

## FCC PART 15.407

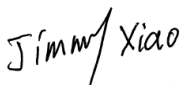
## TEST REPORT

For

### GL Technologies (Hong Kong) Limited

FLAT/RM 203 2/F BUILDING 19W 19 SCIENCE PARK WEST AVENUE SHATIN NT,  
Shatin, Hong Kong

**FCC ID: 2AFIW-AP1300**

|                                                                                                                                                                                                                                                                                                                             |                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                                                                      | <b>Product Type:</b><br>AC1300 Wireless Access Point                                            |
| <b>Report Number:</b> RDG200610003-00BA1                                                                                                                                                                                                                                                                                    |                                                                                                 |
| <b>Report Date:</b> 2020-06-30                                                                                                                                                                                                                                                                                              |                                                                                                 |
| <b>Reviewed By:</b> RF Engineer                                                                                                                                                                                                                                                                                             | Jimmy Xiao  |
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## **TABLE OF CONTENTS**

|                                                                                               |           |
|-----------------------------------------------------------------------------------------------|-----------|
| <b>GENERAL INFORMATION .....</b>                                                              | <b>3</b>  |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....                                      | 3         |
| OBJECTIVE .....                                                                               | 3         |
| RELATED SUBMITTAL(S)/GRANT(S) .....                                                           | 3         |
| TEST METHODOLOGY .....                                                                        | 3         |
| MEASUREMENT UNCERTAINTY .....                                                                 | 4         |
| TEST FACILITY .....                                                                           | 4         |
| <b>SYSTEM TEST CONFIGURATION .....</b>                                                        | <b>5</b>  |
| DESCRIPTION OF TEST CONFIGURATION .....                                                       | 5         |
| EUT EXERCISE SOFTWARE .....                                                                   | 6         |
| EQUIPMENT MODIFICATIONS .....                                                                 | 7         |
| SUPPORT EQUIPMENT LIST AND DETAILS .....                                                      | 7         |
| EXTERNAL I/O CABLE .....                                                                      | 7         |
| BLOCK DIAGRAM OF TEST SETUP .....                                                             | 8         |
| <b>SUMMARY OF TEST RESULTS .....</b>                                                          | <b>9</b>  |
| <b>TEST EQUIPMENT LIST .....</b>                                                              | <b>10</b> |
| <b>FCC §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE) .....</b>                                  | <b>11</b> |
| APPLICABLE STANDARD .....                                                                     | 11        |
| RESULT .....                                                                                  | 11        |
| <b>FCC §15.203 – ANTENNA REQUIREMENT .....</b>                                                | <b>13</b> |
| APPLICABLE STANDARD .....                                                                     | 13        |
| ANTENNA CONNECTOR CONSTRUCTION .....                                                          | 13        |
| <b>FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS .....</b>                            | <b>14</b> |
| APPLICABLE STANDARD .....                                                                     | 14        |
| EUT SETUP .....                                                                               | 14        |
| EMI TEST RECEIVER SETUP .....                                                                 | 14        |
| TEST PROCEDURE .....                                                                          | 14        |
| TEST RESULTS SUMMARY .....                                                                    | 15        |
| TEST DATA .....                                                                               | 15        |
| <b>§15.205 &amp; §15.209 &amp; §15.407(B) (1), (4), (6), (7) – UNDESIRABLE EMISSION .....</b> | <b>22</b> |
| APPLICABLE STANDARD .....                                                                     | 22        |
| EUT SETUP .....                                                                               | 22        |
| EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....                                             | 23        |
| TEST PROCEDURE .....                                                                          | 23        |
| CORRECTED AMPLITUDE & MARGIN CALCULATION .....                                                | 23        |
| TEST RESULTS SUMMARY .....                                                                    | 23        |
| TEST DATA .....                                                                               | 23        |

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

|                                |                                                                                                                                                                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product                        | AC1300 Wireless Access Point                                                                                                                                                                                                             |
| Tested Model                   | GL-AP1300                                                                                                                                                                                                                                |
| Frequency Range                | 5G Wi-Fi: 5150-5250 MHz; 5725-5850 MHz                                                                                                                                                                                                   |
| Maximum conducted output power | Wi-Fi:<br>5150-5250 MHz:<br>18.9dBm (802.11a), 19.7dBm(802.11n20/ac20)<br>20.0dBm(802.11n40/ac40), 19.7dBm(802.11 ac80)<br>5725-5850 MHz:<br>19.7dBm (802.11a), 19.6dBm(802.11n20/ac20)<br>20.0dBm(802.11n40/ac40), 19.7dBm(802.11 ac80) |
| Modulation Technique           | OFDM                                                                                                                                                                                                                                     |
| Antenna Specification          | 5.55dBi(5150-5250 MHz)<br>4.52dBi(5725-5850 MHz)                                                                                                                                                                                         |
| Voltage Range                  | DC 12V from adapter or DC48V from POE                                                                                                                                                                                                    |
| Date of Test                   | 2020-06-20                                                                                                                                                                                                                               |
| Sample serial number           | RDG200610003-RFA1-S1 ( Assigned by BACL, Shenzhen)                                                                                                                                                                                       |
| Received date                  | 2020-06-10                                                                                                                                                                                                                               |
| Sample/EUT Status              | Good condition                                                                                                                                                                                                                           |
| Adapter 1 information          | Model: ICP30A-120-2000<br>Input: AC 100-240V, 50/60Hz, 0.8A<br>Output: DC 12.0V, 2.0A                                                                                                                                                    |
| Adapter 2 information          | Model:KA2401A-1202000DE<br>Input: AC 100-240V, 50/60Hz, 0.65A<br>Output: DC 12.0V, 2.0A                                                                                                                                                  |

### Objective

This type approval report is prepared on behalf of *GL Technologies (Hong Kong) Limited* in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

### Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: 2AFIW-AP1300.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Parameter                          |            | Uncertainty |
|------------------------------------|------------|-------------|
| Occupied Channel Bandwidth         |            | ±5%         |
| RF Output Power with Power meter   |            | ±0.73dB     |
| RF conducted test with spectrum    |            | ±1.6dB      |
| AC Power Lines Conducted Emissions |            | ±1.95dB     |
| Emissions,<br>Radiated             | Below 1GHz | ±4.75dB     |
|                                    | Above 1GHz | ±4.88dB     |
| Temperature                        |            | ±1 °C       |
| Humidity                           |            | ±6%         |
| Supply voltages                    |            | ±0.4%       |

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The device supports Beamforming and non-beamforming mode for 5G Wi-Fi. And these two modes share the same power declared by the applicant.

The EUT has two antennas for 5G Wi-Fi, it can operate in 802.11a/n20/n40/ac20/ac40/ac80 modes.

As the 802.11ac20/ac40 are identical with 802.11n20/n40 modes, so only 802.11n20/n40 modes were tested.

For 5150-5250MHz Band, 7 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 36      | 5180            | 44      | 5220            |
| 38      | 5190            | 46      | 5230            |
| 40      | 5200            | 48      | 5240            |
| 42      | 5210            | /       | /               |

For 802.11a, 802.11n20 mode: channel 36, 40, 48 were tested; For 802.11n40 mode: channel 38, 46 were tested; For 802.11ac80 mode, channel 42 was tested.

For 5725-5850MHz Band, 8 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 149     | 5745            | 157     | 5785            |
| 151     | 5755            | 159     | 5795            |
| 153     | 5765            | 161     | 5805            |
| 155     | 5775            | 165     | 5825            |

For 802.11a, 802.11n20 mode, channel 149, 157, 165 were tested; For 802.11n40 mode, channel 151, 159 were tested; For 802.11ac80 mode, channel 155 was tested.

**EUT Exercise Software**

“QRCT” software was used to test for Wi-Fi Mode.

Test frequencies and power level were configured as below:

| U-NII          | Mode        | Frequency (MHz) | Rate (Mbps) | Power Level |
|----------------|-------------|-----------------|-------------|-------------|
| 5150 – 5250MHz | 802.11 a    | 5180            | 6           | 18          |
|                |             | 5200            | 6           | 18          |
|                |             | 5240            | 6           | 18          |
|                | 802.11 n20  | 5180            | MCS0        | 18          |
|                |             | 5200            | MCS0        | 19          |
|                |             | 5240            | MCS0        | 19          |
|                | 802.11 n40  | 5190            | MCS0        | 17          |
|                |             | 5230            | MCS0        | 19          |
|                | 802.11 ac80 | 5210            | MCS0        | 17          |
| 5725 – 5850MHz | 802.11 a    | 5745            | 6           | 20          |
|                |             | 5785            | 6           | 20          |
|                |             | 5825            | 6           | 20          |
|                | 802.11 n20  | 5745            | MCS0        | 20          |
|                |             | 5785            | MCS0        | 20          |
|                |             | 5825            | MCS0        | 20          |
|                | 802.11 n40  | 5755            | MCS0        | 20          |
|                |             | 5795            | MCS0        | 20          |
|                | 802.11 ac80 | 5775            | MCS0        | 20          |

Note 1: The two antenna ports share the same power level.

Note 2: The worse-case data rates are determined to be as follows for each mode based upon investigations by measuring the output power and PSD across all data rated bandwidths, and modulations. The device supports SISO and MIMO in all modes, per pretest, the MIMO mode was the worst mode for all the modes.

## Equipment Modifications

No modification was made to the EUT tested.

## Support Equipment List and Details

| Manufacturer | Description     | Model          | Serial Number |
|--------------|-----------------|----------------|---------------|
| GOSPELL      | POE             | G0720-480-050  | G0720-480-050 |
| Dell         | PC              | Latitude E5430 | 11429208685   |
| Sagemcom     | Wireless Router | 1704N          | 3c81d839027c  |

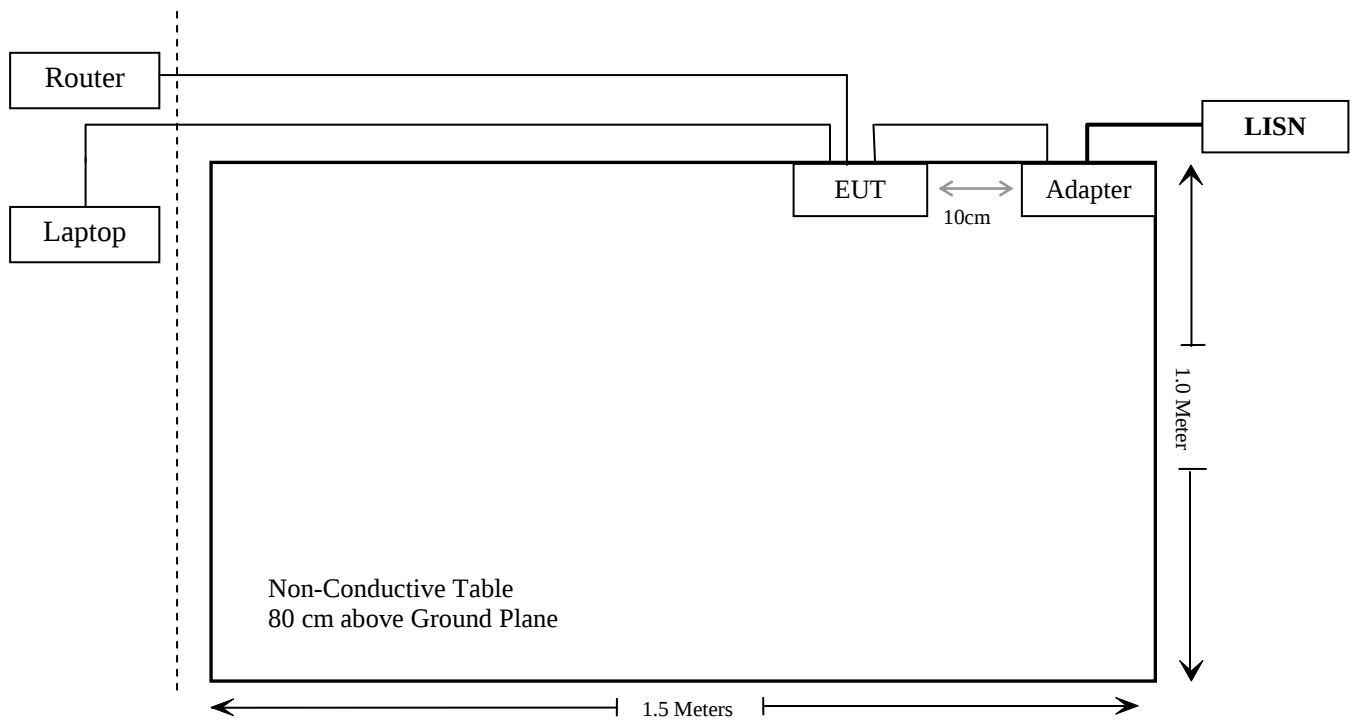
## External I/O Cable

| Cable Description                  | Length (m) | From/Port | To      |
|------------------------------------|------------|-----------|---------|
| Un-shielded Un-detachable DC Cable | 1.0        | EUT       | Adapter |
| Un-shielded detachable AC Cable    | 1.0        | LISN      | POE     |
| Un-shielded detachable RJ45 Cable  | 1.0        | EUT       | POE     |
| Un-shielded detachable RJ45 Cable  | 10         | EUT       | PC      |
| Un-shielded detachable RJ45 Cable  | 10         | EUT       | Router  |
| Un-shielded detachable RJ45 Cable  | 10         | POE       | Router  |

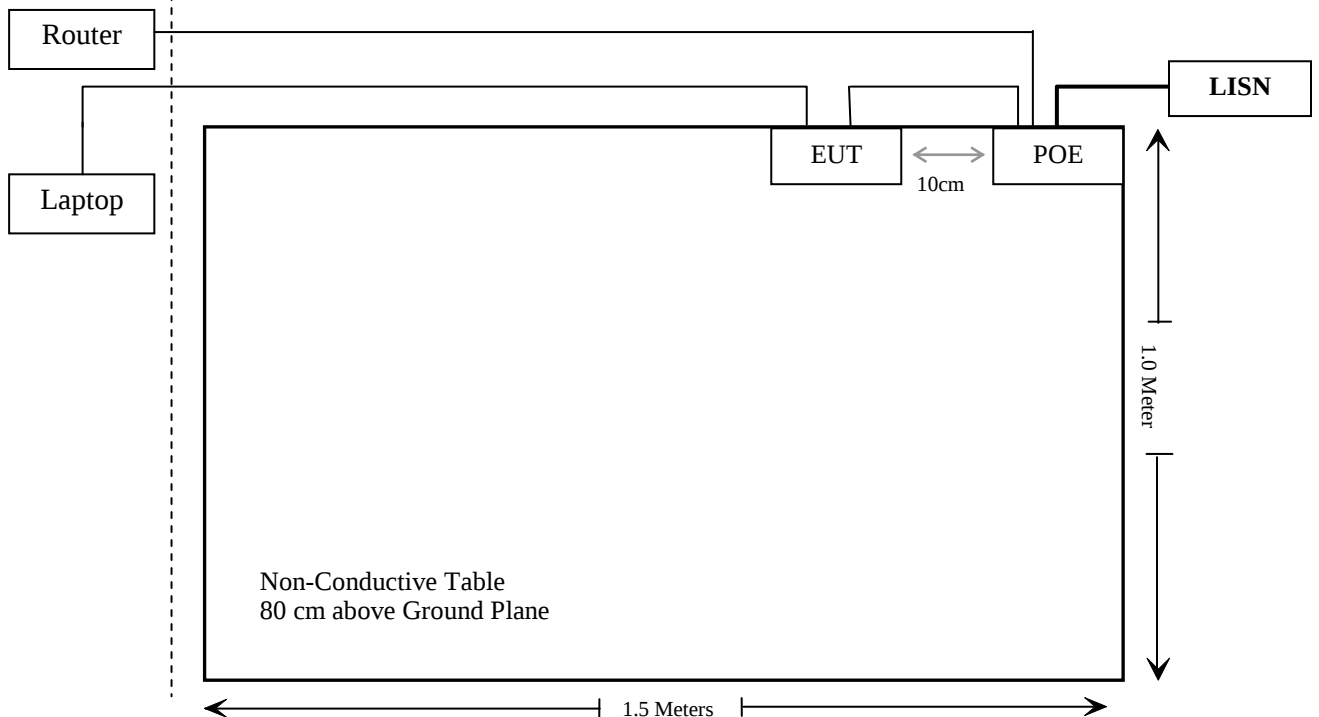
## Block Diagram of Test Setup

For conducted emissions

For Adapter:



For POE:



## SUMMARY OF TEST RESULTS

| FCC Rules                                     | Description of Test                      | Result      |
|-----------------------------------------------|------------------------------------------|-------------|
| §1.1307 (b) (1) & §2.1091                     | Maximum Permissible Exposure(MPE)        | Compliance  |
| §15.203                                       | Antenna Requirement                      | Compliance  |
| §15.407(b)(6)& §15.207(a)                     | Conducted Emissions                      | Compliance  |
| §15.205& §15.209<br>& §15.407(b) (1), (4),(7) | Undesirable Emission& Restricted Bands   | Compliance  |
| §15.407(a) (1), (5),(e)                       | 26 dB Emission Bandwidth & 6dB Bandwidth | Compliance* |
| §15.407(a)(1),(3)                             | Conducted Transmitter Output Power       | Compliance* |
| §15.407 (a)(1),(3)                            | Power Spectral Density                   | Compliance* |

Compliant\*: The EUT is identical with the device (model: GL-AP1300LTEC4, FCC ID: 2AFIW-AP1300C4), the only difference is that the device (model: GL-AP1300LTEC4, FCC ID: 2AFIW-AP1300C4) removed the LTE modular and LTE antennas. The rest are all same. So the “spurious emission below 1GHz” and “AC line conducted emission” were retest. Please refer to the report RDG200416004-00B for the data of other test items.

## TEST EQUIPMENT LIST

| Manufacturer                    | Description        | Model           | Serial Number          | Calibration Date | Calibration Due Date |
|---------------------------------|--------------------|-----------------|------------------------|------------------|----------------------|
| <b>Conducted Emissions Test</b> |                    |                 |                        |                  |                      |
| Rohde & Schwarz                 | EMI Test Receiver  | ESCI            | 101120                 | 2019/7/9         | 2020/7/8             |
| Rohde & Schwarz                 | LISN               | ENV216          | 101613                 | 2020/1/22        | 2021/1/21            |
| Rohde & Schwarz                 | Transient Limitor  | ESH3Z2          | DE25985                | 2019/11/29       | 2020/11/28           |
| Unknown                         | CE Cable           | CE Cable        | UF A210B-1-0720-504504 | 2019/11/29       | 2020/11/28           |
| Rohde & Schwarz                 | CE Test software   | EMC 32          | V8.53.0                | NCR              | NCR                  |
| <b>Radiated Emission Test</b>   |                    |                 |                        |                  |                      |
| R&S                             | EMI Test Receiver  | ESR3            | 102455                 | 2019/7/9         | 2020/7/8             |
| Sonoma instrument               | Pre-amplifier      | 310 N           | 186238                 | 2020/4/20        | 2021/4/20            |
| Sunol Sciences                  | Broadband Antenna  | JB1             | A040904-1              | 2017/12/22       | 2020/12/21           |
| Unknown                         | Cable 2            | RF Cable 2      | F-03-EM197             | 2019/11/29       | 2020/11/28           |
| Unknown                         | Cable              | Chamber Cable 1 | F-03-EM236             | 2019/11/29       | 2020/11/28           |
| Rohde & Schwarz                 | Auto test software | EMC 32          | V9.10                  | NCR              | NCR                  |

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## FCC §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

| Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|-----------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                               | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (Minutes) |
| 0.3-1.34                                            | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                             | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300                                              | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500                                            | /                             | /                             | f/1500                              | 30                       |
| 1500-100,000                                        | /                             | /                             | 1.0                                 | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

| Mode       | Frequency (MHz) | Antenna Gain |           | Max Tune Up Conducted Power |        | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|------------|-----------------|--------------|-----------|-----------------------------|--------|--------------------------|-------------------------------------|---------------------------------|
|            |                 | (dBi)        | (numeric) | (dBm)                       | (mW)   |                          |                                     |                                 |
| 2.4G Wi-Fi | 2412-2472       | 6.93         | 4.93      | 21.0                        | 125.89 | 20                       | 0.124                               | 1.0                             |
| BLE        | 2402-2480       | -0.042       | 0.99      | 9.0                         | 7.94   | 20                       | 0.002                               | 1.0                             |
| 5G Wi-Fi   | 5150-5250       | 8.56         | 7.18      | 20.0                        | 100.0  | 20                       | 0.143                               | 1.0                             |
| 5G Wi-Fi   | 5725-5850       | 7.53         | 5.66      | 20.0                        | 100.0  | 20                       | 0.113                               | 1.0                             |

Note: 1. the tune up conducted power was declared by the applicant  
 2. the BLE, 2.4G Wi-Fi functions can transmit at the same time with 5G Wi-Fi.  
 3. For the Wi-Fi, as it can support the beam-forming function, so the antenna gain should add the  $10\lg 2$ .

So the worst simultaneous transmitting consideration:

The ratio =  $MPE_{2.4GWi-Fi}/limit + MPE_{5GWi-Fi}/limit + MPE_{BLE}/limit = 0.124/1.0 + 0.143/1.0 + 0.002/1.0 = 0.269 < 1.0$

so simultaneous exposure is not required.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

**Result: Compliance**

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## FCC §15.203 – ANTENNA REQUIREMENT

---

### Applicable Standard

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Antenna Connector Construction

The EUT has two internal antennas for Wi-Fi which were permanently attached. The antenna gain is 5.55dBi (5150-5250MHz) and 4.52dBi (5745-5850MHz), fulfill the requirement of this section. Please refer to the EUT photos.

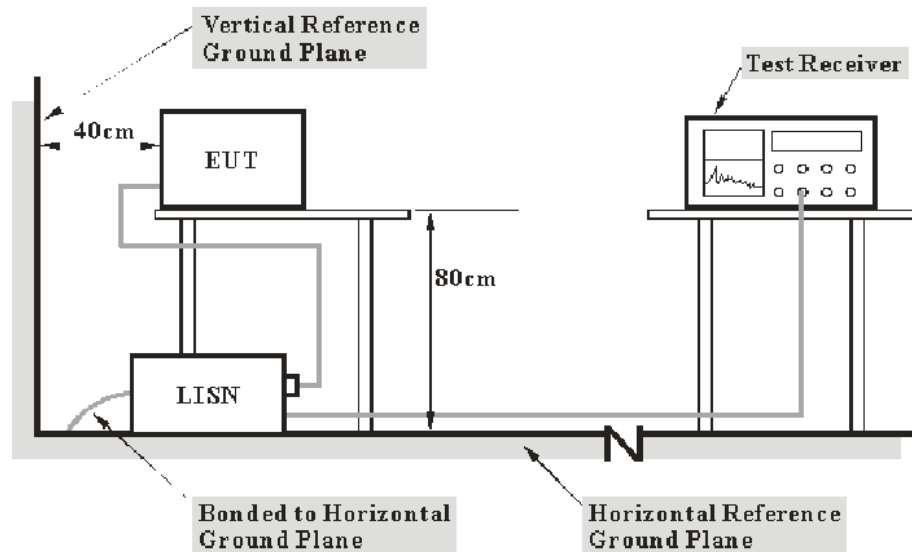
**Result:** Compliance.

## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207, §15.407(b) (6)

## EUT Setup



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range  | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz  |

## Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Results Summary

According to the EUT complied with the FCC Part 15.207.

## Test Data

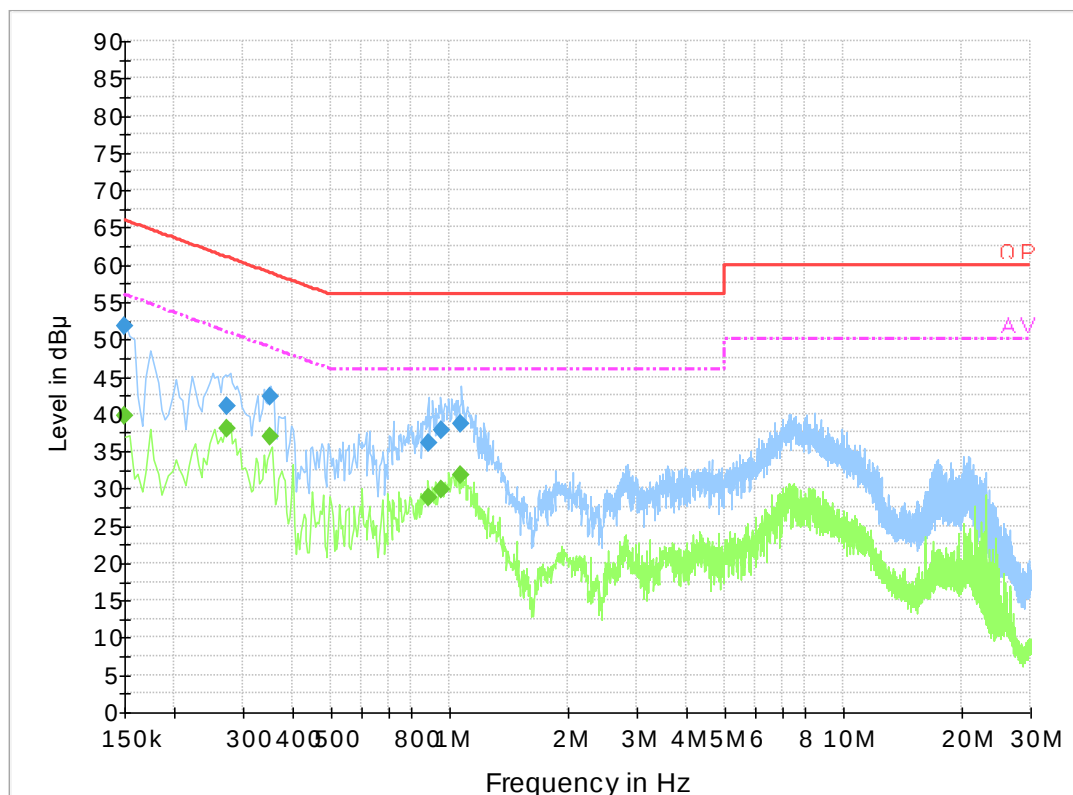
### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 65 %      |
| ATM Pressure:      | 101.0 kPa |

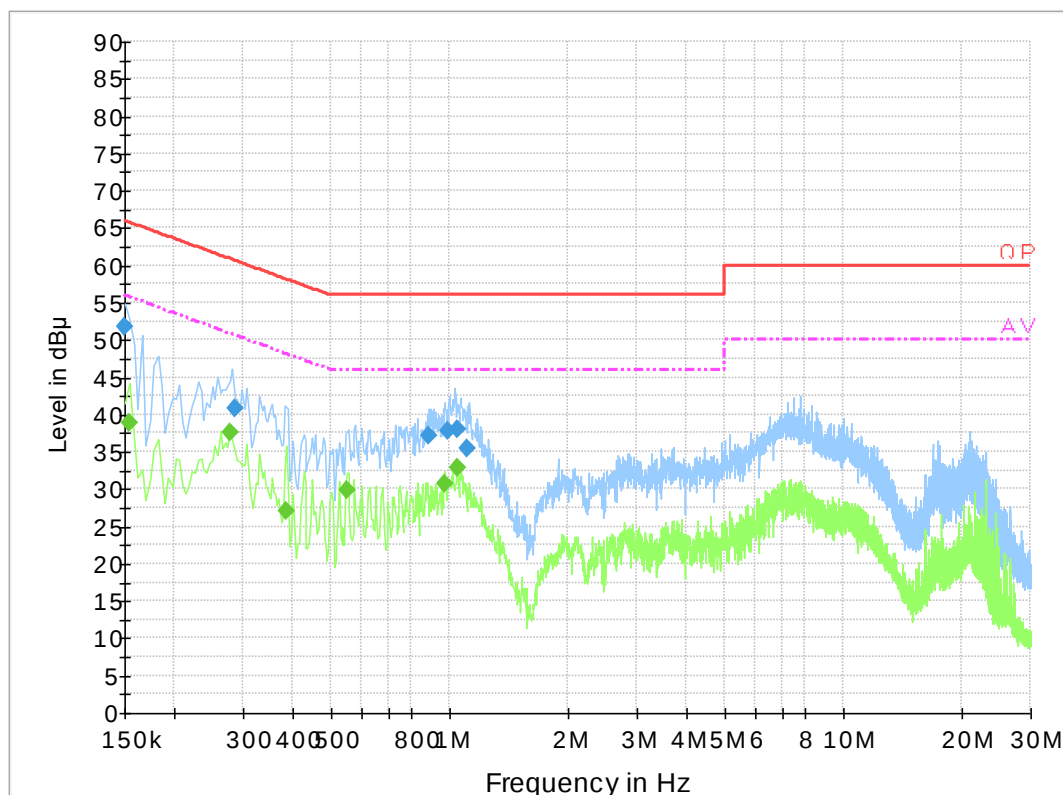
*The testing was performed by Haiguo Li on 2020-06-20.*

*EUT operation mode: Transmitting (worst case is 802.11n40 mode 5230 MHz)*

For Adapter 1

**AC 120V/60 Hz, Line**

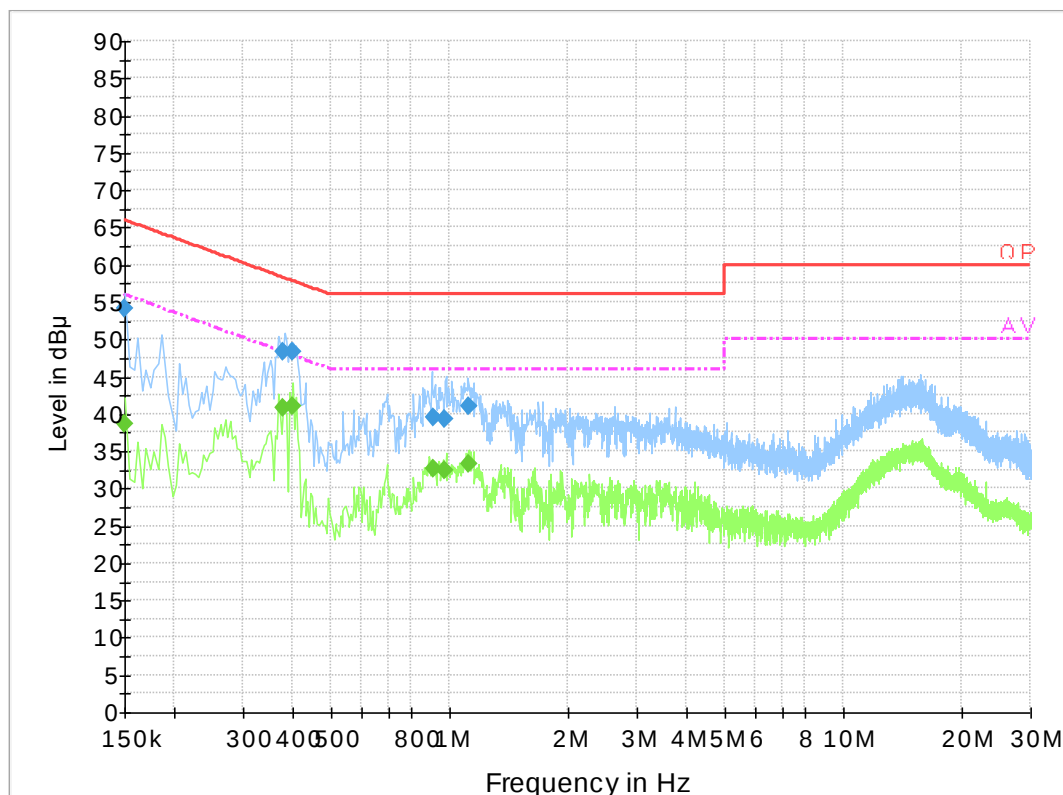
| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.150000        | 51.8                       | 19.8                   | 66.0         | 14.2        | QP                    |
| 0.273500        | 41.0                       | 19.8                   | 61.0         | 20.0        | QP                    |
| 0.352750        | 42.3                       | 19.9                   | 58.9         | 16.6        | QP                    |
| 0.888710        | 36.2                       | 19.8                   | 56.0         | 19.8        | QP                    |
| 0.959750        | 37.9                       | 19.8                   | 56.0         | 18.1        | QP                    |
| 1.069890        | 38.8                       | 19.9                   | 56.0         | 17.2        | QP                    |
| 0.150000        | 39.8                       | 19.8                   | 56.0         | 16.2        | Ave.                  |
| 0.273500        | 38.0                       | 19.8                   | 51.0         | 13.0        | Ave.                  |
| 0.352750        | 37.0                       | 19.9                   | 48.9         | 11.9        | Ave.                  |
| 0.888710        | 28.7                       | 19.8                   | 46.0         | 17.3        | Ave.                  |
| 0.959750        | 29.9                       | 19.8                   | 46.0         | 16.1        | Ave.                  |
| 1.069890        | 31.8                       | 19.9                   | 46.0         | 14.2        | Ave.                  |

**AC 120V/60 Hz, Neutral**

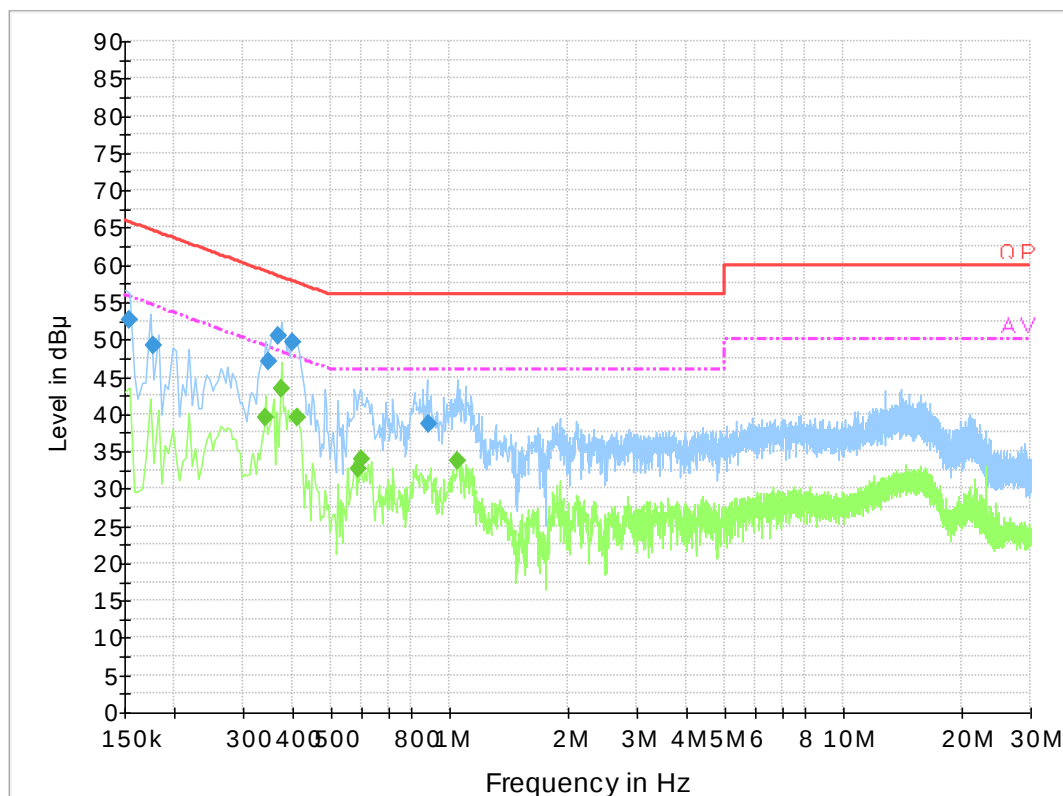
| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.150000        | 51.9                       | 19.8                   | 66.0         | 14.2        | QP                    |
| 0.286500        | 40.8                       | 19.7                   | 60.6         | 19.8        | QP                    |
| 0.884530        | 37.2                       | 19.7                   | 56.0         | 18.8        | QP                    |
| 0.994970        | 37.8                       | 19.8                   | 56.0         | 18.2        | QP                    |
| 1.046490        | 38.0                       | 19.8                   | 56.0         | 18.0        | QP                    |
| 1.113110        | 35.5                       | 19.8                   | 56.0         | 20.5        | QP                    |
| 0.154000        | 38.9                       | 19.8                   | 55.8         | 16.8        | Ave.                  |
| 0.278000        | 37.6                       | 19.7                   | 50.9         | 13.2        | Ave.                  |
| 0.386000        | 27.0                       | 19.8                   | 48.1         | 21.1        | Ave.                  |
| 0.550000        | 29.9                       | 19.8                   | 46.0         | 16.1        | Ave.                  |
| 0.974000        | 30.8                       | 19.8                   | 46.0         | 15.2        | Ave.                  |
| 1.050000        | 32.9                       | 19.8                   | 46.0         | 13.1        | Ave.                  |

For Adapter 2

AC 120V/60 Hz, Line



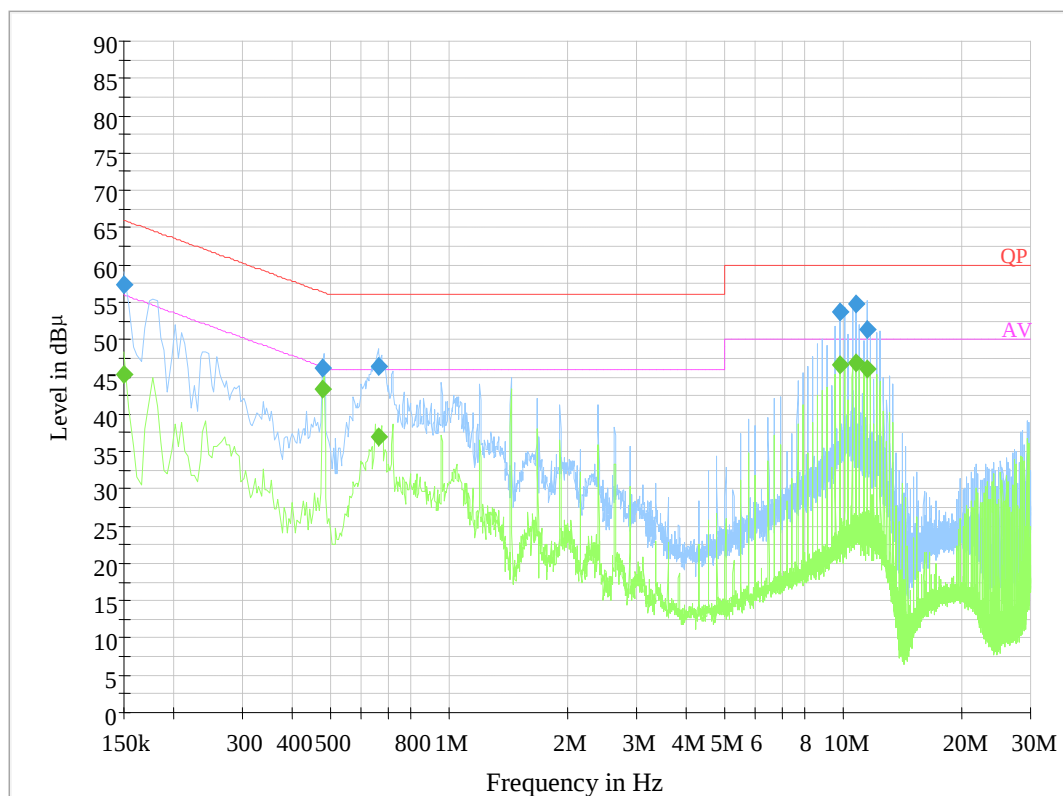
| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.150000        | 54.1                       | 19.8                   | 66.0         | 11.9        | QP                    |
| 0.380270        | 48.3                       | 19.9                   | 58.3         | 10.0        | QP                    |
| 0.399970        | 48.4                       | 19.9                   | 57.9         | 9.4         | QP                    |
| 0.912470        | 39.6                       | 19.8                   | 56.0         | 16.4        | QP                    |
| 0.979270        | 39.4                       | 19.9                   | 56.0         | 16.6        | QP                    |
| 1.121290        | 41.1                       | 19.8                   | 56.0         | 14.9        | QP                    |
| 0.150000        | 38.7                       | 19.8                   | 56.0         | 17.3        | Ave.                  |
| 0.380270        | 40.9                       | 19.9                   | 48.3         | 7.4         | Ave.                  |
| 0.399970        | 41.0                       | 19.9                   | 47.9         | 6.9         | Ave.                  |
| 0.912470        | 32.7                       | 19.8                   | 46.0         | 13.3        | Ave.                  |
| 0.979270        | 32.4                       | 19.9                   | 46.0         | 13.6        | Ave.                  |
| 1.121290        | 33.3                       | 19.8                   | 46.0         | 12.7        | Ave.                  |

**AC 120V/60 Hz, Neutral**

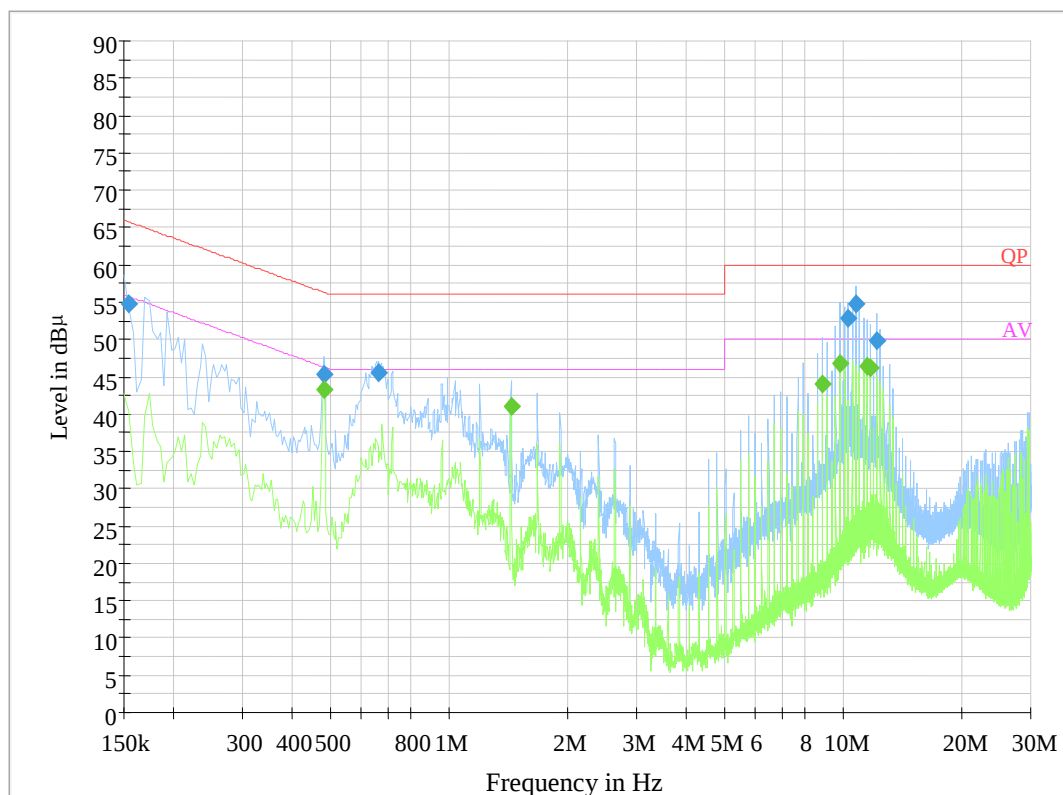
| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.154500        | 52.6                       | 19.8                   | 65.8         | 13.2        | QP                    |
| 0.177500        | 49.1                       | 19.8                   | 64.6         | 15.5        | QP                    |
| 0.348750        | 47.1                       | 19.9                   | 59.0         | 11.9        | QP                    |
| 0.368390        | 50.5                       | 19.9                   | 58.5         | 8.0         | QP                    |
| 0.399910        | 49.6                       | 19.8                   | 57.9         | 8.2         | QP                    |
| 0.891170        | 38.6                       | 19.7                   | 56.0         | 17.4        | QP                    |
| 0.342000        | 39.6                       | 19.8                   | 49.2         | 9.5         | Ave.                  |
| 0.374000        | 43.3                       | 19.8                   | 48.4         | 5.1         | Ave.                  |
| 0.414000        | 39.5                       | 19.8                   | 47.6         | 8.1         | Ave.                  |
| 0.586000        | 32.6                       | 19.8                   | 46.0         | 13.4        | Ave.                  |
| 0.598000        | 34.0                       | 19.8                   | 46.0         | 12.0        | Ave.                  |
| 1.050000        | 33.7                       | 19.8                   | 46.0         | 12.3        | Ave.                  |

For POE:

### AC 120V/60 Hz, Line



| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.150000        | 57.4                       | 19.8                   | 66.0         | 8.6         | QP                    |
| 0.478770        | 46.3                       | 19.8                   | 56.4         | 10.1        | QP                    |
| 0.664070        | 46.4                       | 19.8                   | 56.0         | 9.6         | QP                    |
| 9.850250        | 53.8                       | 20.0                   | 60.0         | 6.2         | QP                    |
| 10.811790       | 54.8                       | 20.0                   | 60.0         | 5.2         | QP                    |
| 11.532990       | 51.3                       | 20.0                   | 60.0         | 8.7         | QP                    |
| 0.150000        | 45.3                       | 19.8                   | 56.0         | 10.7        | Ave.                  |
| 0.478770        | 43.2                       | 19.8                   | 46.4         | 3.2         | Ave.                  |
| 0.664070        | 36.9                       | 19.8                   | 46.0         | 9.1         | Ave.                  |
| 9.850250        | 46.6                       | 20.0                   | 50.0         | 3.4         | Ave.                  |
| 10.811790       | 46.9                       | 20.0                   | 50.0         | 3.1         | Ave.                  |
| 11.532990       | 45.8                       | 20.0                   | 50.0         | 4.2         | Ave.                  |

**AC 120V/60 Hz, Neutral**

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.154000        | 54.8                       | 19.8                   | 65.8         | 11.0        | QP                    |
| 0.482770        | 45.2                       | 19.8                   | 56.3         | 11.0        | QP                    |
| 0.664010        | 45.5                       | 19.8                   | 56.0         | 10.5        | QP                    |
| 10.330930       | 52.9                       | 20.0                   | 60.0         | 7.1         | QP                    |
| 10.811850       | 54.9                       | 20.0                   | 60.0         | 5.1         | QP                    |
| 12.254130       | 49.9                       | 20.0                   | 60.0         | 10.1        | QP                    |
| 0.482000        | 43.1                       | 19.8                   | 46.3         | 3.2         | Ave.                  |
| 1.442000        | 41.1                       | 19.8                   | 46.0         | 4.9         | Ave.                  |
| 8.890000        | 44.1                       | 19.9                   | 50.0         | 5.9         | Ave.                  |
| 9.850000        | 46.9                       | 20.0                   | 50.0         | 3.1         | Ave.                  |
| 11.534000       | 46.2                       | 20.0                   | 50.0         | 3.8         | Ave.                  |
| 11.774000       | 45.9                       | 20.0                   | 50.0         | 4.1         | Ave.                  |

**Note:**

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

**§15.205 & §15.209 & §15.407(B) (1), (4), (6), (7) – UNDESIRABLE EMISSION****Applicable Standard**

FCC §15.407 (b) (1), (4), (6), (7); §15.209; §15.205;

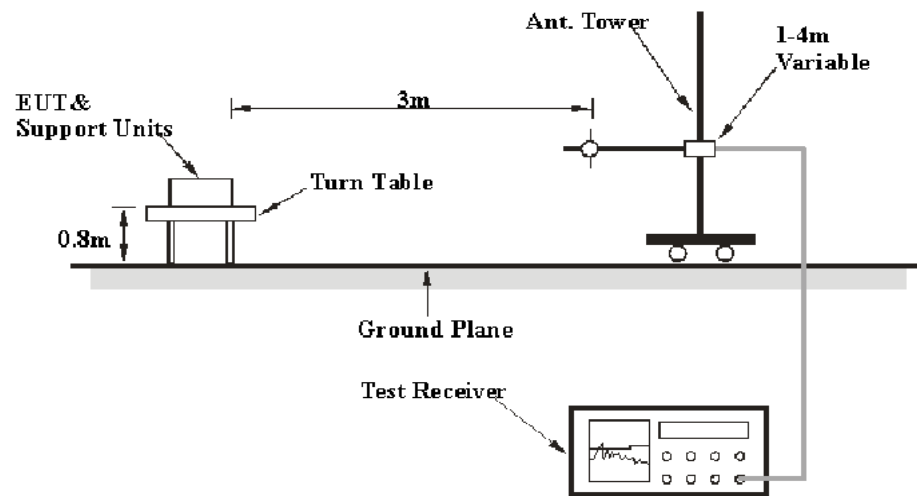
(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(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.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

**EUT Setup****Below 1 GHz:**

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 1 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range   | RBW     | Video B/W | IF B/W  | Measurement |
|-------------------|---------|-----------|---------|-------------|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz   | 120 kHz | QP          |

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart E, section 15.205, 15.209 and 15.407 rules.

## Test Data

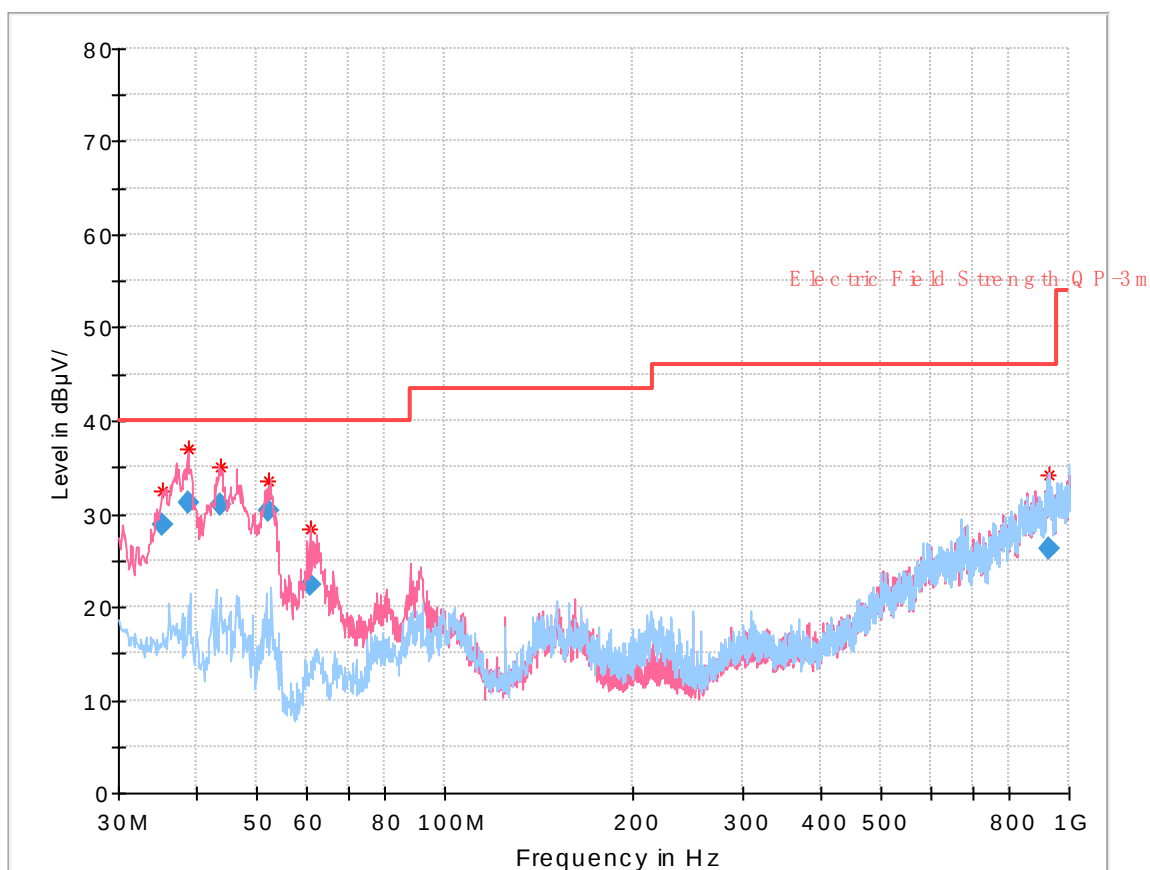
### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 60%       |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Holland Yang on 2020-06-20.*

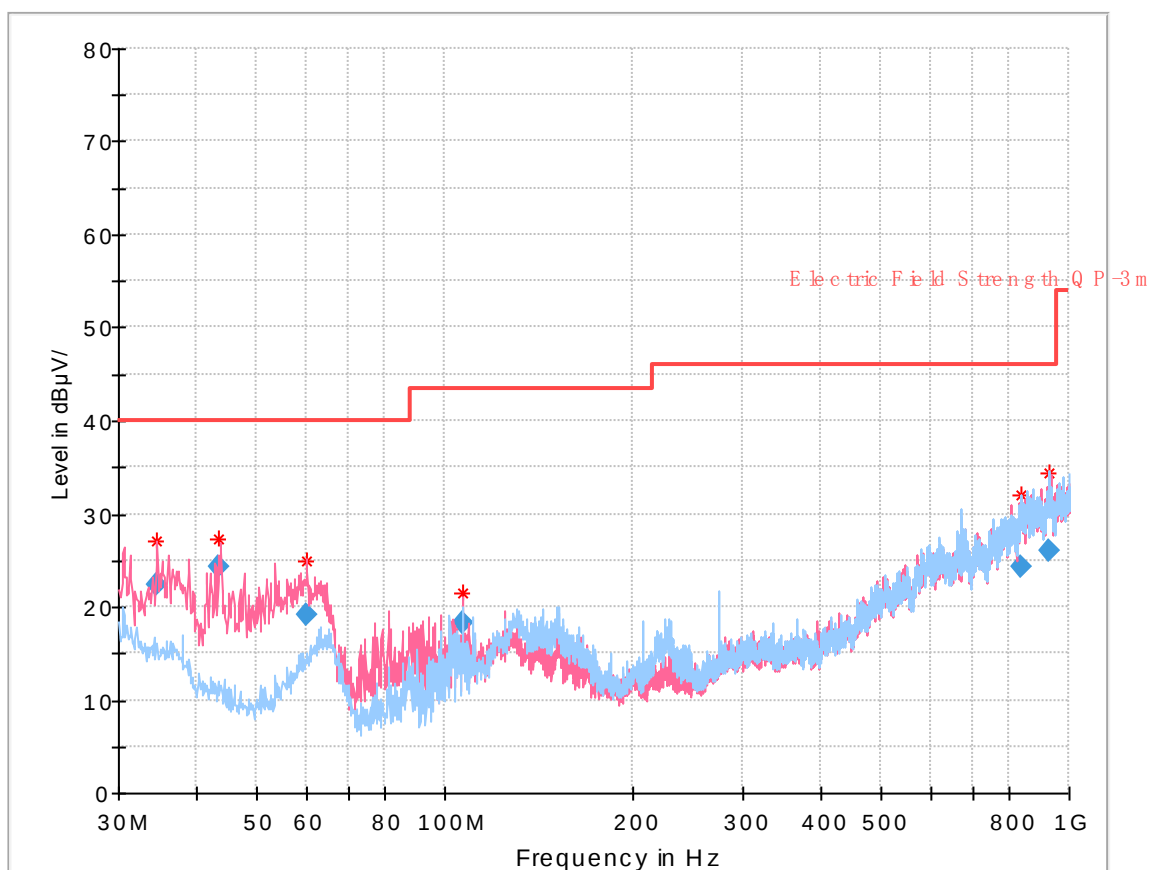
*EUT operation mode: Transmitting*

For Adapter 1

**30 MHz – 1 GHz:** (worst case is 802.11n40 mode 5230 MHz)

| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 35.365000       | 28.71                        | 108.0               | V                | 344.0                       | -10.8                    | 40.00          | 11.29       |
| 38.986875       | 31.15                        | 114.0               | V                | 350.0                       | -13.1                    | 40.00          | 8.85        |
| 43.850625       | 31.00                        | 114.0               | V                | 80.0                        | -16.5                    | 40.00          | 9.00        |
| 52.251250       | 30.35                        | 110.0               | V                | 82.0                        | -19.8                    | 40.00          | 9.65        |
| 60.830750       | 22.41                        | 122.0               | V                | 103.0                       | -20.2                    | 40.00          | 17.59       |
| 931.302750      | 26.14                        | 268.0               | H                | 15.0                        | 4.8                      | 46.00          | 19.86       |

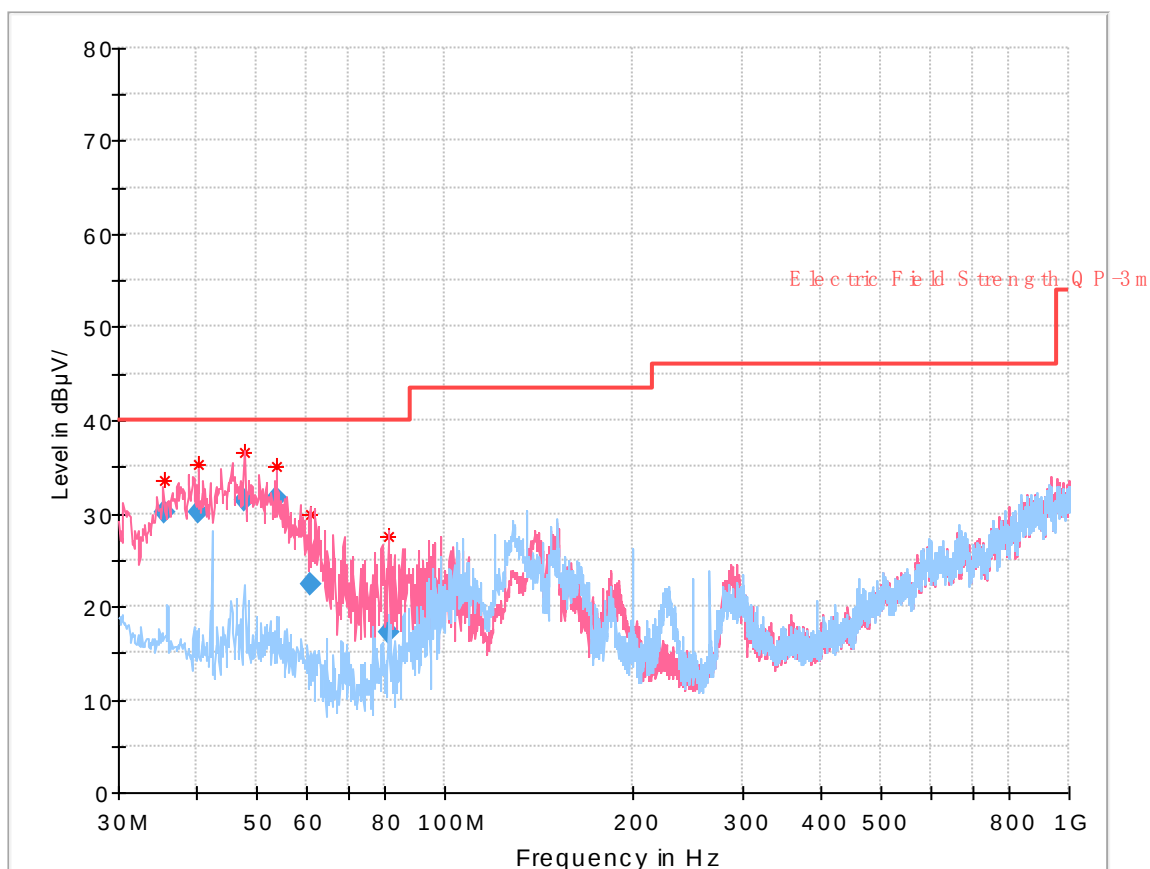
For Adapter 2

**30 MHz – 1 GHz:** (worst case is 802.11n40 mode 5230 MHz)

| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 34.593250       | 22.28                        | 102.0               | V                | 339.0                       | -10.3                    | 40.00          | 17.72       |
| 43.518125       | 24.24                        | 137.0               | V                | 49.0                        | -16.3                    | 40.00          | 15.76       |
| 60.194875       | 19.23                        | 130.0               | V                | 337.0                       | -20.2                    | 40.00          | 20.77       |
| 106.688375      | 18.21                        | 108.0               | V                | 0.0                         | -16.0                    | 43.50          | 25.29       |
| 834.665125      | 24.35                        | 385.0               | H                | 143.0                       | 2.7                      | 46.00          | 21.65       |
| 931.215875      | 26.12                        | 292.0               | H                | 20.0                        | 4.8                      | 46.00          | 19.88       |

For POE:

**30 MHz – 1 GHz:** (worst case is 802.11n40 mode 5230 MHz)



| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Antenna height (cm) | Antenna Polarity | Turntable position (degree) | Correction Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------|-----------------------------|--------------------------|----------------|-------------|
| 35.570000       | 30.09                        | 110.0               | V                | 10.0                        | -10.9                    | 40.00          | 9.91        |
| 40.352625       | 30.01                        | 102.0               | V                | 166.0                       | -14.0                    | 40.00          | 9.99        |
| 47.836875       | 31.35                        | 103.0               | V                | 0.0                         | -18.6                    | 40.00          | 8.65        |
| 53.816625       | 31.70                        | 111.0               | V                | 20.0                        | -19.8                    | 40.00          | 8.30        |
| 60.760250       | 22.47                        | 111.0               | V                | 281.0                       | -20.2                    | 40.00          | 17.53       |
| 81.195250       | 17.19                        | 103.0               | V                | 51.0                        | -19.9                    | 40.00          | 22.81       |

**Note:**

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corr. Amplitude

All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

\*\*\*\*\* END OF REPORT \*\*\*\*\*