



中国认可  
国际互认  
检测  
TESTING  
CNAS L0310



# FCC RF Test Report

**Product Name: Mobile WiFi**

**Model Number: 801HW**

**Report No.: SYBH(Z-RF)20180926023001-2003**

**FCC ID: QIS801HW**

**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 recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.
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 laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named "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

**Date of Receipt Sample:** 2018-10-25  
**Start Date of Test:** 2018-10-29  
**End Date of Test:** 2018-11-20

**Test Result:** Pass

|                                     |            |        |               |
|-------------------------------------|------------|--------|---------------|
| <b>Approved by Senior Engineer:</b> | 2018-11-20 | He Hao | <i>He Hao</i> |
|                                     | Date       | Name   | Signature     |

|                     |            |            |                   |
|---------------------|------------|------------|-------------------|
| <b>Prepared by:</b> | 2018-11-20 | ZhouLingbo | <i>ZhouLingbo</i> |
|                     | Date       | Name       | Signature         |



## CONTENT

|     |   |    |
|-----|---|----|
| 1   | General Information.....                            | 5  |
| 1.1 | Applied Standard.....                               | 5  |
| 1.2 | Test Location .....                                 | 5  |
| 1.3 | Test Environment Condition.....                     | 5  |
| 2   | Test Summary .....                                  | 6  |
| 2.1 | Measurement Technical Requirements.....             | 6  |
| 3   | Description of the Equipment under Test (EUT) ..... | 8  |
| 3.1 | General Description .....                           | 8  |
| 3.2 | EUT Identity .....                                  | 8  |
| 3.3 | Technical Description.....                          | 9  |
| 4   | General Test Conditions / Configurations.....       | 10 |
| 4.1 | Test Modes .....                                    | 10 |
| 4.2 | EUT Configurations.....                             | 10 |
| 4.3 | Test Environments .....                             | 12 |
| 4.4 | Test Setups.....                                    | 13 |
| 4.5 | Test Conditions .....                               | 14 |
| 5   | Main Test Instruments .....                         | 15 |
| 6   | Measurement Uncertainty.....                        | 16 |
| 7   | Appendixes.....                                     | 16 |



## 1 General Information

### 1.1 **Applied Standard**

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

Test Method:            KDB 789033 D02 General UNII Test Procedures New Rules v02  
                                  FCC KDB 558074 D01 DTS Meas Guidance v04  
                                  ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices

### 1.2 **Test Location**

Test Location 1:        Reliability Laboratory of Huawei Technologies Co., Ltd.  
Address1:                No.2 New City Avenue Songshan Lake Sci. &Tech. Industry Park, Dongguan, Guangdong,  
                                  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 Measurement Technical Requirements

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

| Test Item                      | Band      | FCC Rule No.                 | 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)    |  |             |         |
| Occupied Bandwidth             | 5150-5250 | KDB 789033<br>D02<br>§ B     | No limit.  | Appendix B  | Pass    |
|                                | 5250-5350 |                              |  |             |         |
|                                | 5470-5725 |                              |  |             |         |
| Duty Cycle                     | 5150-5725 | --                           | No limit.  | Appendix C  | Pass    |
| Maximum Output Power           | 5150-5250 | 15.407(a)(1)<br>15.407(a)(4) | FCC:<br>conducted<br>< 250mW<br>(avg during transmission)                      | Appendix D  |         |
|                                | 5250-5350 | 15.407(a)(2)<br>15.407(a)(4) | FCC:conducted<br><MIN{250mW,11dBm+10*Ig(EBW)}<br>(avg during transmission)     |             |         |
|                                | 5470-5725 | 15.407(a)(2)<br>15.407(a)(4) | FCC:<br>conducted<br><MIN{250mW,11dBm+10*Ig(EBW)}<br>(avg during transmission) |             |         |
| maximum Power Spectral Density | 5150-5250 | 15.407(a)(1)<br>15.407(a)(4) | FCC<br>conducted<br><11dBm/MHz<br>(avg during transmission)                    | Appendix E  |         |
|                                | 5250-5350 | 15.407(a)(2)<br>15.407(a)(4) | conducted<br><11dBm/MHz<br>(avg during transmission)                           |             |         |



| Test Item           | Band                                | FCC Rule No.                 | Requirements  | Test Result | Verdict |
|---------------------|-------------------------------------|------------------------------|---|-------------|---------|
|                     | 5470-5725                           | 15.407(a)(2)<br>15.407(a)(4) | conducted<br><11dBm/MHz<br>(avg during transmission)                        |             |         |
| Frequency Stability | 5150-5250<br>5250-5350<br>5470-5725 | 15.407(g)                    | an emission is maintained within the band of operation under all conditions | Appendix F  | Pass    |



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

#### 3.1 General Description

801HW which supports LTE B2,B4,B12,B17,B25,B26,B41,And WCDMA HSDPA/HSUPA B2, B4, and CA. 801HW implement such functions as RF signal receiving/ transmitting, LTE/UMTS protocol processing, data service etc., and it can act as a Wi-Fi hotspot for user accessing to internet. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface. 801HW has 6 internal antennas as default Wi-Fi, diversity, and main antenna. The Wi-Fi is 2X2 and the frequency are 2.4GHz and 5GHz.

Note: Only 5G WIFI test data included in this report.


#### 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  | CL1SB08M         | 8.0.1.31(H60SP9C643) |

##### 3.2.2 Sub-Assembly

| Sub-Assembly       |               |                               |   |
|--------------------|---------------|-------------------------------|---|
| Sub-Assembly Name  | Model         | Manufacturer                  | Description   |
| Li-Polymer Battery | HB494590EBC-B | Huawei Technologies Co., Ltd. | Rated capacity: 3000mAh<br>Nominal Voltage:  +3.8V |





### 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 $8$ 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 $8$ 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 $8$ for the $40 \text{ MHz}$ channel bandwidth.<br>$N = 106$ to $122$ with step of $16$ for the $80 \text{ MHz}$ channel bandwidth. |                               |                                 |
| Modulation Type                 | BPSK/QPSK/16QAM/64QAM (OFDM).  |  |                               |                                 |
| Emission Designator             | U-NII(5150-5250, 5250-5350, 5470-5725,)  | 20M8G7D (for 802.11a mod),<br>20M4G7D (for 802.11n 20 MHz mode),<br>39M8G7D (for 802.11n 40 MHz mode),<br>20M3G7D (for 802.11ac 20 MHz mode)<br>39M9G7D (for 802.11ac 40 MHz mode)<br>103MG7D (for 802.11ac 80 MHz mode)                               |                               |                                 |
| TPC                             | <input checked="" type="checkbox"/> Supported, <input type="checkbox"/> Not Supported  |  |                               |                                 |
| Antenna                         | Description  | Isotropic 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"/> MIMO (for 802.11n/ac),<br><input type="checkbox"/> Diversity (for 802.11a) :           Tx &           Rx   |                               |                                 |
|                                 | Gain   | ANT1:4.3 dBi (per antenna port, max.)<br>ANT2:4.8 dBi(per antenna port, max.)<br>MIMO&CDD:3.2 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 SISO 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 | Power Conf., per Port                            |  | Duty cycle [%] |       |
|-----------|--|--|----------------|-------|
|           | ANT1   | ANT2   | ANT1           | ANT2  |
| 11A       | CH36:13<br>CH100:11<br>CH140:12.5<br>Others:13.5 | CH36:13<br>CH100:11<br>CH140:12.5<br>Others:13.5 | 98.94          | 98.94 |
| 11A_CDD   | CH36:15  |  | 98.94          | 98.94 |



| Test Mode     | Power Conf., per Port                           |   | Duty cycle [%] |       |
|---------------|---|---|----------------|-------|
|               |   |   |                |       |
|               | CH100:13<br>CH140:14.5<br>Others:15.5           |   |                |       |
| 11N_20M_SISO  | CH140:10<br>Others:11                           | CH140:10<br>Others:11                         | 98.86          | 98.86 |
| 11N_40M_SISO  | CH38:10<br>CH62:8.5<br>CH102:8.5<br>Others:11   | CH38:10<br>CH62:8.5<br>CH102:8.5<br>Others:11 | 96.64          | 96.64 |
| 11N_20M_MIMO  | CH140:12<br>Others:13                           |   | 98.07          | 98.07 |
| 11N_40M_MIMO  | CH38:12<br>CH62:10.5<br>CH102:10.5<br>Others:13 |   | 97.31          | 97.31 |
| 11AC_20M_SISO | CH140:10<br>Others:11                           | CH140:10<br>Others:11                         | 98.87          | 98.87 |
| 11AC_20M_MIMO | CH140:12<br>Others:13                           |   | 98.09          | 98.09 |
| 11AC_40M_SISO | CH38:10<br>CH62:8.5<br>CH102:8.5<br>Others:11   | CH38:10<br>CH62:8.5<br>CH102:8.5<br>Others:11 | 96.66          | 96.64 |
| 11AC_40M_MIMO | CH38:12<br>CH62:10.5<br>CH102:10.5<br>Others:13 |   | 97.33          | 97.33 |
| 11AC_80M_SISO | CH42:8<br>CH58:6<br>CH106:4<br>CH122:11         | CH42:8<br>CH58:6<br>CH106:4<br>CH122:11       | 96.91          | 97.12 |
| 11AC_80M_MIMO | CH42:10<br>CH58:8<br>CH106:6<br>CH122:13        |   | 94.78          | 94.78 |



### 4.3 Test Environments

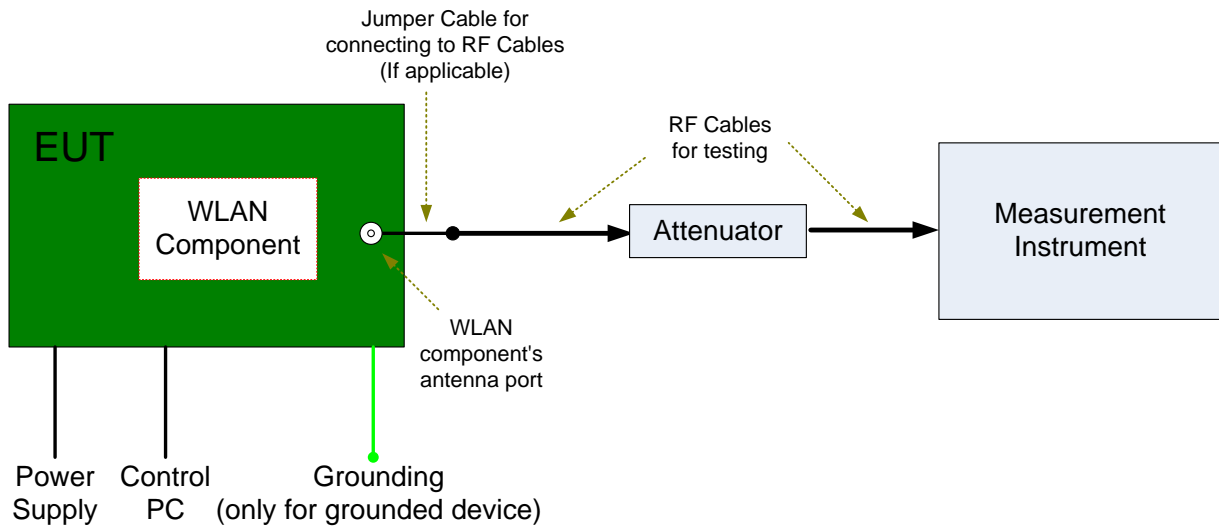
| Environment Parameter | Selected Values During Tests |         |
|-----------------------|------------------------------|---------|
| Relative Humidity     | Ambient                      |         |
| Temperature           | TN                           | Ambient |
| Voltage               | VL                           | 3.45V   |
|                       | VN                           | 3.8V    |
|                       | VH                           | 4.25V   |

NOTE: VL= lower extreme test voltage  
VN= nominal voltage  
VH= upper extreme test voltage  
TN= normal temperature

## 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.





## 4.5 Test Conditions

### 4.5.1 U-NII

| Test Case                      | Test Conditions |  |
|--------------------------------|-----------------|--|
|                                | Configuration   | Description  |
| Emission Bandwidth (EBW)       | Meas. Method    | FCC KDB 789033 D02 §C).  |
|                                | Test Env.       | NTNV   |
|                                | Test Setup      | Test Setup 1   |
|                                | EUT Conf.       | All EUT conf. with Tx modes.   |
| Occupied Bandwidth (OBW)       | Meas. Method    | FCC KDB 789033 D02 §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 D02 §E)3) b)  |
|                                | Test Env.       | NTNV   |
|                                | Test Setup      | Test Setup 1   |
|                                | EUT Conf.       | All EUT conf. with Tx modes.   |
| Maximum Power Spectral Density | Meas. Method    | FCC KDB 789033 D02 §F).  |
|                                | Test Env.       | NTNV   |
|                                | Test Setup      | Test Setup 1   |
|                                | EUT Conf.       | All EUT conf. with Tx modes.   |
| Frequency Stability            | Meas. Method    | 15.407(g)<br>Frequency Stability   |
|                                | Test Env.       | (1) -30 °C to +50 °C with step 10 °C at Rated Voltage;<br>(2) VL, VN and VH of Rated Voltage at Ambient Climate. |
|                                | Test Setup      | Test Setup 1   |
|                                | EUT Conf.       | Ch.36,Ch.140   |



## 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.

### Test Address 1:

| Main Test Equipments |              |          |                |            |            |
|----------------------|--------------|----------|----------------|------------|------------|
| Equipment Name       | Manufacturer | Model    | Serial Number  | Cal Date   | Cal- Due   |
| Power supply         | KEITHLEY     | 2303     | 1342889        | 2018/10/23 | 2019/10/22 |
| Spectrum Analyzer    | Agilent      | N9030A   | MY49431698     | 2018/7/23  | 2019/7/23  |
| Signal generator     | Agilent      | E8257D   | MY49281095     | 2018/7/23  | 2019/7/22  |
| BT/WIFI test system  | Tonscend     | JS0806-2 | 188060102      | 2018/05/30 | 2019/05/29 |
| Temperature Chamber  | WEISS        | WKL64    | 56246002940010 | 2017/12/13 | 2018/12/12 |



## 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  |
|-----------------------------|-------------------------|---|
| Transmit Output Power Data  | Power [dBm]             | U = 0.58 dB   |
| RF Power Density, Conducted | Power [dBm]             | U = 0.64 dB   |
| Bandwidth                   | Magnitude [kHz]         | 20MHz: U=41.78kHz<br>40MHz: U=82.12kHz<br>80MHz: U=163.5kHz |
| Frequency Stability         | Frequency Accuracy [Hz] | U=82.24Hz   |
| Duty Cycle                  | Duty Cycle [%]          | U=±2.06 %   |

## 7 Appendixes

| Appendix No.                    | Description         |
|---------------------------------|---------------------|
| SYBH(Z-RF)20180926023001-2003-A | Appendix for 5 WLAN |

END