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检测
TESTING
CNAS L0310



RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3971

Report Number: SYBH(R)02141450EB-1

FCC ID: QISRRU3971AWS

IC: 6369A-RRU3971AWS

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

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Notice

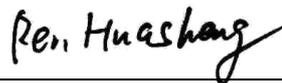
1. The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
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-1.
 - The recognition numbers for the test site located in Shanghai is 6369D, which contains 6369D-1 (3m chamber) and 6369D-2 (10m chamber).
 - The recognition number for the test site located in Chengdu is 6369E-1.
5. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named as "Global Compliance and Testing Center of Huawei Technologies Co., Ltd"; the both names have coexisted since 2009.
6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
7. The test report is invalid if there is any evidence of erasure and/or falsification.
8. The test report is only valid for the test samples.
9. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
 Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Remote Radio Unit
Product Model: RRU3971

Date of Receipt Sample: 2015-11-27
Start Date of Test: 2015-12-03
End Date of Test: 2015-12-10

Test Result: Pass

| | | | |
|-------------------------------------|------------|--------------|---|
| Approved by Senior Engineer: | 2016-07-21 | Ren huasheng |  |
| | Date | Name | Signature |

| | | | |
|---------------------|------------|--------|---|
| Prepared by: | 2016-07-21 | Li Guo |  |
| | Date | Name | Signature |



Modification Record

| No. | Last Report No. | Modification Description |
|-----|---------------------|-------------------------------|
| 1 | --- | First report. |
| 2 | SYBH(R)02141450EB-1 | Change the Product model name |



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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2 (10-1-13 Edition)
47 CFR FCC Part 27 (10-1-13 Edition)

IC RSS-Gen (Issue 4, November 2014)
IC RSS-139 (Issue 3, July 2015)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02
(if applicable) FCC KDB 662911 D01 Multiple Transmitter Output 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

Test Location 2 (TL2): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, 201206, P.R.C

Test Location 3 (TL3): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: No.1899 Xiyuan Avenue, Hi-tech Western District, Chengdu, 611731, 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 AWS Band (1710-1780 MHz paired with 2110-2180 MHz)

2.1.1 Measurement Technical Requirements

| Test Item | FCC Rule | IC Rule | Requirements | | Test Result | Verdict | Test Location | |
|--------------------------|--------------------|--|--------------|--|--|---------|---------------|-----|
| Transmitter Output Power | §2.1046, §27.50(d) | RSS-Gen, §6.12; RSS-139, §6.5; RSS-139, §4.1 | FCC | Base Station / Fixed Station | <ul style="list-style-type: none"> Average EIRP Power ≤ 1640 W (for EBW ≤ 1 MHz). Average EIRP PD ≤ 1640 W/MHz (for EBW > 1 MHz). Average EIRP Power ≤ 1 W (for 1710-1755 MHz) PAPR ≤ 13 dB@0.1%. | Annex A | Pass | TL1 |
| | | | | Mobile Station / Portable Station | <ul style="list-style-type: none"> Average EIRP Power ≤ 1 W (for 1710-1780 MHz). PAPR ≤ 13dB@0.1%. | | | |
| | | | IC | Base Station / Fixed Station | <ul style="list-style-type: none"> Average EIRP Power ≤ 1640 W (for ChBW ≤ 1 MHz). Average EIRP PD ≤ 1640 W/MHz (for ChBW > 1 MHz). Average EIRP Power ≤ 1 W (for 1710-1780 MHz) PAPR ≤ 13 dB@0.1%. | | | |
| | | | | Mobile and Portable Transmitter | <ul style="list-style-type: none"> Average EIRP Power ≤ 1 W (For 1710-1780 MHz). PAPR ≤ 13dB@0.1%. | | | |
| Bandwidth | §2.1049, §27.53(h) | RSS-Gen, §6.6; RSS-139, §2.3 | FCC | <ul style="list-style-type: none"> OBW: No limit. EBW (-26 dBc): No limit. | Annex B | Pass | TL1 | |



| Test Item | FCC Rule | IC Rule | Requirements | Test Result | Verdict | Test Location |
|--|--------------------|-----------------------------|--|-------------|---------|---------------|
| | | | IC OBW: No limit. | | | |
| Band Edges Compliance / Emission Mask | §2.1051, §27.53(h) | RSS-Gen,§6.13; RSS-139,§6.6 | 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 |
| | | | IC ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -20 dBc EBW, or OBW) | | | |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(h) | RSS-Gen,§6.13; RSS-139,§6.6 | ≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges. | Annex D | Pass | TL1 |
| Field Strength of Spurious Radiation / Radiated Spurious Emissions | §2.1053, §27.53(h) | RSS-Gen,§6.13; RSS-139,§6.6 | ≤ -13 dBm/1 MHz. | Annex E | Pass | TL1 |
| Frequency Stability | §2.1055, §27.54 | RSS-Gen,§6.11; RSS-139,§6.4 | FCC <ul style="list-style-type: none"> Test method: Fundamental emissions (Fc_meas) within the authorized bands of operation. Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV. | Annex F | Pass | TL1 |
| | | | IC <ul style="list-style-type: none"> Test method: OBW within frequency block. Test conditions: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. (EBW is -20 dBc EBW, or OBW) | | | |
| Receiver Spurious Emissions | --- | RSS-Gen,§5; RSS-Gen,§7; | --- | Annex G | --- | --- |

2.1.2 Non-measurement Technical Requirements

| Description | FCC Rule | IC Rule | Requirements | Test Result | Verdict |
|----------------|----------|--------------|--|---------------|---------|
| Frequency Plan | §27.5(h) | RSS-139,§6.1 | 1710-1780 MHz paired with 2110-2180 MHz: | See technical | Comply |



| Description | FCC Rule | IC Rule | Requirements | Test Result | Verdict |
|------------------------------|----------|--------------|--|--|---------|
| | §27.5(j) | | | specification description. | |
| Interoperability requirement | | RSS-139,§6.8 | Mobile and portable equipment that transmits in the band 1755-1780 MHz and receives in the band 2155-2180 MHz shall be certified only if it can be capable of operating on all frequencies in the frequency bands 1710-1780 MHz and 2110-2180 MHz. | See technical specification description. | Comply |
| Modulation Characteristics | §2.1047 | RSS-139,§6.2 | Any modulation. | See technical specification description. | Comply |



3 Description of the Equipment under Test (EUT)

3.1 General Description

The RRU3971 2100M is an outdoor remote radio unit. It is the RF part of a distributed base station, powered by a power cabinet, and can be located near the antenna. The RRU39712100M performs modulation, demodulation, data processing, and combination and division of baseband signals and RF signals. With the Software Defined Radio (SDR) technology, the RRU3971 2100M can support the UL dual-mode operation through corresponding software configuration.

The RRU3971 2100M has a dual-transmitter and dual-receiver (4T4R) design, which further improves the output power and the carrier capacity.

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 |
| WD5IJRXGSR | Ver.C | Manufactured Board, MARP RRU,WD5IJRXGSR,Transceiver Board,4T4R,AWS-3,1*1 |

3.2.2 Sub-Assembly

| Sub-Assembly | | | |
|-------------------|-------|--------------|---|
| Sub-Assembly Name | Model | Manufacturer | Description |
| UMPT | -- | Huawei | Universal Main Processing & Transmission unit |
| UBBP | -- | Huawei | Baseband Processing and Interface Unit |



3.3 Technical Specification

| Characteristics | Description | |
|--|---|---|
| Radio System Type | <input type="checkbox"/> GSM (GO) <input checked="" type="checkbox"/> UMTS (UO) <input checked="" type="checkbox"/> LTE (LO) <input type="checkbox"/> CDMA (CO) <input type="checkbox"/> GSM & UMTS (GU) <input type="checkbox"/> GSM & LTE (GL) <input checked="" type="checkbox"/> UMTS & LTE (UL) <input type="checkbox"/> GSM & UMTS & LTE (GUL) <input type="checkbox"/> CDMA & LTE (CL) <input type="checkbox"/> P2P | |
| Equipment Type | Type #1 | <input checked="" type="checkbox"/> Base Station Equipment <input type="checkbox"/> CPE (Customer Premises Equipment) Equipment <input type="checkbox"/> Subscriber Equipment (User Equipment) <input type="checkbox"/> Fixed Point-to-Point Equipment |
| | Type #2 | <input checked="" type="checkbox"/> Fixed <input type="checkbox"/> Mobile <input type="checkbox"/> Portable |
| | Type #3 | <input type="checkbox"/> Indoor <input checked="" type="checkbox"/> Outdoor |
| Frequency Range (Transmission (TX) and Receiving (RX)) | #1 | TX: 2110 to 2180 MHz RX: 1710 to 1780 MHz |
| TX and RX Antenna Ports | TX & RX port: 4, TX-only port: 0, RX-only port: 0 | |
| Multiple Carrier Supported | UMTS: Max.2 carriers LTE: Max.3 carriers UL MSR: Max.3 carriers | |
| Maximum RF Bandwidth | UMTS single RAT: 45 MHz LTE single RAT: 70 MHz UL MSR: 70 MHz | |
| TX Output Power | Max. 40 W (per antenna port) Max. 4*40 W (two antenna ports) | |
| Supported Channel Bandwidth | UMTS: 5 MHz LTE: 5 MHz, 10 MHz, 15 MHz, 20 MHz | |
| Modulation Type | UMTS system: | Base-band: QPSK, 16QAM, 64QAM Carrier: CDMA |
| | LTE system: | Base-band: QPSK, 16QAM,64QAM Carrier: OFDM/OFDMA |
| Designation of | UMTS system: | 4M14F9W |



| Characteristics | Description | |
|--|--------------------------------|--|
| Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.) | LTE system: | 4M50D9W, 9M00D9W, 13M5D9W, 18M0D9W |
| Power Supply | Type: | <input type="checkbox"/> External AC mains, <input checked="" type="checkbox"/> External DC mains, <input type="checkbox"/> AC/DC Adapter, <input type="checkbox"/> Powered over Ethernet (PoE) |
| | Nominal Voltage, Input to EUT: | -48 VDC |
| | Voltage Range, Input to EUT: | -36 to -57 VDC |

3.3.1 Transmit Power Description

3.3.1.1 UL MSR System

| Carrier configuration | Transmit power (per antenna port) |
|-----------------------|--------------------------------------|
| 1*U & 1*L | 1*43.0 dBm (UMTS) & 1*43.0 dBm (LTE) |
| | 1*40.0 dBm (UMTS) & 1*44.8 dBm (LTE) |
| 1*U & 2*L | 1*43.0 dBm (UMTS) & 2*40.0 dBm (LTE) |
| | 1*40.0 dBm (UMTS) & 2*41.8 dBm (LTE) |

3.3.1.2 UMTS System

| Carrier configuration | Transmit power (per antenna port) |
|-----------------------|-----------------------------------|
| 1*U | 1*46.0 dBm |
| 2*U | 2*43.0 dBm |

3.3.1.3 LTE System

| Carrier configuration | Transmit power (per antenna port) |
|-----------------------|--|
| 1*L | 1*46.0 dBm (5MHz, 10MHz, 15MHz, 20MHz) |
| 2*L | 2*43.0 dBm (5MHz, 10MHz, 15MHz, 20MHz) |
| 3*L | 3*41.1 dBm (5MHz, 10MHz, 15MHz, 20MHz) |

3.3.2 Antenna Assemblies

NOTE 1: For the “external antenna” in the report:

- (1) It refers to the antenna external to the equipment, using an antenna connector with a cable and which has been designed or developed for one or more specific types of equipment.
- (2) It is the combination of external antenna and radio equipment that is expected to be compliant with the regulations. If the external antenna is not supplied by the equipment manufacturer, and also will not be equipped on sale, a typical or recommended configuration will be considered during lab testing. However, when the radio equipment is put into service, the practical maximum antenna gain may exceed the value as described; if this is the case, the combination of the practical output power (may be degraded) and the practical antenna gain should NOT exceed the required ERP/EIRP limit.

NOTE 2: The “integral antenna” in the report:

- (1) It refers to the antenna designed as a fixed part of the equipment, without the use of an external connector and which cannot be disconnected from the equipment by a user with the intent to connect another antenna.
- (2) For the testing purpose, a temporary RF connector may be provided.

NOTE 3: The antenna gain is the combination of basic gain (directional gain, G) and, if applicable, additional beam-forming gain (Y).

| Characteristics | Description |
|-----------------|--|
| Antenna Type | <input checked="" type="checkbox"/> External (antenna equipped on sale : <input type="checkbox"/> yes, <input type="checkbox"/> no) <input type="checkbox"/> Integral |
| Smart Antenna | <input checked="" type="checkbox"/> MIMO <input type="checkbox"/> Non MIMO |
| Antenna Gain | <input checked="" type="checkbox"/> External: 18 dBi (per antenna port, typically) <input type="checkbox"/> Integral: dBi (per antenna port, max.) |



4 General Test Conditions / Configurations

4.1 EUT Configurations

4.1.1 General

| Configuration | Description |
|---------------------|---|
| Test Antenna Ports | Until otherwise specified, <ul style="list-style-type: none"> All TX tests are ONLY performed at the main TX antenna port (e.g. TRXA, TXA or similar) of the EUT, and All RX tests are ONLY performed at the main RX antenna port (e.g. TRXA, RXB or similar) of the EUT. |
| Multiple RF Sources | Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements. |

4.1.2 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

| Test Mode | Test Modes Description |
|-----------|---|
| UMTS/TM1 | UMTS system, 3GPP TS 25.141 clause 6.1.1, Test Model 1, QPSK modulation |
| LTE/TM1.1 | LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 1.1 |
| UL/TM1 | MSR system, 3GPP TS 37.141 clause 4.9.2 (UMTS/TM1; LTE/TM1.1) |

4.1.3 Test Configurations

| EUT Conf. | RF Ch. | TX Freq. [MHz] | RX Freq. [MHz] | Ch. BW [MHz] | Power Level [dBm] | Test Mode |
|----------------|--------|----------------|----------------|--------------|-------------------|-----------|
| 1U_TM1_B | B | 2112.6 | -- | 5 | 46.0 | UMTS/TM1 |
| 1U_TM1_M | M | 2132.6 | -- | 5 | 46.0 | UMTS/TM1 |
| 1U_TM1_T | T | 2152.4 | -- | 5 | 46.0 | UMTS/TM1 |
| 2U_TM1_M | M | 2112.6, 2152.4 | -- | 5, 5 | 43.0, 43.0 | UMTS/TM1 |
| 1L_5M_TM1.1_B | B | 2112.5 | -- | 5 | 46.0 | LTE/TM1.1 |
| 1L_5M_TM1.1_M | M | 2145 | -- | 5 | 46.0 | LTE/TM1.1 |
| 1L_5M_TM1.1_T | T | 2177.5 | -- | 5 | 46.0 | LTE/TM1.1 |
| 1L_10M_TM1.1_B | B | 2115.0 | -- | 10 | 46.0 | LTE/TM1.1 |
| 1L_10M_TM1.1_M | M | 2145 | -- | 10 | 46.0 | LTE/TM1.1 |
| 1L_10M_TM1.1_T | T | 2175.0 | -- | 10 | 46.0 | LTE/TM1.1 |
| 1L_15M_TM1.1_B | B | 2117.5 | -- | 15 | 46.0 | LTE/TM1.1 |
| 1L_15M_TM1.1_M | M | 2145 | -- | 15 | 46.0 | LTE/TM1.1 |
| 1L_15M_TM1.1_T | T | 2172.5 | -- | 15 | 46.0 | LTE/TM1.1 |
| 1L_20M_TM1.1_B | B | 2120 | -- | 20 | 46.0 | LTE/TM1.1 |



| EUT Conf. | RF Ch. | TX Freq. [MHz] | RX Freq. [MHz] | Ch. BW [MHz] | Power Level [dBm] | Test Mode |
|----------------|--------|------------------------|----------------|--------------|-------------------|-----------|
| 1L_20M_TM1.1_M | M | 2145 | -- | 20 | 46.0 | LTE/TM1.1 |
| 1L_20M_TM1.1_T | T | 2170 | -- | 20 | 46.0 | LTE/TM1.1 |
| 2L_5M_TM1.1_M | M | 2112.5, 2177.5 | -- | 5, 5 | 43.0, 43.0 | LTE/TM1.1 |
| 3L_5M_TM1.1_M | M | 2112.5, 2172.5, 2177.5 | -- | 5, 5, 5 | 41.1, 41.1, 44.1 | LTE/TM1.1 |
| 1U1L_M | M | 2112.6, 2177.5 | -- | 5,5 | 43.0, 43.0 | UL/TM1 |
| 1U2L_M | M | 2112.6, 2172.5, 2177.5 | -- | 5, 5, 5 | 43.0, 40.0, 40.0 | UL/TM1 |

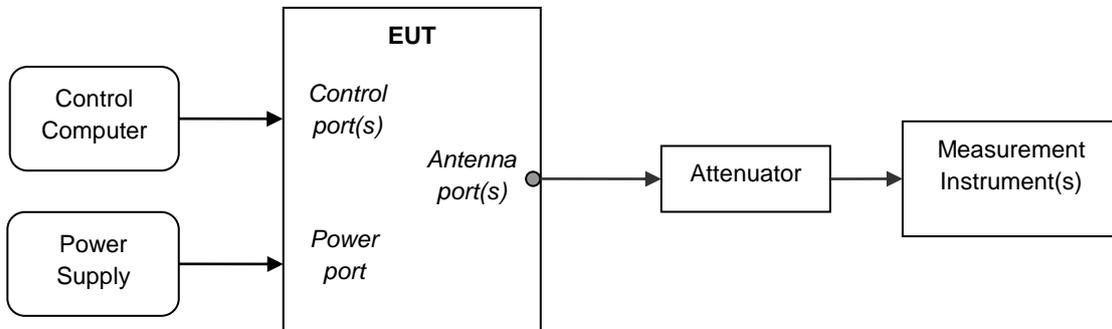


4.2 Test Environments

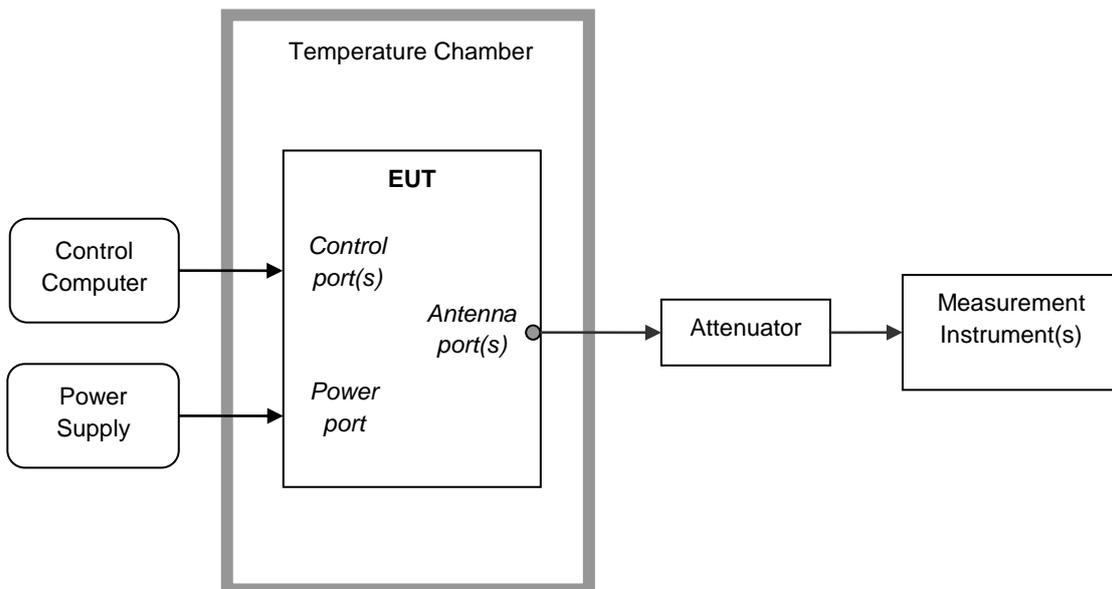
| Environment Parameter | Selected Values During Tests | | |
|-------------------------------------|------------------------------|---------|-------------------|
| | Temperature | Voltage | Relative Humidity |
| Ambient Climate (See clause 1.3) | Ambient | --- | Ambient |
| Rated Voltage | --- | -48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

4.3 Test Setups

4.3.1 Test Setup 1



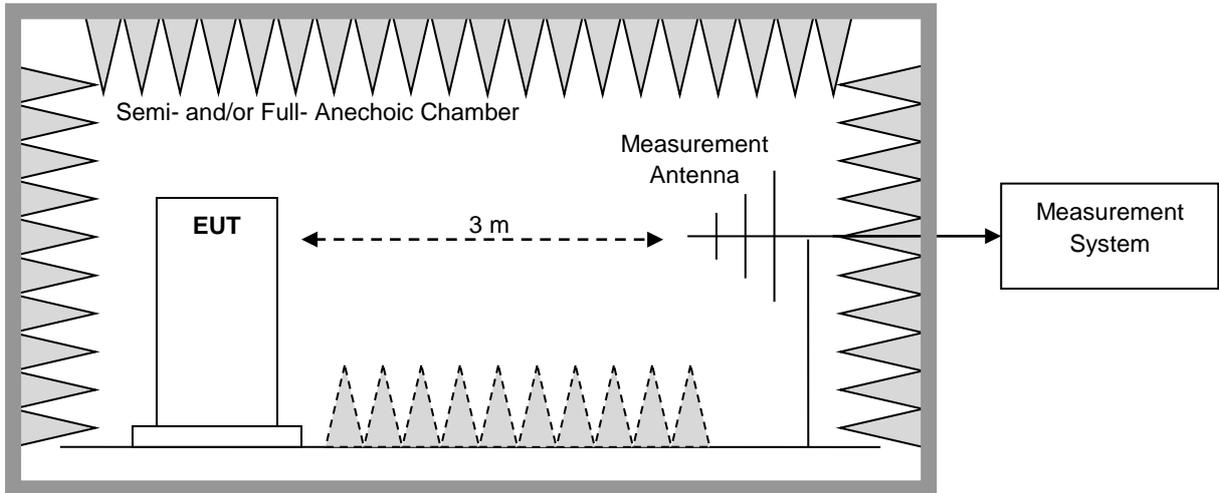
4.3.2 Test Setup 2



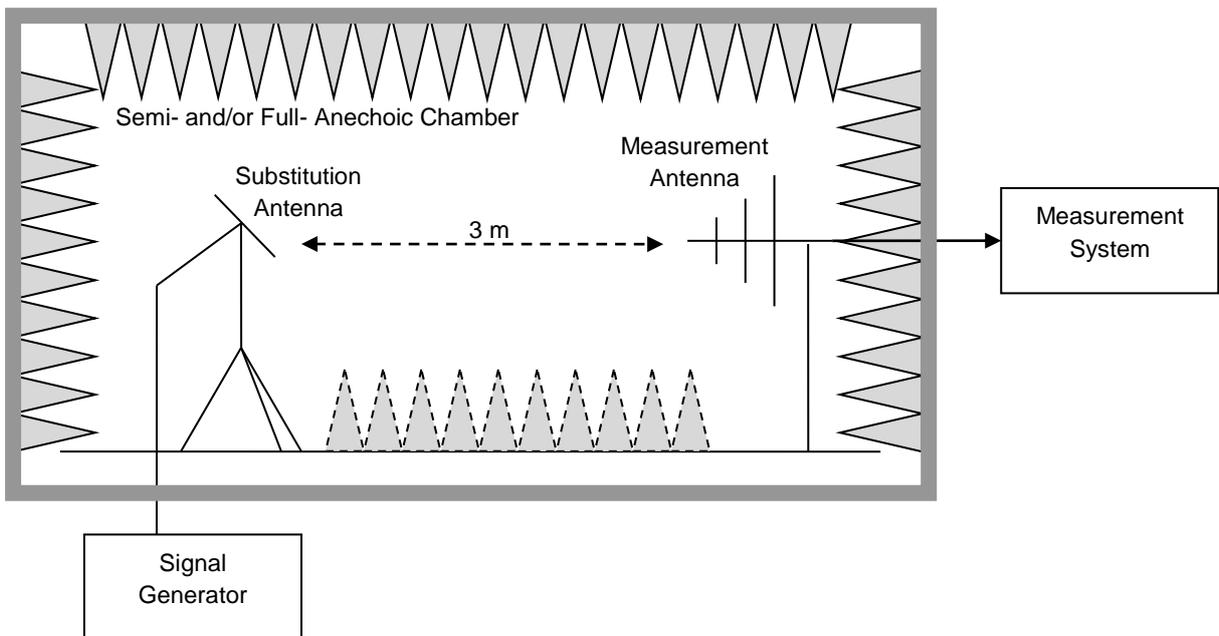
4.3.3 Test Setup 3

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

4.3.3.1 Step 1: Pre-test



4.3.3.2 Step 2: Substitution method to verify the maximum ERP



4.4 Test Conditions

| Test Case | | Test Conditions | |
|--------------------------|--------------------------------------|-----------------|---|
| Transmitter Output Power | Channel Power, Total | Test Env. | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Seup 1 |
| | | EUT Conf. | 1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 2U_TM1_M, 1L_5M_TM1.1_B, 1L_5M_TM1.1_M, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_M, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_M, 1L_15M_TM1.1_T, 1L_20M_TM1.1_B, 1L_20M_TM1.1_M, 1L_20M_TM1.1_T, 2L_5M_TM1.1_M, 3L_5M_TM1.1_M, 1U1L_M, 1U2L_M, |
| | Power Spectral Density (if required) | Test Env. | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Seup 1 |
| | | EUT Conf. | 1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 1L_5M_TM1.1_B, 1L_5M_TM1.1_M, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_M, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_M, 1L_15M_TM1.1_T, 1L_20M_TM1.1_B, 1L_20M_TM1.1_M, 1L_20M_TM1.1_T, |
| | Peak-to-Average Ratio (if required) | Test Env. | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Seup 1 |
| | | EUT Conf. | 1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 1L_5M_TM1.1_B, 1L_5M_TM1.1_M, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_M, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_M, 1L_15M_TM1.1_T, 1L_20M_TM1.1_B, 1L_20M_TM1.1_M, 1L_20M_TM1.1_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, 1L_5M_TM1.1_B, 1L_5M_TM1.1_M, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_M, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_M, 1L_15M_TM1.1_T, 1L_20M_TM1.1_B, 1L_20M_TM1.1_M, 1L_20M_TM1.1_T, |
| | Emission Bandwidth (if required) | Test Env. | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Seup 1 |
| | | EUT Conf. | 1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 1L_5M_TM1.1_B, 1L_5M_TM1.1_M, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_M, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_M, 1L_15M_TM1.1_T, |



| Test Case | Test Conditions | |
|--|-----------------|---|
| | | 1L_20M_TM1.1_B, 1L_20M_TM1.1_M, 1L_20M_TM1.1_T, |
| Band Edges Compliance / Emission Mask | Test Env. | Ambient Climate & Rated Voltage |
| | Test Setup | Test Seup 1 |
| | EUT Conf. | 1U_TM1_B, 1U_TM1_T, 2U_TM1_M, 1L_5M_TM1.1_B, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_T, 1L_20M_TM1.1_B, 1L_20M_TM1.1_T, 2L_5M_TM1.1_M, 3L_5M_TM1.1_M, 1U1L_M, 1U2L_M, |
| Spurious Emission at Antenna Terminals | Test Type | <input checked="" type="checkbox"/> Conducted <input type="checkbox"/> Radiated (go to test case of Field Strength of Spurious Radiation / Radiated Spurious Emissions) NOTE: According to FCC §2.1053 and KDB 971168 §6.1&§5.8, in the cases of the EUTs that are portable or hand-held devices utilizing one or more integral transmit antennas, measurements cannot be performed in a conducted measurement configuration, it becomes necessary to perform the described compliance measurements in a radiated test arrangement. |
| | Test Env. | Ambient Climate & Rated Voltage |
| | Test Setup | Test Seup 1 |
| | EUT Conf. | 1U_TM1_B, 1U_TM1_M, 1U_TM1_T, 2U_TM1_M, 1L_5M_TM1.1_B, 1L_5M_TM1.1_M, 1L_5M_TM1.1_T, 1L_10M_TM1.1_B, 1L_10M_TM1.1_M, 1L_10M_TM1.1_T, 1L_15M_TM1.1_B, 1L_15M_TM1.1_M, 1L_15M_TM1.1_T, 1L_20M_TM1.1_B, 1L_20M_TM1.1_M, 1L_20M_TM1.1_T, 2L_5M_TM1.1_M, 3L_5M_TM1.1_M, 1U1L_M, 1U2L_M, |
| Field Strength of Spurious Radiation / Radiated Spurious Emissions | Test Type | <input type="checkbox"/> Field Strength of Spurious Radiation <input checked="" type="checkbox"/> Radiated Spurious Emissions NOTE: According to FCC §2.1053 and KDB 971168, when antenna-port conducted measurements (i.e. Spurious Emission at Antenna Terminals measurement) are performed to demonstrate compliance to the applicable |



| Test Case | | Test Conditions | |
|-----------------------------|-----------------|-----------------|---|
| | | | unwanted emission limits, a separate radiated measurement (i.e. this Field Strength of Spurious Radiation measurement) is required to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation (, and with the transmit antenna port(s) terminated). Note that when radiated measurements for spurious emissions at antenna terminals are performed to demonstrate compliance to the unwanted emission limits (e.g., an EUT with integral transmit antenna), the field strength of spurious radiation measurement is not required. |
| | | Test Env. | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Seup 3 |
| | | EUT Conf. | 1U1L_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. | 1L_5M_TM1.1_M NOTE: A representative EUT Conf. was selected since the un-modulation carrier configuration was required by the standards/rules. |
| Receiver Spurious Emissions | | Test Env. | Ambient Climate & Rated Voltage |
| | | Test Setup | Test Seup 1 |
| | | EUT Conf. | NA |



5 Main Test Instruments

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

NOTE 2: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

| Equipment Name | Manufacturer | Model | Serial Number | Cal. Due |
|-------------------|--------------|-----------|---------------|------------|
| Test Setup 1 & 2 | | | | |
| Spectrum Analyzer | Agilent | N9030A | MY49431033 | 2016-05-21 |
| Spectrum Analyzer | Agilent | N9020A | MY51240619 | 2016-03-25 |
| Climate Chamber | ESPEC | EW0470S | 12113066 | 2016-10-19 |
| Test Setup 3 | | | | |
| EMI Test receiver | R&S | ESU40 | 100303/040 | 2016-01-12 |
| Bilog antenna | SCHWARZBECK | VULB 9163 | 9163-480 | 2017-05-05 |
| Bilog antenna | SCHWARZBECK | VULB 9163 | 9163-481 | 2017-02-06 |
| Horn antenna | SCHWARZBECK | BBHA 9120 | 9120D-878 | 2017-05-15 |
| Horn antenna | SCHWARZBECK | BBHA 9120 | 9120D-879 | 2017-02-06 |



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 |
|--|---|--|
| Transmitter Output Power | Power [dBm] | U = 0.39 dB |
| Bandwidth | Magnitude [%] | U = 0.2% |
| Band Edge Compliance | Disturbance Power [dBm] | U = 2.0 dB |
| Spurious Emissions, Conducted | Disturbance Power [dBm] | U = 2.0 dB |
| Field Strength of Spurious Radiation / Radiated Spurious Emissions | Power [dBm] / Field Strength [dB μ V/m] | For 3 m Chamber: U = 4.15 dB (30 MHz-1 GHz) U = 3.64 dB (1 GHz-18 GHz) U = 3.26 dB (18 GHz-26.5 GHz) U = 3.83 dB (26.5 GHz-40 GHz) For 10 m Chamber: U = 4.8 dB (30MHz to 1GHz) U = 4.3 dB (1 GHz to 26.5GHz) |
| Frequency Stability | Frequency Accuracy [ppm] | U = 0.21 ppm |

END