



FCC RADIO TEST REPORT

FCC ID : IHDT56XS1
Equipment : Mobile Cellular Phone
Brand Name : Motorola
Model name : XT1980-4
Applicant : Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA
Manufacturer : Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA
Standard : FCC Part 15 Subpart E §15.407

The product was received on Mar. 05, 2019 and testing was started from Mar. 21, 2019 and completed on Mar. 29, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

| Report No. | Version | Description | Issued Date |
|--------------|---------|-------------------------|---------------|
| FR930415-06F | 01 | Initial issue of report | Apr. 19, 2019 |
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Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|-----------------|-----------------------|--------------------|---|
| 3.1 | 15.407(b) | Unwanted Emissions | Pass | Under limit 6.86 dB at 46.490 MHz |
| 3.2 | 15.207 | AC Conducted Emission | Pass | Under limit 9.03 dB at 0.213 MHz |

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Natasha Hsieh



1 General Description

1.1 Product Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|---|
| Equipment | Mobile Cellular Phone |
| Brand Name | Motorola |
| Model Name | XT1980-4 |
| FCC ID | IHDT56XS1 |
| IMEI Code | Conduction : 352157100011156 Radiation : 352157100011040 |
| EUT supports Radios application | CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE/GNSS/NFC/FM/WPC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE |
| HW Version | DVT2 |
| EUT Stage | Identical Prototype |

Remark: The above EUT's information was declared by manufacturer.

| Accessory List | |
|----------------|-----------------------|
| WPC Cover | Brand Name : Motorola |
| | Model Name : MD100W |

1.2 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| Tx/Rx Channel Frequency Range | 5745 MHz ~ 5825 MHz |
| Antenna Type / Gain | Loop Antenna with gain -8.0 dBi |
| Type of Modulation | 802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) |

1.3 Modification of EUT

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



1.4 Testing Location

| | |
|---------------------------|---|
| Test Site | SPORTON INTERNATIONAL INC. |
| Test Site Location | No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978 |
| Test Site No. | Sporton Site No. |
| | CO05-HY |

Note: The test site complies with ANSI C63.4 2014 requirement.

| | |
|---------------------------|---|
| Test Site | SPORTON INTERNATIONAL INC. |
| Test Site Location | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855 |
| Test Site No. | Sporton Site No. |
| | 03CH11-HY |

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No. TW1190 and TW0007

1.5 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 v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. 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

- a. 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: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|--------------------------------------|---------|-------------|---------|-------------|
| 5725-5850 MHz Band 4 (U-NII-3) | 149 | 5745 | 157 | 5785 |
| | 151* | 5755 | 159* | 5795 |
| | 153 | 5765 | 161 | 5805 |
| | 155# | 5775 | 165 | 5825 |

Note:

- 1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
- 2. The above Frequency and Channel in "#n" were 802.11ac VHT80.

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

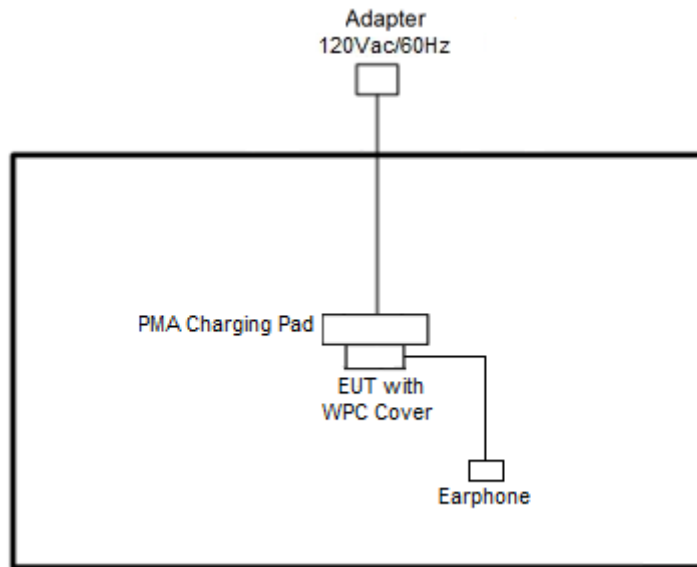
| Modulation | Data Rate |
|--------------|-----------|
| 802.11n HT20 | MCS0 |

| Test Cases | |
|--|--|
| AC Conducted Emission | Mode 1 : GSM1900 Idle + Bluetooth Link + WLAN Link + Camera + Battery + WPC Back Cover + LG Charging Pad + USB Cable (Charging from Adapter) + SIM 1 |
| | Mode 2 : WCDMA Band V Idle + Bluetooth Link + WLAN Link + MPEG4 + Battery + WPC Back Cover + PMA Charging Pad + Adapter + SIM 1 |
| <p>Remark:</p> <ul style="list-style-type: none"> 1. The worst case of conducted emission is mode 2; only the test data of it was reported. 2. For radiation emission, the tests were performed with WPC Back Cover + PMA Charging Pad. | |

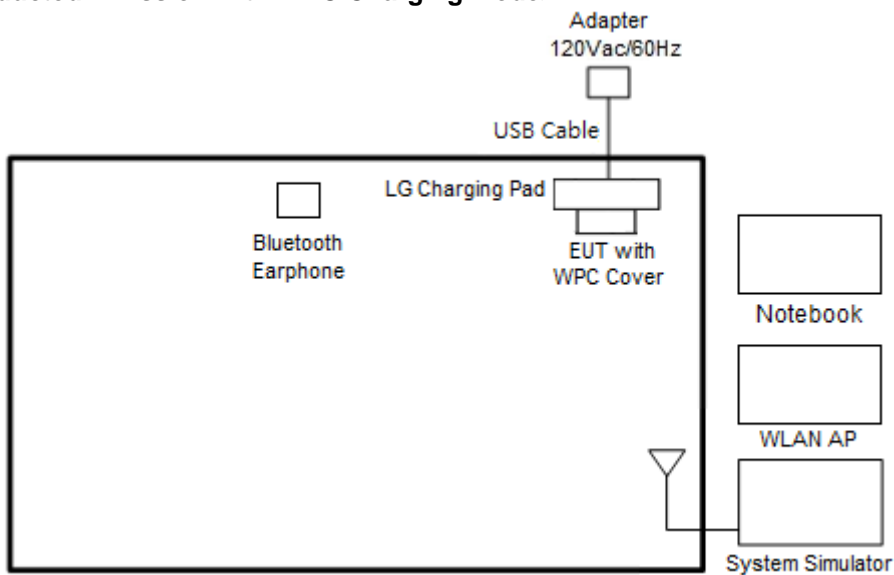
| Ch. # | Band IV : 5725-5850 MHz | |
|-------|-------------------------|-----|
| | 802.11n HT20 | |
| H | High | 165 |

2.3 Connection Diagram of Test System

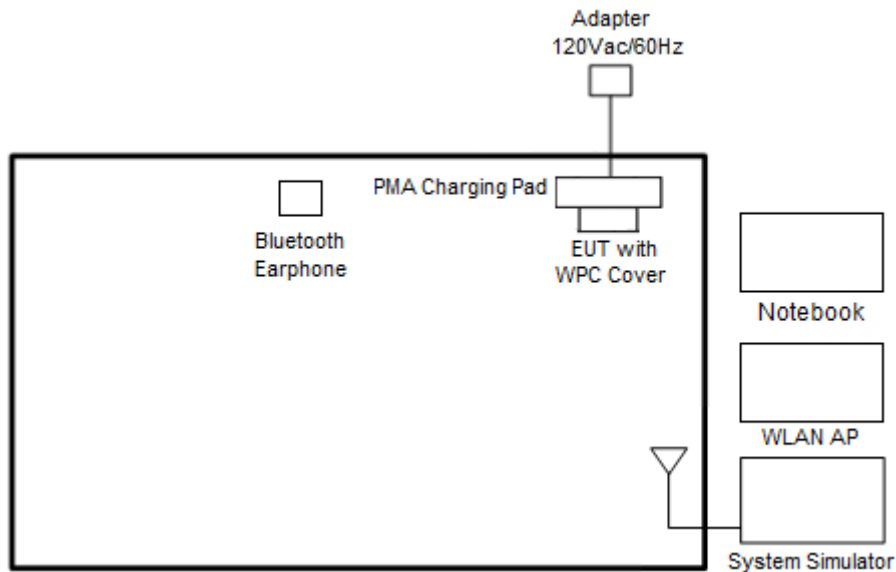
<WLAN Tx with PMA Charging Mode>



<AC Conducted Emission with WPC Charging Mode>



<AC Conducted Emissions with PMA Charging Mode>



2.4 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|------|--------------------|---------------|------------|-------------|-------------------|-------------------|
| 1. | System Simulator | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |
| 2. | WLAN AP | ASUS | RT-AC66U | MSQ-RTAC66U | N/A | Unshielded,1.8m |
| 3. | Bluetooth Earphone | Sony Ericsson | MW600 | PY7DDA-2029 | N/A | N/A |
| 4. | SD Card | SanDisk | MicroSD HC | FCC DoC | N/A | N/A |
| 5. | LG Charging Pad | LG | WCD-110 | FCC DoC | N/A | N/A |
| 6. | PMA Charging Pad | DURACELL | M-018B518A | FCC DoC | N/A | N/A |
| 7. | USB Cable | N/A | N/A | N/A | N/A | N/A |
| 8. | Adapter | N/A | N/A | N/A | N/A | N/A |
| 9. | Earphone | Moto | SH38C16618 | FCC DoC | Unshielded, 1.0 m | N/A |

2.5 EUT Operation Test Setup

The RF test items, utility “QRCT” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



3 Test Result

3.1 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.1.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5.725-5.85 GHz band:
 - 15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- (2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits 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.

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

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



(3) KDB789033 D02 v02r01 G)2)c)

- (i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.³
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.⁴

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. 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

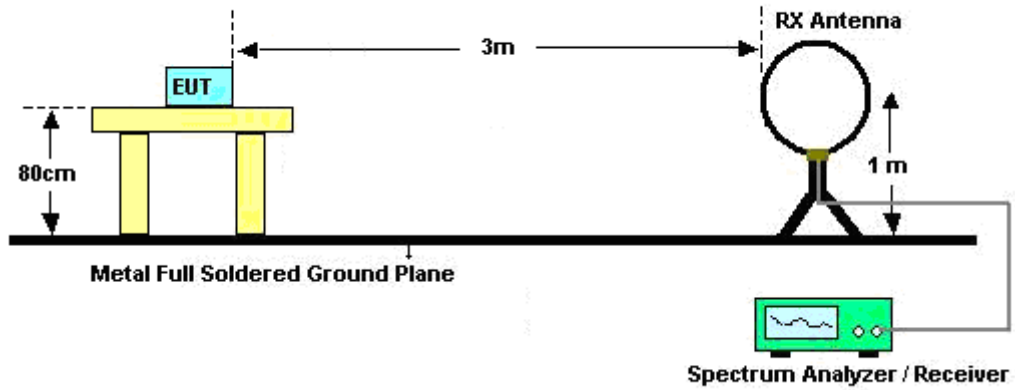
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



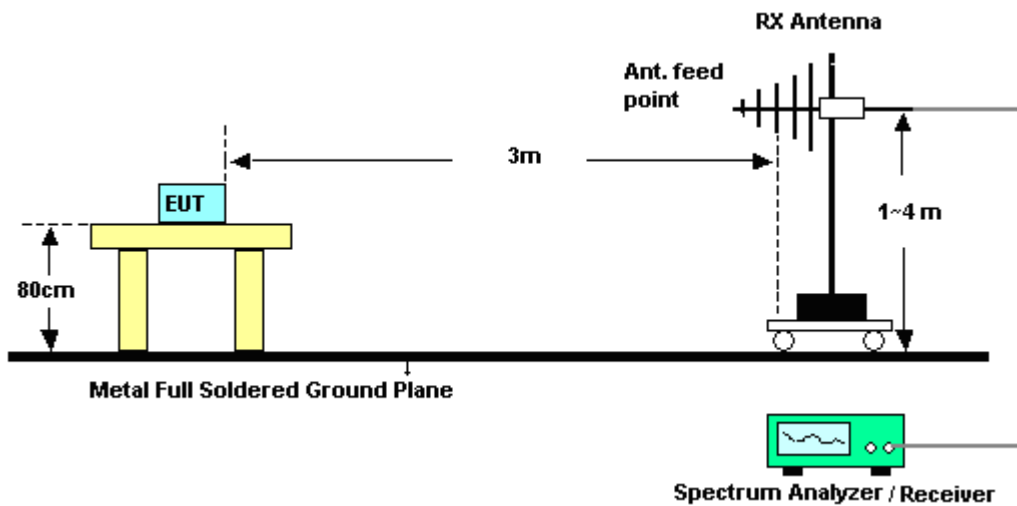
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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.

3.1.4 Test Setup

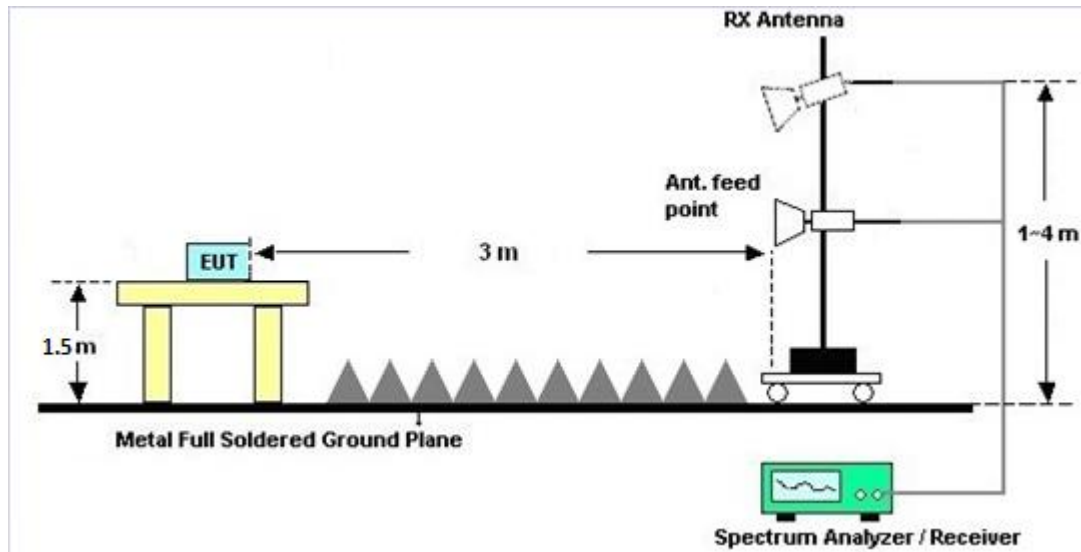
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5 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 was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.1.6 Test Result of Radiated Band Edges

Please refer to Appendix B and C.

3.1.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.



3.2 AC Conducted Emission Measurement

3.2.1 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.

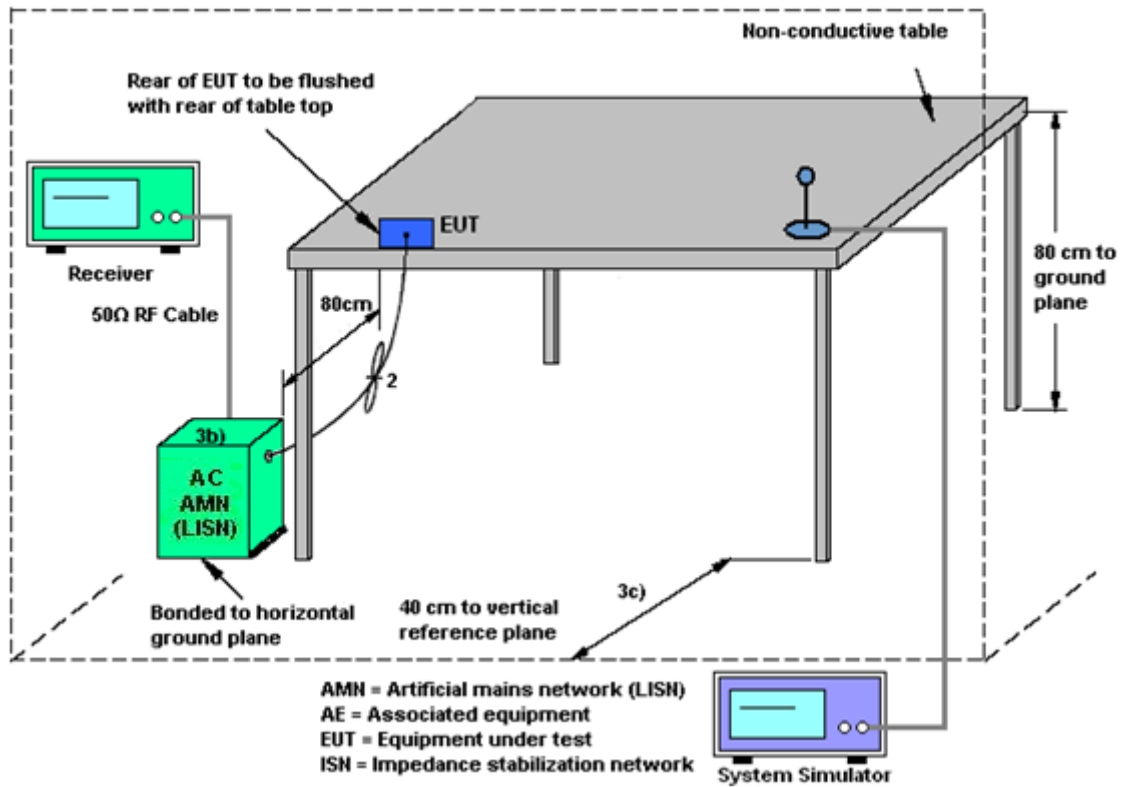
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 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.

3.2.4 Test Setup



3.2.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|----------------------|-----------------|------------------------------|------------------|-------------------------------|------------------|-----------------------------|---------------|-----------------------|
| AC Power Source | ChainTek | APC-1000W | N/A | N/A | N/A | Mar. 29, 2019 | N/A | Conduction (CO05-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESR3 | 102388 | 9KHz~3.6GHz | Nov. 12, 2018 | Mar. 29, 2019 | Nov. 11, 2019 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100080 | 9kHz~30MHz | Nov. 14, 2018 | Mar. 29, 2019 | Nov. 13, 2019 | Conduction (CO05-HY) |
| Software | Rohde & Schwarz | EMC32 V10.30 | N/A | N/A | N/A | Mar. 29, 2019 | N/A | Conduction (CO05-HY) |
| LF Cable | HUBER + SUHNER | RG-214/U | LF01 | N/A | Dec. 31, 2018 | Mar. 29, 2019 | Dec. 30, 2019 | Conduction (CO05-HY) |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100851 | N/A | Dec. 31, 2018 | Mar. 29, 2019 | Dec. 30, 2019 | Conduction (CO05-HY) |
| Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz, VSWR : 2.5:1 max | Jul. 16, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Jul. 15, 2019 | Radiation (03CH11-HY) |
| Amplifier | SONOMA | 310N | 187312 | 9kHz~1GHz | Dec. 04, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Dec. 03, 2019 | Radiation (03CH11-HY) |
| Bilog Antenna | TESEQ | CBL 6111D&N-6-06 | 35414&AT-N0602 | 30MHz~1GHz | Oct. 13, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Oct. 12, 2019 | Radiation (03CH11-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1326 | 1GHz ~ 18GHz | Oct. 30, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Oct. 29, 2019 | Radiation (03CH11-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Nov. 22, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Nov. 21, 2019 | Radiation (03CH11-HY) |
| Preamplifier | Keysight | 83017A | MY53270080 | 1GHz~26.5GHz | Nov. 14, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Nov. 13, 2020 | Radiation (03CH11-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200486 | 10Hz ~ 44GHz | Oct. 19, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Oct. 18, 2019 | Radiation (03CH11-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1~4m | N/A | Mar. 21, 2019~Mar. 27, 2019 | N/A | Radiation (03CH11-HY) |
| Turn Table | EMEC | TT 2000 | N/A | 0~360 Degree | N/A | Mar. 21, 2019~Mar. 27, 2019 | N/A | Radiation (03CH11-HY) |
| Preamplifier | Jet-Power | JPA0118-55-303K | 1710001800054002 | 1GHz~18GHz | Apr. 17, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Apr. 16, 2019 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170584 | 18GHz- 40GHz | Dec. 05, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Dec. 04, 2019 | Radiation (03CH11-HY) |
| EMI Test Receiver | Keysight | N9038A(MXE) | MY53290045 | N/A | Jan. 19, 2019 | Mar. 21, 2019~Mar. 27, 2019 | Jan. 18, 2020 | Radiation (03CH11-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-001042 | N/A | N/A | Mar. 21, 2019~Mar. 27, 2019 | N/A | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 | MY9837/4PE | 9kHz-30MHz | Mar. 13, 2019 | Mar. 21, 2019~Mar. 27, 2019 | Mar. 12, 2020 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | MY2859/2 | 30MHz-40GHz | Mar. 13, 2019 | Mar. 21, 2019~Mar. 27, 2019 | Mar. 12, 2020 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 104 | MY9837/4PE | 30M-18G | Mar. 13, 2019 | Mar. 21, 2019~Mar. 27, 2019 | Mar. 12, 2020 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | MY4274/2 | 30MHz-40GHz | Mar. 13, 2019 | Mar. 21, 2019~Mar. 27, 2019 | Mar. 12, 2020 | Radiation (03CH11-HY) |
| Filter | Wainwright | WHKX8-5872.5-6750-18000-40ST | SN3 | 6.75GHz High Pass | Sep. 17, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Sep. 16, 2019 | Radiation (03CH11-HY) |
| Filter | Wainwright | WLK4-1000-1530-8000-40SS | SN11 | 1G Low Pass | Sep. 16, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Sep. 17, 2019 | Radiation (03CH11-HY) |
| Filter | Wainwright | WHKX12-2700-3000-18000-60SS | SN3 | 2.7G High Pass | Sep. 16, 2018 | Mar. 21, 2019~Mar. 27, 2019 | Sep. 17, 2019 | Radiation (03CH11-HY) |



5 Uncertainty of Evaluation

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

| | |
|---|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 2.2 |
|---|-----|

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

| | |
|---|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 5.2 |
|---|-----|

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

| | |
|---|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 5.5 |
|---|-----|

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

| | |
|---|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 5.2 |
|---|-----|



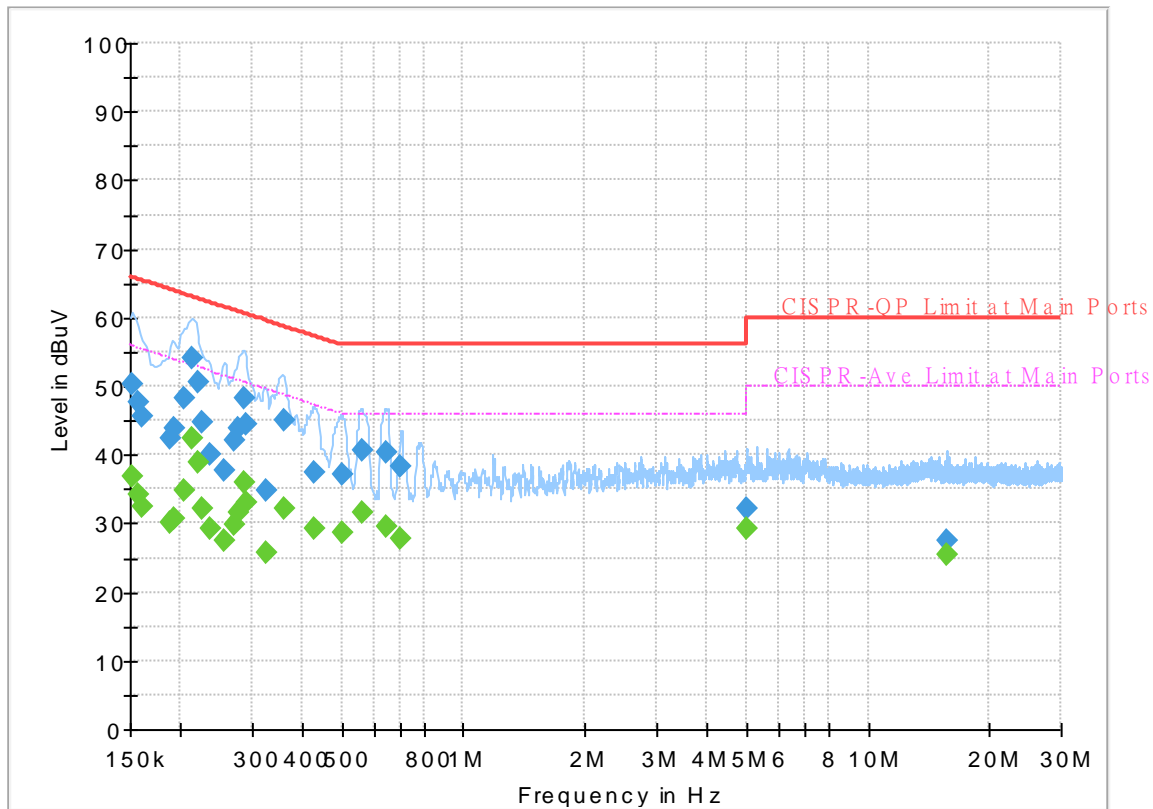
Appendix A. AC Conducted Emission Test Results

| | | | |
|-----------------|--------------------------|---------------------|---------|
| Test Engineer : | Rick Lin and Jimmy Chang | Temperature : | 24~26°C |
| | | Relative Humidity : | 51~53% |

EUT Information

Report NO : 930415-06
 Test Mode : Mode 2
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



Final_Result

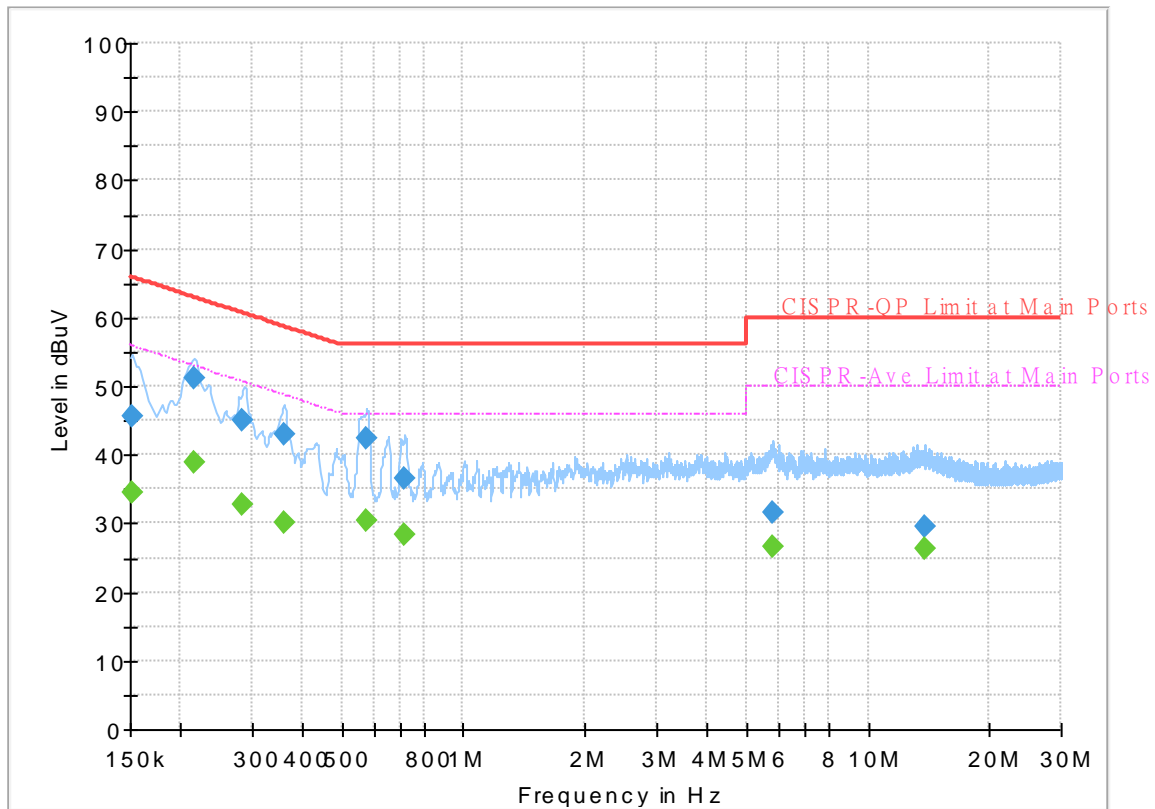
| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|------|--------|------------|
| 0.152250 | --- | 36.96 | 55.88 | 18.92 | L1 | OFF | 19.5 |
| 0.152250 | 50.16 | --- | 65.88 | 15.72 | L1 | OFF | 19.5 |
| 0.156750 | --- | 34.34 | 55.63 | 21.29 | L1 | OFF | 19.5 |
| 0.156750 | 47.67 | --- | 65.63 | 17.96 | L1 | OFF | 19.5 |
| 0.161250 | --- | 32.45 | 55.40 | 22.95 | L1 | OFF | 19.5 |
| 0.161250 | 45.68 | --- | 65.40 | 19.72 | L1 | OFF | 19.5 |
| 0.188250 | --- | 30.14 | 54.11 | 23.97 | L1 | OFF | 19.5 |
| 0.188250 | 42.51 | --- | 64.11 | 21.60 | L1 | OFF | 19.5 |
| 0.192750 | --- | 30.65 | 53.92 | 23.27 | L1 | OFF | 19.5 |
| 0.192750 | 43.87 | --- | 63.92 | 20.05 | L1 | OFF | 19.5 |
| 0.204000 | --- | 34.73 | 53.45 | 18.72 | L1 | OFF | 19.5 |
| 0.204000 | 48.37 | --- | 63.45 | 15.08 | L1 | OFF | 19.5 |
| 0.213000 | --- | 42.39 | 53.09 | 10.70 | L1 | OFF | 19.5 |
| 0.213000 | 54.06 | --- | 63.09 | 9.03 | L1 | OFF | 19.5 |
| 0.219750 | --- | 38.75 | 52.83 | 14.08 | L1 | OFF | 19.5 |
| 0.219750 | 50.65 | --- | 62.83 | 12.18 | L1 | OFF | 19.5 |
| 0.226500 | --- | 32.14 | 52.58 | 20.44 | L1 | OFF | 19.5 |
| 0.226500 | 44.80 | --- | 62.58 | 17.78 | L1 | OFF | 19.5 |
| 0.237750 | --- | 29.23 | 52.17 | 22.94 | L1 | OFF | 19.5 |
| 0.237750 | 40.06 | --- | 62.17 | 22.11 | L1 | OFF | 19.5 |
| 0.255750 | --- | 27.55 | 51.57 | 24.02 | L1 | OFF | 19.5 |

| | | | | | | | |
|-----------|-------|-------|-------|-------|----|-----|------|
| 0.255750 | 37.64 | --- | 61.57 | 23.93 | L1 | OFF | 19.5 |
| 0.271500 | --- | 29.96 | 51.07 | 21.11 | L1 | OFF | 19.5 |
| 0.271500 | 42.12 | --- | 61.07 | 18.95 | L1 | OFF | 19.5 |
| 0.276000 | --- | 31.54 | 50.94 | 19.40 | L1 | OFF | 19.5 |
| 0.276000 | 43.73 | --- | 60.94 | 17.21 | L1 | OFF | 19.5 |
| 0.287250 | --- | 36.09 | 50.60 | 14.51 | L1 | OFF | 19.5 |
| 0.287250 | 48.26 | --- | 60.60 | 12.34 | L1 | OFF | 19.5 |
| 0.291750 | --- | 32.96 | 50.47 | 17.51 | L1 | OFF | 19.5 |
| 0.291750 | 44.51 | --- | 60.47 | 15.96 | L1 | OFF | 19.5 |
| 0.325500 | --- | 25.67 | 49.57 | 23.90 | L1 | OFF | 19.5 |
| 0.325500 | 34.77 | --- | 59.57 | 24.80 | L1 | OFF | 19.5 |
| 0.359250 | --- | 32.17 | 48.75 | 16.58 | L1 | OFF | 19.5 |
| 0.359250 | 45.05 | --- | 58.75 | 13.70 | L1 | OFF | 19.5 |
| 0.426750 | --- | 29.14 | 47.32 | 18.18 | L1 | OFF | 19.5 |
| 0.426750 | 37.46 | --- | 57.32 | 19.86 | L1 | OFF | 19.5 |
| 0.501000 | --- | 28.56 | 46.00 | 17.44 | L1 | OFF | 19.5 |
| 0.501000 | 37.05 | --- | 56.00 | 18.95 | L1 | OFF | 19.5 |
| 0.559500 | --- | 31.54 | 46.00 | 14.46 | L1 | OFF | 19.5 |
| 0.559500 | 40.60 | --- | 56.00 | 15.40 | L1 | OFF | 19.5 |
| 0.642750 | --- | 29.54 | 46.00 | 16.46 | L1 | OFF | 19.6 |
| 0.642750 | 40.47 | --- | 56.00 | 15.53 | L1 | OFF | 19.6 |
| 0.699000 | --- | 27.90 | 46.00 | 18.10 | L1 | OFF | 19.6 |
| 0.699000 | 38.31 | --- | 56.00 | 17.69 | L1 | OFF | 19.6 |
| 5.005500 | --- | 29.39 | 50.00 | 20.61 | L1 | OFF | 19.7 |
| 5.005500 | 32.24 | --- | 60.00 | 27.76 | L1 | OFF | 19.7 |
| 15.612000 | --- | 25.33 | 50.00 | 24.67 | L1 | OFF | 20.1 |
| 15.612000 | 27.39 | --- | 60.00 | 32.61 | L1 | OFF | 20.1 |

EUT Information

Report NO : 930415-06
 Test Mode : Mode 2
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



Final_Result

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|------|--------|------------|
| 0.152250 | --- | 34.57 | 55.88 | 21.31 | N | OFF | 19.5 |
| 0.152250 | 45.63 | --- | 65.88 | 20.25 | N | OFF | 19.5 |
| 0.215250 | --- | 38.83 | 53.00 | 14.17 | N | OFF | 19.5 |
| 0.215250 | 51.18 | --- | 63.00 | 11.82 | N | OFF | 19.5 |
| 0.285000 | --- | 32.69 | 50.67 | 17.98 | N | OFF | 19.5 |
| 0.285000 | 44.95 | --- | 60.67 | 15.72 | N | OFF | 19.5 |
| 0.359250 | --- | 30.01 | 48.75 | 18.74 | N | OFF | 19.5 |
| 0.359250 | 42.93 | --- | 58.75 | 15.82 | N | OFF | 19.5 |
| 0.575250 | --- | 30.44 | 46.00 | 15.56 | N | OFF | 19.5 |
| 0.575250 | 42.34 | --- | 56.00 | 13.66 | N | OFF | 19.5 |
| 0.717000 | --- | 28.39 | 46.00 | 17.61 | N | OFF | 19.6 |
| 0.717000 | 36.67 | --- | 56.00 | 19.33 | N | OFF | 19.6 |
| 5.820000 | --- | 26.72 | 50.00 | 23.28 | N | OFF | 19.8 |
| 5.820000 | 31.69 | --- | 60.00 | 28.31 | N | OFF | 19.8 |
| 13.809750 | --- | 26.43 | 50.00 | 23.57 | N | OFF | 20.1 |
| 13.809750 | 29.56 | --- | 60.00 | 30.44 | N | OFF | 20.1 |



Appendix B. Radiated Spurious Emission

| | | | |
|-----------------|--------------------|---------------------|---------|
| Test Engineer : | Hao Hsu and Ken Wu | Temperature : | 21~26°C |
| | | Relative Humidity : | 50~56% |

Band 4 - 5725~5850MHz

WIFI 802.11n HT20 (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) | Path Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Peak Avg. (P/A) | Pol. (H/V) | |
|-----------------------------|---|-------------------|------------------|-------------------|-----------------------|---------------------|-------------------------|------------------|----------------------|----------------|-------------------|-------------------|--------------|---|
| 802.11n HT20 CH 165 5825MHz | * | 5825 | 98.9 | - | - | 89.28 | 32.25 | 10.58 | 33.21 | 283 | 331 | P | H | |
| | * | 5825 | 90.59 | - | - | 80.97 | 32.25 | 10.58 | 33.21 | 283 | 331 | A | H | |
| | | 5853.6 | 48.94 | -65.05 | 113.99 | 39.26 | 32.31 | 10.59 | 33.22 | 283 | 331 | P | H | |
| | | 5864.8 | 50 | -58.05 | 108.05 | 40.27 | 32.36 | 10.6 | 33.23 | 283 | 331 | P | H | |
| | | 5900.6 | 50.2 | -36.02 | 86.22 | 40.33 | 32.5 | 10.61 | 33.24 | 283 | 331 | P | H | |
| | | 5926.4 | 48.64 | -19.56 | 68.2 | 38.72 | 32.55 | 10.62 | 33.25 | 283 | 331 | P | H | |
| | | | | | | | | | | | | | | H |
| | | | | | | | | | | | | | | H |
| | * | 5825 | 99.52 | - | - | 89.9 | 32.25 | 10.58 | 33.21 | 100 | 178 | P | V | |
| | * | 5825 | 90.89 | - | - | 81.27 | 32.25 | 10.58 | 33.21 | 100 | 178 | A | V | |
| | | 5851.4 | 50.96 | -68.05 | 119.01 | 41.28 | 32.31 | 10.59 | 33.22 | 100 | 178 | P | V | |
| | | 5870.8 | 50.81 | -55.56 | 106.37 | 41.06 | 32.38 | 10.6 | 33.23 | 100 | 178 | P | V | |
| | | 5893.2 | 51.38 | -40.32 | 91.7 | 41.54 | 32.47 | 10.61 | 33.24 | 100 | 178 | P | V | |
| | | 5928 | 50.67 | -17.53 | 68.2 | 40.74 | 32.56 | 10.62 | 33.25 | 100 | 178 | P | V | |
| | | | | | | | | | | | | | V | |
| | | | | | | | | | | | | | V | |
| Remark | 1. No other spurious found. 2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | | |



Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

| WIFI Ant. | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Path Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. | |
|--------------------------------------|---|-----------|------------|------------|------------|------------|----------------|-----------|---------------|---------|-----------|-----------|---------|---|
| 1 | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) | |
| 802.11n HT20 CH 165 5825MHz | | 11650 | 46.78 | -27.22 | 74 | 52.38 | 39.2 | 16.79 | 61.59 | 100 | 0 | P | H | |
| | | 17475 | 48.08 | -20.12 | 68.2 | 42.32 | 41.58 | 20.89 | 56.71 | 100 | 0 | P | H | |
| | | | | | | | | | | | | | H | |
| | | | | | | | | | | | | | H | |
| | | | 11650 | 46.12 | -27.88 | 74 | 51.72 | 39.2 | 16.79 | 61.59 | 100 | 0 | P | V |
| | | | 17475 | 49.08 | -19.12 | 68.2 | 43.32 | 41.58 | 20.89 | 56.71 | 100 | 0 | P | V |
| | | | | | | | | | | | | | | V |
| Remark | 1. No other spurious found. 2. All results are PASS against Peak and Average 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 | Peak or Average |
| H/V | Horizontal or Vertical |



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

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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path 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) + Path 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”.



Appendix C. Radiated Spurious Emission Plots

| | | | |
|-----------------|--------------------|---------------------|---------|
| Test Engineer : | Hao Hsu and Ken Wu | Temperature : | 21~26°C |
| | | Relative Humidity : | 50~56% |

Band 4 - 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

| WIFI | Band 4 5725~5850MHz Band Edge @ 3m | |
|-------------|--|---|
| ANT | 802.11n HT20 CH165 5825MHz | |
| 1 | Horizontal | Fundamental |
| Peak | <p>Site : 03CHI1-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120d-HF HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 930415-06</p> | <p>Site : 03CHI1-HY Condition : PEAK(UNIT) 3m HORN 9120d-HF HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 930415-06</p> |



| WIFI | Band 4 5725~5850MHz Band Edge @ 3m | |
|--------------------|--|---|
| ANT | 802.11n HT20 CH165 5825MHz | |
| 1 | Vertical | Fundamental |
| <p>Peak</p> | <p>Site : 03CH11-HY Condition : PEAK_BE(84)_16-24 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 930415-06</p> | <p>Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 930415-06</p> |



Band 4 - 5725~5850MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

| WIFI | Band 4 5725~5850MHz Harmonic @ 3m | |
|---------------------------------------|--|--|
| ANT | 802.11n HT20 CH165 5825MHz | |
| 1 | Horizontal | Vertical |
| <p>Peak</p> <p>Avg.</p> | <p>Site : 03CH11-4#Y Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 930415-06</p> | <p>Site : 03CH11-4#Y Condition : PEAK(UNII) 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 930415-06</p> |



Emission below 1GHz
5GHz WIFI 802.11n HT20 (LF)

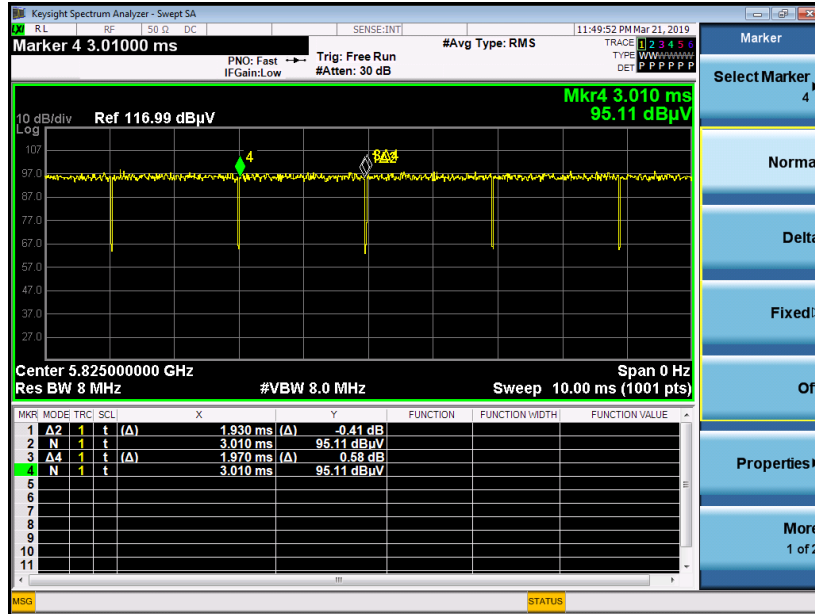
| WIFI | 5GHz 5725~5850MHz | |
|--------------|---|---|
| ANT | 802.11n HT20 LF | |
| 1 | Horizontal | Vertical |
| QP / Peak | <p>Site : 03CH11-4FY Condition : QP 3m BT-LOG 6111D-LF_ETC HORIZONTAL Detector : Peak Project : 930415-06</p> | <p>Site : 03CH11-4FY Condition : QP 3m BT-LOG 6111D-LF_ETC VERTICAL Detector : Peak Project : 930415-06</p> |



Appendix D. Duty Cycle Plots

| Band | Duty Cycle (%) | T(us) | 1/T(kHz) | VBW Setting |
|-------------------|----------------|-------|----------|-------------|
| 5GHz 802.11n HT20 | 98.16 | - | - | 10Hz |

802.11n HT20



—THE END—