# FCC RF Test Report

| | | |
|---|---|---|
| APPLICANT | : | ZTE CORPORATION |
| EQUIPMENT | : | WCDMA/LTE Multi-Mode Digital Mobile Phone |
| BRAND NAME | : | ZTE |
| MODEL NAME | : | A1 |
| FCC ID | : | SRQ-ZTEA1 |
| STANDARD | : | FCC Part 15 Subpart E §15.407 |
| CLASSIFICATION | : | (NII) Unlicensed National Information Infrastructure |

**The product was received on Jul. 21, 2015 and testing was completed on Aug. 14, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.**

**Reviewed by: Joseph Lin / Supervisor**

**Approved by: Jones Tsai / Manager**

Testing Laboratory
2627

***SPORTON INTERNATIONAL (KUNSHAN) INC.***
***No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China***

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR572101E | Rev. 01 | Initial issue of report | Aug. 21, 2015 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | IC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|---|
| 3.1 | 2.1049<br>15.403(i) | RSS-247<br>Section 6 | 26dB & 99% Bandwidth | - | Pass | - |
| 3.2 | 15.407(a) | RSS-247<br>Section 6 | Maximum Conducted Output Power | FCC<br>≤24 dBm<br>(depend on band)<br>IC<br>RSS-247<br>Section 6 Limit | Pass | - |
| 3.3 | 15.407(a) | RSS-247<br>Section 6 | Power Spectral Density | FCC<br>≤11 dBm<br>(depend on band)<br>IC<br>RSS-247<br>Section 6 Limit | Pass | - |
| 3.4 | 15.407(b) | RSS-247<br>Section 6 | Unwanted Emissions | ≤ -17, -27 dBm<br>(depend on band)&15.209(a) | Pass | Under limit 7.45 dB at 48.430 MHz |
| 3.5 | 15.207 | RSS-Gen<br>8.8 | AC Conducted Emission | 15.207(a) | Pass | Under limit 8.60 dB at 0.490 MHz |
| 3.6 | 15.407(g) | - | Frequency Stability | Within Operation Band | Pass | - |
| 3.7 | 15.407(c) | RSS-247<br>6.4(2) | Automatically Discontinue Transmission | Discontinue Transmission | Pass | - |
| 3.8 | 15.203 &<br>15.407(a) | N/A | Antenna Requirement | N/A | Pass | - |

# 1 General Description

## 1.1 Applicant

**ZTE CORPORATION**
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.2 Manufacturer

**ZTE CORPORATION**
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.3 Feature of Equipment Under Test

| Product Feature & Specification | |
|---|---|
| **Equipment** | WCDMA/LTE Multi-Mode Digital Mobile Phone |
| **Brand Name** | ZTE |
| **Model Name** | A1 |
| **FCC ID** | SRQ-ZTEA1 |
| **EUT supports Radios application** | GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(Downlink Only)/LTE/NFC<br>WLAN 2.4GHz 802.11b/g/n HT20<br>WLAN 5GHz 802.11ac VHT20/VHT40/VHT80<br>Bluetooth v2.1 + EDR/Bluetooth v4.0 LE |
| **IMEI Code** | Conducted: 867239027005954<br>Radiation: 867239027004841/867239027004801<br>Conduction: 867239027004544/867239027004501 |
| **HW Version** | wsjB |
| **SW Version** | P897A10V1.0.0B01 |
| **EUT Stage** | Production Unit |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

| Product Specification subjective to this standard | |
|---|---|
| **Tx/Rx Frequency Range** | 5180 MHz ~ 5240 MHz |
| **Maximum Output Power to Antenna** | 802.11ac VHT20 : 11.18 dBm / 0.0131 W<br>802.11ac VHT40 : 10.82 dBm / 0.0121 W<br>802.11ac VHT80 : 11.14 dBm / 0.0130 W |
| **99% Occupied Bandwidth** | 802.11ac VHT20: 19.00 MHz<br>802.11ac VHT40 : 36.50 MHz<br>802.11ac VHT80 : 74.88 MHz |
| **Antenna Type / Gain** | IFA Antenna with gain 0.30 dBi |
| **Type of Modulation** | 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) |

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Testing Location

| | | | | |
|---|---|---|---|---|
| **Test Site** | SPORTON INTERNATIONAL (KUNSHAN) INC. | | | |
| **Test Site Location** | No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China<br>TEL: +86-0512-5790-0158<br>FAX: +86-0512-5790-0958 | | | |
| **Test Site No.** | **Sporton Site No.** | | | **FCC/IC Registration No.** |
| | TH01-KS | 03CH02-KS | CO01-KS | 418269/4086E |

**Note:** The test site complies with ANSI C63.4 2009 requirement.

## 1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01
- ANSI C63.10-2013
- IC RSS-247 Issued 1
- IC RSS-Gen Issue 4

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. FCC permits the use of the 1.5 meter table as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

## 2.1 Carrier Frequency Channel

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5150-5250 MHz Band 1 (U-NII-1) | 36 | 5180 | 44 | 5220 |
| | **38** | **5190** | **46** | **5230** |
| | 40 | 5200 | 48 | 5240 |
| | 42 | 5210 | | |

**Note:** The above Frequency and Channel in boldface were 802.11n HT40.

## 2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

| WLAN 5GHz 802.11ac VHT20 Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. MCS Index | | | | | | | | |
| Channel | Frequency (MHz) | MCS Index MCS0 | Channel | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | MCS8 |
| CH 36 | 5180 | **11.18** | CH 36 | 11.12 | 11.17 | 11.01 | 11.11 | 11.16 | 11.08 | 11.10 | 11.04 |
| CH 44 | 5220 | 10.99 | | | | | | | | | |
| CH 48 | 5240 | 10.95 | | | | | | | | | |

| WLAN 5GHz 802.11ac VHT40 Average Power (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | | | | | | |
| Channel | Frequency (MHz) | MCS Index MCS0 | Channel | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | MCS8 | MCS9 |
| CH 38 | 5190 | **10.82** | CH 38 | 10.77 | 10.70 | 10.59 | 10.69 | 10.75 | 10.80 | 10.62 | 10.65 | 10.74 |
| CH 46 | 5230 | 10.60 | | | | | | | | | | |

| WLAN 5GHz 802.11ac VHT80 Average Power (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | | | | | | |
| Channel | Frequency (MHz) | MCS Index MCS0 | Channel | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | MCS8 | MCS9 |
| CH 42 | 5210 | **11.14** | CH 42 | 11.09 | 11.10 | 11.08 | 11.03 | 11.13 | 11.11 | 11.02 | 11.04 | 10.96 |

## 2.3 Test Mode

**Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.**

| Modulation | Data Rate |
|---|---|
| 802.11ac VHT20 | MCS0 |
| 802.11ac VHT40 | MCS0 |
| 802.11ac VHT80 | MCS0 |

| Test Cases | |
|---|---|
| AC Conducted Emission | Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter) |
| **Remark:** For Radiated TCs, the tests were performed with adapter, earphone and USB cable. | |

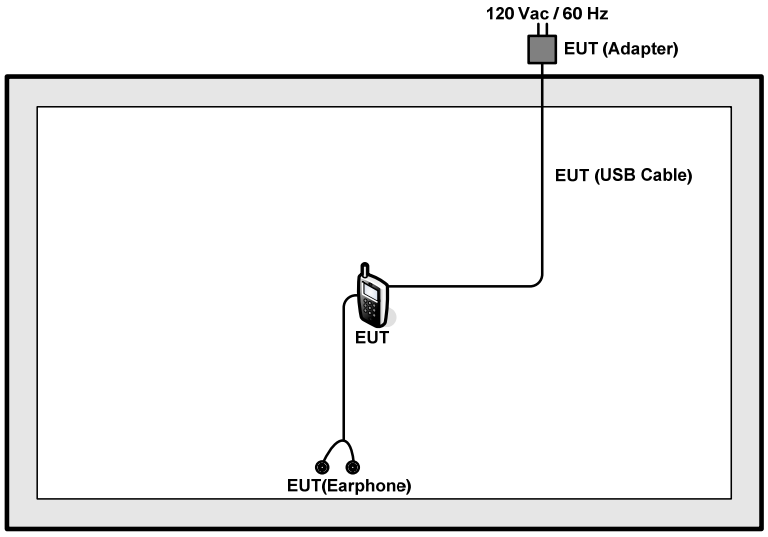
| Ch. # | | Band I：5150-5250 MHz |
|---|---|---|
| | | 802.11ac VHT20 |
| L | Low | 36 |
| M | Middle | 44 |
| H | High | 48 |

| Ch. # | | Band I：5150-5250 MHz |
|---|---|---|
| | | 802.11ac VHT40 |
| L | Low | 38 |
| M | Middle | - |
| H | High | 46 |

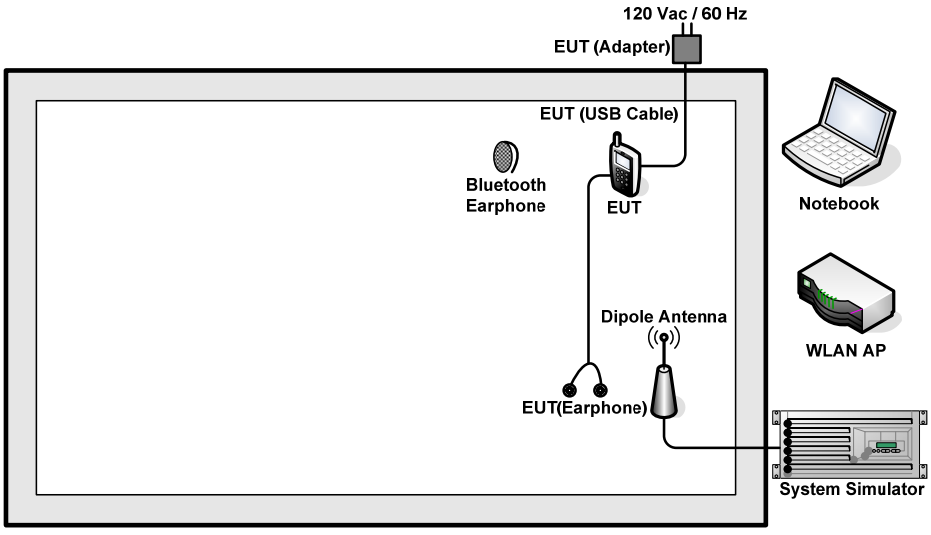
| Ch. # | | Band I：5150-5250 MHz |
|---|---|---|
| | | 802.11ac VHT80 |
| L | Low | - |
| M | Middle | 42 |
| H | High | - |

## 2.4 Connection Diagram of Test System

**<WLAN Tx Mode>**




**<AC Conducted Emission Mode>**



## 2.5 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | WLAN AP | LINKSYS | WRT600N | Q87-WRT600NV11 | N/A | Unshielded, 1.8 m |
| 2. | System Simulator | R&S | CMU 200 | N/A | N/A | Unshielded, 1.8 m |
| 3. | Notebook | Lenovo | G480 | PRC4 | N/A | AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m |
| 4. | Bluetooth Earphone | Nokia | BH-102 | PYAHS-107W | N/A | N/A |

## 2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the Notebook under large package sizes transmission.

## 2.7 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss.

*Offset = RF cable loss.*

Following shows an offset computation example with cable loss 7.0 dB.

*Offset (dB) = RF cable loss(dB).*

= 7.0 (dB)

# 3 Test Result

## 3.1 26dB & 99% Occupied Bandwidth Measurement

### 3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

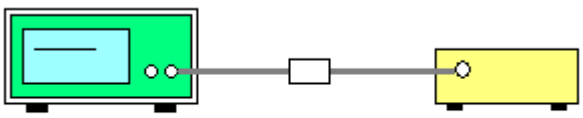
### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

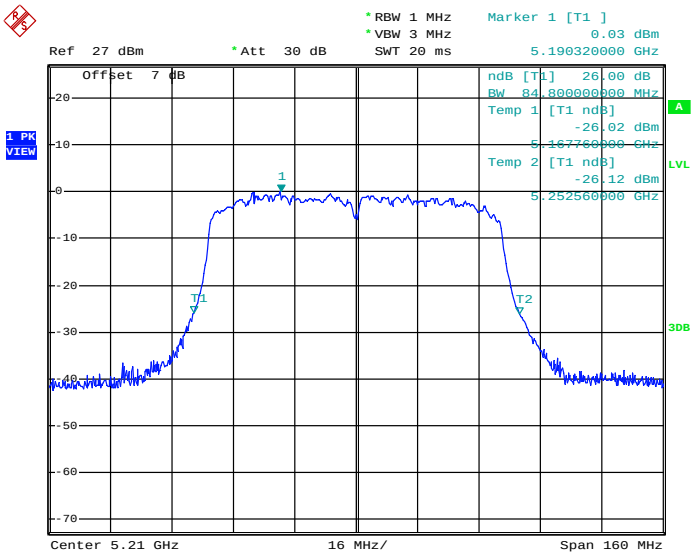
### 3.1.4 Test Setup



### 3.1.5 Test Result of 26dB & 99% Occupied Bandwidth Plots

Please refer to Appendix A.

**Maximum 26dB Bandwidth**

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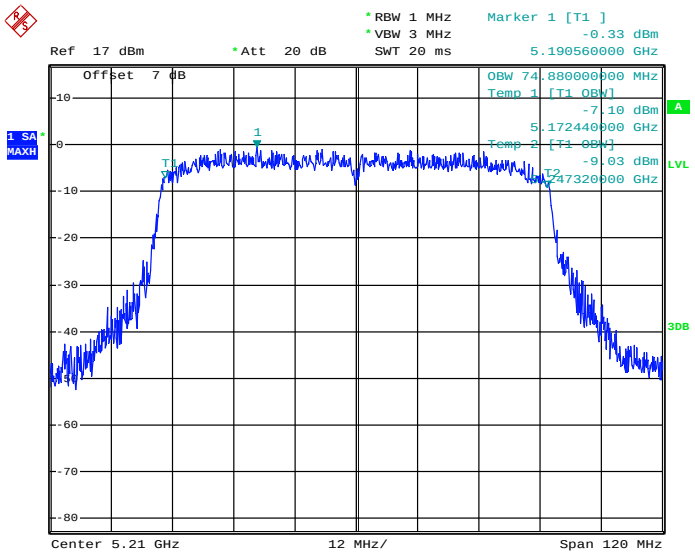
**Maximum 99% Occupied Bandwidth**

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Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## 3.2 Maximum Conducted Output Power Measurement

### 3.2.1 Limit of Maximum Conducted Output Power

**<FCC 14-30 CFR 15.407>**

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

**<IC RSS-247 Section 6>**

For the 5.15–5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

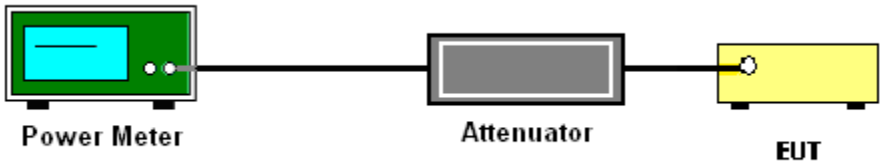
### 3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

### 3.2.4 Test Setup




### 3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

## 3.3 Power Spectral Density Measurement

### 3.3.1 Limit of Power Spectral Density

**<FCC 14-30 CFR 15.407>**

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

**<IC RSS-247 Section 6>**

For the 5.15–5.25 GHz band, the e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.3.3 Test Procedures

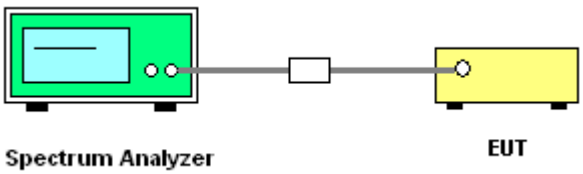
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section F) Maximum power spectral density.

**# Method SA-2 #**

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

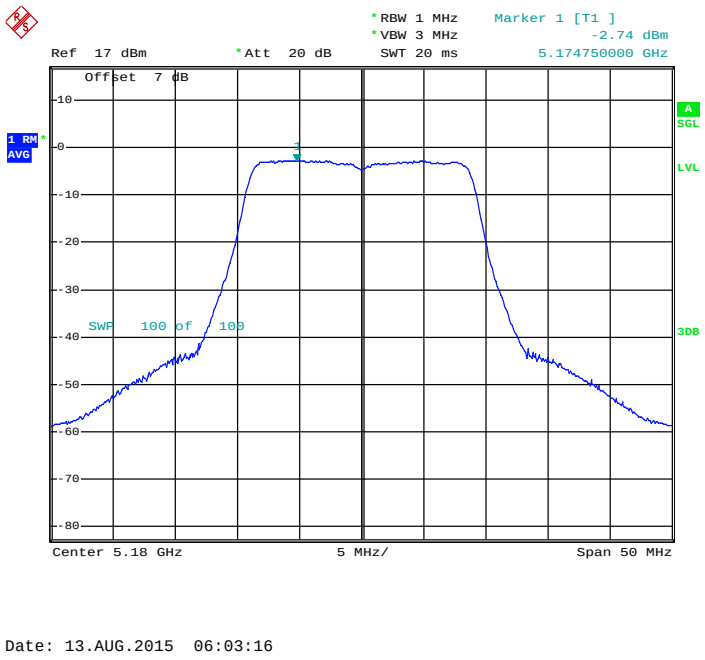
### 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

**Worst Case Power Spectral Density(dBm/MHz)**




**Note:** Average Power Density (dB) = Measured value+ Duty Factor

## 3.4 Unwanted Radiated Emission Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

### 3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

**Note:** The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}\ \mu V/m, \text{ where P is the eirp (Watts)}$$

| EIRP (dBm) | Field Strength at 3m (dBμV/m) |
|---|---|
| -17 | 78.3 |
| - 27 | 68.3 |

(3) KDB789033 v01 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

### 3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

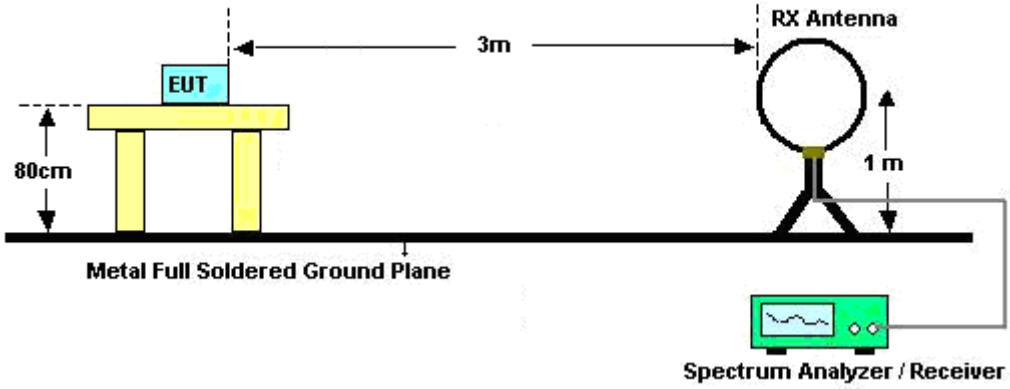
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

| Band | Duty Cycle (%) | T(ms) | 1/T(kHz) | VBW Setting |
|---|---|---|---|---|
| 802.11n VHT20 | 96.42 | 0.98 | 1.03 | 3kHz |
| 802.11n VHT40 | 93.17 | 0.49 | 2.02 | 3kHz |
| 802.11n VHT80 | 85.93 | 0.25 | 4.04 | 10kHz |

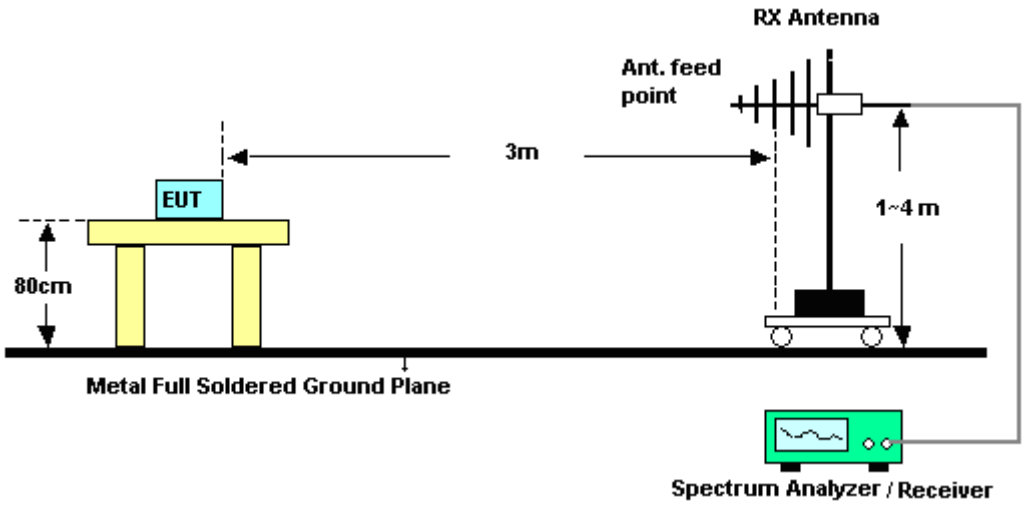
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.4.4 Test Setup

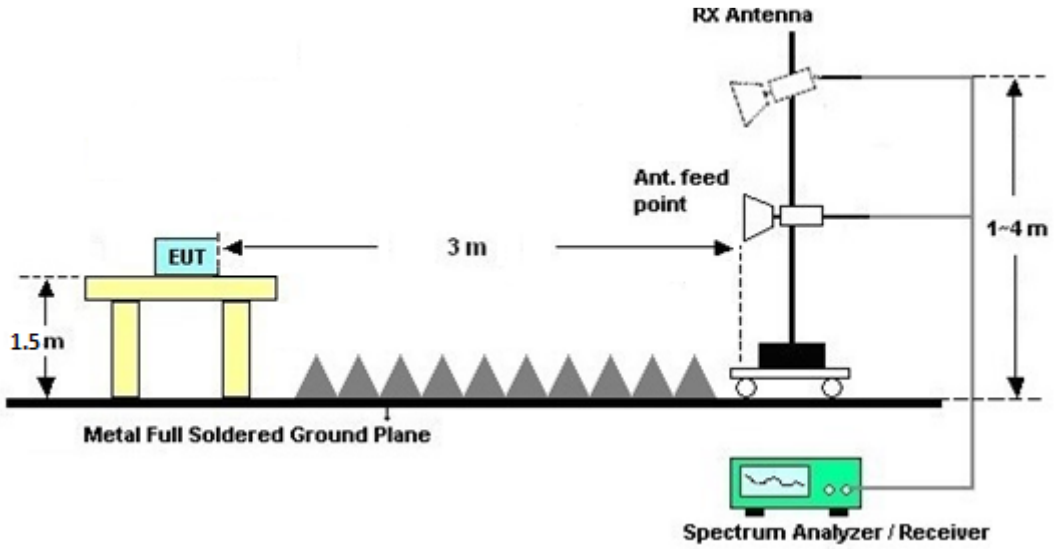
**For radiated emissions below 30MHz**



**For radiated emissions from 30MHz to 1GHz**




**For radiated emissions above 1GHz**




## 3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

## 3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

## 3.4.7 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.

# 3.5 AC Conducted Emission Measurement

## 3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

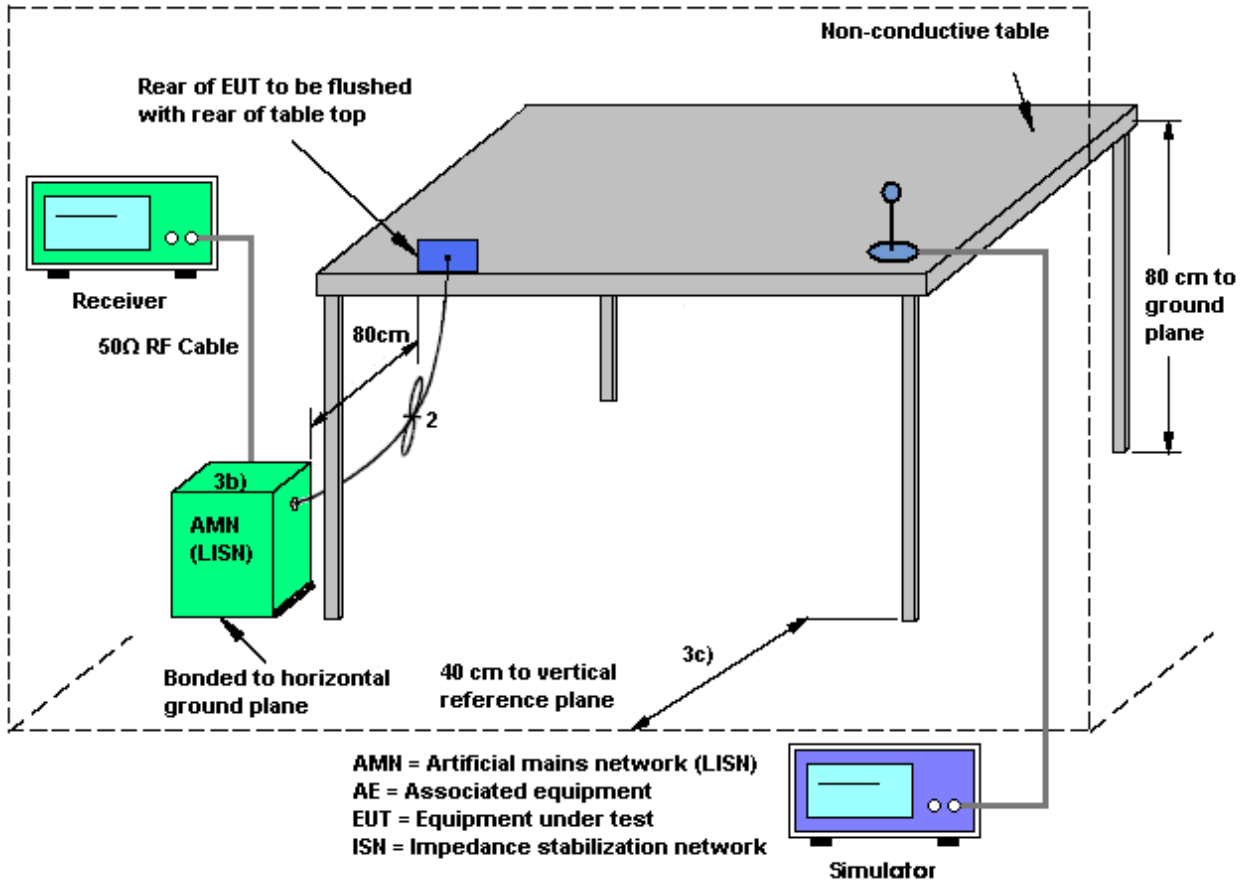
## 3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

## 3.5.3 Test Procedures

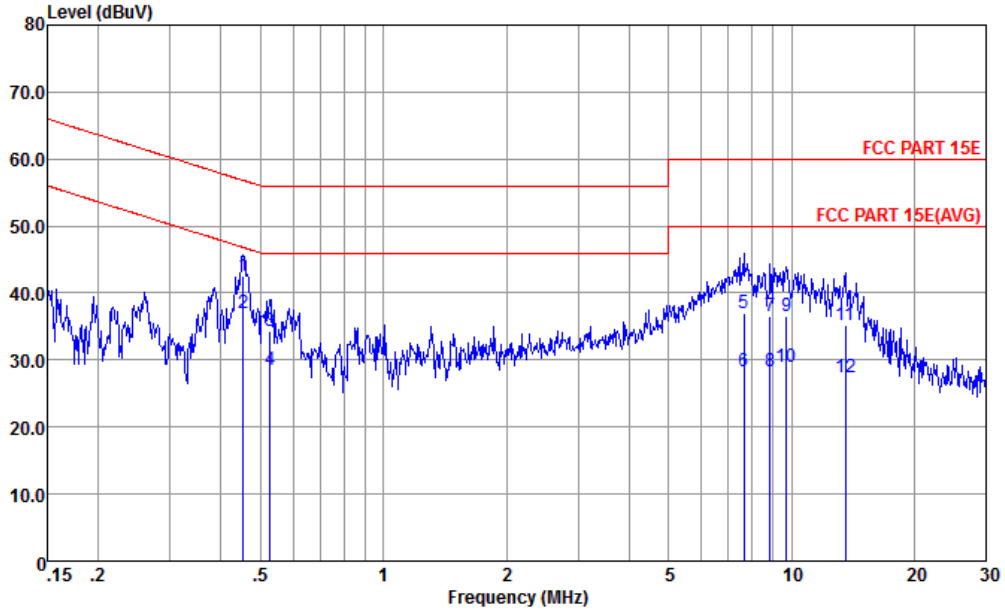
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

### 3.5.4 Test Setup



### 3.5.5 Test Result of AC Conducted Emission

| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 1 | **Temperature :** | 22~24℃ |
| **Test Engineer :** | Eko Guan | **Relative Humidity :** | 44~46% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Function Type :** | GSM850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter) | | |

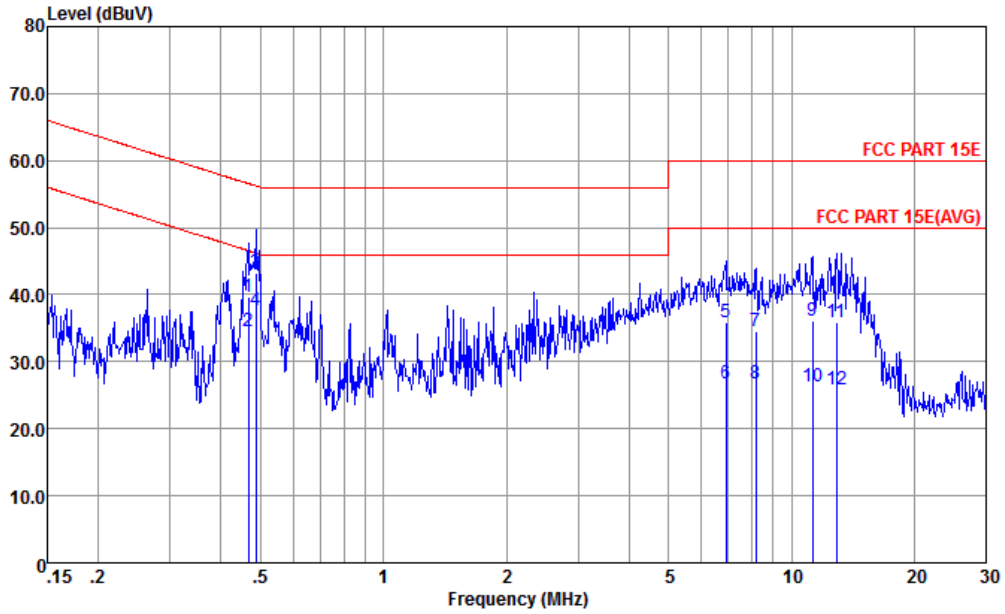



Site : CO01-KS
Condition : FCC PART 15E LISN-L20140306 LINE

mode : Mode 1

| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.45 | 42.67 | -14.13 | 56.80 | 31.81 | 0.24 | 10.62 | QP |
| 2 * | 0.45 | 36.97 | -9.83 | 46.80 | 26.11 | 0.24 | 10.62 | Average |
| 3 | 0.53 | 34.43 | -21.57 | 56.00 | 23.60 | 0.20 | 10.63 | QP |
| 4 | 0.53 | 28.53 | -17.47 | 46.00 | 17.70 | 0.20 | 10.63 | Average |
| 5 | 7.65 | 36.93 | -23.07 | 60.00 | 25.80 | 0.20 | 10.93 | QP |
| 6 | 7.65 | 28.33 | -21.67 | 50.00 | 17.20 | 0.20 | 10.93 | Average |
| 7 | 8.87 | 36.45 | -23.55 | 60.00 | 25.30 | 0.20 | 10.95 | QP |
| 8 | 8.87 | 28.35 | -21.65 | 50.00 | 17.20 | 0.20 | 10.95 | Average |
| 9 | 9.71 | 36.46 | -23.54 | 60.00 | 25.30 | 0.20 | 10.96 | QP |
| 10 | 9.71 | 28.96 | -21.04 | 50.00 | 17.80 | 0.20 | 10.96 | Average |
| 11 | 13.55 | 35.28 | -24.72 | 60.00 | 24.10 | 0.20 | 10.98 | QP |
| 12 | 13.55 | 27.38 | -22.62 | 50.00 | 16.20 | 0.20 | 10.98 | Average |

| Test Mode : | Mode 1 | Temperature : | 22~24℃ |
|---|---|---|---|
| Test Engineer : | Eko Guan | Relative Humidity : | 44~46% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |
| Function Type : | GSM850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter) | | |




Site : CO01-KS
Condition : FCC PART 15E LISN-N20140306 NEUTRAL

mode : Mode 1

| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.47 | 39.75 | -16.83 | 56.58 | 28.80 | 0.33 | 10.62 | QP |
| 2 | 0.47 | 34.45 | -12.13 | 46.58 | 23.50 | 0.33 | 10.62 | Average |
| 3 | 0.49 | 43.13 | -13.10 | 56.23 | 32.20 | 0.31 | 10.62 | QP |
| 4 * | 0.49 | 37.63 | -8.60 | 46.23 | 26.70 | 0.31 | 10.62 | Average |
| 5 | 6.91 | 35.92 | -24.08 | 60.00 | 24.80 | 0.20 | 10.92 | QP |
| 6 | 6.91 | 26.72 | -23.28 | 50.00 | 15.60 | 0.20 | 10.92 | Average |
| 7 | 8.19 | 34.64 | -25.36 | 60.00 | 23.50 | 0.20 | 10.94 | QP |
| 8 | 8.19 | 26.84 | -23.16 | 50.00 | 15.70 | 0.20 | 10.94 | Average |
| 9 | 11.26 | 35.99 | -24.01 | 60.00 | 24.80 | 0.22 | 10.97 | QP |
| 10 | 11.26 | 26.39 | -23.61 | 50.00 | 15.20 | 0.22 | 10.97 | Average |
| 11 | 12.92 | 35.85 | -24.15 | 60.00 | 24.60 | 0.27 | 10.98 | QP |
| 12 | 12.92 | 25.75 | -24.25 | 50.00 | 14.50 | 0.27 | 10.98 | Average |

# 3.6 Frequency Stability Measurement

## 3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

## 3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

## 3.6.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

## 3.6.4 Test Setup


## 3.6.5 Test Result of Frequency Stability

Please refer to Appendix A.

# 3.7 Automatically Discontinue Transmission

## 3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

## 3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

## 3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

## 3.8 Antenna Requirements

### 3.8.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

### 3.8.3 Antenna Gain

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum output power limit.

# 4 List of Measuring Equipments

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP40 | 100319 | 9kHz~40GHz | Oct. 28, 2014 | Aug. 13, 2015 | Oct. 27, 2015 | Conducted (TH01-KS) |
| Pulse Power Senor | Anritsu | MA2411B | 0917070 | 30MHz~40GHz | Jan. 23, 2015 | Aug. 13, 2015 | Jan. 22, 2016 | Conducted (TH01-KS) |
| Power Meter | Anritsu | ML2495A | 1005002 | 50MHz Bandwidth | Jan. 23, 2015 | Aug. 13, 2015 | Jan. 22, 2016 | Conducted (TH01-KS) |
| Thermal Chamber | Ten Billion | TTC-B3S | TBN-960502 | -40~+150°C | Oct. 25, 2014 | Aug. 13, 2015 | Oct. 24, 2015 | Conducted (TH01-KS) |
| EMI Test Receiver | R&S | ESR7 | 101403 | 9kHz~7GHz; Max 30dBm | Sep. 29, 2014 | Aug. 14, 2015 | Sep. 28, 2015 | Radiation (03CH02-KS) |
| Spectrum Analyzer | R&S | FSV40 | 101040 | 10kHz~40GHz; Max 30dBm | Sep. 25, 2014 | Aug. 14, 2015 | Sep. 24, 2015 | Radiation (03CH02-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Nov. 13, 2014 | Aug. 14, 2015 | Nov. 12, 2015 | Radiation (03CH02-KS) |
| Bilog Antenna | TeseQ | CBL6112D | 37879 | 30MHz~2GHz | Sep. 13, 2014 | Aug. 14, 2015 | Sep. 12, 2015 | Radiation (03CH02-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 75957 | 1GHz~18GHz | Nov. 08, 2014 | Aug. 14, 2015 | Nov. 07, 2015 | Radiation (03CH02-KS) |
| Active Horn Antenna | com-power | AHA-118 | 701030 | 1GHz~18GHz | Nov. 08, 2014 | Aug. 14, 2015 | Nov. 07, 2015 | Radiation (03CH02-KS) |
| SHF-EHF Horn | com-power | AH-840 | 101070 | 18GHz~40GHz | Sep. 04, 2014 | Aug. 14, 2015 | Sep. 03, 2015 | Radiation (03CH02-KS) |
| Amplifier | com-power | PA-103A | 161069 | 1kHz~1000MHz / 32 dB | May 04, 2015 | Aug. 14, 2015 | May 03, 2016 | Radiation (03CH02-KS) |
| Amplifier | Agilent | 8449B | 3008A02384 | 1GHz~26.5GHz Gain 30dB | Oct. 28, 2014 | Aug. 14, 2015 | Oct. 27, 2015 | Radiation (03CH02-KS) |
| AC Power Source | Chroma | 61601 | 616010002473 | N/A | NCR | Aug. 14, 2015 | NCR | Radiation (03CH02-KS) |
| Turn Table | MF | MF7802 | N/A | 0~360 degree | NCR | Aug. 14, 2015 | NCR | Radiation (03CH02-KS) |
| Antenna Mast | MF | MF7802 | N/A | 1 m~4 m | NCR | Aug. 14, 2015 | NCR | Radiation (03CH02-KS) |
| EMI Receiver | R&S | ESCI7 | 100768 | 9kHz~7GHz; | May 04, 2015 | Jul. 28, 2015 | May 03, 2016 | Conduction (CO01-KS) |
| AC LISN | MessTec | AN3016 | 060103 | 9kHz~30MHz | Oct. 25, 2014 | Jul. 28, 2015 | Oct. 24, 2015 | Conduction (CO01-KS) |
| AC LISN (for auxiliary equipment) | MessTec | AN3016 | 060105 | 9kHz~30MHz | Oct. 25, 2014 | Jul. 28, 2015 | Oct. 24, 2015 | Conduction (CO01-KS) |
| AC Power Source | Chroma | 61602 | ABP000000811 | AC 0V~300V, 45Hz~1000Hz | Oct. 25, 2014 | Jul. 28, 2015 | Oct. 24, 2015 | Conduction (CO01-KS) |

# 5 Uncertainty of Evaluation

**Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **2.3 dB** |

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.1 dB** |

# Appendix A. Conducted Test Results

Report Number : FR572101E

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Fire Chen | Temperature: | 21~25 | °C |
| Test Date: | 2015/8/13 | Relative Humidity: | 51~54 | % |

Report Number : FR572101E

***TEST RESULTS DATA***
***26dB and 99% OBW***

| Band I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | 99% Bandwidth (MHz) | 26 dB Bandwidth (MHz) | IC 99% Bandwidth Power Limit (dBm) | IC 99% Bandwidth EIRP Limit (dBm) | | |
| VHT20 | MCS0 | 1 | 36 | 5180 | 18.85 | 23.85 | - | 22.75 | | |
| VHT20 | MCS0 | 1 | 44 | 5220 | 19.00 | 24.00 | - | 22.79 | | |
| VHT20 | MCS0 | 1 | 48 | 5240 | 18.95 | 24.00 | - | 22.78 | | |
| VHT40 | MCS0 | 1 | 38 | 5190 | 36.50 | 45.00 | - | 23.01 | | |
| VHT40 | MCS0 | 1 | 46 | 5230 | 36.50 | 45.00 | - | 23.01 | | |
| VHT80 | MCS0 | 1 | 42 | 5210 | 74.88 | 84.80 | - | 23.01 | | |

***TEST RESULTS DATA***
***Average Power Table***

| FCC Band I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | | Pass/Fail |
| VHT20 | MCS0 | 1 | 36 | 5180 | 0.16 | 11.18 | 24.00 | 0.30 | | Pass |
| VHT20 | MCS0 | 1 | 44 | 5220 | 0.16 | 10.99 | 24.00 | 0.30 | | Pass |
| VHT20 | MCS0 | 1 | 48 | 5240 | 0.16 | 10.95 | 24.00 | 0.30 | | Pass |
| VHT40 | MCS0 | 1 | 38 | 5190 | 0.31 | 10.82 | 24.00 | 0.30 | | Pass |
| VHT40 | MCS0 | 1 | 46 | 5230 | 0.31 | 10.60 | 24.00 | 0.30 | | Pass |
| VHT80 | MCS0 | 1 | 42 | 5210 | 0.66 | 11.14 | 24.00 | 0.30 | | Pass |

## ***TEST RESULTS DATA***
## ***Power Spectral Density***

| FCC Band I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Power Density (dBm/MHz) | Average PSD Limit (dBm/MHz) | DG (dBi) | - | Pass/Fail |
| VHT20 | MCS0 | 1 | 36 | 5180 | 0.16 | -2.58 | 11.00 | 0.30 | | Pass |
| VHT20 | MCS0 | 1 | 44 | 5220 | 0.16 | -3.13 | 11.00 | 0.30 | | Pass |
| VHT20 | MCS0 | 1 | 48 | 5240 | 0.16 | -3.26 | 11.00 | 0.30 | | Pass |
| VHT40 | MCS0 | 1 | 38 | 5190 | 0.31 | -5.70 | 11.00 | 0.30 | | Pass |
| VHT40 | MCS0 | 1 | 46 | 5230 | 0.31 | -6.15 | 11.00 | 0.30 | | Pass |
| VHT80 | MCS0 | 1 | 42 | 5210 | 0.66 | -8.80 | 11.00 | 0.30 | | Pass |

***TEST RESULTS DATA***
***Frequency Stability***

| Band I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Center Frequency (MHz) | Frequency Deviation (MHz) | Frequency Stablility (ppm) | Temperature (°C) | Voltage (V) | Note |
| VHT20 | 6Mbps | 1 | 36 | 5180 | 5180.000 | 0.000 | 0.00 | 20 | 3.6 | |
| VHT20 | 6Mbps | 1 | 36 | 5180 | 5179.950 | -0.050 | -9.65 | 20 | 4.2 | |
| VHT20 | 6Mbps | 1 | 36 | 5180 | 5180.000 | 0.000 | 0.00 | 20 | 3.8 | |
| VHT20 | 6Mbps | 1 | 36 | 5180 | 5179.950 | -0.050 | -9.65 | -30 | 3.8 | |
| VHT20 | 6Mbps | 1 | 36 | 5180 | 5180.000 | 0.000 | 0.00 | 50 | 3.8 | |

# Appendix B. Radiated Test Results

**Band 1 5150~5250MHz**

**WIFI 802.11ac VHT20 (Band Edge @ 3m)**

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | * | 5174 | 99.31 | - | - | 93.76 | 35.03 | 7.03 | 36.51 | 150 | 329 | P | H |
| | * | 5172 | 89.69 | - | - | 84.17 | 35.02 | 7.02 | 36.52 | 150 | 329 | A | H |
| 802.11ac | | 5128.35 | 52.07 | -21.93 | 74 | 46.58 | 35.02 | 7.01 | 36.54 | 150 | 329 | P | H |
| VHT20 | | 5128.25 | 40.18 | -13.82 | 54 | 34.69 | 35.02 | 7.01 | 36.54 | 150 | 329 | A | H |
| CH 36 | * | 5174 | 98.59 | - | - | 93.04 | 35.03 | 7.03 | 36.51 | 150 | 156 | P | V |
| 5180MHz | * | 5174 | 89.41 | - | - | 118.89 | 0 | 7.03 | 36.51 | 150 | 156 | A | V |
| | | 5128.05 | 52.32 | -21.68 | 74 | 46.83 | 35.02 | 7.01 | 36.54 | 150 | 156 | P | V |
| | | 5128.2 | 40.55 | -13.45 | 54 | 35.06 | 35.02 | 7.01 | 36.54 | 150 | 156 | A | V |
| 802.11ac | * | 5218 | 98.05 | - | - | 92.47 | 35.03 | 7.05 | 36.5 | 166 | 360 | P | H |
| VHT20 | * | 5214 | 89 | - | - | 83.42 | 35.03 | 7.05 | 36.5 | 166 | 360 | A | H |
| CH 44 | * | 5214 | 99.21 | - | - | 93.63 | 35.03 | 7.05 | 36.5 | 150 | 167 | P | V |
| 5220MHz | * | 5212 | 89.41 | - | - | 83.83 | 35.03 | 7.05 | 36.5 | 150 | 167 | A | V |
| | * | 5234 | 98.52 | - | - | 92.91 | 35.04 | 7.07 | 36.5 | 222 | 9 | P | H |
| | * | 5234 | 88.83 | - | - | 83.22 | 35.04 | 7.07 | 36.5 | 222 | 9 | A | H |
| 802.11ac | | 5375.55 | 51.14 | -22.86 | 74 | 45.37 | 35.06 | 7.21 | 36.5 | 222 | 9 | P | H |
| VHT20 | | 5354 | 38.55 | -15.45 | 54 | 32.8 | 35.05 | 7.2 | 36.5 | 222 | 9 | A | H |
| CH 48 | * | 5234 | 97.4 | - | - | 91.79 | 35.04 | 7.07 | 36.5 | 300 | 35 | P | V |
| 5240MHz | * | 5234 | 87.54 | - | - | 81.93 | 35.04 | 7.07 | 36.5 | 300 | 35 | A | V |
| | | 5399.15 | 52.36 | -21.64 | 74 | 46.55 | 35.06 | 7.25 | 36.5 | 300 | 35 | P | V |
| | | 5385.25 | 38.73 | -15.27 | 54 | 32.94 | 35.06 | 7.23 | 36.5 | 300 | 35 | A | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Band 1 5150~5250MHz

## WIFI 802.11ac VHT20 (Harmonic @ 3m)

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11ac VHT20 CH 36 5180MHz | | 10359 | 47.47 | -26.53 | 74 | 36.4 | 38.1 | 10.3 | 37.33 | 150 | 172 | P | H |
| | | 10359 | 47.88 | -26.12 | 74 | 36.81 | 38.1 | 10.3 | 37.33 | 150 | 146 | P | V |
| 802.11ac VHT20 CH 44 5220MHz | | 10440 | 47.03 | -26.97 | 74 | 35.86 | 38.15 | 10.33 | 37.31 | 150 | 261 | P | H |
| | | 10440 | 48.37 | -25.63 | 74 | 37.2 | 38.15 | 10.33 | 37.31 | 150 | 86 | P | V |
| 802.11ac VHT20 CH 48 5240MHz | | 10479 | 46.79 | -27.21 | 74 | 35.55 | 38.19 | 10.35 | 37.3 | 150 | 315 | P | H |
| | | 10479 | 47.25 | -26.75 | 74 | 36.01 | 38.19 | 10.35 | 37.3 | 150 | 182 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Band 1 5150~5250MHz

## WIFI 802.11ac VHT40 (Band Edge @ 3m)

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | * | 5188 | 95.81 | - | - | 90.26 | 35.03 | 7.03 | 36.51 | 214 | 332 | P | H |
| | * | 5180 | 86.03 | - | - | 80.48 | 35.03 | 7.03 | 36.51 | 214 | 332 | A | H |
| 802.11ac | | 5149.55 | 53.46 | -20.54 | 74 | 47.95 | 35.02 | 7.02 | 36.53 | 214 | 332 | P | H |
| VHT40 | | 5149.85 | 39 | -15 | 54 | 33.49 | 35.02 | 7.02 | 36.53 | 214 | 332 | A | H |
| CH 38 | * | 5188 | 96.17 | - | - | 90.62 | 35.03 | 7.03 | 36.51 | 172 | 50 | P | V |
| 5190MHz | * | 5188 | 85.39 | - | - | 79.84 | 35.03 | 7.03 | 36.51 | 172 | 50 | A | V |
| | | 5149.45 | 54.02 | -19.98 | 74 | 48.51 | 35.02 | 7.02 | 36.53 | 172 | 50 | P | V |
| | | 5147.65 | 39.03 | -14.97 | 54 | 33.52 | 35.02 | 7.02 | 36.53 | 172 | 50 | A | V |
| | * | 5228 | 96.94 | - | - | 91.33 | 35.04 | 7.07 | 36.5 | 158 | 330 | P | H |
| | * | 5234 | 86.44 | - | - | 80.83 | 35.04 | 7.07 | 36.5 | 158 | 330 | A | H |
| 802.11ac | | 5356.05 | 51.4 | -22.6 | 74 | 45.65 | 35.05 | 7.2 | 36.5 | 158 | 330 | P | H |
| VHT40 | | 5398.55 | 38.55 | -15.45 | 54 | 32.74 | 35.06 | 7.25 | 36.5 | 158 | 330 | A | H |
| CH 46 | * | 5228 | 96.57 | - | - | 90.96 | 35.04 | 7.07 | 36.5 | 150 | 156 | P | V |
| 5230MHz | * | 5224 | 85.85 | - | - | 80.27 | 35.03 | 7.05 | 36.5 | 150 | 156 | A | V |
| | | 5390.55 | 50.93 | -23.07 | 74 | 45.14 | 35.06 | 7.23 | 36.5 | 150 | 156 | P | V |
| | | 5361.55 | 38.54 | -15.46 | 54 | 32.77 | 35.06 | 7.21 | 36.5 | 150 | 156 | A | V |

**Remark**

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

**Band 1 5150~5250MHz**

**WIFI 802.11ac VHT40 (Harmonic @ 3m)**

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11ac VHT40 CH 38 5190MHz | | 10380 | 47.17 | -26.83 | 74 | 36.09 | 38.11 | 10.3 | 37.33 | 150 | 82 | P | H |
| | | 10380 | 48.36 | -25.64 | 74 | 37.28 | 38.11 | 10.3 | 37.33 | 152 | 219 | P | V |
| 802.11ac VHT40 CH 46 5230MHz | | 10461 | 47.13 | -26.87 | 74 | 35.91 | 38.18 | 10.34 | 37.3 | 150 | 256 | P | H |
| | | 10461 | 47.71 | -26.29 | 74 | 36.49 | 38.18 | 10.34 | 37.3 | 150 | 138 | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Band 1 5150~5250MHz

## WIFI 802.11ac VHT80 (Band Edge @ 3m)

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 CH 42 5210MHz | * | 5190 | 95.64 | - | - | 90.09 | 35.03 | 7.03 | 36.51 | 156 | 359 | P | H |
| | * | 5190 | 85.91 | - | - | 80.36 | 35.03 | 7.03 | 36.51 | 156 | 359 | A | H |
| | | 5150 | 58.41 | -15.59 | 74 | 52.9 | 35.02 | 7.02 | 36.53 | 156 | 359 | P | H |
| | | 5149.55 | 41.76 | -12.24 | 54 | 36.25 | 35.02 | 7.02 | 36.53 | 156 | 359 | A | H |
| | | 5362.2 | 51.68 | -22.32 | 74 | 45.91 | 35.06 | 7.21 | 36.5 | 156 | 359 | P | H |
| | | 5356.95 | 40.09 | -13.91 | 54 | 34.34 | 35.05 | 7.2 | 36.5 | 156 | 359 | A | H |
| | * | 5202 | 93.14 | - | - | 87.58 | 35.03 | 7.03 | 36.5 | 150 | 172 | P | V |
| | * | 5206 | 83.96 | - | - | 78.4 | 35.03 | 7.03 | 36.5 | 150 | 172 | A | V |
| | | 5148.8 | 55.78 | -18.22 | 74 | 50.27 | 35.02 | 7.02 | 36.53 | 150 | 172 | P | V |
| | | 5149 | 41.24 | -12.76 | 54 | 35.73 | 35.02 | 7.02 | 36.53 | 150 | 172 | A | V |
| | | 5398.8 | 51.08 | -22.92 | 74 | 45.27 | 35.06 | 7.25 | 36.5 | 150 | 172 | P | V |
| | | 5361.95 | 40.1 | -13.9 | 54 | 34.33 | 35.06 | 7.21 | 36.5 | 150 | 172 | A | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

**Band 1 5150~5250MHz**

**WIFI 802.11ac VHT80 (Harmonic @ 3m)**

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBµV/m ) | Over Limit ( dB ) | Limit Line ( dBµV/m ) | Read Level (dBµV) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11ac VHT80 CH 42 5210MHz | | 10419 | 47.33 | -26.67 | 74 | 36.19 | 38.14 | 10.32 | 37.32 | 150 | 62 | P | H |
| | | 10419 | 49.01 | -24.99 | 74 | 37.87 | 38.14 | 10.32 | 37.32 | 150 | 128 | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Emission below 1GHz

## WIFI 802.11ac VHT20 (LF @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | (dBμV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11ac VHT20 LF | | 30 | 23.33 | -16.67 | 40 | 38.72 | 19.1 | 0.73 | 35.22 | - | - | P | H |
| | | 106.63 | 23.41 | -20.09 | 43.5 | 45.41 | 11.98 | 1.34 | 35.32 | - | - | P | H |
| | | 217.21 | 32.57 | -13.43 | 46 | 55.57 | 10.09 | 1.92 | 35.01 | 154 | 260 | P | H |
| | | 297.72 | 28.29 | -17.71 | 46 | 47.36 | 13.42 | 2.27 | 34.76 | - | - | P | H |
| | | 339.43 | 29.66 | -16.34 | 46 | 47.88 | 14.37 | 2.42 | 35.01 | - | - | P | H |
| | | 909.79 | 26.21 | -19.79 | 46 | 35.26 | 21.46 | 4.05 | 34.56 | - | - | P | H |
| | | 35.82 | 31.99 | -8.01 | 40 | 49.56 | 16.84 | 0.79 | 35.2 | - | - | P | V |
| | | 48.43 | 32.55 | -7.45 | 40 | 57.09 | 9.49 | 0.91 | 34.94 | 160 | 120 | P | V |
| | | 67.83 | 28.99 | -11.01 | 40 | 56 | 6.84 | 1.06 | 34.91 | - | - | P | V |
| | | 106.63 | 21.4 | -22.1 | 43.5 | 43.4 | 11.98 | 1.34 | 35.32 | - | - | P | V |
| | | 216.24 | 27.93 | -18.07 | 46 | 50.98 | 10.05 | 1.92 | 35.02 | - | - | P | V |
| | | 428.67 | 29.25 | -16.75 | 46 | 44.9 | 16.66 | 2.73 | 35.04 | - | - | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against limit line. | | | | | | | | | | | | |

## Emission below 1GHz

### WIFI 802.11ac VHT40 (LF @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | (dBμV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11ac VHT40 LF | | 106.63 | 24.42 | -19.08 | 43.5 | 46.42 | 11.98 | 1.34 | 35.32 | - | - | P | H |
| | | 153.19 | 23.88 | -19.62 | 43.5 | 46.12 | 11.09 | 1.6 | 34.93 | - | - | P | H |
| | | 220.12 | 33.18 | -12.82 | 46 | 56.03 | 10.21 | 1.94 | 35 | 100 | 135 | P | H |
| | | 293.84 | 29.66 | -16.34 | 46 | 48.93 | 13.25 | 2.25 | 34.77 | - | - | P | H |
| | | 329.73 | 29.09 | -16.91 | 46 | 47.51 | 14.16 | 2.38 | 34.96 | - | - | P | H |
| | | 431.58 | 29.06 | -16.94 | 46 | 44.63 | 16.71 | 2.74 | 35.02 | - | - | P | H |
| | | 34.85 | 32.11 | -7.89 | 40 | 49 | 17.6 | 0.78 | 35.27 | 150 | 0 | P | V |
| | | 48.43 | 31.35 | -8.65 | 40 | 55.89 | 9.49 | 0.91 | 34.94 | - | - | P | V |
| | | 69.77 | 22.48 | -17.52 | 40 | 49.25 | 7 | 1.08 | 34.85 | - | - | P | V |
| | | 106.63 | 22.09 | -21.41 | 43.5 | 44.09 | 11.98 | 1.34 | 35.32 | - | - | P | V |
| | | 332.64 | 25.97 | -20.03 | 46 | 44.33 | 14.22 | 2.39 | 34.97 | - | - | P | V |
| | | 425.76 | 29.14 | -16.86 | 46 | 44.86 | 16.62 | 2.72 | 35.06 | - | - | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against limit line. | | | | | | | | | | | | |

## Emission below 1GHz

## WIFI 802.11ac VHT80 (LF @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | (dBμV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11ac VHT80 LF | | 30 | 23.33 | -16.67 | 40 | 38.72 | 19.1 | 0.73 | 35.22 | - | - | P | H |
| | | 106.63 | 23.41 | -20.09 | 43.5 | 45.41 | 11.98 | 1.34 | 35.32 | - | - | P | H |
| | | 217.21 | 32.57 | -13.43 | 46 | 55.57 | 10.09 | 1.92 | 35.01 | 154 | 260 | P | H |
| | | 300.63 | 27.93 | -18.07 | 46 | 46.89 | 13.52 | 2.28 | 34.76 | - | - | P | H |
| | | 345.25 | 29.18 | -16.82 | 46 | 47.3 | 14.49 | 2.44 | 35.05 | - | - | P | H |
| | | 909.79 | 26.21 | -19.79 | 46 | 35.26 | 21.46 | 4.05 | 34.56 | - | - | P | H |
| | | 35.82 | 31.99 | -8.01 | 40 | 49.56 | 16.84 | 0.79 | 35.2 | - | - | P | V |
| | | 48.43 | 32.55 | -7.45 | 40 | 57.09 | 9.49 | 0.91 | 34.94 | 160 | 120 | P | V |
| | | 67.83 | 28.99 | -11.01 | 40 | 56 | 6.84 | 1.06 | 34.91 | - | - | P | V |
| | | 106.63 | 21.4 | -22.1 | 43.5 | 43.4 | 11.98 | 1.34 | 35.32 | - | - | P | V |
| | | 216.24 | 27.93 | -18.07 | 46 | 50.98 | 10.05 | 1.92 | 35.02 | - | - | P | V |
| | | 428.67 | 29.25 | -16.75 | 46 | 44.9 | 16.66 | 2.73 | 35.04 | - | - | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against limit line. | | | | | | | | | | | | |

**Note symbol**

| | |
|---|---|
| * | **Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| ! | Test result is **over limit** line. |
| P/A | **P**eak or **A**verage |
| H/V | **H**orizontal or **V**ertical |

## A calculation example for radiated spurious emission is shown as below:

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11b CH 01 2412MHz | | 2390 | 55.45 | -18.55 | 74 | 54.51 | 32.22 | 4.58 | 35.86 | 103 | 308 | P | H |
| | | 2390 | 43.54 | -10.46 | 54 | 42.6 | 32.22 | 4.58 | 35.86 | 103 | 308 | A | H |

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

**Both peak and average measured complies with the limit line, so test result is "PASS".**