

FCC PART 15B  
MEASUREMENT AND TEST REPORT

For

**Micron Electronics LLC.**

1001 Yamato Road, Suite 400, Boca Raton, Florida 33431 United States

**FCC ID: ZKQ-AGPS4GA**

|                                                                                                                                                                                                                                                   |                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                            | <b>Product Type:</b><br>Tracker |
| <b>Test Engineer:</b> Lee Li                                                                                                                                                                                                                      | Lee Li                          |
| <b>Report Number:</b> RSHA190517002-00A                                                                                                                                                                                                           |                                 |
| <b>Report Date:</b> 2019-06-04<br>Ray Wang                                                                                                                                                                                                        | Ray Wang                        |
| <b>Reviewed By:</b> EMC Leader                                                                                                                                                                                                                    |                                 |
| <b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Kunshan)<br>No.248 Chenghu Road, Kunshan, Jiangsu province, China<br>Tel: +86-0512-86175000<br>Fax: +86-0512-88934268<br><a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a> |                                 |

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

## **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         |
| TEST FACILITY .....                                      | 3         |
| <b>SYSTEM TEST CONFIGURATION.....</b>                    | <b>4</b>  |
| JUSTIFICATION .....                                      | 4         |
| EUT EXERCISE SOFTWARE .....                              | 4         |
| SPECIAL ACCESSORIES.....                                 | 4         |
| EQUIPMENT MODIFICATIONS .....                            | 4         |
| SUPPORT EQUIPMENT LIST AND DETAILS .....                 | 4         |
| BLOCK DIAGRAM OF RADIATED TEST SETUP.....                | 5         |
| <b>SUMMARY OF TEST RESULTS .....</b>                     | <b>6</b>  |
| <b>FCC §15.107 –CONDUCTED EMISSIONS .....</b>            | <b>7</b>  |
| APPLICABLE STANDARD .....                                | 7         |
| MEASUREMENT UNCERTAINTY.....                             | 7         |
| EUT SETUP .....                                          | 7         |
| EMI TEST RECEIVER SETUP.....                             | 8         |
| TEST PROCEDURE .....                                     | 8         |
| TEST EQUIPMENT LIST AND DETAILS.....                     | 8         |
| CORRECTED FACTOR & MARGIN CALCULATION .....              | 8         |
| TEST DATA .....                                          | 9         |
| <b>FCC §15.109 - RADIATED EMISSIONS .....</b>            | <b>11</b> |
| APPLICABLE STANDARD .....                                | 11        |
| MEASUREMENT UNCERTAINTY.....                             | 11        |
| EUT SETUP .....                                          | 11        |
| EMI TEST RECEIVER SETUP.....                             | 12        |
| TEST PROCEDURE .....                                     | 12        |
| TEST EQUIPMENT LIST AND DETAILS.....                     | 13        |
| CORRECTED AMPLITUDE & MARGIN CALCULATION .....           | 13        |
| TEST DATA .....                                          | 13        |

## GENERAL INFORMATION

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

|                             |                                                  |
|-----------------------------|--------------------------------------------------|
| Applicant                   | Micron Electronics LLC.                          |
| Test Model                  | AGPS 1000                                        |
| Product                     | Tracker                                          |
| Rate Voltage                | DC 3.8V by Battery and DC 5V charging by Adapter |
| Highest Operation Frequency | 2480MHz                                          |
| Dimension                   | 78mm(L)*45mm(W)*22.5mm(H)                        |

#### Adapter Information:

Model: JT-H050200

Input: AC100-240V 50/60Hz 0.5A

Output: 5V, 2A

*\*All measurement and test data in this report was gathered from production sample serial number: 20190517002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-05-17)*

### Objective

This report is prepared on behalf of *Micron Electronics LLC.* in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15, Class B device.

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

FCC Part 15.247 DTS Submittal with FCC ID: ZKQ-AGPS4GA

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01), the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

*Test mode: Charging & GPS on*

### EUT Exercise Software

No exercise software was used to test.

### Special Accessories

No special accessory was used.

### Equipment Modifications

No modification was made to the EUT tested.

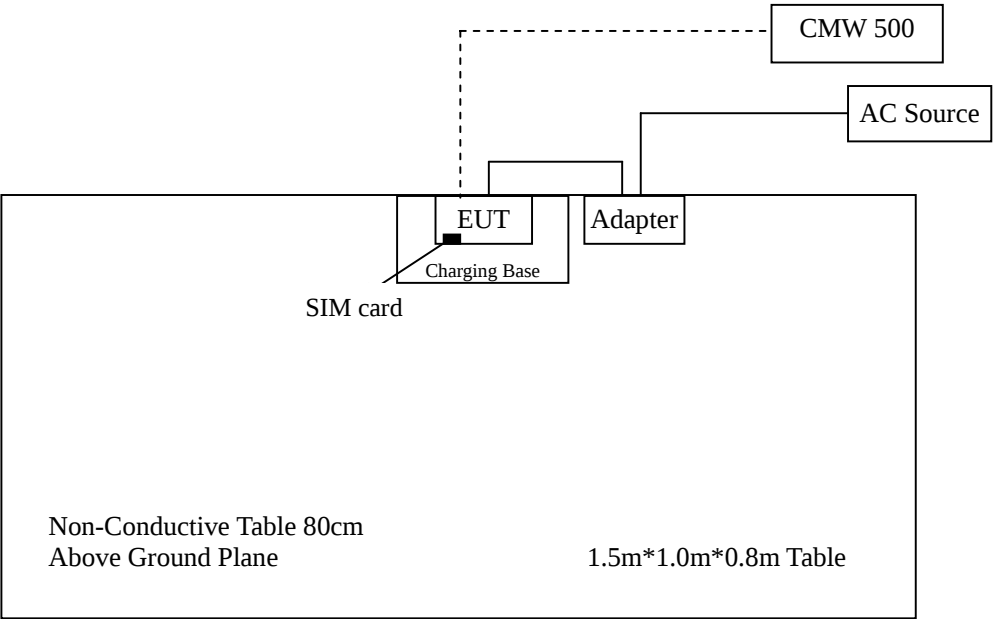
### Support Equipment List and Details

| Manufacturer    | Description                               | Model  | Serial Number |
|-----------------|-------------------------------------------|--------|---------------|
| /               | SIM Card                                  | /      | /             |
| Rohde & Schwarz | WIDEBAND RADIO<br>COMMUNICATION<br>TESTER | CMW500 | 116218        |

### External I/O Cable

| Cable Description | Length (m) | From/Port | To      |
|-------------------|------------|-----------|---------|
| Power Cable       | 1.0        | EUT       | Adapter |

Block Diagram of Radiated Test Setup



**SUMMARY OF TEST RESULTS**

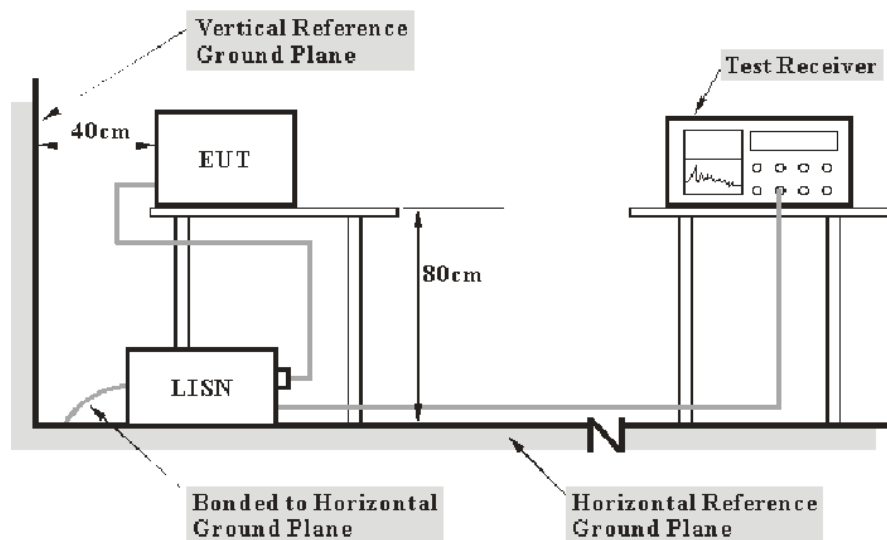
| FCC Rules | Description of Test | Results   |
|-----------|---------------------|-----------|
| §15.107   | Conducted Emissions | Compliant |
| §15.109   | Radiated Emissions  | Compliant |

### Applicable Standard

## Measurement Uncertainty

| Item |              | Measurement Uncertainty | $U_{\text{cispr}}$ |
|------|--------------|-------------------------|--------------------|
| AMN  | 150kHz~30MHz | 3.19 dB                 | 3.4 dB             |

## EUT Setup



- The test voltage is AC 120V/60Hz.

## 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 EUT was connected to the outlet of the LISN.

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

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

## Test Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCS30  | 834115/007    | 2018-11-12       | 2019-11-11           |
| ROHDE&SCHWARZ   | LISN              | ENV216  | 3560655016    | 2018-11-12       | 2019-11-11           |
| BACL            | BACL-EMC          | V1.0    | CE001         | --               | --                   |
| MICRO-COAX      | Coaxial Cable     | Cable-6 | 006           | 2018-09-08       | 2019-09-07           |

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

## Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Amplitude} = \text{Meter Reading} + \text{VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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 7 dB below the limit. The equation for margin calculation is as follows:

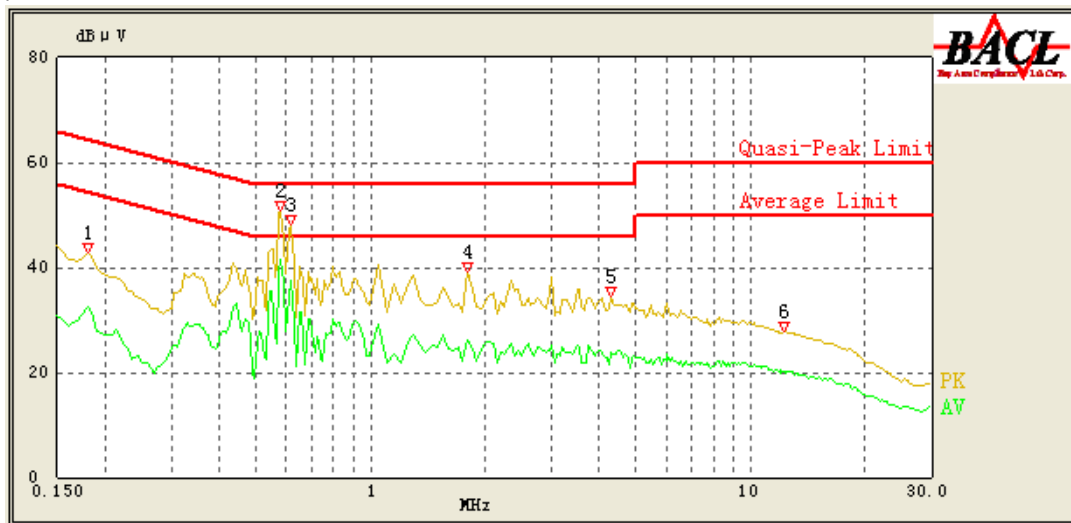
$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

**Test Data****Environmental Conditions**

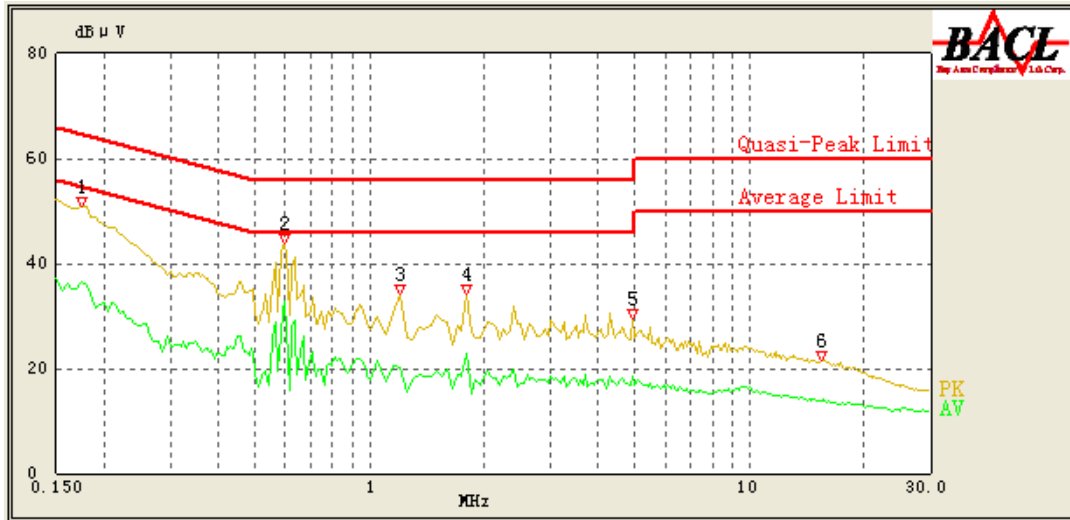
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24°C      |
| <b>Relative Humidity:</b> | 50 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

The testing was performed by Lee Li on 2019-05-28.

Test mode: Charging & GPS on

**1) Line:**

| No. | Frequency (MHz) | Reading (dBμV) | Correction (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/AV/QP) |
|-----|-----------------|----------------|-----------------|--------------|-------------|---------------------|
| 1   | 0.180           | 42.70          | 16.03           | 64.47        | 21.77       | QP                  |
|     | 0.180           | 32.58          | 16.03           | 54.47        | 21.89       | AV                  |
| 2   | 0.580           | 50.84          | 16.03           | 56.00        | 5.16        | QP                  |
|     | 0.580           | 41.66          | 16.03           | 46.00        | 4.34        | AV                  |
| 3   | 0.615           | 48.13          | 16.01           | 56.00        | 7.87        | QP                  |
|     | 0.615           | 37.54          | 16.01           | 46.00        | 8.46        | AV                  |
| 4   | 1.800           | 39.03          | 15.86           | 56.00        | 16.97       | QP                  |
|     | 1.800           | 26.04          | 15.86           | 46.00        | 19.96       | AV                  |
| 5   | 4.300           | 34.63          | 15.85           | 56.00        | 21.37       | QP                  |
|     | 4.300           | 23.99          | 15.85           | 46.00        | 22.01       | AV                  |
| 6   | 12.200          | 27.73          | 16.13           | 60.00        | 32.27       | QP                  |
|     | 12.350          | 19.95          | 16.13           | 50.00        | 30.05       | AV                  |

**Neutral:**

| No. | Frequency (MHz) | Reading (dBμV) | Correction (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/AV/QP) |
|-----|-----------------|----------------|-----------------|--------------|-------------|---------------------|
| 1   | 0.175           | 50.70          | 16.03           | 64.71        | 14.01       | QP                  |
|     | 0.175           | 36.54          | 16.03           | 54.71        | 18.17       | AV                  |
| 2   | 0.600           | 43.95          | 16.01           | 56.00        | 12.05       | QP                  |
|     | 0.600           | 32.86          | 16.01           | 46.00        | 13.14       | AV                  |
| 3   | 1.200           | 34.22          | 15.87           | 56.00        | 21.78       | QP                  |
|     | 1.200           | 20.20          | 15.87           | 46.00        | 25.80       | AV                  |
| 4   | 1.800           | 34.03          | 15.86           | 56.00        | 21.97       | QP                  |
|     | 1.800           | 22.74          | 15.86           | 46.00        | 23.26       | AV                  |
| 5   | 4.900           | 29.36          | 15.85           | 56.00        | 26.64       | QP                  |
|     | 4.900           | 18.39          | 15.85           | 46.00        | 27.61       | AV                  |
| 6   | 15.550          | 21.65          | 16.24           | 60.00        | 38.35       | QP                  |
|     | 15.650          | 14.16          | 16.24           | 50.00        | 35.84       | AV                  |

## FCC §15.109 - RADIATED EMISSIONS

### Applicable Standard

FCC §15.109

### Measurement Uncertainty

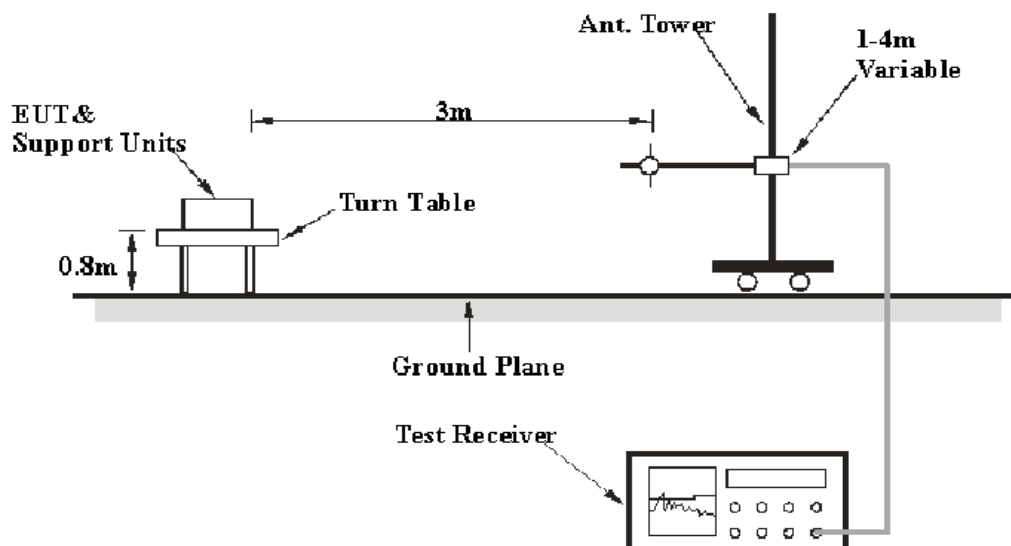
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

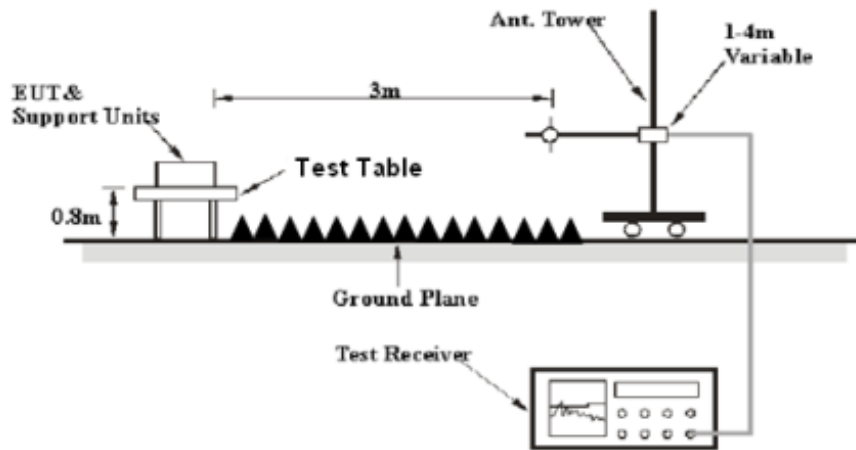
| Item              |               | Measurement Uncertainty | $U_{\text{cispr}}$ |
|-------------------|---------------|-------------------------|--------------------|
| Radiated Emission | 30MHz~1GHz    | 6.11dB                  | 6.3 dB             |
|                   | 1GHz~6GHz     | 4.45dB                  | 5.2 dB             |
|                   | 6 GHz ~18 GHz | 5.23dB                  | 5.5 dB             |

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

### EUT Setup

Below 1GHz:



**Above 1GHz:**

The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

**EMI Test Receiver Setup**

The system was investigated from 30 MHz to 18 GHz.

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

| Frequency Range  | RBW     | Video B/W | IF B/W | Detector |
|------------------|---------|-----------|--------|----------|
| 30MHz – 1000 MHz | 120 kHz | 300 kHz   | 120kHz | QP       |
| Above 1 GHz      | 1MHz    | 3 MHz     | /      | Peak     |
|                  | 1MHz    | 3 MHz     | 1MHz   | AVG      |

**Test Procedure**

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

**Test Equipment List and Details**

| Manufacturer      | Description        | Model     | Serial Number | Calibration Date | Calibration Due Date |
|-------------------|--------------------|-----------|---------------|------------------|----------------------|
| Sonoma Instrument | Amplifier          | 310N      | 185700        | 2018-08-14       | 2019-08-13           |
| Rohde & Schwarz   | EMI Test Receiver  | ESCI      | 100195        | 2018-11-12       | 2019-11-11           |
| Sunol Sciences    | Broadband Antenna  | JB3       | A060217       | 2016-12-26       | 2019-12-25           |
| Champrotek        | Chamber            | Chamber A | T-KSEMC049    | -                | -                    |
| Champrotek        | Chamber            | Chamber B | T-KSEMC080    | -                | -                    |
| R&S               | Auto test Software | EMC32     | 100361        | -                | -                    |
| ETS               | Horn Antenna       | 3115      | 6229          | 2016-12-12       | 2019-12-11           |
| Rohde & Schwarz   | EMI Receiver       | ESU40     | 100207        | 2018-08-27       | 2019-08-26           |
| A.H.Systems, inc  | Amplifier          | 2641-1    | 491           | 2019-02-20       | 2020-02-19           |
| MICRO-COAX        | Coaxial Cable      | Cable-8   | 008           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX        | Coaxial Cable      | Cable-9   | 009           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX        | Coaxial Cable      | Cable-10  | 010           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX        | Coaxial Cable      | Cable-4   | 004           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX        | Coaxial Cable      | Cable-5   | 005           | 2018-08-15       | 2019-08-14           |

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

**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 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

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

**Test Data****Environmental Conditions**

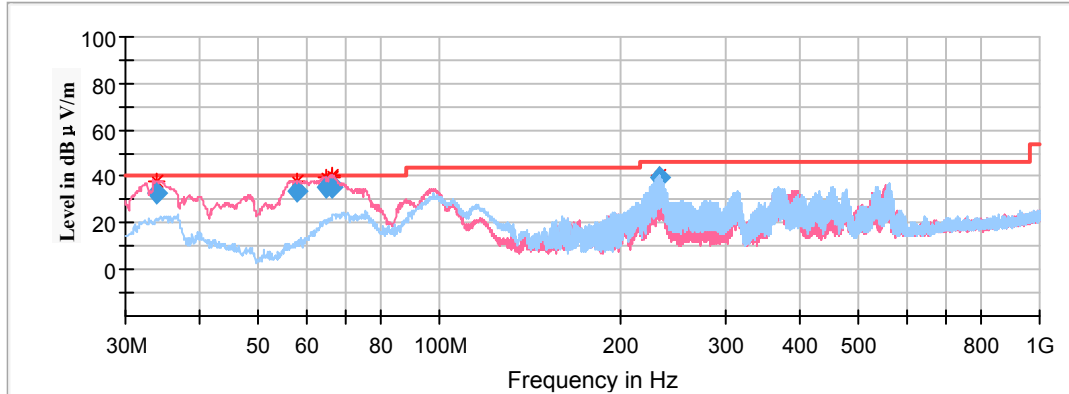
|                    |           |
|--------------------|-----------|
| Temperature:       | 24.2°C    |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 101.0 kPa |

The testing was performed by Lee Li on 2019-05-30.

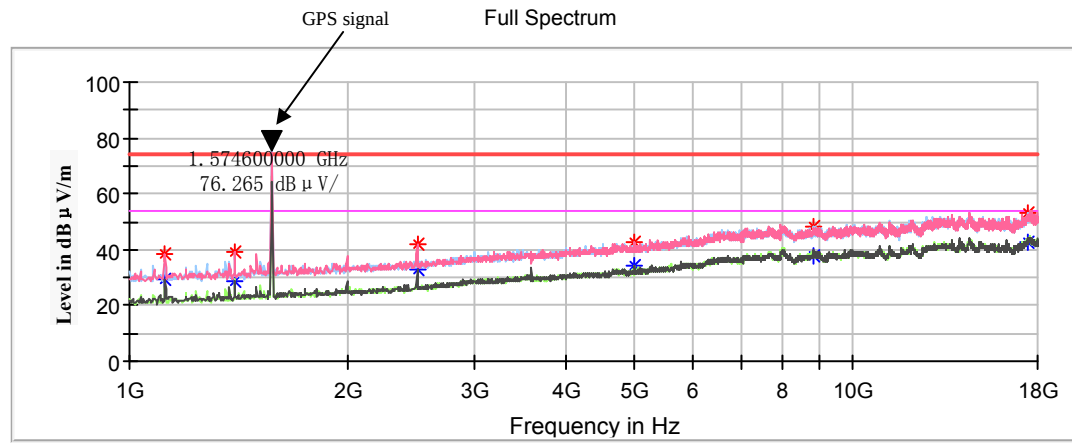
Test mode: Charging & GPS on

1)30MHz ~ 1GHz

Full Spectrum



| Frequency (MHz) | Quasi-Peak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|---------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 33.823800       | 32.85               | 40.00          | 7.15        | 100.0       | V   | 137.0         | -13.6        |
| 57.725440       | 33.60               | 40.00          | 6.40        | 100.0       | V   | 319.0         | -23.2        |
| 64.815560       | 34.97               | 40.00          | 5.03        | 100.0       | V   | 353.0         | -23.3        |
| 66.188040       | 35.17               | 40.00          | 4.83        | 100.0       | V   | 137.0         | -23.3        |
| 66.268440       | 35.87               | 40.00          | 4.13        | 100.0       | V   | 278.0         | -23.3        |
| 233.360480      | 39.57               | 46.00          | 6.43        | 200.0       | H   | 330.0         | -17.9        |

**Above 1 GHz:**

| Frequency (MHz) | Max Peak (dB $\mu$ V/m) | Average (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|-------------------------|------------------------|----------------------|-------------|-------------|-----|---------------|--------------|
| 1119.000000     | ---                     | 29.49                  | 54.00                | 24.51       | 100.0       | V   | 207.0         | -12.0        |
| 1119.000000     | 38.34                   | ---                    | 74.00                | 35.66       | 100.0       | V   | 207.0         | -12.0        |
| 1397.800000     | ---                     | 28.94                  | 54.00                | 25.06       | 200.0       | V   | 214.0         | -10.5        |
| 1397.800000     | 39.19                   | ---                    | 74.00                | 34.81       | 200.0       | V   | 214.0         | -10.5        |
| 2499.400000     | ---                     | 32.77                  | 54.00                | 21.23       | 100.0       | V   | 339.0         | -6.9         |
| 2499.400000     | 42.09                   | ---                    | 74.00                | 31.91       | 100.0       | V   | 339.0         | -6.9         |
| 4998.400000     | ---                     | 34.22                  | 54.00                | 19.78       | 100.0       | H   | 252.0         | -0.3         |
| 4998.400000     | 42.97                   | ---                    | 74.00                | 31.03       | 100.0       | H   | 252.0         | -0.3         |
| 8840.400000     | ---                     | 37.88                  | 54.00                | 16.12       | 200.0       | H   | 180.0         | 7.2          |
| 8840.400000     | 48.05                   | ---                    | 74.00                | 25.95       | 200.0       | H   | 180.0         | 7.2          |
| 17418.600000    | ---                     | 42.44                  | 54.00                | 11.56       | 200.0       | H   | 264.0         | 13.9         |
| 17418.600000    | 53.32                   | ---                    | 74.00                | 20.68       | 200.0       | H   | 264.0         | 13.9         |

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