# FCC Test Report

Report No: FCS202106006W03

Issued for

CLMBR, INC.

3033 E 1st Ave, Suite 501, Denver, CO. USA

| | |
|---|---|
| Product Name: | Tablet PC |
| Brand Name: | CLMBR |
| Model Name: | CLMBR Pure |
| Series Model: | NA |
| FCC ID: | 2AZ9G-PURE |

Issued By: Flux Compliance Service Laboratory
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# TEST RESULT CERTIFICATION

| | |
|---|---|
| Applicant's Name ..... : | CLMBR, INC. |
| Address..... : | 3033 E 1st Ave, Suite 501, Denver, CO. USA |
| Manufacture's Name ..... : | Shenzhen ELINK technology Co., LTD. |
| Address..... : | F4, Block A, Qiaohonsheng CCI Garden, Yintian Instrial Park, Xixiang, Bao'an, Shenzhen, Guangdong, China. |

**Product Description**

| | |
|---|---|
| Product Name ..... : | Tablet PC |
| Model Name..... : | CLMBR Pure |
| Series Model ..... : | NA |
| Test Standards ..... : | CFR 47 FCC Part15E section 15.407 |
| Test Procedure ..... : | ANSI C63.10-2013<br>KDB 789033 D02 General UNII Test procedures New Rules 02<br>KDB558074 D01 Meas Guidance v05 |

This device described above has been tested by Flux Compliance Service Laboratory, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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**Date of Test** ..... :

| | |
|---|---|
| Date (s) of performance of tests : | June. 01, 2021 ~ June. 09, 2021 |
| Date of Issue..... : | June. 09, 2021 |
| Test Result ..... : | Pass |

Tested by : Scott Shen

(Scott Shen)

Reviewed by : Duke Qian

(Duke Qian)

Approved by :

(Kait Chen)

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## Revision History

| Rev. | Issue Date | Report NO. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | June. 09, 2021 | FCS202106006W03 | ALL | Initial Issue |
| | | | | |

# 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| Standard Section | Test Item | Judgment | Remark |
|---|---|---|---|
| FCC 15.407 (e) | 6/26db Bandwidth and 99% Bandwidth | PASS | -- |
| FCC 15.407 (a) | Maximum Conducted Output Power | PASS | -- |
| FCC 15.407 (a) | Power Spectral Density | PASS | -- |
| FCC 15.407 (g) | Frequency Stability Measurement | PASS | |
| FCC 15.407 (a)<br>FCC 15.209<br>FCC 15.205 | Emissions in restricted frequency bands | PASS | |
| FCC 15.407 (a)<br>FCC 15.209<br>FCC 15.205 | Band Edge Compliance | PASS | |
| FCC 15.207 | Power Line Conducted Emission | PASS | |
| FCC 15.203 | Antenna requirement | PASS | -- |

## 1.1 TEST FACTORY

| | |
|---|---|
| Company Name: | Flux Compliance Service Laboratory |
| Address: | Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan |
| Telephone: | +86-769-27280901 |
| Fax: | +86-769-27280901 |
| FCC Test Firm Registration Number: 514908<br>Designation number: CN0127<br>A2LA accreditation number：5545.01 | |

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ±**U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

| No. | Item | Uncertainty |
|---|---|---|
| 1 | RF output power, conducted | ±0.71dB |
| 2 | Unwanted Emissions, conducted | ±2.988 dB |
| 3 | Conducted Emission (9KHz-150KHz) | ±4.13 dB |
| 4 | Conducted Emission (150KHz-30MHz) | ±4.74 dB |
| 5 | All emissions,radiated(<1G) 30MHz-1000MHz | ±5.2 dB |
| 6 | All emissions,radiated 1GHz -18GHz | ±4.66 dB |
| 7 | All emissions,radiated 18GHz -40GHz | ±4.31 dB |

# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF THE EUT

| | |
|---|---|
| Product Name | Tablet PC |
| Trade Name | CLMBR |
| Model Name | CLMBR Pure |
| Series Model | NA |
| Model Difference | NA |
| Channel List | Please refer to the Note 2.2. |
| Operation frequency | IEEE 802.11a/n/ac(HT20)/ac(HT40) /ac(HT80):<br>U-NII-1 5150MHZ-5250 MHz |
| Number of channel | 5150MHZ-5250 MHz (7CH) |
| Modulation: | OFDM |
| Power supply | DC 3.7V from battery |
| Hardware version number | V1.0 |
| Software version number | V1.0 |
| Sample type | Portable equipment |
| Connecting I/O Port(s) | Please refer to the User's Manual |

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.

2. Channel list

| U-NII-1 (5.15-5.25GHz) | | | |
|---|---|---|---|
| channel | Frequency(MHz) | channel | Frequency(MHz) |
| 36 | 5180 | 38 | 5190 |
| 40 | 5200 | 42 | 5210 |
| 44 | 5220 | 46 | 5230 |
| 48 | 5240 | | |

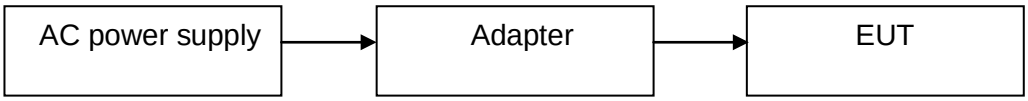
3. Table for Filed Antenna

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) | NOTE |
|---|---|---|---|---|---|---|
| 1 | KCC | KCC | PIFA antenna | N/A | 1.0 | Antenna |

## 2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Block diagram of EUT configuration for test




Test software: the FCC Assist
The test softeware was used to control EUT work in continuous TX mode, and select test channel, Wireless mode as below table

For 802.11a/n/ac(HT20):

| channel | Frequency(MHz) | channel | Frequency(MHz) |
|---|---|---|---|
| 36 | 5180 | 40 | 5200 |
| 48 | 5240 | | |

For 802.11n/ac(HT40)

| channel | Frequency(MHz) | channel | Frequency(MHz) |
|---|---|---|---|
| 38 | 5190 | 46 | 5230 |

For 802.11ac(VHT80)

| channel | Frequency(MHz) | channel | Frequency(MHz) |
|---|---|---|---|
| 42 | 5210 | | |

## 2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

| Item | Equipment | Mfr/Brand | Model/Type No. | Serial No. | Note |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Support units

| Item | Equipment | Mfr/Brand | Model/Type No. | Serial No. | Note |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

## 2.4 EQUIPMENTS LIST

### Radiation Test equipment

| Kind of Equipment | Manufacturer | Type No. | Company No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESRP 3 | FCS-E001 | 2020. 06.26 | 2021. 06.25 |
| Signal Analyzer | R&S | FSV40-N | FCS-E012 | 2020.08.09 | 2021.08.10 |
| Active loop Antenna | ZHINAN | ZN30900C | FCS-E013 | 2020.08.09 | 2021.08.10 |
| Bilog Antenna | SCHWARZBECK | VULB 9168 | FCS-E002 | 2020.08.26 | 2021.08.25 |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | FCS-E003 | 2020.08.26 | 2021.08.25 |
| SHF-EHF Horn Antenna (18G-40GHz) | A-INFO | LB-180400-KF | FCS-E018 | 2020.06.26 | 2021.06.25 |
| Pre-Amplifier(0.1M-3G Hz) | EMCI | EM330N | FCS-E004 | 2020.06.26 | 2021.06.25 |
| Pre-Amplifier (1G-18GHz) | N/A | TSAMP-0518SE | FCS-E014 | 2020.08.09 | 2021.08.10 |
| Pre-Amplifier (18G-40GHz) | TERA-MW | TRLA-0400 | FCS-E019 | 2020.08.08 | 2021.08.07 |
| Temperature & Humidity | HTC-1 | victor | FCS-E005 | 2020.08.26 | 2021.08.25 |

### Conduction Test equipment

| Kind of Equipment | Manufacturer | Type No. | Company No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | FCS-E020 | 2020.08.09 | 2021.08.10 |
| LISN | R&S | ENV216 | FCS-E007 | 2020.08.08 | 2021.08.07 |
| LISN | ETS | 3810/2NM | FCS-E009 | 2020.08.09 | 2021.08.10 |
| Temperature & Humidity | HTC-1 | victor | FCS-E008 | 2020.08.08 | 2021.08.07 |

### RF Connected Test

| Kind of Equipment | Manufacturer | Type No. | Company No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| MXA SIGNAL Analyzer | Keysight | N9020A | FCS-E015 | 2020.08.09 | 2021.08.10 |
| Spectrum Analyzer | Agilent | E4447A | MY50180039 | 2020.08.08 | 2021.08.07 |
| Spectrum Analyzer | R&S | FSV-40 | 101499 | 2020.08.26 | 2021.08.25 |
| Power meter | Agilent | U2021XA | MY55150021 | 2020.08.26 | 2021.08.25 |

# 3. 26dB Bandwidth, 6dB Bandwidth and 99% Bandwidth

## 3.1 Limit

| FCC Part15, Subpart E | | |
|---|---|---|
| Test Item | Limit | Frequency Range (MHz) |
| Bandwidth | 26 dB Bandwidth | 5150-5250 |
| | 26 dB Bandwidth | 5250-5350 |
| | 26 dB Bandwidth | For FCC:5470-5725<br>For IC:5470-5600<br>5650-5725 |
| | Minimum 500kHz 6dB Bandwidth | 5725-5850 |

## 3.2 Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

| | |
|---|---|
| Center Frequency | The centre frequency of the channel under test |
| Detector | Peak |
| RBW | For 6dB Bandwidth: RBW=100kHz<br>For 26dB Bandwidth: approximately 1% of the emission bandwidth. |
| VBW | For 6dB Bandwidth: VBW=300kHz<br>For 26dB Bandwidth: >3RBW |
| Trace | Max hold |
| Sweep | Auto couple |

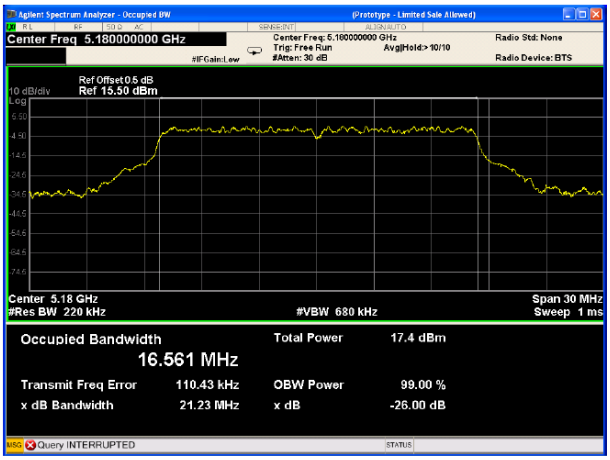
(2) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26dB and 6dB relative to the maximum level measured in the fundamental emission.

## 3.3 Test setup

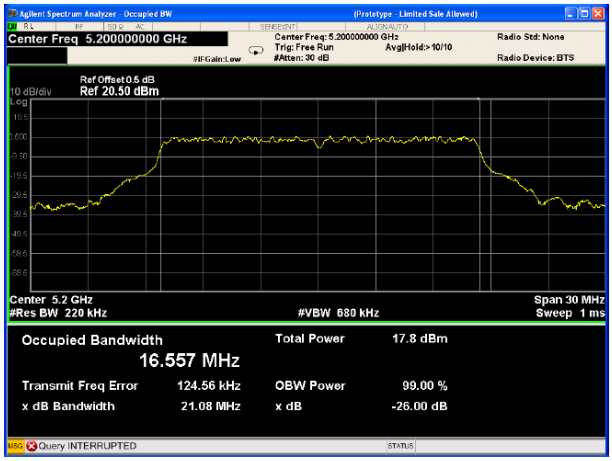
## 3.4 Test results

| Band | Operation mode | 26 dB Bandwidth (MHz) | | | 99% Bandwidth (MHz) | | |
|---|---|---|---|---|---|---|---|
| | | Low | Middle | High | Low | Middle | High |
| U-NII-1 | 802.11a | 21.23 | 21.08 | 21.08 | 16.561 | 16.557 | 16.559 |
| | 802.11n(HT20) | 21.30 | 21.55 | 21.38 | 17.813 | 17.817 | 17.758 |
| | 802.11n(HT40) | 39.55 | / | 39.36 | 36.336 | / | 36.366 |
| | 802.11ac(HT20) | 21.37 | 21.40 | 21.39 | 17.835 | 17.812 | 17.831 |
| | 802.11ac(HT40) | 40.34 | / | 39.49 | 36.521 | / | 36.507 |
| | 802.11ac(HT80) | 80.98 | / | / | 75.731 | / | / |

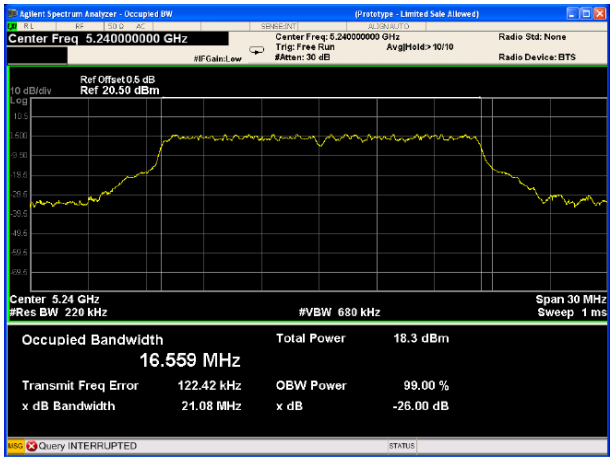
802.11a U-NII-1 Low CH



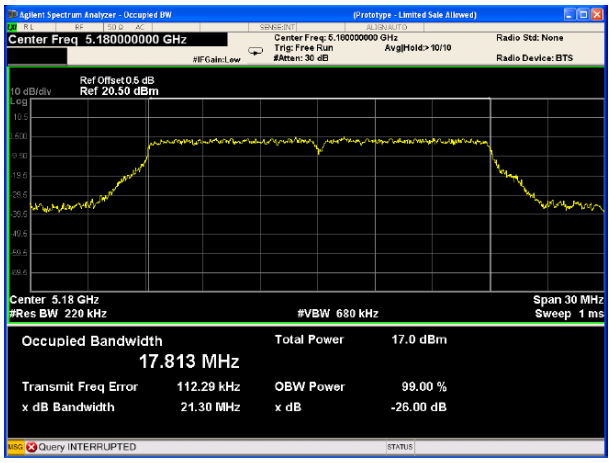

802.11a U-NII-1 Middle CH



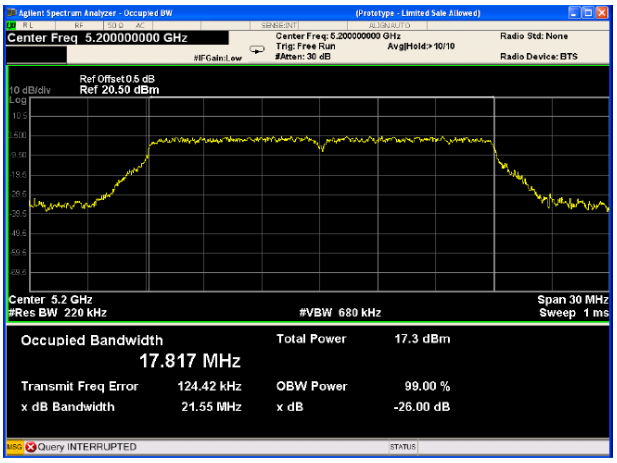

802.11a U-NII-1 High CH



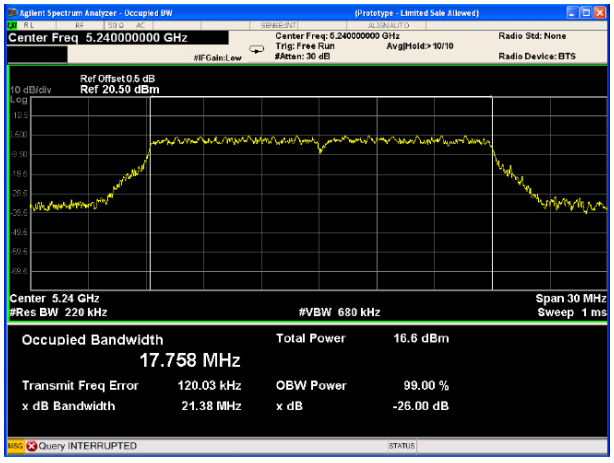
802.11n(HT20) U-NII-1 Low CH



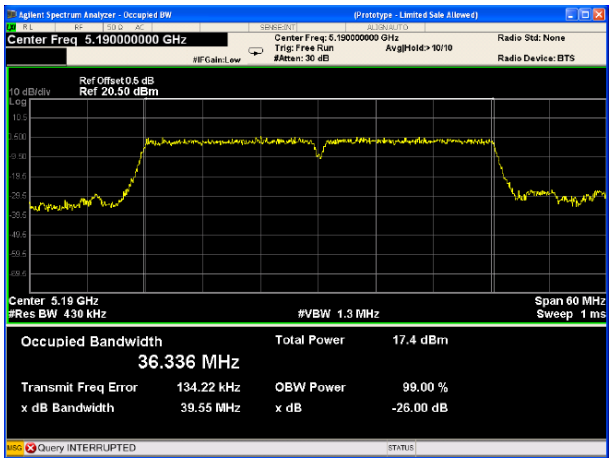

802.11 n(HT20) U-NII-1 Middle CH



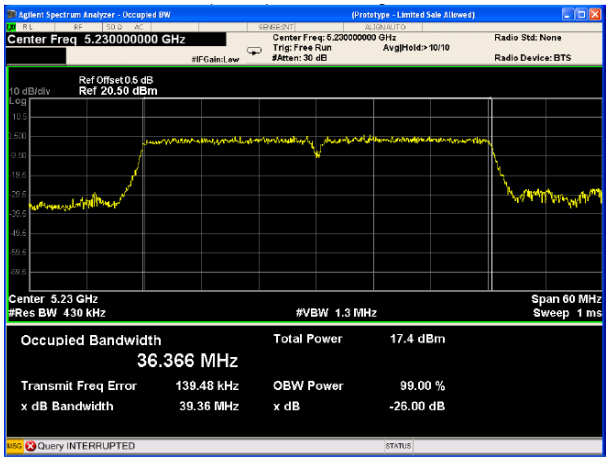

802.11n(HT20) U-NII-1 High CH



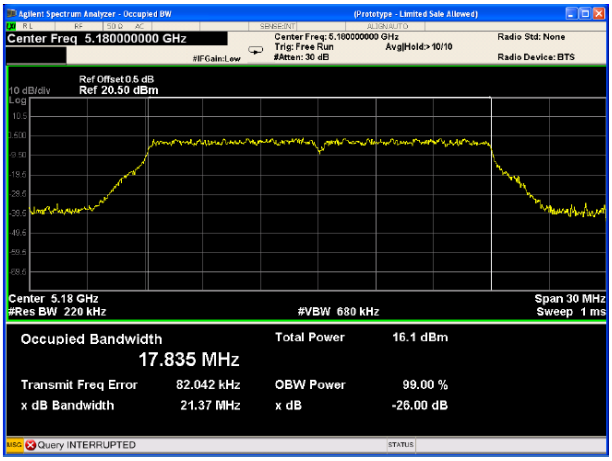
802.11n(HT40) U-NII-1 Low CH



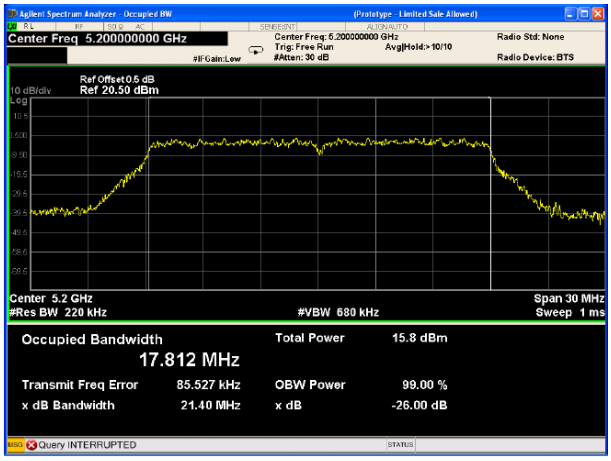

802.11 n(HT40) U-NII-1 High CH



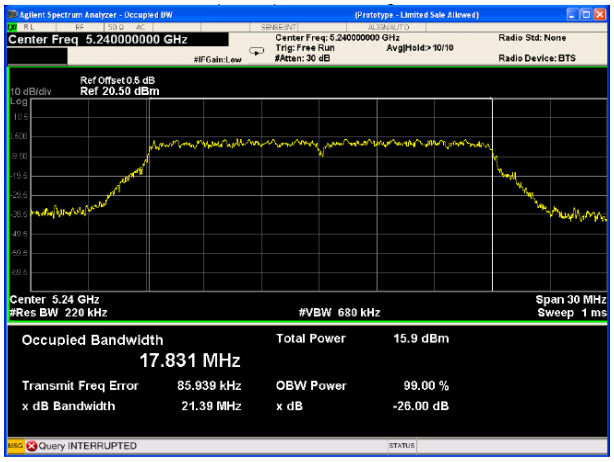

802.11ac(HT20) U-NII-1 Low CH



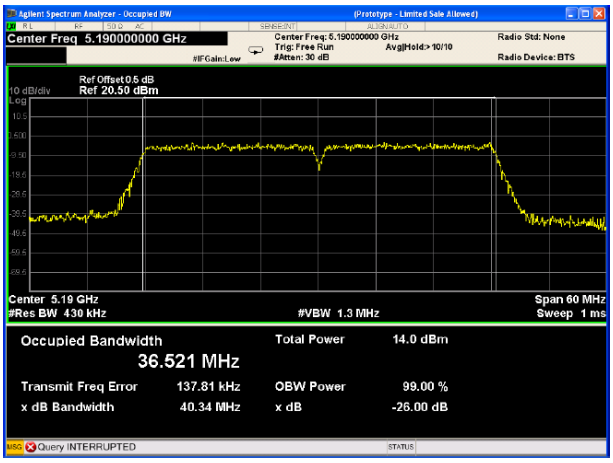

802.11 ac(HT20) U-NII-1 Middle CH



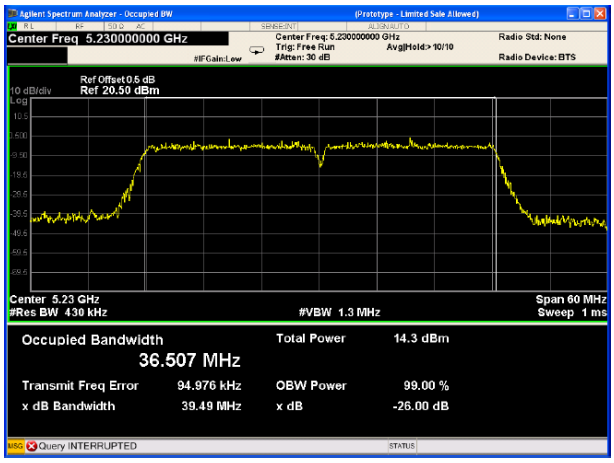

802.11 ac(HT20) U-NII-1 High CH



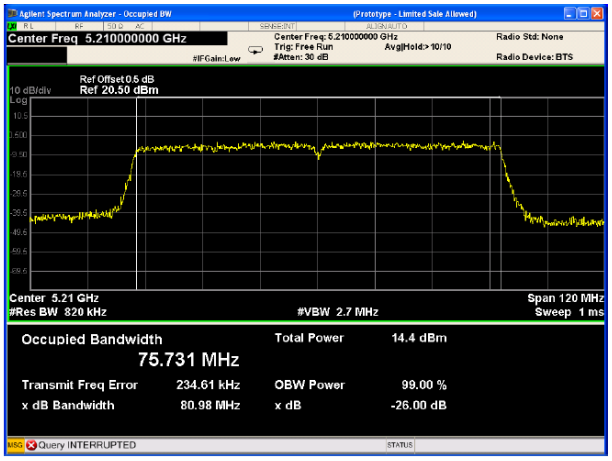
802.11ac(HT40) U-NII-1 Low CH




802.11 ac(HT40) U-NII-1 High CH




802.11ac(HT80) U-NII-1 Low CH



# 4 CONDUCTED OUTPUT POWER

## 4.1 limit

| FCC Part15, Subpart E/ RSS-247 | | |
|---|---|---|
| Test Item | Limit | Frequency Range (MHz) |
| Conducted Output Power | For FCC client devices: 250mW (24dBm) | 5150-5250 |
| | For RSS: e.i.r.p. power: not exceed 200 mW(23dBm) or 10 + 10 log10 B | |
| | 250mW (24dBm) or 11 + 10 log10 B | 5250-5350 |
| | 250mW (24dBm) or 11 + 10 log10 B | For FCC:5470-5725<br>For IC:5470-5600<br>5650-5725 |
| | 1 Watt (30dBm) | 5725-5850 |
| Note: For ISED: B=99% bandwidth. | | |

## 4.2 test procedure

a. Connect each EUT's antenna output to power meter by RF cable and attenuator
b. Get each antenna port's output power of EUT.

## 4.3 TEST SETUP

4.4 test results

| Band | Operation mode | Conducted Output Power (dBm) | | |
|---|---|---|---|---|
| | | Low | Middle | High |
| U-NII-1 | 802.11a | 6.16 | 6.78 | 6.64 |
| | 802.11n(HT20) | 5.11 | 5.73 | 5.57 |
| | 802.11n(HT40) | 5.17 | / | 5.86 |
| | 802.11ac(HT20) | 4.46 | 4.37 | 4.59 |
| | 802.11ac(HT40) | 4.32 | / | 4.94 |
| | 802.11ac(HT80) | 4.50 | / | / |

# 5. POWER SPECTRAL DENSITY

## 5.1 LIMIT

| FCC Part15, Subpart E/ RSS-247 | | |
|---|---|---|
| Test Item | Limit | Frequency Range (MHz) |
| Power Spectral Density | For FCC: Other than Mobile and portable:17dBm/MHz<br>Mobile and portable:11dBm/MHz | 5150-5250 |
| | For RSS eirp:10dBm/MHz | |
| | 11dBm/MHz | 5250-5350 |
| | 11dBm/MHz | For FCC:5470-5725<br>For IC:5470-5600<br>5650-5725 |
| | 30dBm/500kHz | 5725-5850 |

## 5.2 TEST PROCEDURE

The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW.

Connect the UUT to the spectrum analyser and use the following settings:

5725MHz-5850MHz

| | |
|---|---|
| Center Frequency | The centre frequency of the channel under test |
| Detector | RMS |
| RBW | 500kHz |
| VBW | ≥3 × RBW |
| Span | Encompass the entire emissions bandwidth (EBW) of the signal |
| Trace | Max hold |
| Sweep time | Auto |

Note:

1. For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v01, section II.F.5., it is acceptable to set RBW at 1MHz and VBW at 3MHz if the spectrum analyzer does not have 500kHz RBW.

2. The value measured with RBW=1MHz is to be added with 10log(500kHz/1MHz) which is - 3dB. For example, if the measured value is +10dBm using RBW=1MHz (that is +10dBm/MHz), then the converted value will be +7dBm/500kHz.

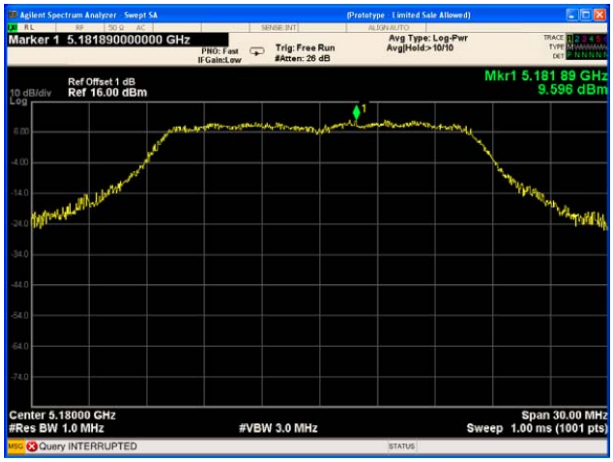
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

## 5.3 TEST SETUP

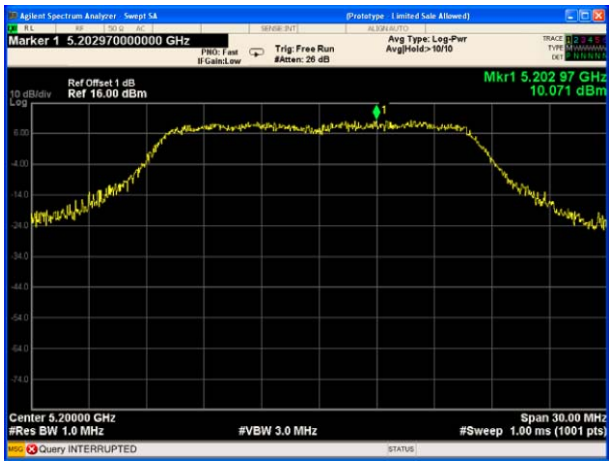
## 5.4 TEST RESULTS

| Band | Operation mode | Power Spectral Density (dBm/MHz) | | |
|---|---|---|---|---|
| | | Low | Middle | High |
| U-NII-1 | 802.11a | 9.596 | 10.071 | 9.824 |
| | 802.11n(HT20) | 6.009 | 6.925 | 7.499 |
| | Limit | ≤11.00dBm/MHz | | |

802.11a U-NII-1 Low CH

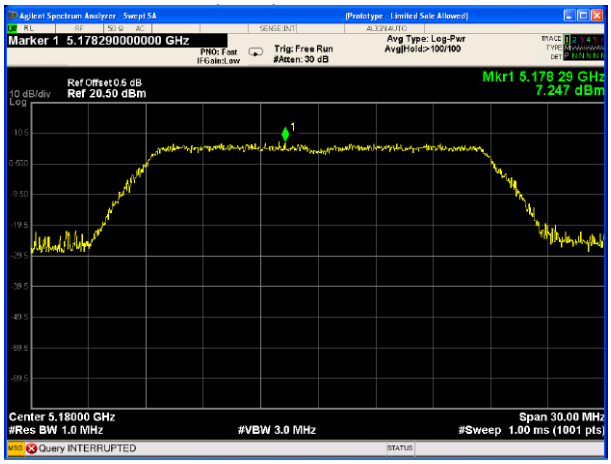



802.11a U-NII-1 Middle CH

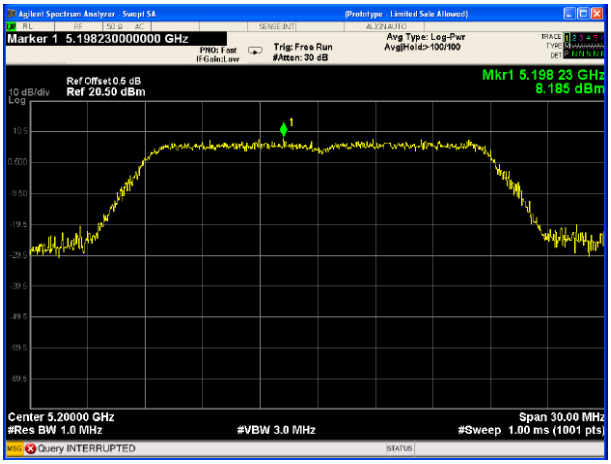


802.11a U-NII-1 High CH

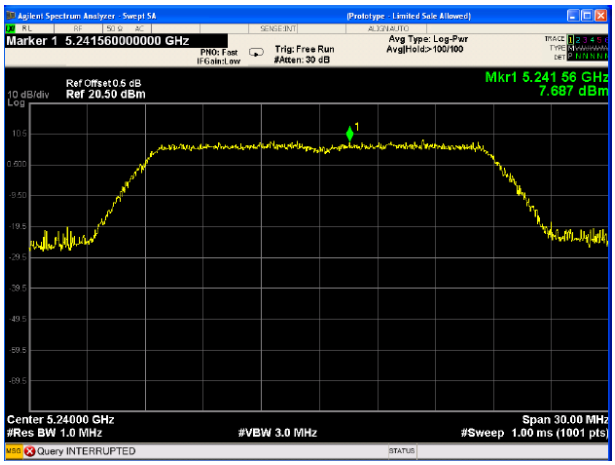
802.11n(HT20) U-NII-1 Low CH



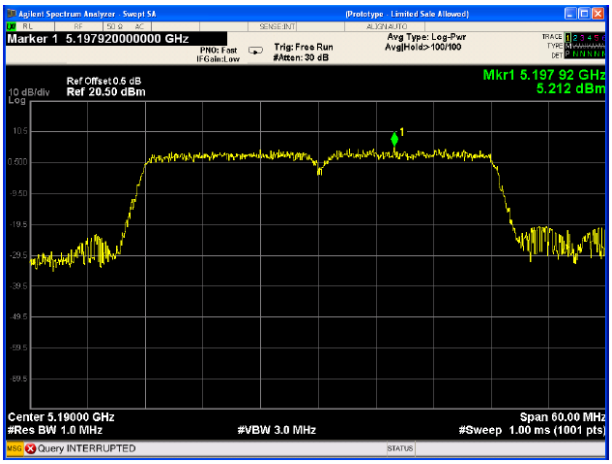

802.11 n(HT20) U-NII-1 Middle CH



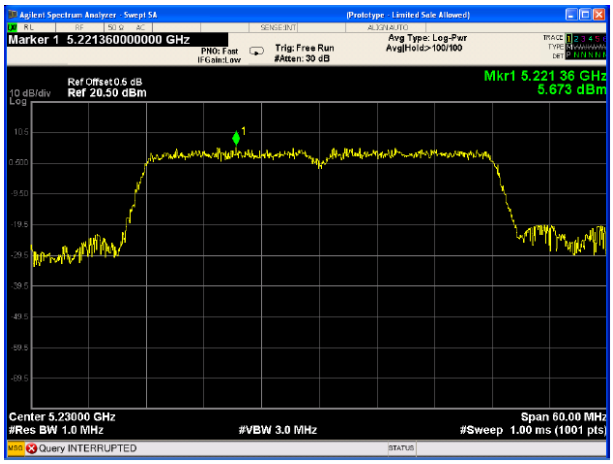

802.11 n(HT20) U-NII-1 High CH



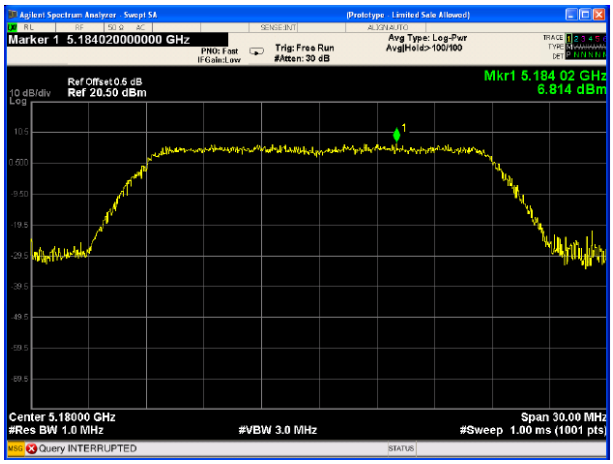
802.11n(HT40) U-NII-1 Low CH



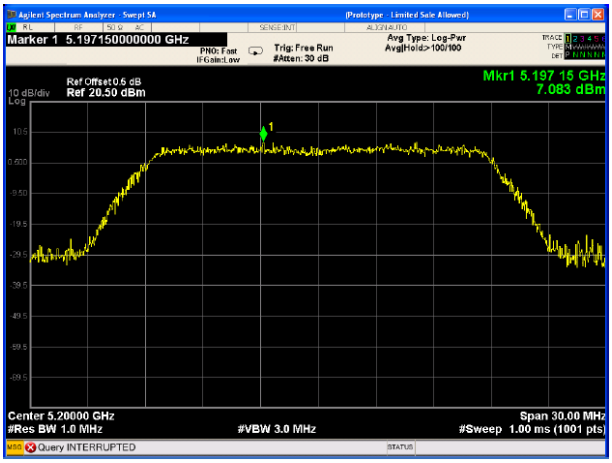

802.11 n(HT40) U-NII-1 High CH



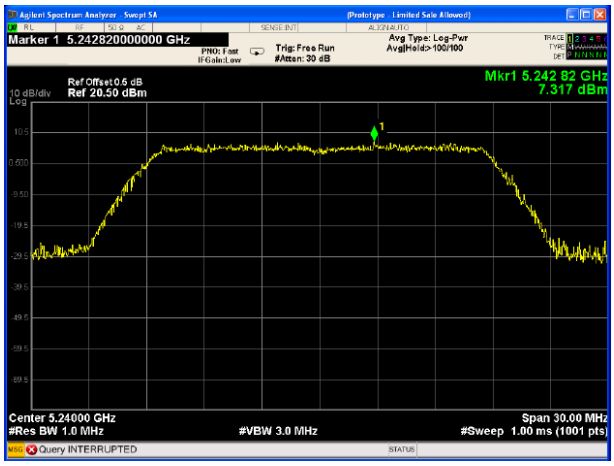

802.11ac(HT20) U-NII-1 Low CH



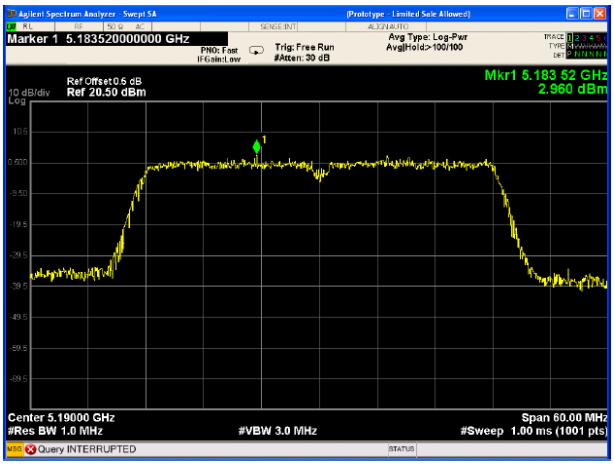

802.11ac(HT20) U-NII-1 Middle CH



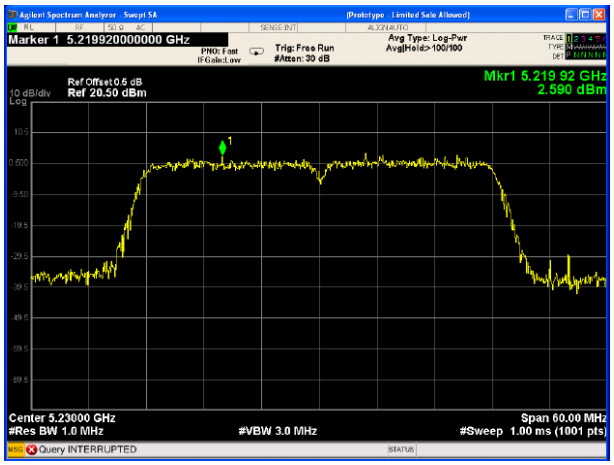

802.11ac(HT20) U-NII-1 High CH



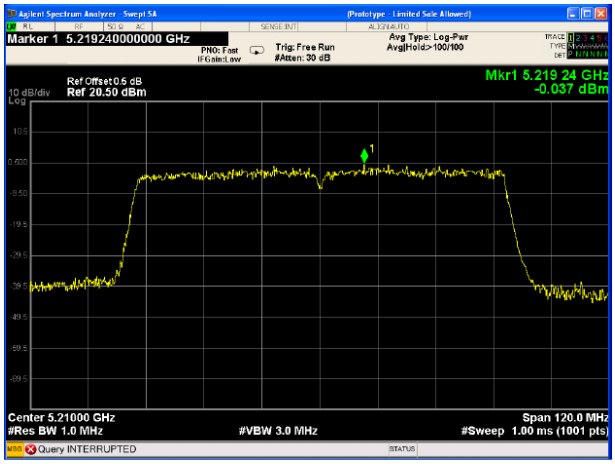
802.11ac(HT40) U-NII-1 Low CH




802.11ac(HT40) U-NII-1 High CH




802.11ac(HT40) U-NII-1 Low CH



# 6. FREQUENCY STABILITY MEASUREMENT

## 6.1 LIMIT

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

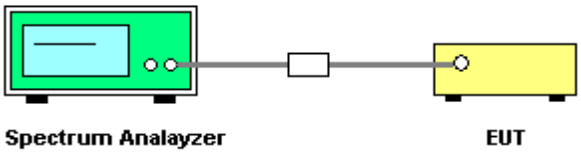
## 6.2 TEST PROCEDURE

(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.

## 6.3 TEST SETUP



6.4 TEST RESULTS

| U-NII-1 Test Frequency:5180MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supply (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 50 | 3.7 | / | / | / |
| 45 | | 1807 | 2.1599 | 20 |
| 30 | | 1800 | 2.1516 | 20 |
| 20 | | 1806 | 2.1587 | 20 |
| 10 | | 1800 | 2.1516 | 20 |
| 0 | | 1803 | 2.1552 | 20 |
| -10 | | 1800 | 2.1516 | 20 |
| -15 | | 1809 | 2.1623 | 20 |
| -30 | | / | / | / |
| 20 | 3.33 | 1810 | 2.1635 | 20 |
| 20 | 4.07 | 1798 | 2.1492 | 20 |

# 7. Band edge

## 7.1 LIMIT

For transmitters operating in the 5.15-5.25 GHz and 5.725-5.85G band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

-27 dBm/MHz Limit=95.2+EIRP[dBm]=95.2-27=68.2 dBμV/m

## 7.2 TEST PROCEDURE

(1) EUT height should be 0.8m for below 1GHz at a semi□ anechoic chamber while EUT height should be 1.5m for above 1GHz at full chamber or semi□ anechoic chamber ground with absorbers

(2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

| Test frequency range | Test antenna used | Test distance |
|---|---|---|
| 9kHz-30MHz | Active Loop antenna | 3m |
| 30MHz-1GHz | Trilog Broadband Antenna | 3m |
| 1GHz-18GHz | Double Ridged Horn Antenna(1GHz-18GHz) | 3m |
| 18GHz-40GHz | Horn Antenna(18GHz-40GHz) | 1m |

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9kHz to 40GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m (Except loop antenna, it’s fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9kHz to 40GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9kHz to 30MHz and 18GHz to 40GHz, so below final test was performed with frequency range from 30MHz to 18GHz.

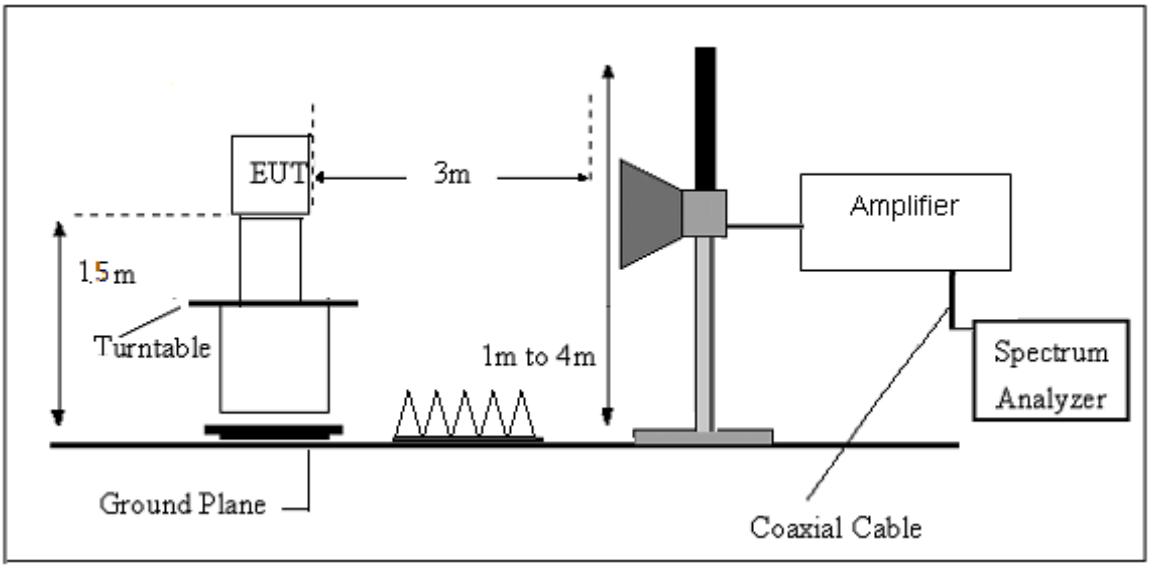
(6) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit

(7) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

| Frequency band | RBW |
|---|---|
| 9kHz-150kHz | 200Hz |
| 150kHz-30MHz | 9kHz |
| 30MHz-1GHz | 120kHz |

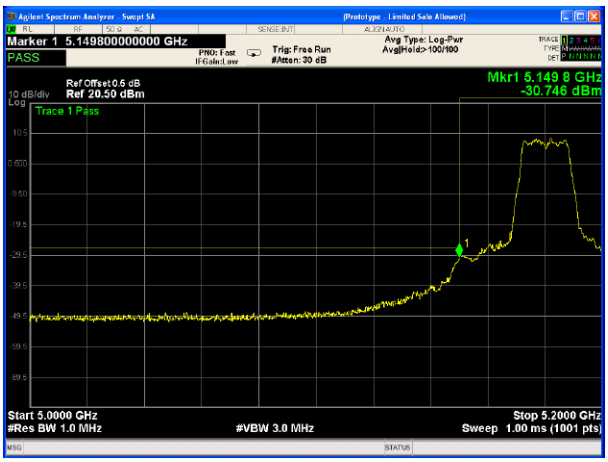
(8) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz, Peak detector for Peak measure, RMS detector for AV value

7.3 TEST SETUP

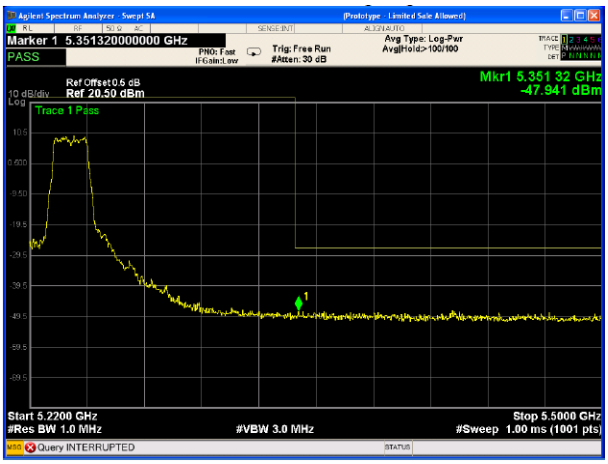


## 7.5 TEST RESULTS

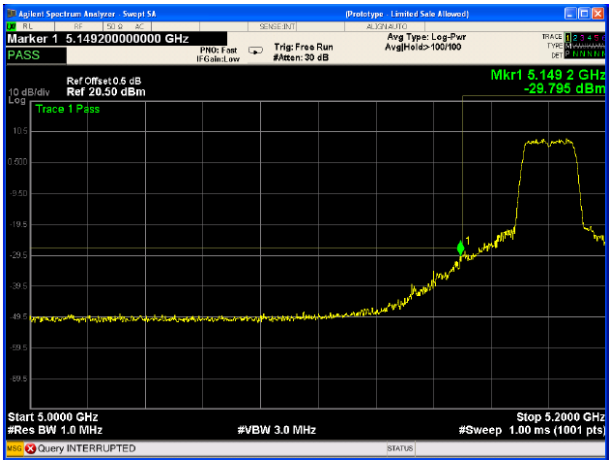
802.11a U-NII-1 Band edge-left side



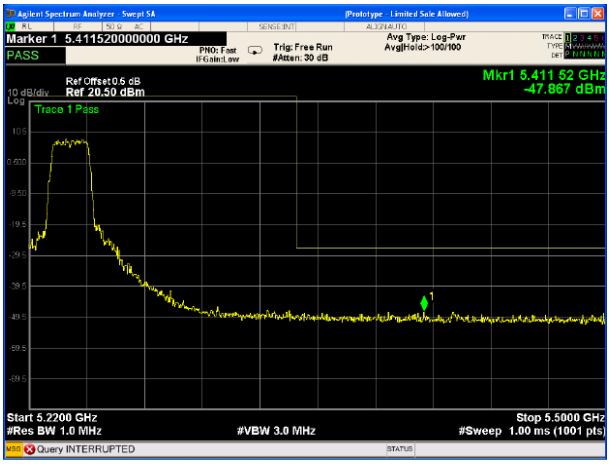

802.11a U-NII-1 Band edge-right side



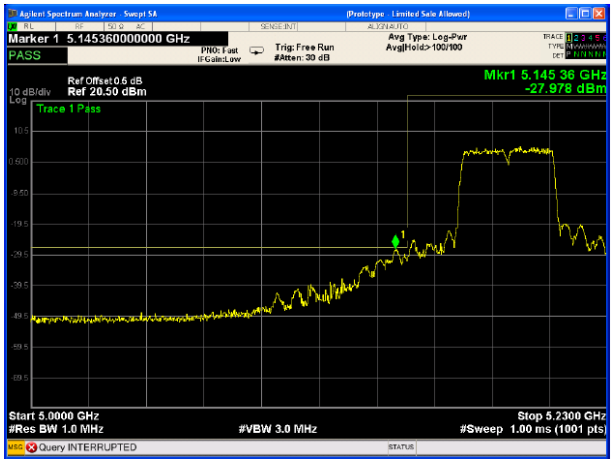

802.11n(H20) U-NII-1 Band edge-left side



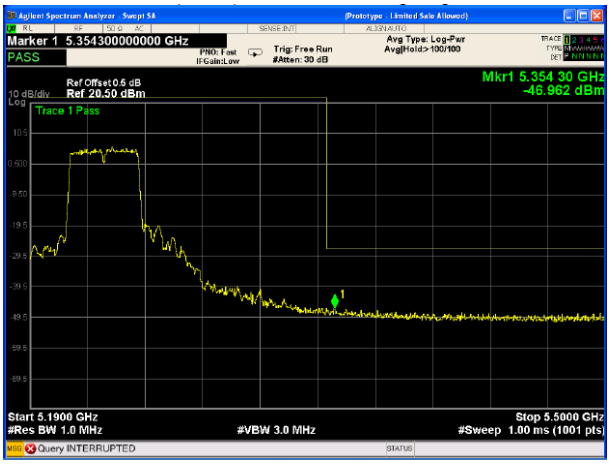

802.11(H20) U-NII-1 Band edge-right side



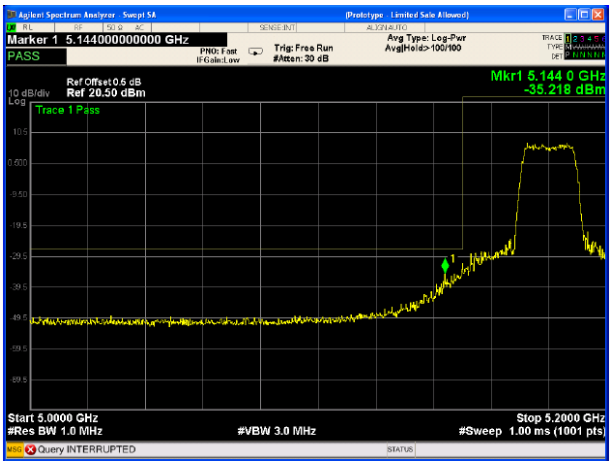

802.11n(H40) U-NII-1 Band edge-left side



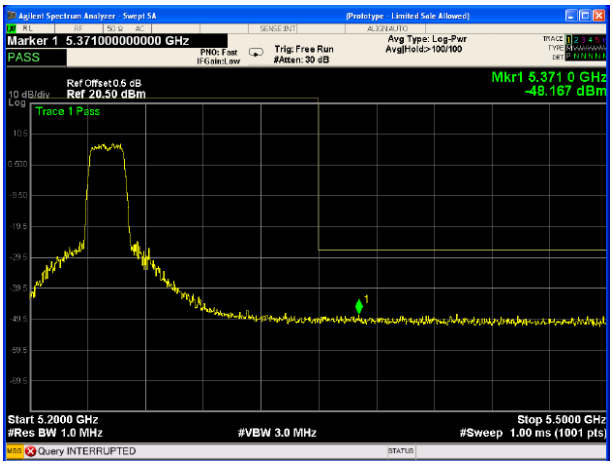

802.11(H40) U-NII-1 Band edge-right side



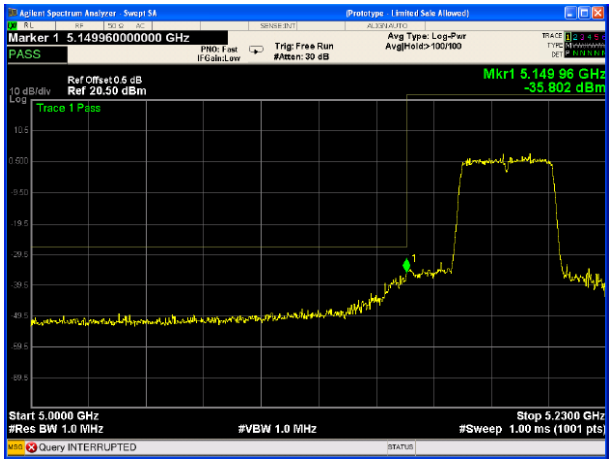
802.11ac(HT20) U-NII-1 Band edge-left side



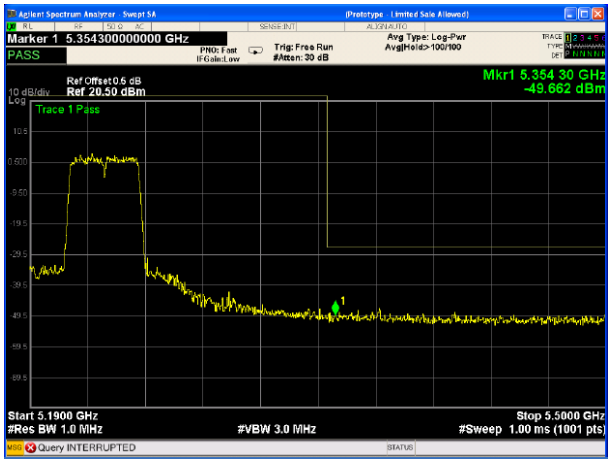

802.11 ac(HT20)U-NII-1 Band edge-right side



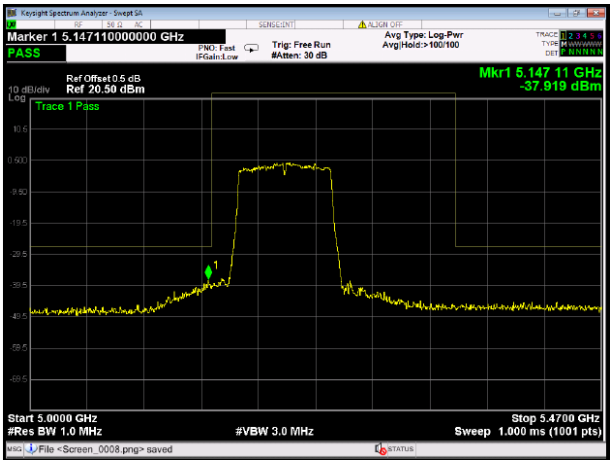

802.11ac(HT40) U-NII-1 Band edge-left side



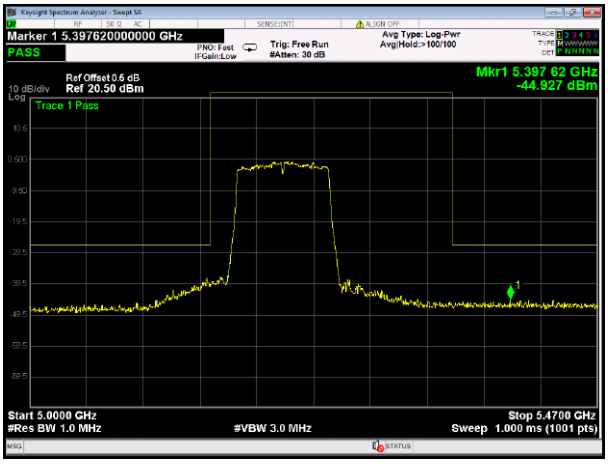

802.11 ac(HT40)U-NII-1 Band edge-right side




802.11ac(HT80) U-NII-1 Band edge-left side




802.11 ac(HT80)U-NII-1 Band edge-right side



# 8. Duty Cycle

## 8.1 TEST REQUIREMENT

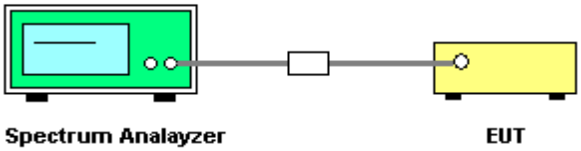
47 CFR Part 15C 15.407 and 789033 D02 General UNII Test Procedures New Rules v02r01(December 14, 2017), Section (B)

ANSI C63.10: 2013

## 8.2 TEST PROCEDURE

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

## 7.3 TEST SETUP



## 8.4 TEST RESULTS

| UNII-1 a Mode | | | |
|---|---|---|---|
| channel | On time(ms) | Period(ms) | Duty Cycle(%) |
| 36 | 100 | 100 | 100 |
| 40 | 100 | 100 | 100 |
| 48 | 100 | 100 | 100 |

| UNII-1 n(HT20) Mode | | | |
|---|---|---|---|
| channel | On time(ms) | Period(ms) | Duty Cycle(%) |
| 36 | 100 | 100 | 100 |
| 40 | 100 | 100 | 100 |
| 48 | 100 | 100 | 100 |
| UNII-1 n(HT40) Mode | | | |
| channel | On time(ms) | Period(ms) | Duty Cycle(%) |
| 38 | 100 | 100 | 100 |
| 46 | 100 | 100 | 100 |
| | | | |

| UNII-1 ac(HT20) Mode | | | |
|---|---|---|---|
| channel | On time(ms) | Period(ms) | Duty Cycle(%) |
| 36 | 100 | 100 | 100 |
| 40 | 100 | 100 | 100 |
| 48 | 100 | 100 | 100 |
| UNII-1 ac(HT40) Mode | | | |
| channel | On time(ms) | Period(ms) | Duty Cycle(%) |
| 38 | 100 | 100 | 100 |
| 46 | 100 | 100 | 100 |
| | | | |
| UNII-1 ac(HT80) Mode | | | |
| channel | On time(ms) | Period(ms) | Duty Cycle(%) |
| 42 | 100 | 100 | 100 |
| | | | |
| | | | |

# 9 RADIATED EMISSION MEASUREMENT

## 9.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

| Frequencies (MHz) | Field Strength (micorvolts/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 |

For Radiated Emission

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/AV |
| Start Frequency | 1000 MHz(Peak/AV) |
| Stop Frequency | 10th carrier hamonic(Peak/AV) |
| RB / VB (emission in restricted band) | PK=1MHz / 1MHz, AV=1 MHz /10 Hz |

9.2 TEST PROCEDURE

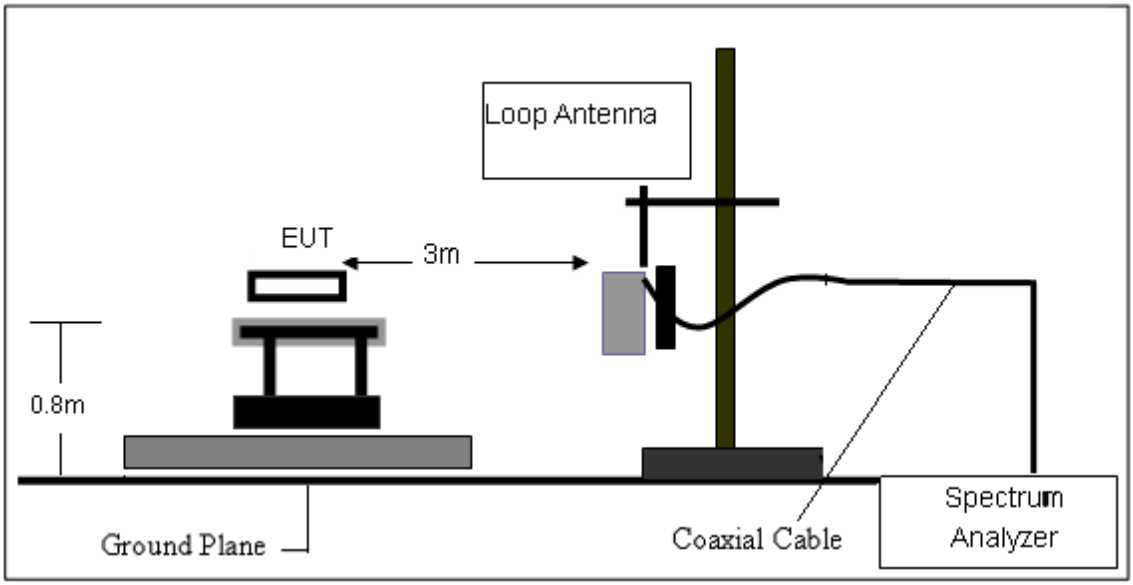
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz,and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

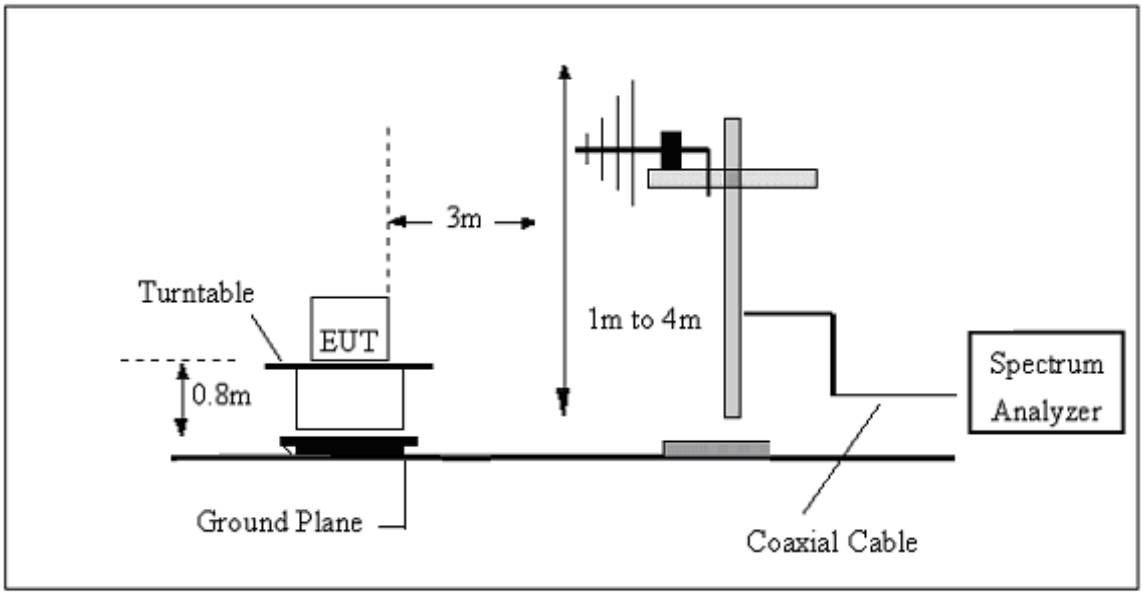
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

9.3 TESTSETUP

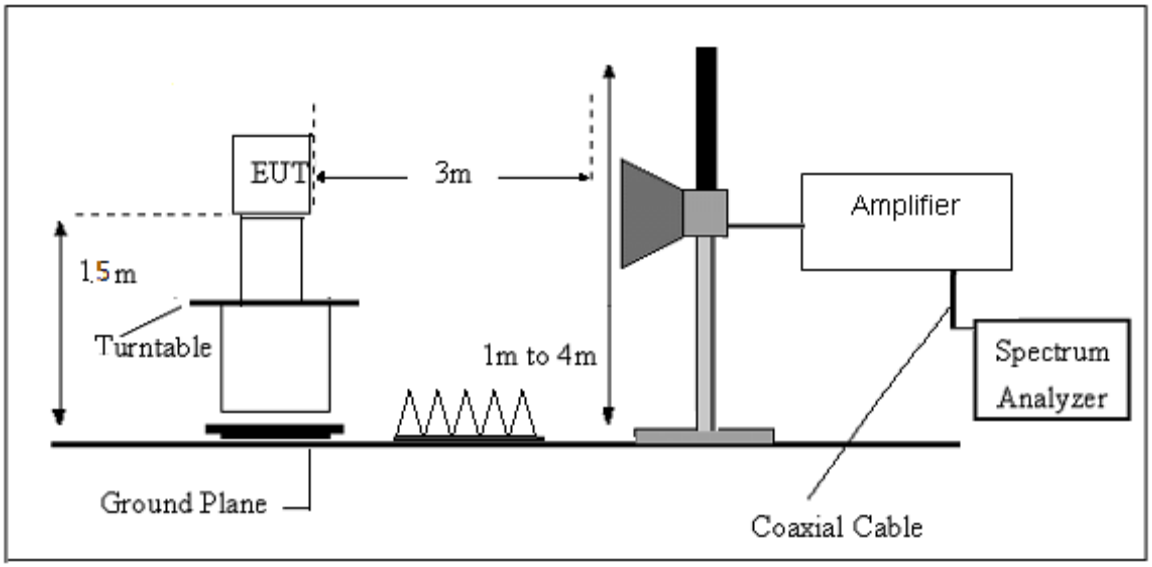
（A）Radiated Emission Test-Up Frequency Below 30MHz




（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



9.4. TEST RESULTS

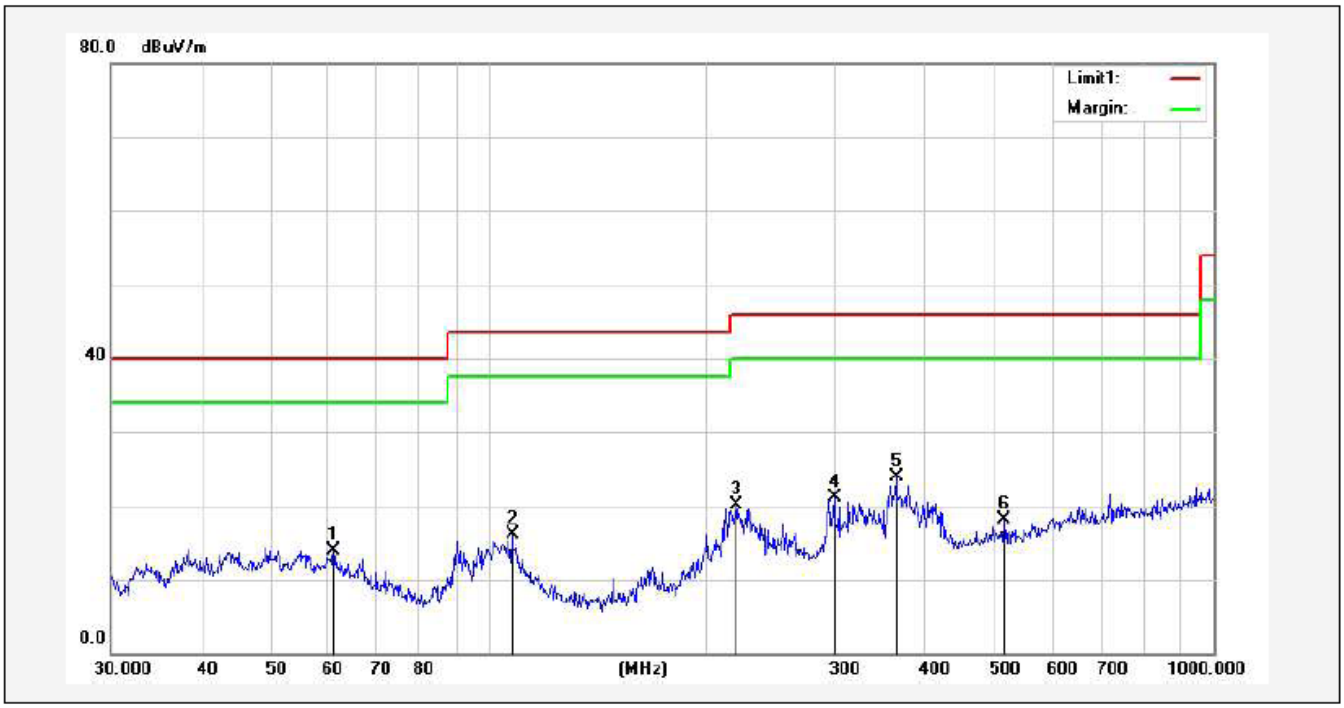
(9KHz-30MHz)

| | | | |
|---|---|---|---|
| Temperature: | 22.7℃ | Relative Humidity: | 61% |
| Test Voltage: | AC 120V 60Hz | Test Mode: | / |

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

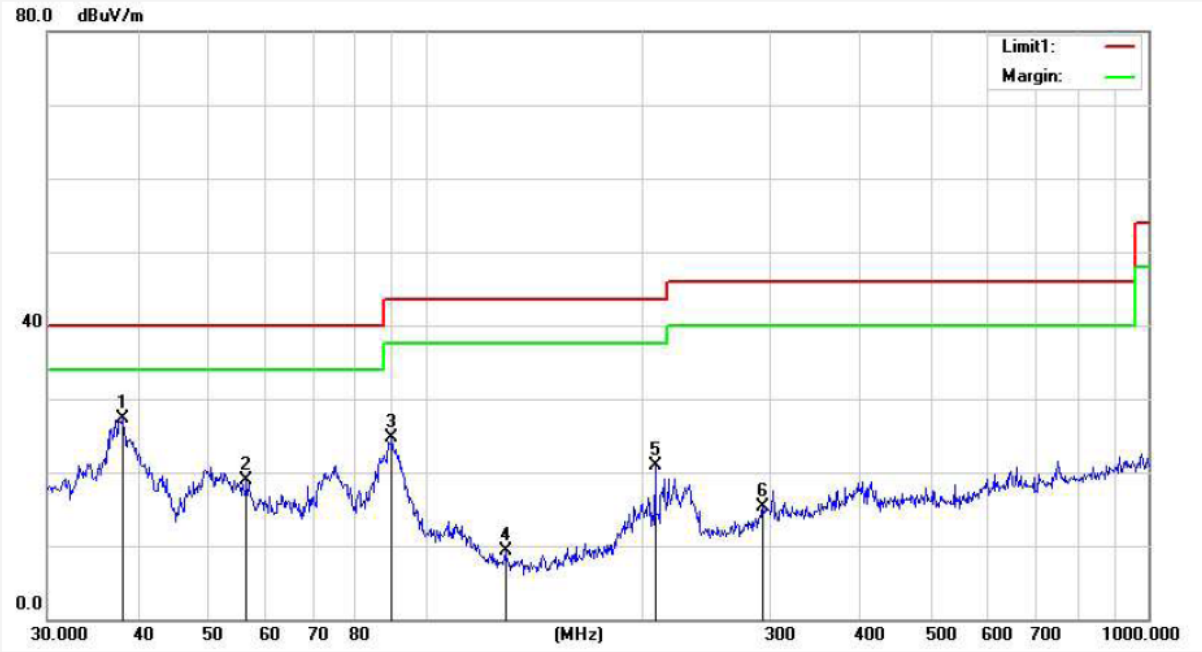
.
(30MHz-1000MHz)
802.11a U-NII-1 Low Channel 5180MHz（worst data）

H




| No. | Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 60.9176 | 31.05 | -17.17 | 13.88 | 40.00 | -26.12 | peak |
| 2 | 107.5101 | 33.85 | -17.79 | 16.06 | 43.50 | -27.44 | peak |
| 3 | 219.0753 | 38.00 | -17.86 | 20.14 | 46.00 | -25.86 | peak |
| 4 | 299.3158 | 37.21 | -16.06 | 21.15 | 46.00 | -24.85 | peak |
| 5 | 364.2595 | 38.81 | -14.94 | 23.87 | 46.00 | -22.13 | peak |
| 6 | 513.6331 | 31.28 | -13.14 | 18.14 | 46.00 | -27.86 | peak |

V




| No. | Frequency (MHz) | Reading (dBuV) | Correction (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 38.0783 | 67.52 | -40.24 | 27.28 | 40.00 | -12.72 | peak |
| 2 | 56.5929 | 59.20 | -40.24 | 18.96 | 40.00 | -21.04 | peak |
| 3 | 89.9047 | 64.97 | -40.24 | 24.73 | 43.50 | -18.77 | peak |
| 4 | 129.0146 | 49.52 | -40.24 | 9.28 | 43.50 | -34.22 | peak |
| 5 | 207.8501 | 61.10 | -40.24 | 20.86 | 43.50 | -22.64 | peak |
| 6 | 293.0842 | 55.52 | -40.24 | 15.28 | 46.00 | -30.72 | peak |

Note:
All model are tested. Only show worst data on report

(1GHz ~ 40GHz) Restricted band and Spurious emission Requirements

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.407/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11a U-NII-1 Low Channel 5180MHz | | | | | | | | | |
| 4500.37 | 49.00 | PK | 109 | 1.8 | H | -2.03 | 46.97 | 74.00 | -27.03 |
| 4500.37 | 45.66 | Ave | 109 | 1.8 | H | -2.03 | 43.63 | 54.00 | -10.37 |
| 10360.00 | 41.87 | PK | 359 | 1.3 | H | 5.33 | 47.20 | 74.00 | -26.80 |
| 10360.00 | 36.00 | Ave | 359 | 1.3 | H | 5.33 | 41.33 | 54.00 | -12.67 |
| 802.11a U-NII-1 Middle channel 5200MHz | | | | | | | | | |
| 4531.52 | 50.05 | PK | 246 | 1.8 | H | -1.94 | 48.11 | 74.00 | -25.89 |
| 4531.52 | 44.98 | Ave | 246 | 1.8 | H | -1.94 | 43.04 | 54.00 | -10.96 |
| 10400.00 | 42.05 | PK | 110 | 1.6 | H | 5.21 | 47.26 | 74.00 | -26.74 |
| 10400.00 | 36.17 | Ave | 110 | 1.6 | H | 5.21 | 41.38 | 54.00 | -12.62 |
| 802.11a U-NII-1 High channel 5240MHz | | | | | | | | | |
| 4502.74 | 49.98 | PK | 298 | 1.7 | H | -2.24 | 47.74 | 74.00 | -26.26 |
| 4502.74 | 43.84 | Ave | 298 | 1.7 | H | -2.24 | 41.60 | 54.00 | -12.40 |
| 10480.00 | 42.03 | PK | 118 | 1.4 | H | 5.14 | 47.17 | 74.00 | -26.83 |
| 10480.00 | 35.42 | Ave | 118 | 1.4 | H | 5.14 | 40.56 | 54.00 | -13.44 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.407/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11n(HT20) U-NII-1 Low Channel 5180MHz | | | | | | | | | |
| 4501.82 | 48.54 | PK | 162 | 1.4 | H | -2.14 | 46.40 | 74.00 | -27.60 |
| 4501.82 | 45.07 | Ave | 162 | 1.4 | H | -2.14 | 42.93 | 54.00 | -11.07 |
| 10360.00 | 42.12 | PK | 37 | 1.6 | H | 5.33 | 47.45 | 74.00 | -26.55 |
| 10360.00 | 34.80 | Ave | 37 | 1.6 | H | 5.33 | 40.13 | 54.00 | -13.87 |
| 802.11n(HT20) U-NII-1 Middle channel 5200MHz | | | | | | | | | |
| 4536.90 | 49.22 | PK | 143 | 1.5 | H | -2.12 | 47.10 | 74.00 | -26.90 |
| 4536.90 | 46.16 | Ave | 143 | 1.5 | H | -2.12 | 44.04 | 54.00 | -9.96 |
| 10400.00 | 42.80 | PK | 21 | 1.9 | H | 5.21 | 48.01 | 74.00 | -25.99 |
| 10400.00 | 36.07 | Ave | 21 | 1.9 | H | 5.21 | 41.28 | 54.00 | -12.72 |
| 802.11n(HT20) U-NII-1 High channel 5240MHz | | | | | | | | | |
| 4512.97 | 48.22 | PK | 257 | 1.6 | H | -1.96 | 46.26 | 74.00 | -27.74 |
| 4512.97 | 45.88 | Ave | 257 | 1.6 | H | -1.96 | 43.92 | 54.00 | -10.08 |
| 10480.00 | 41.17 | PK | 162 | 1.4 | H | 5.14 | 46.31 | 74.00 | -27.69 |
| 10480.00 | 36.78 | Ave | 162 | 1.4 | H | 5.14 | 41.92 | 54.00 | -12.08 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.407/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11n(HT40) U-NII-1 Low Channel 5190MHz | | | | | | | | | |
| 4506.90 | 39.13 | PK | 6 | 1.8 | H | -1.89 | 37.24 | 74.00 | -36.76 |
| 4506.90 | 39.39 | Ave | 6 | 1.8 | H | -1.89 | 37.50 | 54.00 | -16.50 |
| 10380.00 | 39.66 | PK | 122 | 1.1 | H | 5.26 | 44.92 | 74.00 | -29.08 |
| 10380.00 | 34.53 | Ave | 122 | 1.1 | H | 5.26 | 39.79 | 54.00 | -14.21 |
| 802.11n(HT40) U-NII-1 High channel 5230MHz | | | | | | | | | |
| 4507.99 | 38.61 | PK | 64 | 1.3 | H | -1.94 | 36.67 | 74.00 | -37.33 |
| 4507.99 | 34.99 | Ave | 64 | 1.3 | H | -1.94 | 33.05 | 54.00 | -20.95 |
| 10480.00 | 42.10 | PK | 98 | 1.2 | H | 5.28 | 47.38 | 74.00 | -26.62 |
| 10480.00 | 36.23 | Ave | 98 | 1.2 | H | 5.28 | 41.51 | 54.00 | -12.49 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.407/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11ac(HT20) U-NII-1 High channel 5240MHz | | | | | | | | | |
| 4519.50 | 43.03 | PK | 167 | 1.4 | H | -1.81 | 41.22 | 74.00 | -32.78 |
| 4519.50 | 43.01 | Ave | 167 | 1.4 | H | -1.81 | 41.20 | 54.00 | -12.80 |
| 5122.32 | 47.31 | PK | 303 | 1.3 | H | -1.06 | 46.25 | 74.00 | -27.75 |
| 5122.32 | 40.75 | Ave | 303 | 1.3 | H | -1.06 | 39.69 | 54.00 | -14.31 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.407/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11ac(HT40) U-NII-1 Low Channel 5190MHz | | | | | | | | | |
| 4500.14 | 35.59 | PK | 141 | 1.2 | H | -1.91 | 33.68 | 74.00 | -40.32 |
| 4500.14 | 30.29 | Ave | 141 | 1.2 | H | -1.91 | 28.38 | 54.00 | -25.62 |
| 10380.00 | 39.59 | PK | 151 | 1.9 | H | 5.26 | 44.85 | 74.00 | -29.15 |
| 10380.00 | 34.79 | Ave | 151 | 1.9 | H | 5.26 | 40.05 | 54.00 | -13.95 |
| 802.11ac(HT40) U-NII-1 High channel 5230MHz | | | | | | | | | |
| 4503.44 | 36.59 | PK | 293 | 1.4 | H | -1.93 | 34.66 | 74.00 | -39.34 |
| 4503.44 | 31.09 | Ave | 293 | 1.4 | H | -1.93 | 29.16 | 54.00 | -24.84 |
| 10460.00 | 40.89 | PK | 87 | 2.0 | H | 5.28 | 46.17 | 74.00 | -27.83 |
| 10480.00 | 36.20 | Ave | 87 | 2.0 | H | 5.28 | 41.48 | 54.00 | -12.52 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.407/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 802.11ac(HT80) U-NII-1 Low Channel 5210MHz | | | | | | | | | |
| 4534.47 | 28.57 | PK | 298 | 1.9 | H | -1.88 | 26.69 | 74.00 | -47.31 |
| 4534.47 | 42.75 | Ave | 298 | 1.9 | H | -1.88 | 40.87 | 54.00 | -13.13 |
| 10420.00 | 41.85 | PK | 82 | 1.3 | H | 4.65 | 46.50 | 74.00 | -27.50 |
| 10420.00 | 35.78 | Ave | 82 | 1.3 | H | 4.65 | 40.43 | 54.00 | -13.57 |

Note:
All model are tested. Only show worst data on report

# 10 CONDUCTED EMISSION TEST

## 10.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

| FREQUENCY (MHz) | Conducted Emissionlimit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 56.00 | 46.00 |
| 5.0 -30.0 | 60.00 | 50.00 |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

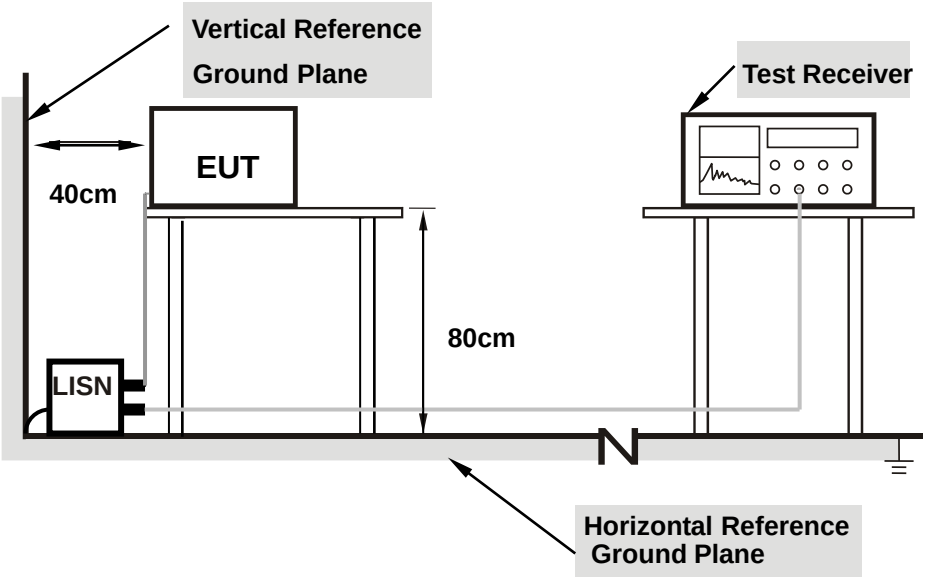
The following table is the setting of the receiver

| **Receiver Parameters** | **Setting** |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

10.2 TEST PROCEDURE

a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

10.3 TEST SETUP



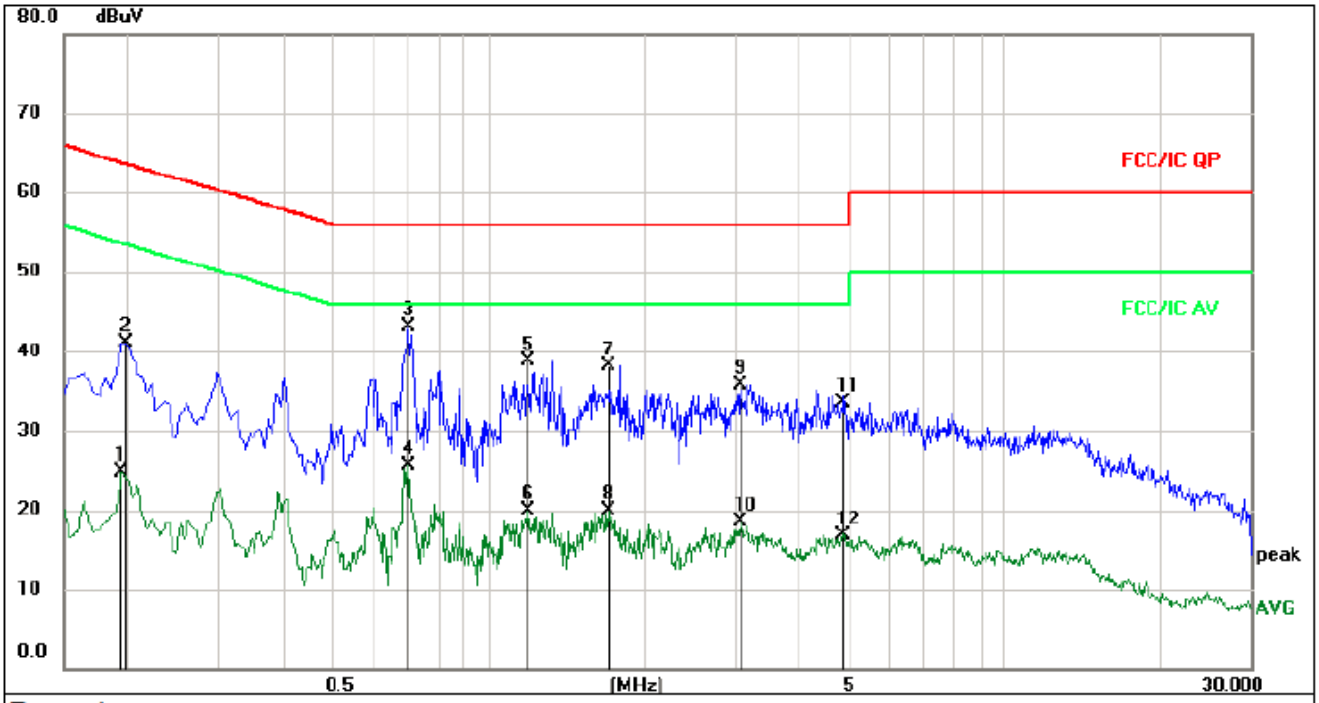

**Note: 1.Support units were connected to second LISN.**

**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

10 .4 TEST RESULT

| | | | |
|---|---|---|---|
| Temperature: | 22.1 ℃ | Relative Humidity: | 56% |
| Test Voltage: | 120V/60HZ | Phase: | L/N |
| Test Mode: | ON | | |

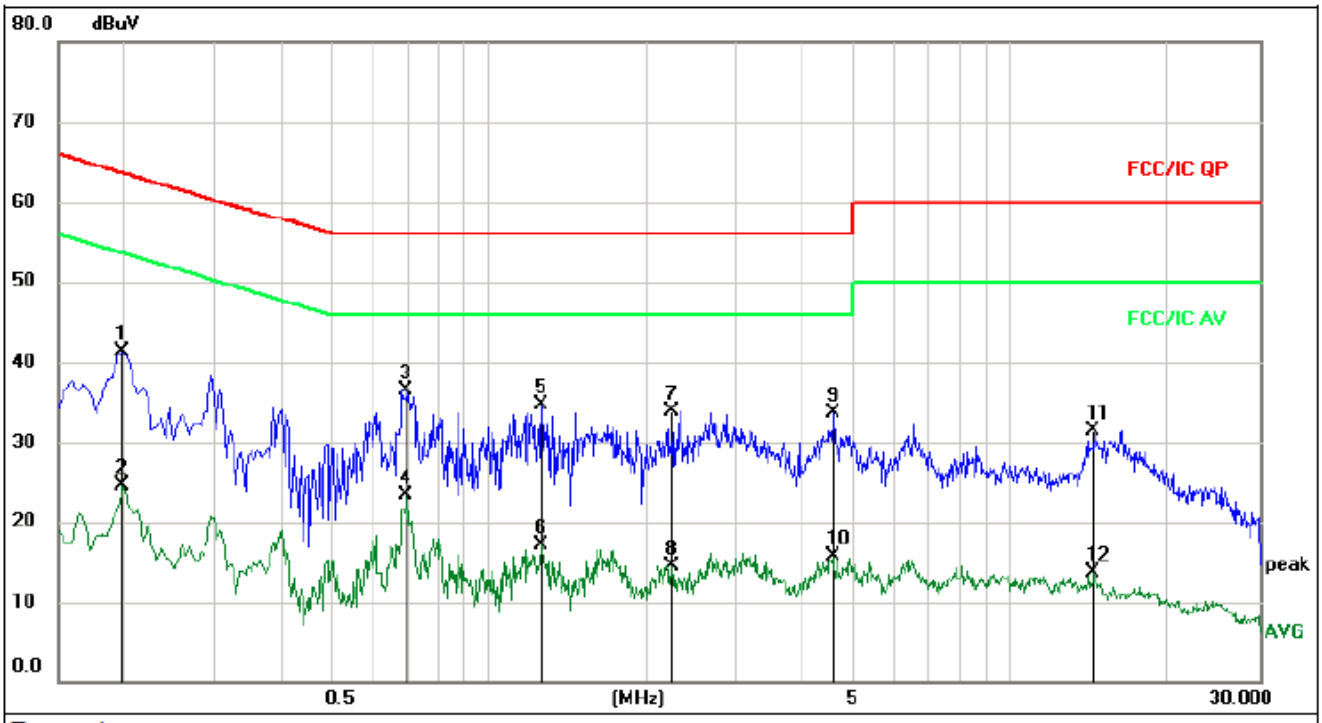
L-line




Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1949 | 15.12 | 9.65 | 24.77 | 53.83 | -29.06 | AVG | |
| 2 | | 0.1995 | 31.50 | 9.65 | 41.15 | 63.63 | -22.48 | QP | |
| 3 | * | 0.6990 | 33.51 | 9.68 | 43.19 | 56.00 | -12.81 | QP | |
| 4 | | 0.6990 | 15.78 | 9.68 | 25.46 | 46.00 | -20.54 | AVG | |
| 5 | | 1.1940 | 28.92 | 9.69 | 38.61 | 56.00 | -17.39 | QP | |
| 6 | | 1.1940 | 10.20 | 9.69 | 19.89 | 46.00 | -26.11 | AVG | |
| 7 | | 1.7160 | 28.32 | 9.70 | 38.02 | 56.00 | -17.98 | QP | |
| 8 | | 1.7160 | 10.18 | 9.70 | 19.88 | 46.00 | -26.12 | AVG | |
| 9 | | 3.0885 | 25.98 | 9.72 | 35.70 | 56.00 | -20.30 | QP | |
| 10 | | 3.0885 | 8.80 | 9.72 | 18.52 | 46.00 | -27.48 | AVG | |
| 11 | | 4.8795 | 23.71 | 9.74 | 33.45 | 56.00 | -22.55 | QP | |
| 12 | | 4.8795 | 7.06 | 9.74 | 16.80 | 46.00 | -29.20 | AVG | |

N-line




Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1995 | 31.75 | 9.65 | 41.40 | 63.63 | -22.23 | QP | |
| 2 | | 0.1995 | 14.82 | 9.65 | 24.47 | 53.63 | -29.16 | AVG | |
| 3 | * | 0.6945 | 26.89 | 9.68 | 36.57 | 56.00 | -19.43 | QP | |
| 4 | | 0.6945 | 13.60 | 9.68 | 23.28 | 46.00 | -22.72 | AVG | |
| 5 | | 1.2660 | 25.02 | 9.70 | 34.72 | 56.00 | -21.28 | QP | |
| 6 | | 1.2660 | 7.44 | 9.70 | 17.14 | 46.00 | -28.86 | AVG | |
| 7 | | 2.2515 | 24.18 | 9.72 | 33.90 | 56.00 | -22.10 | QP | |
| 8 | | 2.2515 | 4.77 | 9.72 | 14.49 | 46.00 | -31.51 | AVG | |
| 9 | | 4.5734 | 23.99 | 9.73 | 33.72 | 56.00 | -22.28 | QP | |
| 10 | | 4.5734 | 5.98 | 9.73 | 15.71 | 46.00 | -30.29 | AVG | |
| 11 | | 14.3700 | 21.64 | 9.86 | 31.50 | 60.00 | -28.50 | QP | |
| 12 | | 14.3700 | 3.76 | 9.86 | 13.62 | 50.00 | -36.38 | AVG | |

# 11. ANTENNA REQUIREMENT

## 11.1 STANDARD REQUIREMENT

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

## 11.2 RESULT

The antennas used for this product are PIFA antenna and no other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.0.dBi.

※※※※※END OF THE REPORT※※※※※