



# **FCC RF Test Report**

**Product Name: Smart Phone**

**Model Number: H1511**

**Report No: SYBH(Z-RF)011072015-2002**

**FCC ID: QISH1511**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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## Notice

1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 684868.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1.
5. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
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**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Administration Building, Headquarters of Huawei Technologies Co., Ltd.,  
Bantian, Longgang District, Shenzhen, 518129, P.R.C

**Date of Receipt Sample:** 2015-07-20  
**Start Date of Test:** 2015-07-20  
**End Date of Test:** 2015-09-10

**Test Result:** Pass

|                                     |            |             |                                                                                       |
|-------------------------------------|------------|-------------|---------------------------------------------------------------------------------------|
| <b>Approved by Senior Engineer:</b> | 2015-09-10 | Liu Chunlin |  |
|                                     | Date       | Name        | Signature                                                                             |

|                     |            |          |                                                                                       |
|---------------------|------------|----------|---------------------------------------------------------------------------------------|
| <b>Prepared by:</b> | 2015-09-10 | maowenli |  |
|                     | Date       | Name     | Signature                                                                             |

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## 1 General Information

### 1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J 2014  
47 CFR FCC Part 15, Subpart C 2014  
47 CFR FCC Part 15, Subpart E 2014

Test Method: FCC KDB 558074 D01 DTS Meas Guidance v03r02  
FCC KDB 662911 D01 Multiple Transmitter Output v02  
KDB 789033 D02 General UNII Test Procedures New Rules v01  
ANSI C63.10-2013, American National Standard for Testing Unlicensed  
Wireless Devices

### 1.2 Test Location

Test Location: Reliability Laboratory of Huawei Technologies Co., Ltd.

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

### 1.3 Test Environment Condition

Ambient Temperature: 19.5 to 25 °C  
Ambient Relative Humidity: 40 to 55 %  
Atmospheric Pressure: Not applicable

## 2 Test Summary

### 2.1 Measurement Technical Requirements

#### 2.1.1 U-NII (5150-5250, 5250-5350, 5470-5725 MHz, 5725-5850)

| Test Item                      | Band      | FCC Rule                                               | Requirements                                                                                                                                                                                                                                                              | Test Result | Verdict |
|--------------------------------|-----------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------|
| Emission Bandwidth             | 5150-5250 | 15.403(i)<br>15.407(a)(1)                              | No limit.                                                                                                                                                                                                                                                                 | Appendix A  | Pass    |
|                                | 5250-5350 | 15.403(i)<br>15.407(a)(2)                              |                                                                                                                                                                                                                                                                           |             |         |
|                                | 5470-5725 | 15.403(i)<br>15.407(a)(2)                              |                                                                                                                                                                                                                                                                           |             |         |
|                                | 5725-5850 | 15.403(i)<br>15.407(e)                                 | ≥ 500 kHz.                                                                                                                                                                                                                                                                |             |         |
| Maximum Conducted Output Power | 5150-5250 | 15.407(a)(1)<br>15.407(a)(4)                           | < 250mW<br>(avg during transmission)                                                                                                                                                                                                                                      | Appendix B  | Pass    |
|                                | 5250-5350 | 15.407(a)(2)<br>15.407(a)(4)                           | <MIN{250mW, 11dBm+10*lg(E BW)} (avg during transmission)                                                                                                                                                                                                                  |             |         |
|                                | 5470-5725 | 15.407(a)(2)<br>15.407(a)(4)                           | <MIN{250mW, 11dBm+10*lg(E BW)} (avg during transmission)                                                                                                                                                                                                                  |             |         |
|                                | 5725-5850 | 15.407(a)(3)                                           | < 1W<br>(avg during transmission)                                                                                                                                                                                                                                         |             |         |
| Peak Power Spectral Density    | 5150-5250 | 15.407(a)(1)<br>15.407(a)(4)                           | <11dBm/MHz<br>(avg during transmission)                                                                                                                                                                                                                                   | Appendix C  | Pass    |
|                                | 5250-5350 | 15.407(a)(2)<br>15.407(a)(4)                           | <11dBm/MHz<br>(avg during transmission)                                                                                                                                                                                                                                   |             |         |
|                                | 5470-5725 | 15.407(a)(2)<br>15.407(a)(4)                           | <11dBm/MHz<br>(avg during transmission)                                                                                                                                                                                                                                   |             |         |
|                                | 5725-5850 | 15.407(a)(3)<br>15.407(a)(4)                           | <30dBm/500KHz<br>(avg during transmission)                                                                                                                                                                                                                                |             |         |
| Unwanted Emissions             | 5150-5250 | 15.407(b)(1)<br>15.407(b)(6)<br>15.407(b)(7)<br>15.209 | <ul style="list-style-type: none"> <li>F&lt;1GHz:<br/>§15.209/§7.2.5 limit (QP).</li> <li>F≥1GHz &amp; out-restricted:<br/>&lt;-27dBm/MHz PK e.i.r.p.<br/>(exl. 5.15-5.35 GHz).</li> <li>F≥1GHz &amp; in-restricted:<br/>§15.209/§7.2.5 limit<br/>(AV&amp;PK).</li> </ul> | Appendix D  | Pass    |
|                                | 5250-5350 | 15.407(b)(2)<br>15.407(b)(6)                           | <ul style="list-style-type: none"> <li>F&lt;1GHz:<br/>§15.209/§7.2.5 limit (QP).</li> </ul>                                                                                                                                                                               |             |         |

| Test Item                               | Band                                             | FCC Rule                                               | Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Test Result | Verdict |
|-----------------------------------------|--------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------|
|                                         |                                                  | 15.407(b)(7)<br>15.209                                 | <ul style="list-style-type: none"> <li>F<math>\geq</math>1GHz &amp; out-restricted:<br/>&lt;-27dBm/MHz PK e.i.r.p.<br/>(exl. 5.25-5.35 GHz).</li> <li>F<math>\geq</math>1GHz &amp; in-restricted:<br/>§15.209/§7.2.5 limit<br/>(AV&amp;PK).</li> </ul>                                                                                                                                                                                                                                     |             |         |
|                                         | 5470-5725                                        | 15.407(b)(3)<br>15.407(b)(6)<br>15.407(b)(7)<br>15.209 | <ul style="list-style-type: none"> <li>F&lt;1GHz:<br/>§15.209/§7.2.5 limit (QP).</li> <li>F<math>\geq</math>1GHz &amp; out-restricted:<br/>&lt;-27dBm/MHz PK e.i.r.p.<br/>(exl. 5.47-5.725 GHz).</li> <li>F<math>\geq</math>1GHz &amp; in-restricted:<br/>§15.209/§7.2.5 limit<br/>(AV&amp;PK).</li> </ul>                                                                                                                                                                                 |             |         |
|                                         | 5725-5850                                        | 15.407(b)(4)<br>15.407(b)(6)<br>15.407(b)(7)<br>15.209 | <ul style="list-style-type: none"> <li>F&lt;1GHz:<br/>§15.209/§7.2.5 limit (QP)</li> <li>F<math>\geq</math>1GHz &amp; out-restricted:<br/>&lt;-17dBm/MHz PK<br/>e.i.r.p.(from the edge to 10<br/>MHz above or below the<br/>band edge);<br/>&lt;-27dBm/MHz PK<br/>e.i.r.p( for frequencies 10<br/>MHz or<br/>greater above or below<br/>the band edge)<br/>(exl. 5725-5850 GHz).</li> <li>F<math>\geq</math>1GHz &amp; in-restricted:<br/>§15.209/§7.2.5 limit<br/>(AV&amp;PK).</li> </ul> |             |         |
| Frequency<br>Stability                  | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 15.407(g)                                              | FCC Part 15.407(g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Appendix E  | Pass    |
| AC Power Line<br>Conducted<br>Emissions | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 15.207                                                 | FCC Part 15.207 conducted<br>limit;                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Appendix F  | Pass    |

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

#### 3.1 General Description

H1511 is subscriber equipment in the LTE/WCDMA/CDMA/GSM system. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The HSPA+/UMTS frequency band is Band I and Band II and Band IV and Band V. The CDMA/1XEV-DO band is BC1 and BC0 and BC10. The LTE frequency band is B2 and B3 and B4 and B5 and B7 and B12 and B13 and B17 and B25 and B26 and B29 and B30 and B41. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/HSPA/UMTS and GSM/GPRS/EDGE and CDMA2000 1x and 1XEV-DO protocol processing, voice, video MMS service, GPS, AGPS NFC and WIFI etc. Externally it provides micro SD card interface (it can also used as micro SD card interface), earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

#### 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       |                  |                    |
|-------------|------------------|--------------------|
| Description | Hardware Version | Software Version   |
| Main board  | HL1NINAMH        | User release M MDA |

##### 3.2.2 Sub-Assembly

| Sub-Assembly      |              |                               |                                                                                                                                                                         |
|-------------------|--------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sub-Assembly Name | Model        | Manufacturer                  | Description                                                                                                                                                             |
| Adapter           | HW-050300U00 | Huawei Technologies Co., Ltd. | Input Voltage: ~100-240V 50/60Hz 0.5A<br>Output Voltage: 5V  3A<br>Rated Power: 5W |
| Adapter           | HW-050300E00 | Huawei Technologies Co., Ltd. | Input Voltage: ~100-240V 50/60Hz 0.5A<br>Output Voltage: 5V  3A<br>Rated Power: 5W |
| Adapter           | HW-050300B00 | Huawei Technologies           | Input Voltage: ~100-240V 50/60Hz 0.5A                                                                                                                                   |

| Sub-Assembly      |              |                               |                                                                                                                                                                                                                                                           |
|-------------------|--------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sub-Assembly Name | Model        | Manufacturer                  | Description                                                                                                                                                                                                                                               |
|                   |              | Co., Ltd.                     | Output Voltage: 5V  3A<br>Rated Power: 5W                                                                                                                              |
| Adapter           | HW-050300A00 | Huawei Technologies Co., Ltd. | Input Voltage: ~100-240V 50/60Hz 0.5A<br>Output Voltage: 5V  3A<br>Rated Power: 5W                                                                                     |
| Adapter           | HW-050300J00 | Huawei Technologies Co., Ltd. | Input Voltage: ~100-240V 50/60Hz 0.5A<br>Output Voltage: 5V  3A<br>Rated Power: 5W                                                                                     |
| Adapter           | HW-050300R00 | Huawei Technologies Co., Ltd. | Input Voltage: ~100-240V 50/60Hz 0.5A<br>Output Voltage: 5V  3A<br>Rated Power: 5W                                                                                     |
| Adapter           | HW-050300I00 | Huawei Technologies Co., Ltd. | Input Voltage: ~100-240V 50/60Hz 0.5A<br>Output Voltage: 5V  3A<br>Rated Power: 5W                                                                                   |
| Battery           | HB416683ECW  | Huawei Technologies Co., Ltd. | Rated capacity: 3450mAh<br>Nominal Voltage:  +3.8V<br>Charging Voltage:  +4.35V |

### 3.3 Technical Description

| Characteristics                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 802.11 WLAN Mode Supported | <input checked="" type="checkbox"/> 802.11a (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11n (20 MHz channel bandwidth),<br><input checked="" type="checkbox"/> 802.11n (40 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11ac (20 MHz channel bandwidth),<br><input checked="" type="checkbox"/> 802.11ac (40 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11ac (80 MHz channel bandwidth), |                                                                                                                                                                                                                                                    |
| TX/RX Operating Range           | All                                                                                                                                                                                                                                                                                                                                                                                                                                                      | $f_c = 5000 \text{ MHz} + N * 5 \text{ MHz}$ , where:<br>- $f_c$ = "Operating Frequency" in MHz,<br>- $N$ = "Channel Number".                                                                                                                      |
|                                 | 5150-5250 MHz (U-NII)                                                                                                                                                                                                                                                                                                                                                                                                                                    | $N = 36$ to $48$ with step of $4$ for the $20 \text{ MHz}$ channel bandwidth.<br>$N = 38$ to $46$ with step of $4$ for the $40 \text{ MHz}$ channel bandwidth.<br>$N = 42$ for the $80 \text{ MHz}$ channel bandwidth.                             |
|                                 | 5250-5350 MHz (U-NII)                                                                                                                                                                                                                                                                                                                                                                                                                                    | $N = 52$ to $64$ with step of $4$ for the $20 \text{ MHz}$ channel bandwidth.<br>$N = 54$ to $62$ with step of $4$ for the $40 \text{ MHz}$ channel bandwidth.<br>$N = 58$ for the $80 \text{ MHz}$ channel bandwidth.                             |
|                                 | 5470-5725 MHz (U-NII)                                                                                                                                                                                                                                                                                                                                                                                                                                    | $N = 100$ to $140$ with step of $4$ for the $20 \text{ MHz}$ channel bandwidth.<br>$N = 102$ to $134$ with step of $4$ for the $40 \text{ MHz}$ channel bandwidth.<br>$N = 106$ for the $80 \text{ MHz}$ channel bandwidth.                        |
|                                 | 5725-5850 MHz U-NII                                                                                                                                                                                                                                                                                                                                                                                                                                      | $N = 149$ to $165$ with step of $4$ for the $20 \text{ MHz}$ channel bandwidth.<br>$N = 151$ to $159$ with step of $4$ for the $40 \text{ MHz}$ channel bandwidth.<br>$N = 155$ for the $80 \text{ MHz}$ channel bandwidth.                        |
| Modulation Type                 | BPSK/QPSK/16QAM/64QAM (OFDM).                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                    |
| Emission Designator             | U-NII(5150-5250, 5250-5350, 5470-5725)                                                                                                                                                                                                                                                                                                                                                                                                                   | 19M5G7D (for 802.11a mod),<br>19M9G7D (for 802.11n 20 MHz mode),<br>40M9G7D (for 802.11n 40 MHz mode),<br>19M7G7D (for 802.11ac 20 MHz mode)<br>40M8G7D (for 802.11ac 40 MHz mode)<br>87M2G7D (for 802.11ac 80 MHz mode)                           |
|                                 | U-NII(5725-5850)                                                                                                                                                                                                                                                                                                                                                                                                                                         | 16M7G7D (for 802.11a mod),<br>17M6G7D (for 802.11n 20 MHz mode),<br>36M6G7D (for 802.11n 40 MHz mode),<br>17M5G7D (for 802.11ac 20 MHz mode)<br>36M6G7D (for 802.11ac 40 MHz mode)<br>75M2G7D (for 802.11ac 80 MHz mode)                           |
| TPC                             | <input checked="" type="checkbox"/> Supported, <input type="checkbox"/> Not Supported                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                    |
| Antenna                         | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated                                                                                                                                                                  |
|                                 | Ports                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input checked="" type="checkbox"/> Ant 1, <input checked="" type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3, <input type="checkbox"/> Ant 4                                                                                               |
|                                 | Smart System                                                                                                                                                                                                                                                                                                                                                                                                                                             | <input checked="" type="checkbox"/> SISO (for 802.11a/n/ac),<br><input checked="" type="checkbox"/> CDD (for 802.11a),<br><input checked="" type="checkbox"/> MIMO (for 802.11n/ac),<br><input type="checkbox"/> Diversity (for 802.11a) : Tx & Rx |



| Characteristics | Description |                                                                                                                      |                               |                                 |
|-----------------|-------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
|                 | Gain        | Ant1:1.1 dBi (per antenna port, max.)<br>Ant2:1.2 dBi (per antenna port, max.)                                       |                               |                                 |
|                 | Remark      | When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above. |                               |                                 |
| Power Supply    | Type        | <input checked="" type="checkbox"/> AC/DC Adapter                                                                    | <input type="checkbox"/> PoE: | <input type="checkbox"/> Other: |

## 4 General Test Conditions / Configurations

### 4.1 Test Modes

NOTE: Worst cases for each IEEE 802.11 mode are selected to perform tests.

| Test Mode | Test Modes Description                                                        |
|-----------|-------------------------------------------------------------------------------|
| 11A       | IEEE 802.11a with data rate of 6 Mbps using SISO mode.                        |
| 11A-CDD   | IEEE 802.11a with data rate of 6 Mbps using CDD mode.                         |
| 11N20     | IEEE 802.11n with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.  |
| 11N20m    | IEEE 802.11n with data rate of MCS8 and bandwidth of 20 MHz using MIMO mode.  |
| 11N40     | IEEE 802.11n with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.  |
| 11N40m    | IEEE 802.11n with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.  |
| 11AC20    | IEEE 802.11ac with data rate of MCS0 and bandwidth of 20 MHz using SISO mode. |
| 11AC20m   | IEEE 802.11ac with data rate of MCS8 and bandwidth of 20 MHz using MIMO mode. |
| 11AC40    | IEEE 802.11ac with data rate of MCS0 and bandwidth of 40 MHz using SISO mode. |
| 11AC40m   | IEEE 802.11ac with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode. |
| 11AC80    | IEEE 802.11ac with data rate of MCS0 and bandwidth of 80 MHz using SISO mode. |
| 11AC80m   | IEEE 802.11ac with data rate of MCS8 and bandwidth of 80 MHz using MIMO mode. |

### 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 performed at all TX antenna ports of the EUT, and</li><li>All RX tests are performed at all RX antenna ports 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

##### 4.2.2.1 U-NII

| Test Mode | Test Channel | Frequency[MHz] | Antenna Port | Duty Cycle |
|-----------|--------------|----------------|--------------|------------|
| 11A       | 36           | 5180           | Ant 1        | 95         |
| 11A       | 36           | 5180           | Ant 2        | 95         |
| 11A-CDD   | 36           | 5180           | Ant 1        | 95         |
| 11A-CDD   | 36           | 5180           | Ant 2        | 95         |

|         |     |      |       |    |
|---------|-----|------|-------|----|
| 11A     | 48  | 5240 | Ant 1 | 95 |
| 11A     | 48  | 5240 | Ant 2 | 95 |
| 11A-CDD | 48  | 5240 | Ant 1 | 95 |
| 11A-CDD | 48  | 5240 | Ant 2 | 95 |
| 11A     | 52  | 5260 | Ant 1 | 95 |
| 11A     | 52  | 5260 | Ant 2 | 95 |
| 11A-CDD | 52  | 5260 | Ant 1 | 95 |
| 11A-CDD | 52  | 5260 | Ant 2 | 95 |
| 11A     | 64  | 5320 | Ant 1 | 95 |
| 11A     | 64  | 5320 | Ant 2 | 95 |
| 11A-CDD | 64  | 5320 | Ant 1 | 95 |
| 11A-CDD | 64  | 5320 | Ant 2 | 95 |
| 11A     | 100 | 5500 | Ant 1 | 95 |
| 11A     | 100 | 5500 | Ant 2 | 95 |
| 11A-CDD | 100 | 5500 | Ant 1 | 95 |
| 11A-CDD | 100 | 5500 | Ant 2 | 95 |
| 11A     | 140 | 5700 | Ant 1 | 95 |
| 11A     | 140 | 5700 | Ant 2 | 95 |
| 11A-CDD | 140 | 5700 | Ant 1 | 95 |
| 11A-CDD | 140 | 5700 | Ant 2 | 95 |
| 11A     | 149 | 5745 | Ant 1 | 95 |
| 11A     | 149 | 5745 | Ant 2 | 95 |
| 11A-CDD | 149 | 5745 | Ant 1 | 95 |
| 11A-CDD | 149 | 5745 | Ant 2 | 95 |
| 11A     | 165 | 5825 | Ant 1 | 95 |
| 11A     | 165 | 5825 | Ant 2 | 95 |
| 11A-CDD | 165 | 5825 | Ant 1 | 95 |
| 11A-CDD | 165 | 5825 | Ant 2 | 95 |
| 11N20   | 36  | 5180 | Ant 1 | 95 |
| 11N20   | 36  | 5180 | Ant 2 | 95 |
| 11N20M  | 36  | 5180 | Ant 1 | 91 |
| 11N20M  | 36  | 5180 | Ant 2 | 91 |
| 11N20   | 48  | 5240 | Ant 1 | 95 |
| 11N20   | 48  | 5240 | Ant 2 | 95 |
| 11N20M  | 48  | 5240 | Ant 1 | 91 |
| 11N20M  | 48  | 5240 | Ant 2 | 91 |
| 11N20   | 52  | 5260 | Ant 1 | 95 |
| 11N20   | 52  | 5260 | Ant 2 | 95 |
| 11N20M  | 52  | 5260 | Ant 1 | 91 |

|         |     |      |       |    |
|---------|-----|------|-------|----|
| 11N20M  | 52  | 5260 | Ant 2 | 91 |
| 11N20   | 64  | 5320 | Ant 1 | 95 |
| 11N20   | 64  | 5320 | Ant 2 | 95 |
| 11N20M  | 64  | 5320 | Ant 1 | 91 |
| 11N20M  | 64  | 5320 | Ant 2 | 91 |
| 11N20   | 100 | 5500 | Ant 1 | 95 |
| 11N20   | 100 | 5500 | Ant 2 | 95 |
| 11N20M  | 100 | 5500 | Ant 1 | 91 |
| 11N20M  | 100 | 5500 | Ant 2 | 91 |
| 11N20   | 140 | 5700 | Ant 1 | 95 |
| 11N20   | 140 | 5700 | Ant 2 | 95 |
| 11N20M  | 140 | 5700 | Ant 1 | 91 |
| 11N20M  | 140 | 5700 | Ant 2 | 91 |
| 11N40   | 38  | 5190 | Ant 1 | 90 |
| 11N40   | 38  | 5190 | Ant 2 | 91 |
| 11N40M  | 38  | 5190 | Ant 1 | 83 |
| 11N40M  | 38  | 5190 | Ant 2 | 83 |
| 11N40   | 46  | 5230 | Ant 1 | 90 |
| 11N40   | 46  | 5230 | Ant 2 | 91 |
| 11N40M  | 46  | 5230 | Ant 1 | 83 |
| 11N40M  | 46  | 5230 | Ant 2 | 83 |
| 11N40   | 54  | 5270 | Ant 1 | 90 |
| 11N40   | 54  | 5270 | Ant 2 | 91 |
| 11N40M  | 54  | 5270 | Ant 1 | 83 |
| 11N40M  | 54  | 5270 | Ant 2 | 83 |
| 11N40   | 62  | 5310 | Ant 1 | 90 |
| 11N40   | 62  | 5310 | Ant 2 | 91 |
| 11N40M  | 62  | 5310 | Ant 1 | 83 |
| 11N40M  | 62  | 5310 | Ant 2 | 83 |
| 11N40   | 102 | 5510 | Ant 1 | 90 |
| 11N40   | 102 | 5510 | Ant 2 | 91 |
| 11N40M  | 102 | 5510 | Ant 1 | 83 |
| 11N40M  | 102 | 5510 | Ant 2 | 83 |
| 11N40   | 134 | 5670 | Ant 1 | 90 |
| 11N40   | 134 | 5670 | Ant 2 | 91 |
| 11N40M  | 134 | 5670 | Ant 1 | 83 |
| 11N40M  | 134 | 5670 | Ant 2 | 83 |
| 11AC20  | 36  | 5180 | Ant 1 | 95 |
| 11AC20  | 36  | 5180 | Ant 2 | 95 |
| 11AC20M | 36  | 5180 | Ant 1 | 95 |
| 11AC20M | 36  | 5180 | Ant 2 | 95 |

|         |     |      |       |    |
|---------|-----|------|-------|----|
| 11AC20  | 48  | 5240 | Ant 1 | 95 |
| 11AC20  | 48  | 5240 | Ant 2 | 95 |
| 11AC20M | 48  | 5240 | Ant 1 | 95 |
| 11AC20M | 48  | 5240 | Ant 2 | 95 |
| 11AC20  | 52  | 5260 | Ant 1 | 95 |
| 11AC20  | 52  | 5260 | Ant 2 | 95 |
| 11AC20M | 52  | 5260 | Ant 1 | 95 |
| 11AC20M | 52  | 5260 | Ant 2 | 95 |
| 11AC20  | 64  | 5320 | Ant 1 | 95 |
| 11AC20  | 64  | 5320 | Ant 2 | 95 |
| 11AC20M | 64  | 5320 | Ant 1 | 95 |
| 11AC20M | 64  | 5320 | Ant 2 | 95 |
| 11AC20  | 100 | 5500 | Ant 1 | 95 |
| 11AC20  | 100 | 5500 | Ant 2 | 95 |
| 11AC20M | 100 | 5500 | Ant 1 | 95 |
| 11AC20M | 100 | 5500 | Ant 2 | 95 |
| 11AC20  | 140 | 5700 | Ant 1 | 95 |
| 11AC20  | 140 | 5700 | Ant 2 | 95 |
| 11AC20M | 140 | 5700 | Ant 1 | 95 |
| 11AC20M | 140 | 5700 | Ant 2 | 95 |
| 11AC40  | 38  | 5190 | Ant 1 | 91 |
| 11AC40  | 38  | 5190 | Ant 2 | 90 |
| 11AC40M | 38  | 5190 | Ant 1 | 91 |
| 11AC40M | 38  | 5190 | Ant 2 | 90 |
| 11AC40  | 46  | 5230 | Ant 1 | 91 |
| 11AC40  | 46  | 5230 | Ant 2 | 90 |
| 11AC40M | 46  | 5230 | Ant 1 | 91 |
| 11AC40M | 46  | 5230 | Ant 2 | 90 |
| 11AC40  | 54  | 5270 | Ant 1 | 91 |
| 11AC40  | 54  | 5270 | Ant 2 | 90 |
| 11AC40M | 54  | 5270 | Ant 1 | 91 |
| 11AC40M | 54  | 5270 | Ant 2 | 90 |
| 11AC40  | 62  | 5310 | Ant 1 | 91 |
| 11AC40  | 62  | 5310 | Ant 2 | 90 |
| 11AC40M | 62  | 5310 | Ant 1 | 91 |
| 11AC40M | 62  | 5310 | Ant 2 | 90 |
| 11AC40  | 102 | 5510 | Ant 1 | 91 |
| 11AC40  | 102 | 5510 | Ant 2 | 90 |
| 11AC40M | 102 | 5510 | Ant 1 | 91 |
| 11AC40M | 102 | 5510 | Ant 2 | 90 |
| 11AC40  | 134 | 5670 | Ant 1 | 91 |

|         |     |      |       |    |
|---------|-----|------|-------|----|
| 11AC40  | 134 | 5670 | Ant 2 | 90 |
| 11AC40M | 134 | 5670 | Ant 1 | 91 |
| 11AC40M | 134 | 5670 | Ant 2 | 90 |
| 11AC80  | 42  | 5210 | Ant 1 | 82 |
| 11AC80  | 42  | 5210 | Ant 2 | 82 |
| 11AC80  | 58  | 5290 | Ant 1 | 82 |
| 11AC80  | 58  | 5290 | Ant 2 | 82 |
| 11AC80  | 106 | 5530 | Ant 1 | 82 |
| 11AC80  | 106 | 5530 | Ant 2 | 82 |
| 11AC80M | 42  | 5210 | Ant 1 | 82 |
| 11AC80M | 42  | 5210 | Ant 2 | 82 |
| 11AC80M | 58  | 5290 | Ant 1 | 82 |
| 11AC80M | 58  | 5290 | Ant 2 | 82 |
| 11AC80M | 106 | 5530 | Ant 1 | 82 |
| 11AC80M | 106 | 5530 | Ant 2 | 82 |

### 4.3 Test Environments

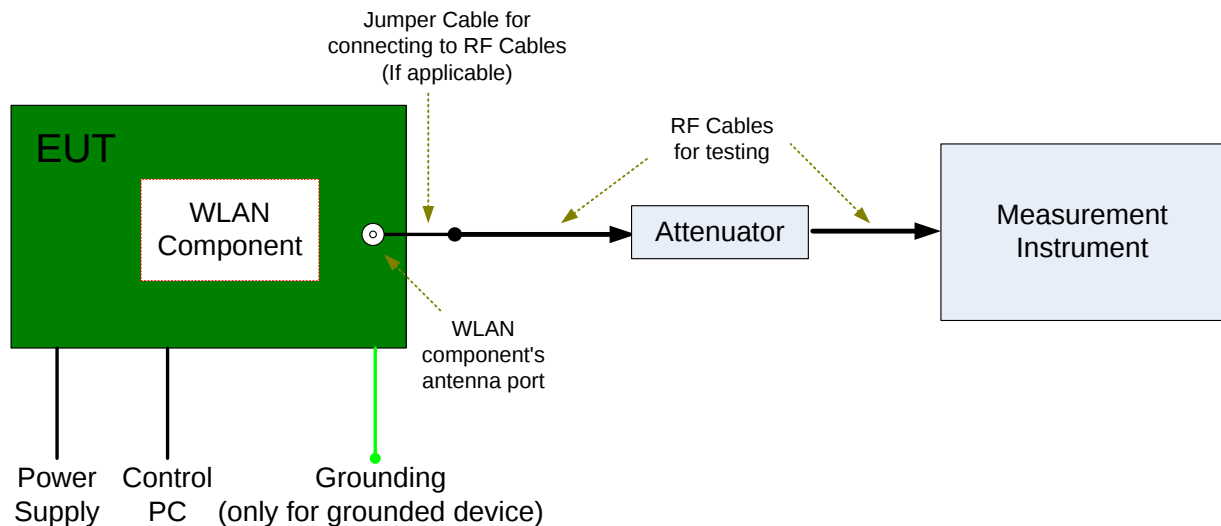
NOTE: The values used in the test report may be stringent than the declared.

| Environment Parameter | Selected Values During Tests |         |                   |
|-----------------------|------------------------------|---------|-------------------|
|                       | Temperature                  | Voltage | Relative Humidity |
| NTNV                  | Ambient                      | 3.8 VDC | Ambient           |

### 4.4 Test Setups

#### 4.4.1 Test Setup 1

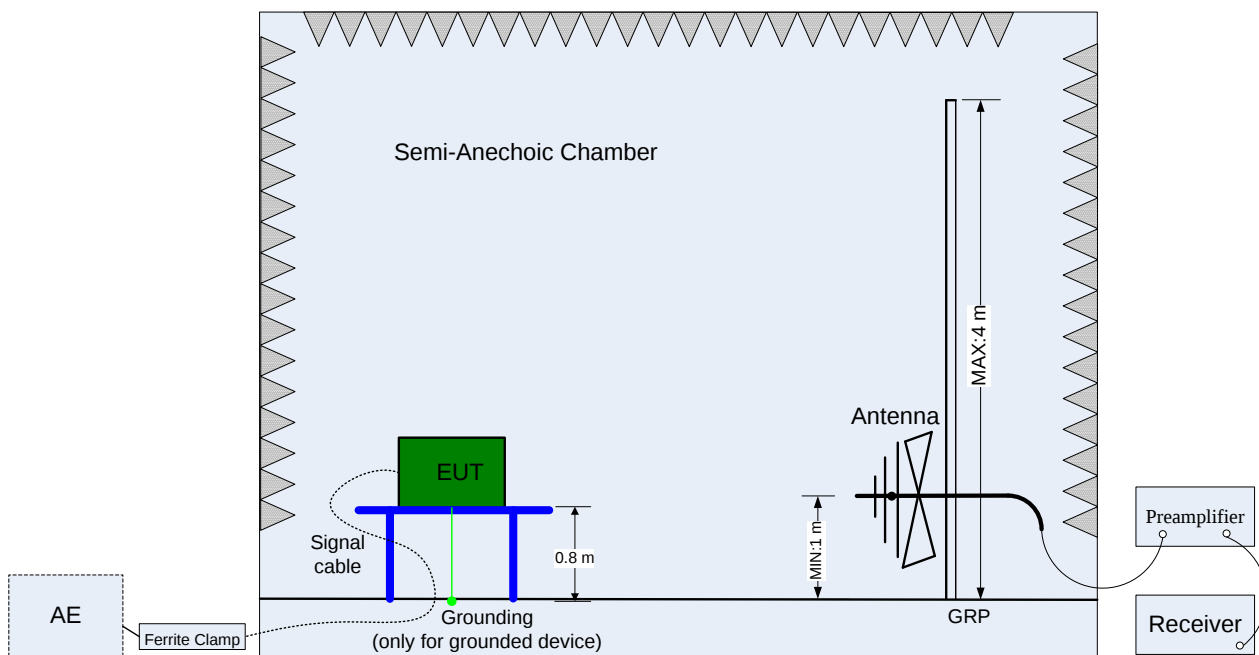
The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



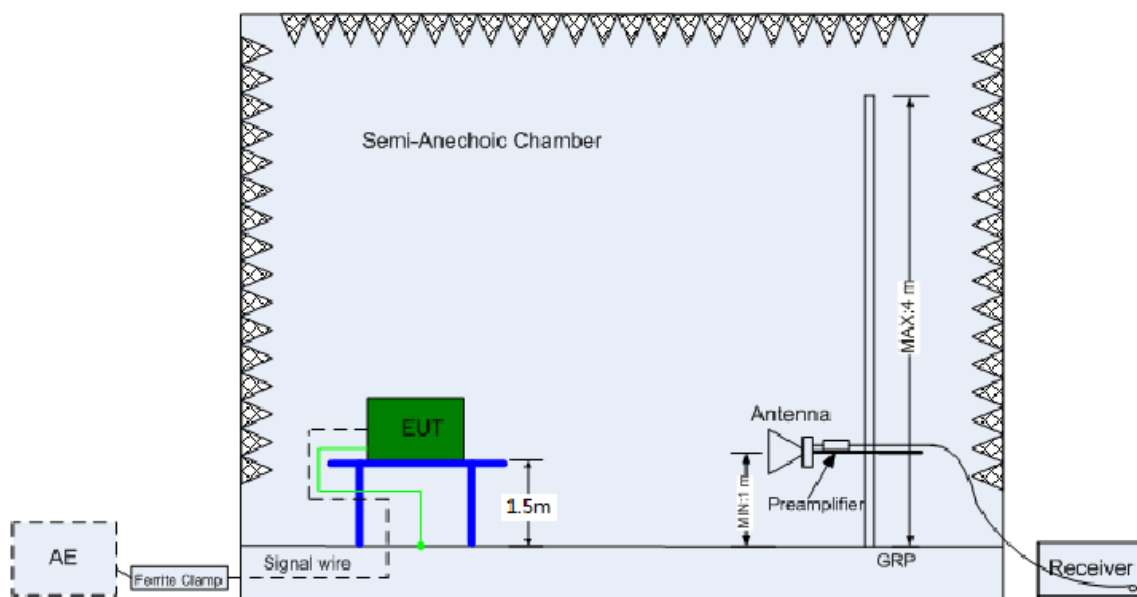
#### 4.4.2 Test Setup 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4. The test distance is 3 m (for 30 MHz to 26.5 GHz) or 1 m (for 26.5 GHz to 40 GHz). The setup is according to ANSI C63.10, ANSI C63.4 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



(Below 1 GHz)

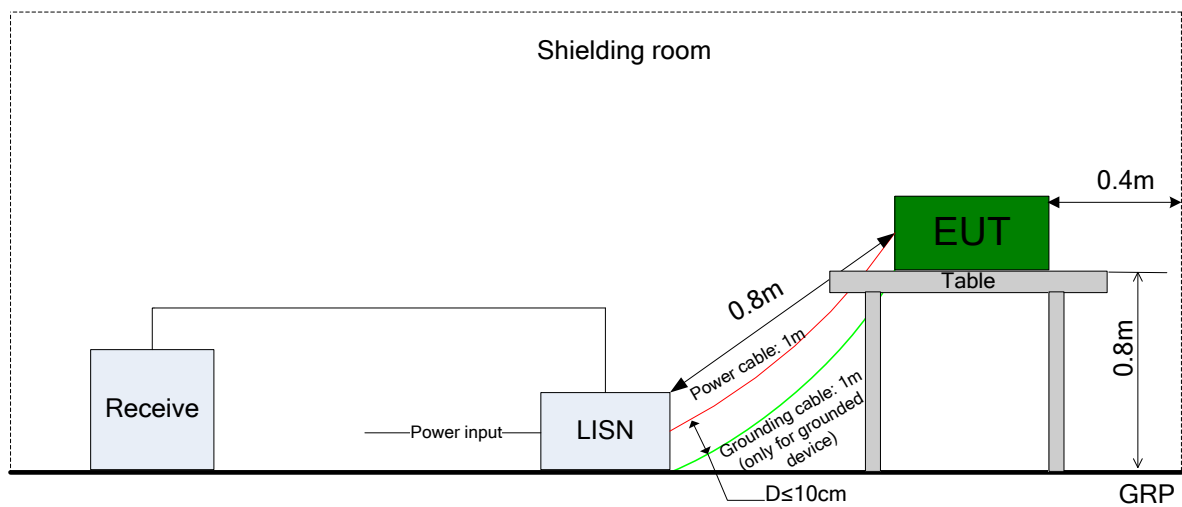


(Above 1 GHz)

### 4.4.3 Test Setup 3

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



## 4.5 Test Conditions

### 4.5.1 U-NII

| Test Case                      | Test Conditions |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                | Configuration   | Description                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 26 dB Emission Bandwidth (EBW) | Meas. Method    | FCC KDB 789033 §D).                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                | Test Env.       | NTNV                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                | Test Setup      | Test Setup 1                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                | EUT Conf.       | All EUT conf. with Tx modes.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Maximum Conducted Output Power | Meas. Method    | FCC KDB 789033 §C)3)b) Method SA-1 and d) Method SA-2.                                                                                                                                                                                                                                                                                                                                                                               |
|                                | Test Env.       | NTNV                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                | Test Setup      | Test Setup 1                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                | EUT Conf.       | All EUT conf. with Tx modes.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Peak Power Spectral Density    | Meas. Method    | FCC KDB 789033 §E).                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                | Test Env.       | NTNV                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                | Test Setup      | Test Setup 1                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                | EUT Conf.       | All EUT conf. with Tx modes.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Peak Excursion Ratio           | Meas. Method    | FCC KDB 789033 §F).                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                | Test Env.       | NTNV                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                | Test Setup      | Test Setup 1                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                | EUT Conf.       | All EUT conf. with Tx modes.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Unwanted Emissions (Cond.)     | Meas. Method    | FCC KDB 789033 §G), Conducted (antenna-port).<br>NOTE: Antenna-port conducted measurements (Cond.) are acceptable as an alternative to radiated measurements (Rad.) for demonstrating compliance to the limits in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test (Radt-a) for cabinet/case emissions will also be required. |
|                                | Test Env.       | NTNV                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                | Test Setup      | Test Setup 1                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                | EUT Conf.       | 5150-5250<br>All EUT Test Mode<br>20 MHz bandwidth: Ch.36, Ch.48<br>40 MHz bandwidth: Ch.38, Ch.46<br>80 MHz bandwidth: Ch.42                                                                                                                                                                                                                                                                                                        |
|                                |                 | 5250-5350<br>All EUT Test Mode<br>20 MHz bandwidth: Ch.52, Ch.64<br>40 MHz bandwidth: Ch.54, Ch.62<br>80 MHz bandwidth: Ch.58                                                                                                                                                                                                                                                                                                        |
|                                |                 | 5470-5725<br>All EUT Test Mode<br>20 MHz bandwidth: Ch.100, Ch.140                                                                                                                                                                                                                                                                                                                                                                   |
|                                |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Test Case                               | Test Conditions |                                                                                                                  |                                                                                                                               |
|-----------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|                                         | Configuration   | Description                                                                                                      |                                                                                                                               |
|                                         |                 |                                                                                                                  | 40 MHz bandwidth: Ch.102, Ch.134<br>80 MHz bandwidth: Ch.106                                                                  |
|                                         |                 | 5725-5850                                                                                                        | All EUT Test Mode<br>20 MHz bandwidth: Ch.149, Ch.157, Ch.165<br>40 MHz bandwidth: Ch.151, Ch.159<br>80 MHz bandwidth: Ch.155 |
| AC Power Line<br>Conducted<br>Emissions | Meas. Method    | AC mains conducted.<br>Pre: RBW = 10 kHz; Det. = Peak.<br>Final: RBW = 9 kHz; Det. = CISPR Quasi-Peak & Average. |                                                                                                                               |
|                                         | Test Env.       | NTNV                                                                                                             |                                                                                                                               |
|                                         | Test Setup      | Test Setup 3                                                                                                     |                                                                                                                               |
|                                         | EUT Conf.       | (Worst Conf.)                                                                                                    |                                                                                                                               |



## 5 Main Test Instruments

| Equipment Name                                  | Manufacturer | Model     | Serial Number  | Cal Date   | Cal- Due   |
|-------------------------------------------------|--------------|-----------|----------------|------------|------------|
| Power supply                                    | KEITHLEY     | 2303      | A120714713     | 2014-08-07 | 2016-08-06 |
| Wireless Communication Test set                 | Agilent      | N4010A    | MY49081592     | 2014-11-04 | 2015-11-03 |
| Universal Radio Communication Tester            | R&S          | CMU200    | 123299         | 2014-11-04 | 2015-11-03 |
| Spectrum Analyzer                               | Agilent      | N9020A    | MY52090652     | 2015-07-08 | 2016-07-07 |
| Universal Radio Communication Tester            | R & S        | CMW500    | 126854         | 2015-02-13 | 2016-02-12 |
| Spectrum Analyzer                               | Agilent      | E4440A    | MY48250119     | 2015-07-08 | 2016-07-07 |
| Signal Analyzer                                 | R&S          | FSQ31     | 200021         | 2014-11-04 | 2015-11-03 |
| Spectrum Analyzer                               | Agilent      | N9030A    | MY49431698     | 2014-11-04 | 2015-11-03 |
| Temperature Chamber                             | WEISS        | WKL64     | 56246002940010 | 2015-02-13 | 2016-02-12 |
| Signal generator                                | Agilent      | E8257D    | MY49281095     | 2014-11-04 | 2015-11-03 |
| Vector Signal Generator                         | R&S          | SMU200A   | 104162         | 2014-11-04 | 2015-11-03 |
| Power Detecting & Sampling Unit                 | R&S          | OSP-B157  | 100881         | 2014-09-08 | 2015-10-07 |
| Signal Generator                                | Agilent      | E4438C    | MY47271904     | 2014-10-28 | 2015-10-27 |
| Test receiver                                   | R&S          | ESU26     | 100387         | 2015-6-24  | 2016-06-23 |
| Test receiver                                   | R&S          | ESCI      | 101163         | 2015-6-24  | 2016-06-23 |
| Spectrum analyzer                               | R&S          | FSU3      | 200474         | 2015-06-15 | 2016-06-14 |
| Spectrum analyzer                               | R&S          | FSU43     | 100144         | 2015-06-15 | 2016-06-14 |
| LOOP Antennas(9kHz-30MHz)                       | R&S          | HFH2-Z2   | 100262         | 2015-4-30  | 2017-4-29  |
| LOOP Antennas(9kHz-30MHz)                       | R&S          | HFH2-Z2   | 100263         | 2015-4-30  | 2017-4-29  |
| Trilog Broadband Antenna (30M~3GHz)             | SCHWARZB ECK | VULB 9163 | 9163-490       | 2015-4-30  | 2017-4-29  |
| Trilog Broadband Antenna (30M~3GHz)             | SCHWARZB ECK | VULB 9163 | 9163-520       | 2015-4-30  | 2017-4-29  |
| Double-Ridged Waveguide Horn Antenna (1G~18GHz) | R&S          | HF907     | 100304         | 2015-4-30  | 2017-4-29  |
| double ridged horn antenna (0.8G-18GHz)         | R&S          | HF907     | 100305         | 2015-4-30  | 2017-4-29  |
| Pyramidal Horn Antenna(18GHz-26.5GHz)           | ETS-Lindgren | 3160-09   | 5140299        | 2015-7-15  | 2017-7-14  |
| Artificial Main Network                         | R&S          | ENV4200   | 100134         | 2015-6-24  | 2016-6-23  |
| Line Impedance Stabilization Network            | R&S          | ENV216    | 100382         | 2015-6-24  | 2016-6-23  |

END