1 |
| TX_1L_10M_B_TM1_ANTB | B      | 2625               | --                | 10              | 46                   | LTE/TM1.1 |
| TX_1L_10M_M_TM1_ANTB | M      | 2655               | --                | 10              | 46                   | LTE/TM1.1 |
| TX_1L_10M_T_TM1_ANTB | T      | 2685               | --                | 10              | 46                   | LTE/TM1.1 |
| TX_1L_15M_B_TM1_ANTB | B      | 2627.5             | --                | 15              | 46                   | LTE/TM1.1 |
| TX_1L_15M_M_TM1_ANTB | M      | 2655               | --                | 15              | 46                   | LTE/TM1.1 |
| TX_1L_15M_T_TM1_ANTB | T      | 2682.5             | --                | 15              | 46                   | LTE/TM1.1 |
| TX_1L_20M_B_TM1_ANTB | B      | 2630               | --                | 20              | 46                   | LTE/TM1.1 |
| TX_1L_20M_M_TM1_ANTB | M      | 2655               | --                | 20              | 46                   | LTE/TM1.1 |
| TX_1L_20M_T_TM1_ANTB | T      | 2670               | --                | 20              | 46                   | LTE/TM1.1 |
| TX_2L_5M_B_TM1_ANTB  | B      | 2622.5,<br>2627.5, | --                | 5, 5            | 43, 43               | LTE/TM1.1 |
| TX_2L_5M_M_TM1_ANTB  | M      | 2652.5, 2657.5     | --                | 5, 5            | 43, 43               | LTE/TM1.1 |
| TX_2L_5M_T_TM1_ANTB  | T      | 2687.5, 2682.5     | --                | 5, 5            | 43, 43               | LTE/TM1.1 |
| TX_2L_20M_B_TM1_ANTB | B      | 2630, 2650         | --                | 20, 20          | 43, 43               | LTE/TM1.1 |
| TX_2L_20M_M_TM1_ANTB | M      | 2645, 2665,        | --                | 20, 20          | 43, 43               | LTE/TM1.1 |
| TX_2L_20M_T_TM1_ANTB | T      | 2670, 2650,        | --                | 20, 20          | 43, 43               | LTE/TM1.1 |
| TX_1L_5M_M_TM2_ANTA  | M      | 2655               | --                | 5               | 46                   | LTE/TM2   |
| TX_1L_5M_M_TM3_ANTA  | M      | 2655               | --                | 5               | 46                   | LTE/TM3.1 |
| TX_1L_5M_M_TM2_ANTB  | M      | 2655               | --                | 5               | 46                   | LTE/TM2   |
| TX_1L_5M_M_TM3_ANTB  | M      | 2655               | --                | 5               | 46                   | LTE/TM3.1 |
| RSE_2L_5M_M_TM1_ANTA | M      | 2642.5, 2687.5     | --                | 5, 5            | 43, 43               | LTE/TM1   |
| RSE_2L_5M_M_TM1_ANTB | M      | 2642.5, 2687.5     | --                | 5, 5            | 43, 43               | LTE/TM1   |

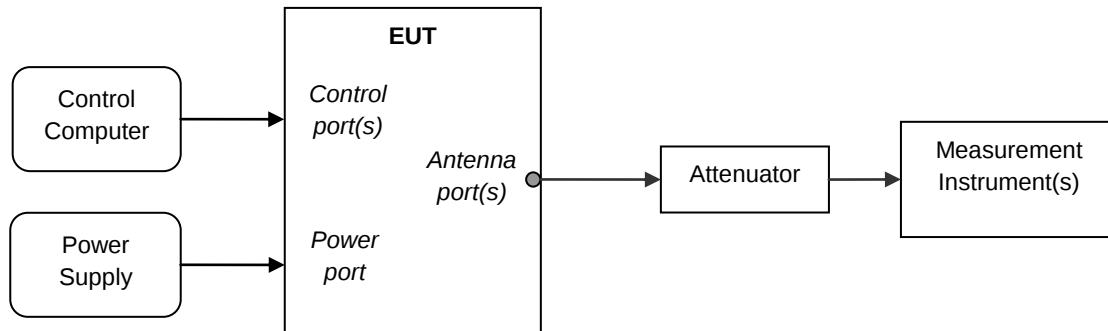


### 4.3 Test Environments

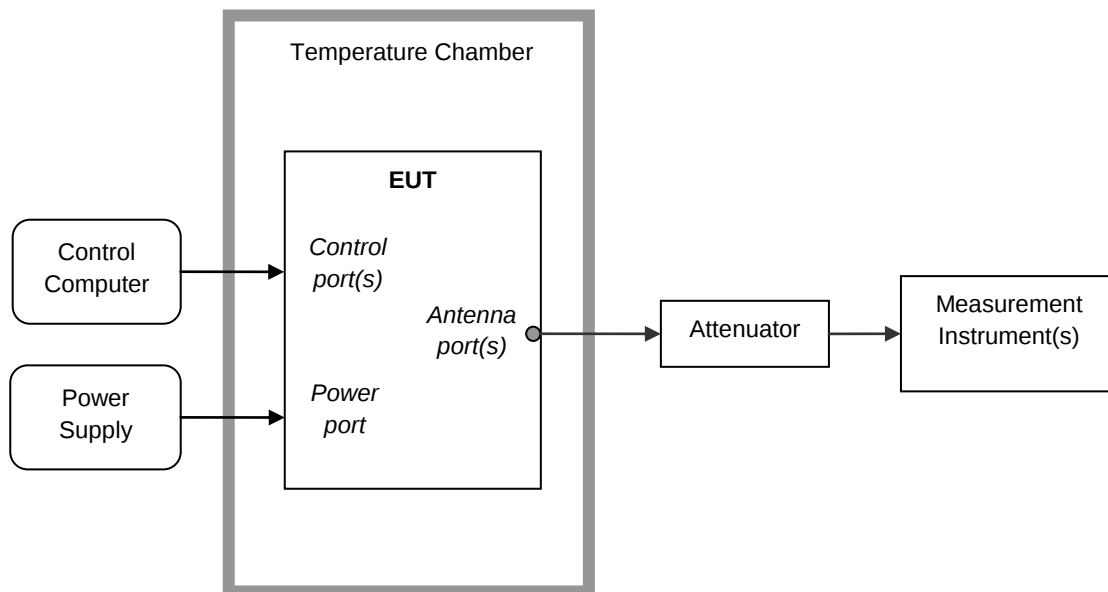
| Environment Parameter | Selected Values During Tests |         |                   |
|-----------------------|------------------------------|---------|-------------------|
|                       | Temperature                  | Voltage | Relative Humidity |
| Ambient Climate       | Ambient      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

## 4.4 Test Setups

### 4.4.1 Test Setup 1



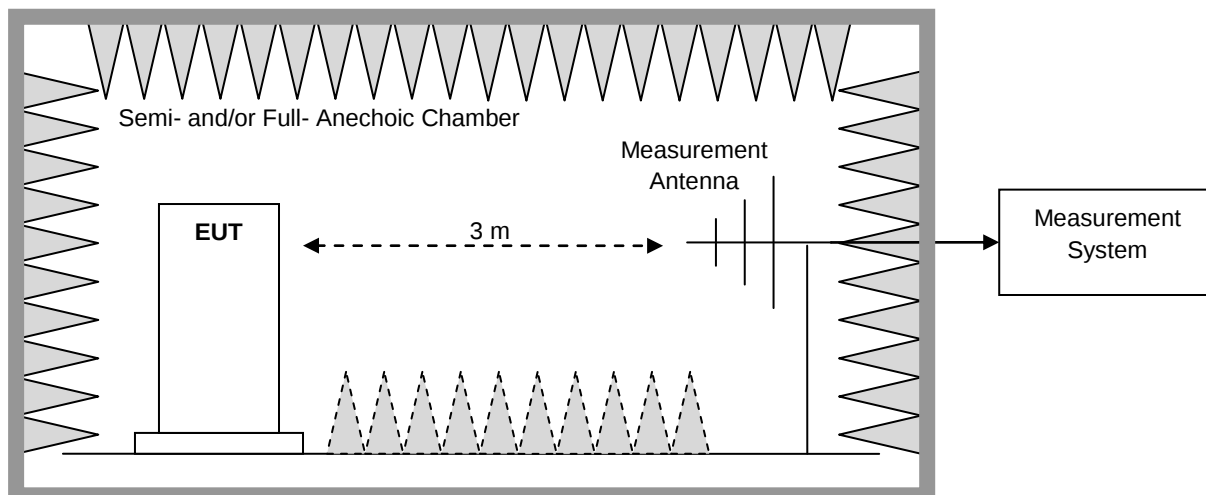
### 4.4.2 Test Setup 2



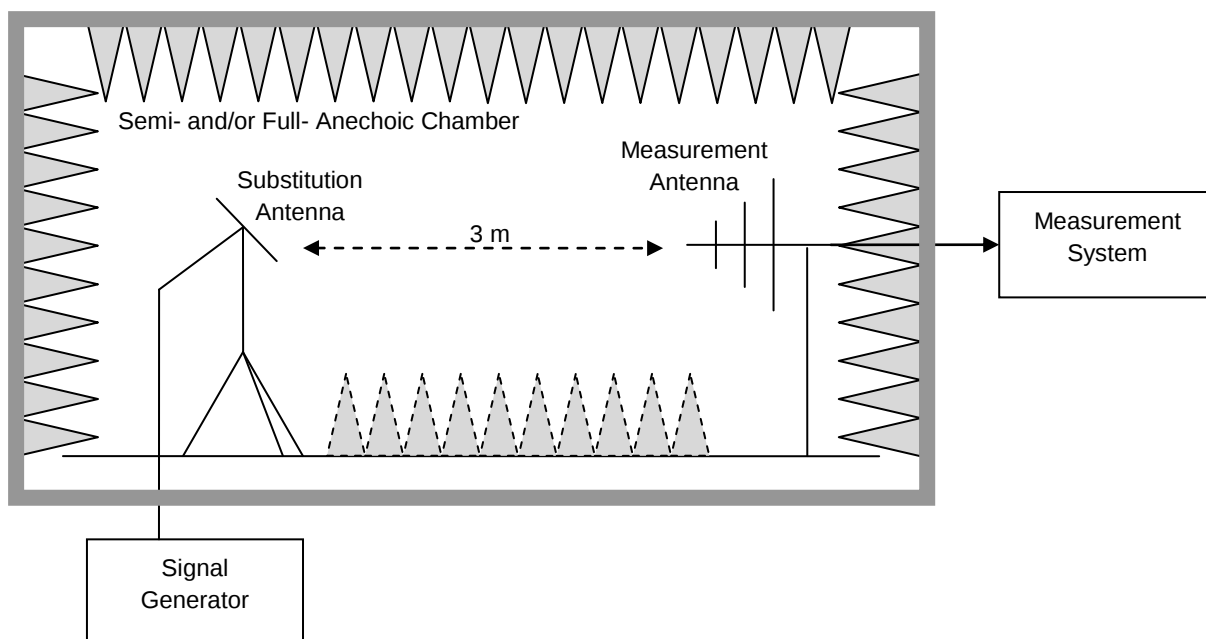
### 4.4.3 Test Setup 3

**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<br>Output<br>Power-<br>Conduct | Average Power,<br>Total                   | Test<br>Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                            |                                           | Test Setup           | Test Seup 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                            |                                           | EUT Conf.            | TX_1L_5M_B_TM1_ANTA, TX_1L_5M_M_TM1_ANTA,<br>TX_1L_5M_T_TM1_ANTA, TX_1L_20M_B_TM1_ANTA,<br>TX_1L_20M_M_TM1_ANTA, TX_1L_20M_T_TM1_ANTA,<br>TX_2L_5M_B_TM1_ANTA, TX_2L_5M_M_TM1_ANTA,<br>TX_2L_5M_T_TM1_ANTA, TX_2L_20M_B_TM1_ANTA,<br>TX_2L_20M_M_TM1_ANTA, TX_2L_20M_T_TM1_ANTA,<br>TX_1L_5M_B_TM1_ANTB, TX_1L_5M_M_TM1_ANTB,<br>TX_1L_5M_T_TM1_ANTB, TX_1L_20M_B_TM1_ANTB,<br>TX_1L_20M_M_TM1_ANTB, TX_1L_20M_T_TM1_ANTB,<br>TX_2L_5M_B_TM1_ANTB, TX_2L_5M_M_TM1_ANTB,<br>TX_2L_5M_T_TM1_ANTB, TX_2L_20M_B_TM1_ANTB,<br>TX_2L_20M_M_TM1_ANTB, TX_2L_20M_T_TM1_ANTB |
|                                            | Peak-to-Average<br>Ratio<br>(if required) | Test<br>Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                            |                                           | Test Setup           | Test Seup 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                            |                                           | EUT Conf.            | TX_1L_5M_B_TM1_ANTA, TX_1L_5M_M_TM1_ANTA,<br>TX_1L_5M_T_TM1_ANTA, TX_1L_20M_B_TM1_ANTA,<br>TX_1L_20M_M_TM1_ANTA, TX_1L_20M_T_TM1_ANTA,<br>TX_1L_5M_B_TM1_ANTB, TX_1L_5M_M_TM1_ANTB,<br>TX_1L_5M_T_TM1_ANTB, TX_1L_20M_B_TM1_ANTB,<br>TX_1L_20M_M_TM1_ANTB, TX_1L_20M_T_TM1_ANTB                                                                                                                                                                                                                                                                                     |
|                                            | Power Spectral<br>Density                 | Test<br>Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                            |                                           | Test Setup           | Test Seup 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                            |                                           | EUT Conf.            | TX_1L_5M_B_TM1_ANTA, TX_1L_5M_M_TM1_ANTA,<br>TX_1L_5M_T_TM1_ANTA, TX_1L_20M_B_TM1_ANTA,<br>TX_1L_20M_M_TM1_ANTA, TX_1L_20M_T_TM1_ANTA,<br>TX_1L_5M_B_TM1_ANTB, TX_1L_5M_M_TM1_ANTB,<br>TX_1L_5M_T_TM1_ANTB, TX_1L_20M_B_TM1_ANTB,<br>TX_1L_20M_M_TM1_ANTB, TX_1L_20M_T_TM1_ANTB                                                                                                                                                                                                                                                                                     |
| Bandwidth                                  | Occupied<br>Bandwidth                     | Test<br>Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                            |                                           | Test Setup           | Test Seup 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                            |                                           | EUT Conf.            | TX_1L_5M_B_TM1_ANTA, TX_1L_5M_M_TM1_ANTA,<br>TX_1L_5M_T_TM1_ANTA, TX_1L_20M_B_TM1_ANTA,<br>TX_1L_20M_M_TM1_ANTA, TX_1L_20M_T_TM1_ANTA,<br>TX_1L_5M_B_TM1_ANTB, TX_1L_5M_M_TM1_ANTB,                                                                                                                                                                                                                                                                                                                                                                                 |

| Test Case                              |                   | Test Conditions                                                                                                                                                                                                                                                                                                                                                              |                                                                                          |
|----------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
|                                        |                   |                                                                                                                                                                                                                                                                                                                                                                              | TX_1L_5M_T_TM1_ANTB, TX_1L_20M_B_TM1_ANTB,<br>TX_1L_20M_M_TM1_ANTB, TX_1L_20M_T_TM1_ANTB |
| Band Edges Compliance                  | Test Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                              |                                                                                          |
|                                        | Test Setup        | Test Seup 1                                                                                                                                                                                                                                                                                                                                                                  |                                                                                          |
|                                        | EUT Conf.         | TX_1L_5M_B_TM1_ANTA, TX_1L_5M_T_TM1_ANTA,<br>TX_1L_20M_B_TM1_ANTA, TX_1L_20M_T_TM1_ANTA,<br>TX_1L_5M_B_TM1_ANTB, TX_1L_5M_T_TM1_ANTB,<br>TX_1L_20M_B_TM1_ANTB, TX_1L_20M_T_TM1_ANTB,<br>TX_2L_5M_B_TM1_ANTA, TX_2L_5M_T_TM1_ANTA,<br>TX_2L_20M_B_TM1_ANTA, TX_2L_20M_T_TM1_ANTA,<br>TX_2L_5M_B_TM1_ANTB, TX_2L_5M_T_TM1_ANTB,<br>TX_2L_20M_B_TM1_ANTB, TX_2L_20M_T_TM1_ANTB, |                                                                                          |
| Spurious Emission at Antenna Terminals | Test Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                              |                                                                                          |
|                                        | Test Setup        | Test Seup 1                                                                                                                                                                                                                                                                                                                                                                  |                                                                                          |
|                                        | EUT Conf.         | TX_1L_5M_B_TM1_ANTA, TX_1L_5M_M_TM1_ANTA,<br>TX_1L_5M_T_TM1_ANTA, TX_2L_5M_B_TM1_ANTA,<br>TX_2L_5M_M_TM1_ANTA, TX_2L_5M_T_TM1_ANTA,<br>TX_1L_5M_B_TM1_ANTB, TX_1L_5M_M_TM1_ANTB,<br>TX_1L_5M_T_TM1_ANTB, TX_2L_5M_B_TM1_ANTB,<br>TX_2L_5M_M_TM1_ANTB, TX_2L_5M_T_TM1_ANTB,                                                                                                   |                                                                                          |
| Field Strength of Spurious Radiation   | Test Environment. | Ambient Climate & Rated Voltage                                                                                                                                                                                                                                                                                                                                              |                                                                                          |
|                                        | Test Setup        | Test Seup 3                                                                                                                                                                                                                                                                                                                                                                  |                                                                                          |
|                                        | EUT Conf.         | RSE_2L_5M_M_TM1_ANTA, RSE_2L_5M_M_TM1_ANTB                                                                                                                                                                                                                                                                                                                                   |                                                                                          |
| Frequency Stability                    | Test Environment. | (1) -30 °C to +50 °C with step 10 °C at Rated Voltage;<br>(2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.                                                                                                                                                                                                                                                        |                                                                                          |
|                                        | Test Setup        | Test Seup 2                                                                                                                                                                                                                                                                                                                                                                  |                                                                                          |
|                                        | EUT Conf.         | TX_1L_5M_M_TM2_ANTA, TX_1L_5M_M_TM2_ANTB,<br>TX_1L_5M_M_TM3_ANTA, TX_1L_5M_M_TM3_ANTB<br><br>NOTE: A representative EUT configuration was selected since the un-modulation carrier configuration was required by the standards/rules.                                                                                                                                        |                                                                                          |
| Receiver Spurious Emissions            | Test Environment. | 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        | Agilent      | N9030A       | MY49431033    | 2014-05-19 |
| Power Meter              | Agilent      | E4417A       | GB41292113    | 2014-05-13 |
| Vector Signal Generator  | R&S          | SMU200A      | 100699        | 2014-04-14 |
| Signal Generator         | Agilent      | E8257D       | MY49281095    | 2013-09-13 |
| Climate Chamber          | ESPEC        | EW0470S      | 12113066      | 2013-07-26 |
| Test Setup 3             |              |              |               |            |
| 3m Semi Anechoic Chamber | S+M          | ---          | ---           | ---        |
| EMI Test receiver        | R&S          | ESU40        | 100144        | 2014-01-09 |
| Broadband Antenna        | SCHAFFNER    | CBL 6112B    | 2536          | 2015-03-22 |
| Horn Antenna             | R&S          | HF906        | 359287/005    | 2014-03-23 |
| Horn antenna             | 3117         | ETS-LINDGREN | 00062553      | 2014-03-06 |



## 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                                                                                                                                        |
|--------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF Power Output                      | 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:<br>U = 4.6 dB (30 MHz to 1GHz)<br>U = 3.0 dB (above 1 GHz)<br>For 10 m Chamber:<br>U = 4.6 dB (30 MHz to 1GHz)<br>U = 3.0 dB (above 1 GHz) |
| Frequency Stability                  | Frequency Accuracy [ppm] | U = 0.21 ppm                                                                                                                                                |

END