

# RF TEST REPORT



Report No.: FCC\_IC\_RF\_SL18020601-ZBR-003A2\_Co-Location\_Rev1.0  
Supersede Report No.: FCC\_IC\_RF\_SL18020601-ZBR-003A2\_Co-Location

|                                                 |   |                                                                                     |
|-------------------------------------------------|---|-------------------------------------------------------------------------------------|
| Applicant                                       | : | Zebra Technologies Corporation                                                      |
| Host Product Name                               | : | Card Printer                                                                        |
| Host Product Model                              | : | ZC100, ZC150, ZC300, ZC350                                                          |
| Module Model No.                                | : | ZQ3BT, M6e-Micro, WYSBHVXGXG                                                        |
| FCC Test Standard                               | : | 15.247, 15.407                                                                      |
| IC Test Standard                                | : | RSS-247 Issue 2, RSS-210 Issue 9                                                    |
| Test Method                                     | : | ANSI C63.10 2013<br>RSS-Gen Issue 5 2018<br>KDB 558074 D01 15.247 Meas Guidance v05 |
| FCC ID                                          | : | I28-ZBRZQ3BT, I28-RFIDM6EM, I28MD-FXLAN11AC                                         |
| IC                                              | : | 3798B-ZBRZQ3BT, 3798B-RFIDM6EM, 3798B-FXLAN11AC                                     |
| Dates of test                                   | : | 01/28/2019 – 01/30/2019                                                             |
| Issue Date                                      | : | 02/27/2019                                                                          |
| Test Result                                     | : | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail              |
| Equipment complied with the specification       |   | [X]                                                                                 |
| Equipment did not comply with the specification |   | [ ]                                                                                 |

This Test Report is Issued Under the Authority of:

|                                                                                                                                      |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                   |  |
| Shuo Zhang                                                                                                                           | Chen Ge                                                                               |
| RF Test Engineer                                                                                                                     | Engineer Reviewer                                                                     |
| This test report may be reproduced in full only<br>Test result presented in this test report is applicable to the tested sample only |                                                                                       |

Issued By:  
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## Laboratory Introduction

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### Accreditations for Conformity Assessment

| Country/Region | Accreditation Body     | Scope                             |
|----------------|------------------------|-----------------------------------|
| USA            | FCC, A2LA              | EMC, RF/Wireless, Telecom         |
| Canada         | IC, A2LA, NIST         | EMC, RF/Wireless, Telecom         |
| Taiwan         | BSMI, NCC, NIST        | EMC, RF, Telecom, Safety          |
| Hong Kong      | OFTA, NIST             | RF/Wireless, Telecom              |
| Australia      | NATA, NIST             | EMC, RF, Telecom, Safety          |
| Korea          | KCC/RRA, NIST          | EMI, EMS, RF, Telecom, Safety     |
| Japan          | VCCI, JATE, TELEC, RFT | EMI, RF/Wireless, Telecom         |
| Mexico         | NOM, COFETEL, Caniety  | EMC, RF/Wireless, Telecom, Safety |
| Europe         | A2LA, NIST             | EMC, RF, Telecom, Safety          |
| Israel         | MOC, NIST              | EMC, RF, Telecom, Safety          |

### Accreditations for Product Certifications

| Country   | Accreditation Body | Scope               |
|-----------|--------------------|---------------------|
| USA       | FCC TCB, NIST      | EMC, RF, Telecom    |
| Canada    | IC FCB, NIST       | EMC, RF, Telecom    |
| Singapore | iDA, NIST          | EMC, RF, Telecom    |
| EU        | NB                 | EMC & RED Directive |
| Japan     | MIC (RCB 208)      | RF, Telecom         |
| Hong Kong | OFTA (US002)       | RF, Telecom         |

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## 1 Report Revision History

| Report No.                                        | Report | Description           | Issue Date |
|---------------------------------------------------|--------|-----------------------|------------|
| FCC_IC_RF_SL18020601-ZBR-003A2_Co-Location        | None   | Original              | 01/31/2019 |
| FCC_IC_RF_SL18020601-ZBR-003A2_Co-Location_Rev1.0 | 1.0    | Update EUT Radio info | 02/27/2019 |
|                                                   |        |                       |            |
|                                                   |        |                       |            |
|                                                   |        |                       |            |

## 2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Zebra Technologies Corporation  
Host Product: ZC100, ZC150, ZC300, ZC350  
Module(s) Model: ZQ3BT, M6e-Micro, WYSBHVXG

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1<sup>st</sup> page. This test report covers the radiated emissions requirements of the standards referenced in the report to allow system level approval of the modules in specified Hosts.

## 3 Customer information

|                      |   |                                              |
|----------------------|---|----------------------------------------------|
| Applicant Name       | : | Zebra Technologies Corporation               |
| Applicant Address    | : | 3 Overlook Point Lincolnshire, IL 60069, USA |
| Manufacturer Name    | : | Zebra Technologies Corporation               |
| Manufacturer Address | : | 3 Overlook Point Lincolnshire, IL 60069, USA |

## 4 Test site information

|                      |   |                                             |
|----------------------|---|---------------------------------------------|
| Lab performing tests | : | SIEMIC Laboratories                         |
| Lab Address          | : | 775 Montague Expressway, Milpitas, CA 95035 |
| FCC Test Site No.    | : | 540430                                      |
| IC Test Site No.     | : | 4842D-2                                     |
| VCCI Test Site No.   | : | A0133                                       |

## 5 Modification

| Index | Item | Description | Note |
|-------|------|-------------|------|
| -     | -    | -           | -    |
| -     | -    | -           | -    |

## 6 EUT Information

### 6.1 EUT Description

|                           |                                |
|---------------------------|--------------------------------|
| Host Product Name         | Card Printer                   |
| Host Model No.            | ZC100, ZC150, ZC300, ZC350     |
| Trade Name                | Zebra Technologies Corporation |
| Serial No.                | C3J183200714                   |
| Input Power               | 24VDC                          |
| Power Adapter Manu/Model  | N/A                            |
| Power Adapter SN          | N/A                            |
| Product Hardware version  | N/A                            |
| Date of EUT received      | 12/01/2018                     |
| Equipment Class/ Category | DTS, DSS, UNII                 |
| Port/Connectors           | USB, RJ45                      |
| Remark                    | N/A                            |

### 6.2 Radio Description

The host EUT contains 3 modules as specified.

**Specifications for ZQ3BT Radio:**

**Module Model No: ZQ3BT**

| Radio Type                | BT/LE     |                      | Report Reference                     |
|---------------------------|-----------|----------------------|--------------------------------------|
| Operating Frequency (MHz) | 2402-2480 |                      |                                      |
| Modulation                | GFSK      | GFSK, $\pi/4$ -DQPSK |                                      |
| Channel Spacing           | 2MHz      | 1MHz                 |                                      |
| Number of Channels        | 40        | 79                   |                                      |
| Antenna Type              | Chip      |                      |                                      |
| Antenna Gain              | 1.69 dBi  |                      |                                      |
| Max conducted power       | 7.09 dBm  |                      | FCC IC_SL17060501-ZBR-021_DSS_Rev2.0 |
| Note                      |           |                      |                                      |

**Module Model No.: WYSBHVXG (AC Radio)**

| Radio Type                       | BT                                                     |       | 2.4GHz                                                             |           | 5GHz                                           |                                              |                                      |
|----------------------------------|--------------------------------------------------------|-------|--------------------------------------------------------------------|-----------|------------------------------------------------|----------------------------------------------|--------------------------------------|
| Operating Frequency (MHz)        | 2402-2480                                              |       | 2412-2462                                                          | 2422-2462 | 5180-5240, 5260-5320<br>5500-5700, 5745-5825   | 5190-5230, 5270-5310<br>5510-5670, 5755-5795 | 5210, 5290, 5530<br>5610, 5690, 5775 |
| Modulation                       | GFSK, $\pi/4$ -DQPSK                                   |       | DSSS<br>(CCK, DQPSK, DBPSK)<br>OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM) |           | OFDM (BPSK, QPSK, 16QAM, 64QAM)                |                                              |                                      |
| Channel Spacing                  | 2 MHz                                                  | 1 MHz | 20 MHz                                                             | 40 MHz    | 20 MHz                                         | 40 MHz                                       | 80 MHz                               |
| Number of Channels               | 40                                                     | 79    | 11                                                                 | 7         | 22                                             | 10                                           | 6                                    |
| Antenna Type                     | Patch Antenna                                          |       |                                                                    |           |                                                |                                              |                                      |
| Antenna Gain                     | 3.66 dBi                                               |       | 3.19 dBi                                                           |           |                                                |                                              |                                      |
|                                  |                                                        |       |                                                                    |           | Report Reference                               |                                              |                                      |
| Max conducted power (BT-BLE)     | 8.43 dBm                                               |       |                                                                    |           | FCC_RF_SL15072901-ZBR-024_DTS Rev.2.0 (BLE)    |                                              |                                      |
| Max conducted power (BT-BDR/EDR) | 10.265 dBm                                             |       |                                                                    |           | FCC_RF_SL15072901-ZBR-024_DSS Rev. 3.0 (BT)    |                                              |                                      |
| Max conducted power (2.4GHz)     | 16.77 dBm                                              |       |                                                                    |           | FCC_IC_RF_SL15072901-ZBR-024_DTS_2.4G Rev. 2.0 |                                              |                                      |
| Max conducted power (5GHz)       | 13.95 dBm                                              |       |                                                                    |           | FCC_RF_SL15072901-ZBR-024_UNII Rev. 2.0        |                                              |                                      |
| Note                             | 2.4GHz and 5GHz Radio does not transmit simultaneously |       |                                                                    |           |                                                |                                              |                                      |

#### M6e-Micro:

| Radio Type                | UHF RFID                                                                    | Page/Report Reference              |
|---------------------------|-----------------------------------------------------------------------------|------------------------------------|
| Operating Frequency (MHz) | 902.75-927.75                                                               |                                    |
| Modulation                | ASK                                                                         |                                    |
| Channel Spacing           | 5000 kHz                                                                    |                                    |
| Number of Channels        | 50                                                                          |                                    |
| Antenna Type              | Loop/Coil                                                                   |                                    |
| Antenna Gain              | 3 dBi                                                                       |                                    |
| Antenna Connector Type    | U.FL Connector                                                              |                                    |
| Max conducted power       | 28.01 dBm                                                                   | SL13080801-ZBR-047-RFID-FCC_Rev1.0 |
| Note                      | M6e-Micro transmits simultaneously transmit with either ZQ3BT or WYSBHVXGX. |                                    |

#### Host EUT Configuration:

- **ZC100:** optional WYSBHVXGX radio module
- **ZC150:** std LCD, ZQ3BT radio module, and flipper, optional WYSBHVXGX radio module
- **ZC300:** std LCD, ZQ3BT radio module, flipper, ZCLFHF radio module, and optional WYSBHVXGX radio module
- **ZC350:** std LCD, ZQ3BT radio module, flipper, ZCLFHF radio module, M6e-Micro radio module, and optional WYSBHVXGX radio module

## 7 Supporting Equipment/Software and cabling Description

### 7.1 Supporting Equipment

| Item | Supporting Equipment Description | Model          | Serial Number | Manufacturer | Note |
|------|----------------------------------|----------------|---------------|--------------|------|
| 1    | Laptop                           | ThinkPad T420s | N/A           | Lenovo       | -    |
|      |                                  |                |               |              |      |
|      |                                  |                |               |              |      |

### 7.2 Cabling Description

| Name | Connection Start |          | Connection Stop |          | Length / shielding Info |            | Note |
|------|------------------|----------|-----------------|----------|-------------------------|------------|------|
|      | From             | I/O Port | To              | I/O Port | Length (m)              | Shielding  |      |
| USB  | EUT              | I/O Port | Laptop          | USB      | 2                       | Unshielded | -    |
|      |                  |          |                 |          |                         |            |      |

### 7.3 Test Software Description

| Test Item  | Software      | Description                                                 |
|------------|---------------|-------------------------------------------------------------|
| RF Testing | Zebra Toolbox | Set the EUT to transmit continuously in different test mode |
|            |               |                                                             |
|            |               |                                                             |



## 8 Test Summary

| Test Item                      | Test standard |             | Test Method/Procedure                                  | Pass / Fail                              |
|--------------------------------|---------------|-------------|--------------------------------------------------------|------------------------------------------|
| Antenna Requirement            | FCC           | 15.203      | ANSI C63.10 – 2013<br>558074 D01 DTS Meas Guidance v05 | <input checked="" type="checkbox"/> Pass |
|                                | IC            | -           |                                                        | <input type="checkbox"/> N/A             |
| AC Conducted Emissions Voltage | FCC           | 15.207(a)   | ANSI C63.10 2013<br>RSS Gen. 8.9                       | <input type="checkbox"/> Pass            |
|                                | IC            | RSS Gen 8.8 |                                                        | <input checked="" type="checkbox"/> N/A  |

| Test Item                  | Test standard                                                                                                                                                                                                                                                                                                                                                                                                                                           |             | Test Method/Procedure |                  | Pass / Fail                              |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------|------------------|------------------------------------------|
| Radiated Spurious Emission | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 15.209      | FCC                   | ANSI C63.10 2013 | <input checked="" type="checkbox"/> Pass |
|                            | IC                                                                                                                                                                                                                                                                                                                                                                                                                                                      | RSS-GEN 8.9 | IC                    | ANSI C63.10 2013 | <input type="checkbox"/> N/A             |
| Frequency Stability        | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -           | FCC                   | -                | <input type="checkbox"/> Pass            |
|                            | IC                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -           | IC                    | -                | <input checked="" type="checkbox"/> N/A  |
| Occupied Bandwidth         | FCC                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -           | FCC                   | -                | <input type="checkbox"/> Pass            |
|                            | IC                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -           | IC                    | -                | <input checked="" type="checkbox"/> N/A  |
| Remark                     | <ol style="list-style-type: none"> <li>All measurement uncertainties are not taken into consideration for all presented test result.</li> <li>The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.</li> <li><b>Only Radiated Spurious Emission for colocation has been tested for this report.</b></li> </ol> |             |                       |                  |                                          |

## 9 Measurement Uncertainty

| Emissions                   |                 |                                                                                                                                                 |             |
|-----------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Test Item                   | Frequency Range | Description                                                                                                                                     | Uncertainty |
| AC Conducted Emissions      | 150KHz – 30MHz  | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2                                 | ±3.5dB      |
| RF conducted measurement    | 150KHz – 40GHz  | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2                                 | ±0.95dB     |
| Radiated Spurious Emissions | 30MHz – 1GHz    | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | ±6dB        |
| Radiated Spurious Emissions | 1GHz – 40GHz    | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | ±6dB        |

## 10 Measurements, examination and derived results

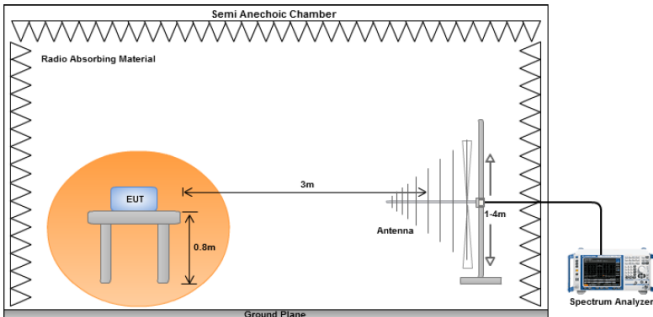
### 10.1 Antenna Requirement

| Spec    | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Applicable                          |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| §15.203 | <p>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.</p> <p>Antenna requirement must meet at least one of the following:</p> <p>a) Antenna must be permanently attached to the device.<br/> b) The antenna must use a unique type of connector to attach to the device.<br/> c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.</p> | <input checked="" type="checkbox"/> |
| Remark  | The Bluetooth Module uses a Chip antenna that is permanently attached to the board which meets the requirement. The UHF RFID Module uses a Loop/Coil antenna that is integrated to the board which meets the requirement. The AC radio uses an u.fl connector for antenna connection which meet the requirement.                                                                                                                                                                                                                     |                                     |
| Result  | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |

## 10.2 Radiated Measurements

### 10.2.1 Radiated Measurements 30MHz to 1GHz

#### Requirement(s):

| Spec                            | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Applicable                                                                                                                 |                       |         |     |          |     |         |     |           |     |                                                |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|---------|-----|----------|-----|---------|-----|-----------|-----|------------------------------------------------|
| 47 CFR §15.225<br>RSS-210 (B.6) | <div>Operation within the band 13.110–14.010 MHz:<br/>(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.<br/>(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.<br/>(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.<br/>(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.</div> <table><thead><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr></thead><tbody><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></tbody></table> | Frequency range (MHz)                                                                                                      | Field Strength (uV/m) | 30 – 88 | 100 | 88 – 216 | 150 | 216 960 | 200 | Above 960 | 500 | <div><input checked="" type="checkbox"/></div> |
| Frequency range (MHz)           | Field Strength (uV/m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| 30 – 88                         | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| 88 – 216                        | 150                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| 216 960                         | 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| Above 960                       | 500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| Test Setup                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| Procedure                       | <div>1. The EUT was switched on and allowed to warm up to its normal operating condition.<br/>2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:<br/>    a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.<br/>    b. The EUT was then rotated to the direction that gave the maximum emission.<br/>    c. Finally, the antenna height was adjusted to the height that gave the maximum emission.<br/>3. A Quasi-peak measurement was then made for that frequency point.<br/>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</div>                                                      |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| Test Date                       | 01/28/2019 – 01/30/2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <div>Environmental conditions</div> <div>Temperature20.1°C<br/>Relative Humidity36%<br/>Atmospheric Pressure1026mbar</div> |                       |         |     |          |     |         |     |           |     |                                                |
| Remark                          | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |
| Result                          | <div><input checked="" type="checkbox"/> Pass</div> <div><input type="checkbox"/> Fail</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                            |                       |         |     |          |     |         |     |           |     |                                                |

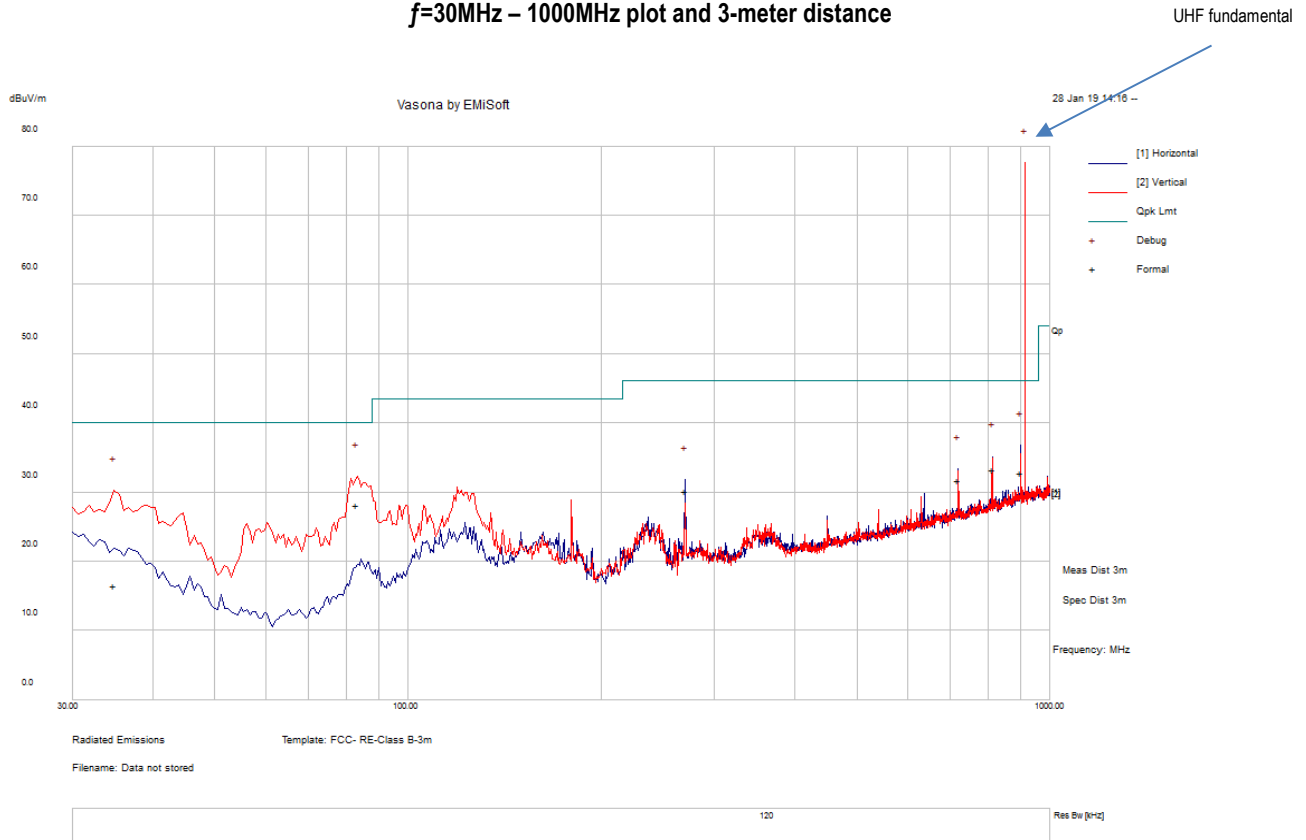
Test Data    ☒ Yes (See below)      ☐ N/A

Test Plot    ☒ Yes (See below)      ☐ N/A

Test was done by Shuo Zhang at 10-meter chamber.

|                     |                                          |  |         |                                                                           |
|---------------------|------------------------------------------|--|---------|---------------------------------------------------------------------------|
| Test specification: | Radiated Emissions                       |  |         |                                                                           |
| Mains Power:        | 120VAC, 60Hz                             |  | Result: | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> Fail |
| Tested by:          | Shuo Zhang                               |  |         |                                                                           |
| Test Date:          | 01/28/2019                               |  |         |                                                                           |
| Remarks:            | UHF and BT radio transmit simultaneously |  |         |                                                                           |

**f=30MHz – 1000MHz plot and 3-meter distance**



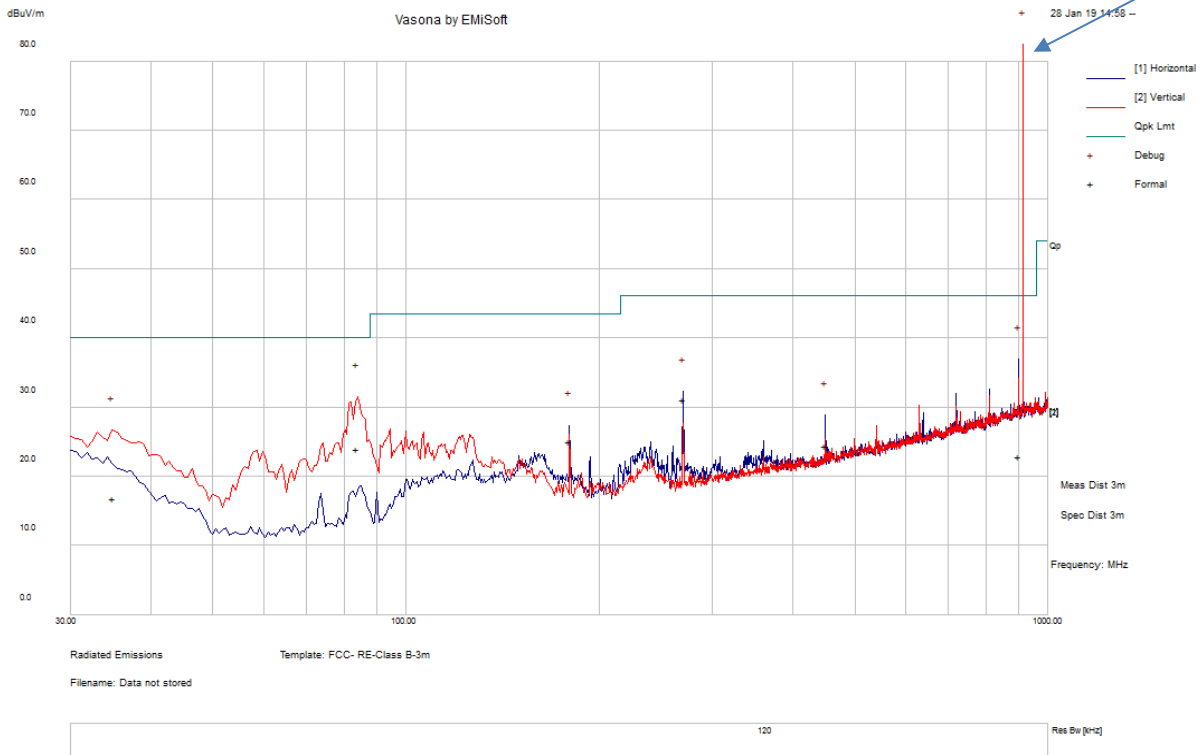
**f=30MHz – 1000MHz Measurements**

| Frequency MHz | Raw dBuV/m | Cable Loss | AF dB  | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 83.15         | 44.15      | 11.71      | -27.71 | 28.14        | Quasi Max        | V   | 101    | 137     | 40           | -11.86    | Pass       |
| 900.00        | 30.17      | 15.95      | -13.29 | 32.83        | Quasi Max        | H   | 168    | 253     | 46           | -13.17    | Pass       |
| 34.85         | 21.85      | 11.19      | -16.43 | 16.62        | Quasi Max        | V   | 253    | 235     | 40           | -23.38    | Pass       |
| 813.69        | 32.15      | 15.5       | -14.32 | 33.33        | Quasi Max        | H   | 100    | 143     | 46           | -12.67    | Pass       |
| 719.97        | 31.63      | 15.2       | -15.09 | 31.74        | Quasi Max        | H   | 100    | 149     | 46           | -14.27    | Pass       |
| 269.99        | 40.2       | 13.09      | -23.09 | 30.2         | Quasi Max        | H   | 105    | 235     | 46           | -15.8     | Pass       |

|                     |                                                |  |         |                                                                           |
|---------------------|------------------------------------------------|--|---------|---------------------------------------------------------------------------|
| Test specification: | Radiated Emissions                             |  |         |                                                                           |
| Mains Power:        | 120VAC, 60Hz                                   |  | Result: | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> Fail |
| Tested by:          | Shuo Zhang                                     |  |         |                                                                           |
| Test Date:          | 01/28/2019                                     |  |         |                                                                           |
| Remarks:            | UHF and AC radio Wi-Fi transmit simultaneously |  |         |                                                                           |

**f=30MHz – 1000MHz plot and 3-meter distance**

UHF fundamental

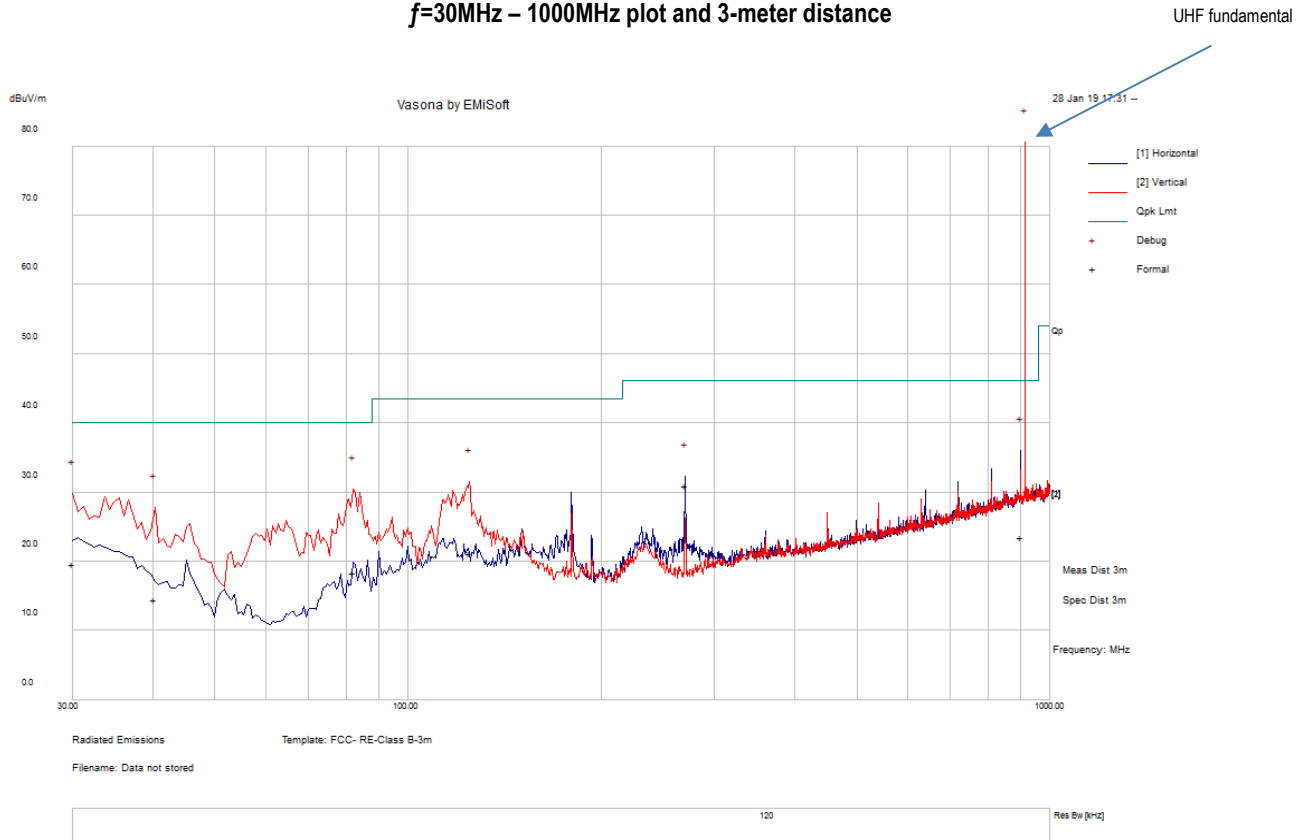


**f=30MHz – 1000MHz Measurements**

| Frequency MHz | Raw dBuV/m | Cable Loss | AF dB  | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 83.86         | 39.99      | 11.72      | -27.71 | 24           | Quasi Max        | V   | 158    | 77      | 40           | -16.01    | Pass       |
| 899.76        | 20.31      | 15.95      | -13.3  | 22.97        | Quasi Max        | H   | 150    | 93      | 46           | -23.03    | Pass       |
| 35.04         | 22.22      | 11.2       | -16.58 | 16.85        | Quasi Max        | V   | 101    | 338     | 40           | -23.16    | Pass       |
| 269.99        | 41.14      | 13.09      | -23.09 | 31.14        | Quasi Max        | H   | 100    | 225     | 46           | -14.86    | Pass       |
| 179.98        | 37.71      | 12.43      | -25.12 | 25.02        | Quasi Max        | H   | 110    | 113     | 43.5         | -18.48    | Pass       |
| 449.99        | 29.52      | 14.06      | -19.1  | 24.49        | Quasi Max        | H   | 235    | 220     | 46           | -21.51    | Pass       |

|                     |                                             |  |         |                                                                           |
|---------------------|---------------------------------------------|--|---------|---------------------------------------------------------------------------|
| Test specification: | Radiated Emissions                          |  |         |                                                                           |
| Mains Power:        | 120VAC, 60Hz                                |  | Result: | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> Fail |
| Tested by:          | Shuo Zhang                                  |  |         |                                                                           |
| Test Date:          | 01/28/2019                                  |  |         |                                                                           |
| Remarks:            | UHF and AC radio BT transmit simultaneously |  |         |                                                                           |

### f=30MHz – 1000MHz plot and 3-meter distance

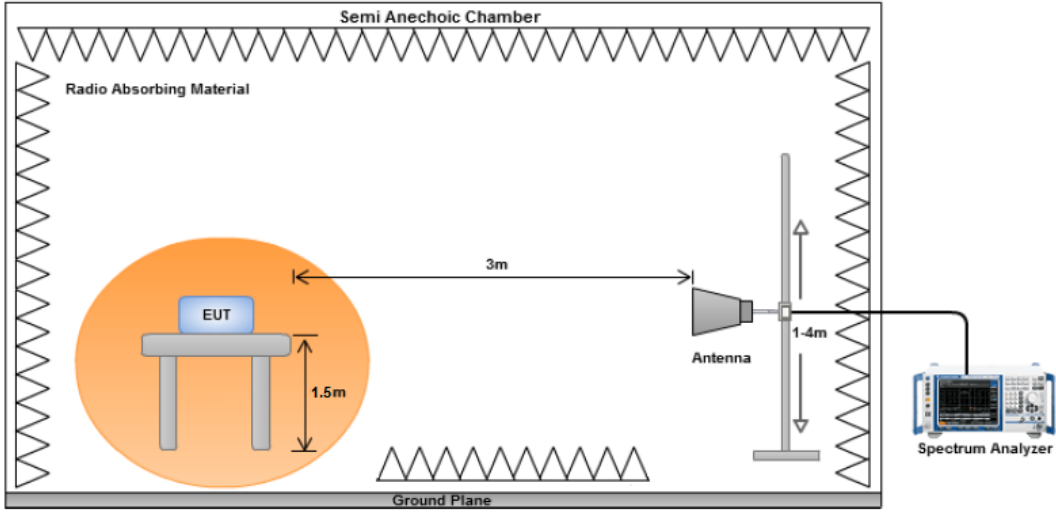


### f=30MHz – 1000MHz Measurements

| Frequency MHz | Raw dBuV/m | Cable Loss | AF dB  | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 82.19         | 34.46      | 11.7       | -27.72 | 18.44        | Quasi Max        | V   | 199    | 308     | 40           | -21.56    | Pass       |
| 899.75        | 20.88      | 15.95      | -13.3  | 23.54        | Quasi Max        | H   | 128    | 13      | 46           | -22.46    | Pass       |
| 30.00         | 20.62      | 11.12      | -12.08 | 19.65        | Quasi Max        | V   | 134    | 111     | 40           | -20.35    | Pass       |
| 124.66        | 31.75      | 12.12      | -22.66 | 21.21        | Quasi Max        | V   | 100    | 131     | 43.5         | -22.29    | Pass       |
| 40.23         | 23.72      | 11.31      | -20.48 | 14.55        | Quasi Max        | V   | 101    | 313     | 40           | -25.45    | Pass       |
| 269.98        | 41.01      | 13.09      | -23.09 | 31.01        | Quasi Max        | H   | 113    | 214     | 46           | -14.99    | Pass       |

## 10.2.2 Radiated Spurious Emissions between 1GHz-25GHz

### Requirement(s):

| Spec                             | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Applicable                          |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 47CFR§15.247(d),<br>RSS210(A8.5) | a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required<br><br><input type="checkbox"/> 20 dB down <input checked="" type="checkbox"/> 30 dB down | <input checked="" type="checkbox"/> |
|                                  | b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | or restricted band, emission must also comply with the radiated emission limits specified in 15.209                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <input type="checkbox"/>            |
| Test Setup                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |
| Procedure                        | <ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> <li>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>The EUT was then rotated to the direction that gave the maximum emission.</li> <li>Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>An average measurement was then made for that frequency point.</li> <li>Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |
| Remark                           | The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |
| Result                           | <input checked="" type="checkbox"/> Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |

Test Data    ☒ Yes (See below)    ☐ N/A

Test Plot    ☐ Yes (See below)    ☒ N/A

Test was done by Shuo Zhang at 10-meter chamber.



|                     |                                          |  |         |                                                                           |
|---------------------|------------------------------------------|--|---------|---------------------------------------------------------------------------|
| Test specification: | Radiated Emissions                       |  |         |                                                                           |
| Mains Power:        | 120VAC, 60Hz                             |  | Result: | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> Fail |
| Tested by:          | Shuo Zhang                               |  |         |                                                                           |
| Test Date:          | 01/28/2019                               |  |         |                                                                           |
| Remarks:            | UHF and BT radio transmit simultaneously |  |         |                                                                           |

| Frequency MHz | Raw dBμV/m | Cable Loss | AF dB | Level dBμV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|-------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4068.47       | 43.76      | 3.88       | -0.48 | 47.16        | Peak Max         | V   | 128    | 58      | 74           | -26.84    | Pass       |
| 8012.02       | 40.63      | 5.42       | -0.68 | 45.37        | Peak Max         | V   | 222    | 82      | 74           | -28.63    | Pass       |
| 1904.23       | 42.68      | 2.68       | -2.62 | 42.73        | Peak Max         | V   | 188    | 85      | 74           | -31.27    | Pass       |
| 4068.47       | 33.34      | 3.88       | -0.48 | 36.73        | Average Max      | V   | 128    | 58      | 54           | -17.27    | Pass       |
| 8012.02       | 27.14      | 5.42       | -0.68 | 31.88        | Average Max      | V   | 222    | 82      | 54           | -22.12    | Pass       |
| 1904.23       | 29.44      | 2.68       | -2.62 | 29.49        | Average Max      | V   | 188    | 85      | 54           | -24.51    | Pass       |

|                     |                                                |  |         |                                                                           |
|---------------------|------------------------------------------------|--|---------|---------------------------------------------------------------------------|
| Test specification: | Radiated Emissions                             |  |         |                                                                           |
| Mains Power:        | 120VAC, 60Hz                                   |  | Result: | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> Fail |
| Tested by:          | Shuo Zhang                                     |  |         |                                                                           |
| Test Date:          | 01/28/2019                                     |  |         |                                                                           |
| Remarks:            | UHF and AC radio Wi-Fi transmit simultaneously |  |         |                                                                           |

| Frequency MHz | Raw dBμV/m | Cable Loss | AF dB | Level dBμV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|-------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 3253.30       | 41.13      | 3.47       | -1.55 | 43.05        | Peak Max         | H   | 334    | 186     | 74           | -30.95    | Pass       |
| 6312.96       | 41.59      | 4.7        | -0.28 | 46.01        | Peak Max         | V   | 144    | 257     | 74           | -27.99    | Pass       |
| 1906.85       | 41.61      | 2.68       | -2.63 | 41.66        | Peak Max         | V   | 330    | 156     | 74           | -32.34    | Pass       |
| 3253.30       | 28.67      | 3.47       | -1.55 | 30.59        | Average Max      | H   | 334    | 186     | 54           | -23.41    | Pass       |
| 6312.96       | 27.47      | 4.7        | -0.28 | 31.89        | Average Max      | V   | 144    | 257     | 54           | -22.11    | Pass       |
| 1906.85       | 29.71      | 2.68       | -2.63 | 29.76        | Average Max      | V   | 330    | 156     | 54           | -24.24    | Pass       |

|                     |                                             |  |         |                                                                           |
|---------------------|---------------------------------------------|--|---------|---------------------------------------------------------------------------|
| Test specification: | Radiated Emissions                          |  |         |                                                                           |
| Mains Power:        | 120VAC, 60Hz                                |  | Result: | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> Fail |
| Tested by:          | Shuo Zhang                                  |  |         |                                                                           |
| Test Date:          | 01/28/2019                                  |  |         |                                                                           |
| Remarks:            | UHF and AC radio BT transmit simultaneously |  |         |                                                                           |

| Frequency MHz | Raw dBμV/m | Cable Loss | AF dB | Level dBμV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|-------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 11204.77      | 40.34      | 6.05       | 2.14  | 48.52        | Peak Max         | V   | 140    | 12      | 74           | -25.48    | Pass       |
| 6450.71       | 40.08      | 4.8        | -0.19 | 44.69        | Peak Max         | V   | 181    | 46      | 74           | -29.31    | Pass       |
| 3891.08       | 40.98      | 3.73       | -0.54 | 44.17        | Peak Max         | V   | 254    | 196     | 74           | -29.83    | Pass       |
| 11204.77      | 26.36      | 6.05       | 2.14  | 34.54        | Average Max      | V   | 140    | 12      | 54           | -19.46    | Pass       |
| 6450.71       | 26.94      | 4.8        | -0.19 | 31.55        | Average Max      | V   | 181    | 46      | 54           | -22.45    | Pass       |
| 3891.08       | 27.98      | 3.73       | -0.54 | 31.18        | Average Max      | V   | 254    | 196     | 54           | -22.82    | Pass       |

## Annex A. TEST INSTRUMENT

| Instrument                           | Model       | Serial #   | Cal Date   | Cal Cycle | Cal Due    | In use                              |
|--------------------------------------|-------------|------------|------------|-----------|------------|-------------------------------------|
| <b>Radiated Emissions</b>            |             |            |            |           |            |                                     |
| Keysight EXA 44GHz Spectrum Analyzer | N9030B(PXA) | MY57140374 | 09/06/2018 | 1 Year    | 09/06/2019 | <input checked="" type="checkbox"/> |
| Bi-Log antenna (30MHz~2GHz)          | JB1         | A030702    | 03/09/2018 | 1 Year    | 03/09/2019 | <input checked="" type="checkbox"/> |
| Horn Antenna (1GHz~26GHz)            | 3115        | 100059     | 11/09/2018 | 1 Year    | 11/09/2019 | <input checked="" type="checkbox"/> |
| Horn Antenna (18GHz~40GHz)           | PA-840      | 181251     | 06/23/2018 | 1 Year    | 06/23/2019 | <input checked="" type="checkbox"/> |
| Preamplifier (100KHz-7GHz)           | LPA-6-30    | 11170602   | 05/09/2018 | 1 Year    | 05/09/2019 | <input checked="" type="checkbox"/> |
| Pre-Amplifier (1-26.5GHz)            | 8449B       | 3008A00715 | 08/16/2018 | 1 Year    | 08/16/2019 | <input checked="" type="checkbox"/> |

## Annex A. SIEMIC Accreditation

| Accreditations                          | Document                                                                                                                                                                | Scope / Remark                                                                                                                                                            |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISO 17025 (A2LA)                        |                                                                                        | Please see the documents for the detailed scope                                                                                                                           |
| ISO Guide 65 (A2LA)                     |                                                                                        | Please see the documents for the detailed scope                                                                                                                           |
| TCB Designation                         |                                                                                                                                                                         | <a href="#">A1</a> , <a href="#">A2</a> , <a href="#">A3</a> , <a href="#">A4</a> , <a href="#">B1</a> , <a href="#">B2</a> , <a href="#">B3</a> , <a href="#">B4</a> , C |
| FCC DoC Accreditation                   |                                                                                        | FCC Declaration of Conformity Accreditation                                                                                                                               |
| FCC Site Registration                   |                                                                                        | 3 meter site                                                                                                                                                              |
| FCC Site Registration                   |                                                                                        | 10 meter site                                                                                                                                                             |
| IC Site Registration                    |                                                                                        | 3 meter site                                                                                                                                                              |
| IC Site Registration                    |                                                                                        | 10 meter site                                                                                                                                                             |
| EU NB                                   |                                                                                        | <b>Radio Equipment: EN45011:</b><br>EN ISO/IEC 17065                                                                                                                      |
|                                         |                                                                                      | <b>Electromagnetic Compatibility:</b><br>EN45011 – EN ISO/IEC 17065                                                                                                       |
| Singapore iDA<br>CB(Certification Body) |   | <a href="#">Phase I</a> , <a href="#">Phase II</a>                                                                                                                        |
| Vietnam MIC<br>CAB Accreditation        |                                                                                      | Please see the document for the detailed scope                                                                                                                            |
| Hong Kong OFCA                          |                                                                                      | <b>(Phase II)</b> OFCA Foreign Certification Body for Radio and Telecom                                                                                                   |
|                                         |                                                                                      | <b>(Phase I)</b> Conformity Assessment Body for Radio and Telecom                                                                                                         |
| Industry Canada CAB                     |                                                                                      | <b>Radio:</b> Scope A – All Radio Standard Specification in Category I                                                                                                    |
|                                         |                                                                                      | <b>Telecom:</b> CS-03 Part I, II, V, VI, VII, VIII                                                                                                                        |

|                                                    |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Japan Recognized Certification<br>Body Designation |    | <b>Radio:</b> A1. Terminal equipment for purpose of calling<br><b>Telecom:</b> B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Korea CAB Accreditation                            |    | <b>EMI:</b> KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI<br>KN22: Test Method for EMI<br><b>EMS:</b> KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS<br>KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS<br><b>Radio:</b> RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68<br><b>Telecom:</b> President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4 |
| Taiwan NCC CAB Recognition                         |   | LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Taiwan BSMI CAB Recognition                        |  | CNS 13438                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Japan VCCI                                         |  | R-3083: Radiation 3 meter site<br>C-3421: Main Ports Conducted Interference Measurement<br>T-1597: Telecommunication Ports Conducted Interference Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Australia CAB Recognition                          |  | <b>EMC:</b> AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4<br><b>Radiocommunications:</b> AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771<br><b>Telecommunications:</b> AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06, AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1                                                                                                        |
| Australia NATA Recognition                         |  | AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |