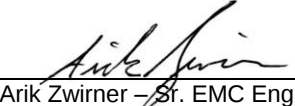




# Test Report

Bureau Veritas Consumer Products Services Inc.

|                     |                                                                                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Report No           | ET1200-2                                                                                                                      |
| Client              | Hanchett Entry Systems, Inc.                                                                                                  |
| Address             | 10027 S. 51st St. Ste. 102<br>Phoenix, AZ 85044                                                                               |
| Phone               | 1-623-582-4626 x 7137                                                                                                         |
| Items tested        | Aperio V3 Wireless Reader (Model: R100-V3)                                                                                    |
| FCC ID              | VC3-R100V3                                                                                                                    |
| IC                  | 7160A-R100V3                                                                                                                  |
| FRN                 | 0026838094                                                                                                                    |
| Equipment Type      | Digital Transmission System                                                                                                   |
| Equipment Code      | DTS                                                                                                                           |
| FCC/IC Rule Parts   | CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2                                                                     |
| Test Dates          | June 12 <sup>th</sup> to 16 <sup>th</sup> , 2019                                                                              |
| Results             | As detailed within this report                                                                                                |
| Prepared by         | <br>Christopher Hamel – EMC Engineer       |
| Authorized by       | <br>Arik Zwirner – Sr. EMC Engineer        |
| Issue Date          | 7/29/19                                                                                                                       |
| Conditions of Issue | This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 16 of this report. |

Bureau Veritas Consumer Products Services Inc. is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



Bureau Veritas Consumer Products Services Inc.  
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828

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Report REV Sep-08-2017 - YF



## Summary and Test Methodology

This test report supports an application for a Class II permissive change of a transmitter operating pursuant to:

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

EUT is the Aperio V3 Wireless Reader (Model: R100-V3). It is an RFID reader module that communicates reading activity to a remote unit over the 2405MHz - 2480MHz frequency band. No changes have been made to the radio circuitry for 2.4GHz Zigbee operation, however a certified Bluetooth Low Energy module (FCC ID: VC3-R100V3, IC: 7160A-R100V3) is co-located with the 2.4GHz Zigbee and they can transmit simultaneously. Radiated spurious emissions were tested for different simultaneous transmission configurations between the modules.

All testing was performed according to ANSI C63.10-2013. Radiated emissions were maximized by rotating the device around 3 orthogonal planes (X, Y and Z) as well as varying the test antenna's height and polarity. Worst case results are reported.

Modules operated on the following channel configurations:

- BLE at 2402MHz with Zigbee at 2445MHz
- BLE at 2440MHz with Zigbee at 2480MHz
- BLE at 2468MHz with Zigbee at 2405MHz

Note: BLE could not be operated beyond 2468MHz channel due to limitations with the provided test setup by the client.

EUT operating voltage is 3V DC via 2xAA batteries.

We found that the product met the above requirements without modification. Test sample was received in good condition.

Following bandwidths were used during radiated spurious emissions testing.

| Frequency  | RBW    | VBW  |
|------------|--------|------|
| 30-1000MHz | 120kHz | 1MHz |
| 1-25GHz    | 1MHz   | 3MHz |



## Product Tested - Configuration Documentation

| EUT Configuration                                         |                                                                      |    |    |
|-----------------------------------------------------------|----------------------------------------------------------------------|----|----|
| Work Order:                                               | T1200                                                                |    |    |
| Company:                                                  | Hanchett Entry Systems, Inc., DBA ASSA ABLOY (EMS&OEM) Group Company |    |    |
| Company Address:                                          | 10027 S. 51st St. Ste. 102                                           |    |    |
|                                                           | Phoenix, AZ, 85044                                                   |    |    |
|                                                           |                                                                      |    |    |
| Contact:                                                  | Baruch Spence                                                        |    |    |
|                                                           |                                                                      |    |    |
|                                                           | MN                                                                   | PN | SN |
| EUT:                                                      | R100-V3                                                              |    |    |
| EUT Description:                                          | Aperio V3 Wireless Reader                                            |    |    |
| EUT Max Frequency:                                        | 2480 MHz                                                             |    |    |
|                                                           |                                                                      |    |    |
| Software Operating Mode Description:                      |                                                                      |    |    |
| EUT will constantly Transmit both BLE and Zigbee signals. |                                                                      |    |    |
|                                                           |                                                                      |    |    |

### Statement of Conformity

| RSS-GEN | RSP-100 | RSS 247 | Part 15          | Comments                                                                                                                                                                               |
|---------|---------|---------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6.4     |         |         | 15.15(b)         | There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.                                                      |
|         | 3.1     |         | 15.19            | The label is shown in the label exhibit.                                                                                                                                               |
|         | 3.2     |         | 15.21            | Information to the user is shown in the instruction manual exhibit.                                                                                                                    |
|         |         |         | 15.27            | No special accessories are required for compliance.                                                                                                                                    |
| 3.2     |         |         | 15.31            | The EUT was tested in accordance with the measurement standards in this section.                                                                                                       |
| 6.13.2  |         |         | 15.33            | Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.                                                  |
| 6.13.1  |         |         | 15.35            | The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.      |
| 6.8     |         |         | 15.203           | The antenna for this device is an internal PCB surface mount antenna with 3.45dBi gain.                                                                                                |
| 8.10    |         |         | 15.205<br>15.209 | The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable |

## Test Results

### Radiated Spurious Emissions

#### LIMITS

*Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).*

[15.247(d)]

Radiated emissions were maximized by rotating the device around 3 orthogonal planes (X, Y and Z) and worst case emissions observed in Y orientation. All the results below are for the worst case orientation only.

Modules operated on the following channel configurations:

- BLE at 2402MHz with Zigbee at 2445MHz
- BLE at 2440MHz with Zigbee at 2480MHz
- BLE at 2468MHz with Zigbee at 2405MHz

Note: BLE could not be operated beyond 2468MHz channel due to limitations with the provided test setup by the client.

Bureau Veritas Consumer Product Services Inc. Work Order - T1200  
 Radiated Emissions Electric Field 3m Distance EUT Power Input - 3.3V Battery  
 30-1000MHz Vertical Data Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Notes: Test Engineer - CCH/AV  
 BLE Low Zigbee Mid EUT Maximum Frequency - 2480MHz

Data Taken at June 13, 2019

| Frequency<br>(MHz) | Raw QP<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted QP<br>Amplitude<br>(dBμV/m) | Lim1:<br>FCC_pt15_2<br>09<br>(dBμV/m) | Margin to<br>Lim1<br>(dB) | Test Results<br>Lim1<br>(Pass/Fail) | Worst<br>Margin<br>Lim1<br>(dB) |
|--------------------|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| 30.499             | 27.7                        | -7.3                           | 20.3                                 | 40                                    | -19.7                     | PASS                                |                                 |
| 778.751            | 26.5                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 781.791            | 30.7                        | -3.6                           | 27.1                                 | 46                                    | -18.9                     | PASS                                |                                 |
| 785.391            | 43.1                        | -3.6                           | 39.5                                 | 46                                    | -6.5                      | PASS                                | -6.5                            |
| 894.845            | 26.1                        | -2.2                           | 23.9                                 | 46                                    | -22.1                     | PASS                                |                                 |
| 965.17             | 25.8                        | -1.2                           | 24.6                                 | 54                                    | -29.4                     | PASS                                |                                 |

Bureau Veritas Consumer Product Services Inc. Work Order - T1200  
 Radiated Emissions Electric Field 3m Distance EUT Power Input - 3.3V Battery  
 30-1000MHz Horizontal Data Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Notes: Test Engineer - CCH/AV  
 BLE Low Zigbee Mid EUT Maximum Frequency - 2480MHz

Data Taken at June 13, 2019

| Frequency<br>(MHz) | Raw QP<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted QP<br>Amplitude<br>(dBμV/m) | Lim1:<br>FCC_pt15_2<br>09<br>(dBμV/m) | Margin to<br>Lim1<br>(dB) | Test Results<br>Lim1<br>(Pass/Fail) | Worst<br>Margin<br>Lim1<br>(dB) |
|--------------------|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| 30.179             | 27.7                        | -7.1                           | 20.5                                 | 40                                    | -19.5                     | PASS                                |                                 |
| 121.596            | 27.9                        | -14.2                          | 13.7                                 | 43.5                                  | -29.8                     | PASS                                |                                 |
| 778.925            | 26.5                        | -3.6                           | 22.9                                 | 46                                    | -23.1                     | PASS                                |                                 |
| 782.552            | 34.1                        | -3.6                           | 30.5                                 | 46                                    | -15.5                     | PASS                                | -15.5                           |
| 785.737            | 26.4                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 957.45             | 25.8                        | -1.2                           | 24.6                                 | 46                                    | -21.4                     | PASS                                |                                 |

### 30-1000MHz BLE Low Zigbee Mid



Bureau Veritas Consumer Product Services Inc. Work Order - T1200  
Radiated Emissions Electric Field 3m Distance EUT Power Input - 3.3V Battery  
30-1000MHz Vertical Data Test Site - CH1  
Conditions - 24.7°C; 44.7%RH; 1008mBar  
Notes: Test Engineer - CCH/AV  
BLE Mid Zigbee High EUT Maximum Frequency - 2480MHz

Data Taken at June 13, 2019

| Frequency<br>(MHz) | Raw QP<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted QP<br>Amplitude<br>(dBμV/m) | Lim1:<br>FCC_pt15_2<br>09<br>(dBμV/m) | Margin to<br>Lim1<br>(dB) | Test Results<br>Lim1<br>(Pass/Fail) | Worst<br>Margin<br>Lim1<br>(dB) |
|--------------------|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| 778.131            | 26.4                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 779.284            | 26.5                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 782.259            | 31                          | -3.6                           | 27.4                                 | 46                                    | -18.6                     | PASS                                | -18.6                           |
| 782.352            | 26.4                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 785.994            | 26.4                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 998.528            | 25.8                        | -0.8                           | 25                                   | 54                                    | -29                       | PASS                                |                                 |

Bureau Veritas Consumer Product Services Inc. Work Order - T1200  
Radiated Emissions Electric Field 3m Distance EUT Power Input - 3.3V Battery  
30-1000MHz Horizontal Data Test Site - CH1  
Conditions - 24.7°C; 44.7%RH; 1008mBar  
Notes: Test Engineer - CCH/AV  
BLE Mid Zigbee High EUT Maximum Frequency - 2480MHz

Data Taken at June 13, 2019

| Frequency<br>(MHz) | Raw QP<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted QP<br>Amplitude<br>(dBμV/m) | Lim1:<br>FCC_pt15_2<br>09<br>(dBμV/m) | Margin to<br>Lim1<br>(dB) | Test Results<br>Lim1<br>(Pass/Fail) | Worst<br>Margin<br>Lim1<br>(dB) |
|--------------------|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| 30.664             | 27.7                        | -7.4                           | 20.3                                 | 40                                    | -19.7                     | PASS                                | -19.7                           |
| 115.244            | 28                          | -14.9                          | 13.1                                 | 43.5                                  | -30.4                     | PASS                                |                                 |
| 940.631            | 25.9                        | -1.6                           | 24.3                                 | 46                                    | -21.7                     | PASS                                |                                 |
| 997.709            | 25.7                        | -0.8                           | 24.9                                 | 54                                    | -29.1                     | PASS                                |                                 |

### 30-1000MHz BLE Mid Zigbee High



Bureau Veritas Consumer Product Services Inc. Work Order - T1200  
Radiated Emissions Electric Field 3m Distance EUT Power Input - 3.3V Battery  
30-1000MHz Vertical Data Test Site - CH1  
Conditions - 24.7°C; 44.7%RH; 1008mBar  
Notes: Test Engineer - CCH/AV  
BLE 2468 Zigbee Low EUT Maximum Frequency - 2480MHz

Data Taken at June 13, 2019

| Frequency<br>(MHz) | Raw QP<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted QP<br>Amplitude<br>(dBμV/m) | Lim1:<br>FCC_pt15_2<br>09<br>(dBμV/m) | Margin to<br>Lim1<br>(dB) | Test Results<br>Lim1<br>(Pass/Fail) | Worst<br>Margin<br>Lim1<br>(dB) |
|--------------------|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| 30.671             | 27.7                        | -7.4                           | 20.2                                 | 40                                    | -19.8                     | PASS                                | -19.8                           |
| 200.432            | 29.2                        | -14.9                          | 14.2                                 | 43.5                                  | -29.3                     | PASS                                |                                 |
| 778.105            | 26.5                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 785.999            | 26.4                        | -3.6                           | 22.8                                 | 46                                    | -23.2                     | PASS                                |                                 |
| 893.057            | 26.1                        | -2.2                           | 23.9                                 | 46                                    | -22.1                     | PASS                                |                                 |
| 982.952            | 25.8                        | -1.1                           | 24.7                                 | 54                                    | -29.3                     | PASS                                |                                 |

Bureau Veritas Consumer Product Services Inc. Work Order - T1200  
Radiated Emissions Electric Field 3m Distance EUT Power Input - 3.3V Battery  
30-1000MHz Horizontal Data Test Site - CH1  
Conditions - 24.7°C; 44.7%RH; 1008mBar  
Notes: Test Engineer - CCH/AV  
BLE 2468 Zigbee Low EUT Maximum Frequency - 2480MHz

Data Taken at June 13, 2019

| Frequency<br>(MHz) | Raw QP<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted QP<br>Amplitude<br>(dBμV/m) | Lim1:<br>FCC_pt15_2<br>09<br>(dBμV/m) | Margin to<br>Lim1<br>(dB) | Test Results<br>Lim1<br>(Pass/Fail) | Worst<br>Margin<br>Lim1<br>(dB) |
|--------------------|-----------------------------|--------------------------------|--------------------------------------|---------------------------------------|---------------------------|-------------------------------------|---------------------------------|
| 30.694             | 27.6                        | -7.4                           | 20.2                                 | 40                                    | -19.8                     | PASS                                | -19.8                           |
| 130.939            | 27.7                        | -14.1                          | 13.6                                 | 43.5                                  | -29.9                     | PASS                                |                                 |
| 870.477            | 26.2                        | -2.7                           | 23.4                                 | 46                                    | -22.6                     | PASS                                |                                 |
| 992.95             | 25.7                        | -0.9                           | 24.9                                 | 54                                    | -29.1                     | PASS                                |                                 |

### 30-1000MHz BLE High Zigbee Low



Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 3m Distance  
 1-6GHz Vertical Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:

BLE Low Zigbee Mid

Data Taken at June 12, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|--------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|----------------------------|-----------------------------|
| 2160               | 35.1                          | 26.5                         | 9.1                            | 44.1                                      | 74                                           | -29.9                  | PASS                           |                              | 35.6                                     | 54                                              | -18.4              | PASS                       |                             |
| 3196.1             | 34.7                          | 26.9                         | 10.4                           | 45.1                                      | 74                                           | -28.9                  | PASS                           |                              | 37.3                                     | 54                                              | -16.7              | PASS                       |                             |
| 3812.5             | 35.3                          | 26                           | 10.8                           | 46.1                                      | 74                                           | -27.9                  | PASS                           |                              | 36.8                                     | 54                                              | -17.2              | PASS                       |                             |
| 4891.2             | 43.1                          | 38.4                         | 12.3                           | 55.4                                      | 74                                           | -18.6                  | PASS                           | -18.6                        | 50.7                                     | 54                                              | -3.3               | PASS                       | -3.3                        |
| 5312.7             | 34.2                          | 25.1                         | 13.3                           | 47.6                                      | 74                                           | -26.4                  | PASS                           |                              | 38.5                                     | 54                                              | -15.5              | PASS                       |                             |
| 5834.4             | 33.7                          | 25.5                         | 14.3                           | 48                                        | 74                                           | -26                    | PASS                           |                              | 39.8                                     | 54                                              | -14.2              | PASS                       |                             |

Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 3m Distance  
 1-6GHz Horizontal Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:

BLE Low Zigbee Mid

Data Taken at June 12, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|--------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|----------------------------|-----------------------------|
| 1294.5             | 35.7                          | 26.2                         | 4.3                            | 40                                        | 74                                           | -34                    | PASS                           |                              | 30.5                                     | 54                                              | -23.5              | PASS                       |                             |
| 2148.4             | 36.2                          | 26.6                         | 9                              | 45.2                                      | 74                                           | -28.8                  | PASS                           |                              | 35.5                                     | 54                                              | -18.5              | PASS                       |                             |
| 3169.9             | 37.4                          | 27                           | 10.4                           | 47.8                                      | 74                                           | -26.2                  | PASS                           |                              | 37.5                                     | 54                                              | -16.5              | PASS                       |                             |
| 4889.3             | 38.3                          | 30.1                         | 12.3                           | 50.6                                      | 74                                           | -23.4                  | PASS                           | -23.4                        | 42.4                                     | 54                                              | -11.6              | PASS                       | -11.6                       |
| 5313.9             | 33.3                          | 25.2                         | 13.3                           | 46.6                                      | 74                                           | -27.4                  | PASS                           |                              | 38.5                                     | 54                                              | -15.5              | PASS                       |                             |

### 1-6GHz BLE Low Zigbee Mid

Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 3m Distance  
 1-6GHz Vertical Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:

BLE Mid Zigbee High

Data Taken at June 12, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|--------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|----------------------------|-----------------------------|
| 2165.4             | 35.5                          | 26.6                         | 9.1                            | 44.6                                      | 74                                           | -29.4                  | PASS                           |                              | 35.7                                     | 54                                              | -18.3              | PASS                       |                             |
| 2909.9             | 35.3                          | 26.4                         | 10.8                           | 46.1                                      | 74                                           | -27.9                  | PASS                           |                              | 37.2                                     | 54                                              | -16.8              | PASS                       |                             |
| 4959.1             | 42.2                          | 36.5                         | 12.5                           | 54.7                                      | 74                                           | -19.3                  | PASS                           | -19.3                        | 49                                       | 54                                              | -5                 | PASS                       | -5                          |
| 5298.9             | 33.6                          | 25.1                         | 13.3                           | 46.9                                      | 74                                           | -27.1                  | PASS                           |                              | 38.4                                     | 54                                              | -15.6              | PASS                       |                             |
| 5319.4             | 33.9                          | 25.1                         | 13.4                           | 47.3                                      | 74                                           | -26.7                  | PASS                           |                              | 38.5                                     | 54                                              | -15.5              | PASS                       |                             |
| 5651               | 35.4                          | 25.9                         | 14                             | 49.3                                      | 74                                           | -24.7                  | PASS                           |                              | 39.9                                     | 54                                              | -14.1              | PASS                       |                             |



Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 3m Distance  
 1-6GHz Horizontal Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:  
 BLE Mid Zigbee High

Data Taken at June 12, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Results<br>(Pass/Fail) | Worst<br>Average<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|--------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|----------------------------|------------------------------------|
| 1228.9             | 36.6                          | 26.3                         | 4.1                            | 40.7                                      | 74                                           | -33.3                  | PASS                           |                              | 30.4                                     | 54                                              | -23.6              | PASS                       |                                    |
| 2168.4             | 35.8                          | 26.5                         | 9.2                            | 44.9                                      | 74                                           | -29.1                  | PASS                           |                              | 35.6                                     | 54                                              | -18.4              | PASS                       |                                    |
| 2950.4             | 36.2                          | 26.2                         | 10.4                           | 46.6                                      | 74                                           | -27.4                  | PASS                           |                              | 36.7                                     | 54                                              | -17.3              | PASS                       |                                    |
| 4959.6             | 37.1                          | 28.6                         | 12.5                           | 49.7                                      | 74                                           | -24.3                  | PASS                           | -24.3                        | 41.2                                     | 54                                              | -12.8              | PASS                       | -12.8                              |
| 5323.9             | 35.2                          | 25.2                         | 13.4                           | 48.6                                      | 74                                           | -25.4                  | PASS                           |                              | 38.5                                     | 54                                              | -15.5              | PASS                       |                                    |
| 5821.8             | 34.3                          | 25.5                         | 14.3                           | 48.6                                      | 74                                           | -25.4                  | PASS                           |                              | 39.8                                     | 54                                              | -14.2              | PASS                       |                                    |

### 1-6GHz BLE Mid Zigbee High

Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 3m Distance  
 1-6GHz Vertical Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:  
 BLE 2468 Zigbee Low

Data Taken at June 12, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|--------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|----------------------------|-----------------------------|
| 2165.3             | 37.1                          | 26.6                         | 9.1                            | 46.2                                      | 74                                           | -27.8                  | PASS                           |                              | 35.8                                     | 54                                              | -18.2              | PASS                       |                             |
| 3094.5             | 36.9                          | 26.7                         | 10.2                           | 47.1                                      | 74                                           | -26.9                  | PASS                           |                              | 36.9                                     | 54                                              | -17.1              | PASS                       |                             |
| 4217.9             | 33.9                          | 25.4                         | 11.2                           | 45.1                                      | 74                                           | -28.9                  | PASS                           |                              | 36.7                                     | 54                                              | -17.3              | PASS                       |                             |
| 4809.1             | 44.6                          | 38.1                         | 12.1                           | 56.7                                      | 74                                           | -17.3                  | PASS                           | -17.3                        | 50.1                                     | 54                                              | -3.9               | PASS                       | -3.9                        |
| 5307               | 33.9                          | 25.2                         | 13.3                           | 47.3                                      | 74                                           | -26.7                  | PASS                           |                              | 38.5                                     | 54                                              | -15.5              | PASS                       |                             |
| 5855.1             | 34.8                          | 25.5                         | 14.3                           | 49.1                                      | 74                                           | -24.9                  | PASS                           |                              | 39.9                                     | 54                                              | -14.1              | PASS                       |                             |

Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 3m Distance  
 1-6GHz Horizontal Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:  
 BLE 2468 Zigbee Low

Data Taken at June 12, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Results<br>(Pass/Fail) | Worst<br>Average<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|--------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|----------------------------|------------------------------------|
| 1416.8             | 35.8                          | 26.1                         | 4.2                            | 40                                        | 74                                           | -34                    | PASS                           |                              | 30.3                                     | 54                                              | -23.7              | PASS                       |                                    |
| 2165.1             | 35.5                          | 26.6                         | 9.1                            | 44.6                                      | 74                                           | -29.4                  | PASS                           |                              | 35.7                                     | 54                                              | -18.3              | PASS                       |                                    |
| 3196.8             | 37.4                          | 26.9                         | 10.4                           | 47.8                                      | 74                                           | -26.2                  | PASS                           |                              | 37.3                                     | 54                                              | -16.7              | PASS                       |                                    |
| 4809               | 38.3                          | 30.8                         | 12.1                           | 50.4                                      | 74                                           | -23.6                  | PASS                           | -23.6                        | 42.9                                     | 54                                              | -11.1              | PASS                       | -11.1                              |
| 5900.3             | 35.3                          | 25.7                         | 14.5                           | 49.8                                      | 74                                           | -24.2                  | PASS                           |                              | 40.3                                     | 54                                              | -13.7              | PASS                       |                                    |

### 1-6GHz BLE High Zigbee Low



Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 1m Distance  
 6-18GHz Vertical Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:  
 BLE Low Zigbee Mid

Data Taken at June 14, 2019

| Frequency (MHz) | Raw Peak Reading (dBμV) | Raw Avg Reading (dBμV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBμV/m) | Pk Lim: FCC_pt15_2 09_Peak (dBμV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBμV/m) | Av Lim: FCC_pt15_2 09_Average (dBμV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|-----------------|-------------------------|------------------------|--------------------------|----------------------------------|-------------------------------------|------------------|--------------------------|------------------------|---------------------------------|----------------------------------------|-----------------|-------------------------|-----------------------|
| 10532.7         | 42                      | 34.1                   | 7.5                      | 49.5                             | 83.5                                | -34              | PASS                     |                        | 41.6                            | 63.5                                   | -21.9           | PASS                    |                       |
| 12870.7         | 42.3                    | 33.5                   | 10.6                     | 53                               | 83.5                                | -30.5            | PASS                     |                        | 44.2                            | 63.5                                   | -19.3           | PASS                    |                       |
| 17920.6         | 43.8                    | 34.8                   | 15.3                     | 59.1                             | 83.5                                | -24.4            | PASS                     | -24.4                  | 50.1                            | 63.5                                   | -13.4           | PASS                    | -13.4                 |

Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 1m Distance  
 6-18GHz Horizontal Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:  
 BLE Low Zigbee Mid

Data Taken at June 14, 2019

| Frequency (MHz) | Raw Peak Reading (dBμV) | Raw Avg Reading (dBμV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBμV/m) | Pk Lim: FCC_pt15_2 09_Peak (dBμV/m) | Peak Margin (dB) | Peak Test Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBμV/m) | Av Lim: FCC_pt15_2 09_Average (dBμV/m) | Avg Margin (dB) | Avg Test Results (Pass/Fail) | Worst Avg Margin (dB) |
|-----------------|-------------------------|------------------------|--------------------------|----------------------------------|-------------------------------------|------------------|-------------------------------|------------------------|---------------------------------|----------------------------------------|-----------------|------------------------------|-----------------------|
| 12731.5         | 44.4                    | 34                     | 10.1                     | 54.5                             | 83.5                                | -29              | PASS                          |                        | 44.1                            | 63.5                                   | -19.4           | PASS                         |                       |
| 17866.1         | 45                      | 35.1                   | 15.2                     | 60.2                             | 83.5                                | -23.3            | PASS                          | -23.3                  | 50.4                            | 63.5                                   | -13.1           | PASS                         | -13.1                 |

### 6-18GHz BLE Low Zigbee Mid

Bureau Veritas Consumer Product Services Inc.  
 Radiated Emissions Electric Field 1m Distance  
 6-18GHz Vertical Data

Work Order - T1200  
 EUT Power Input - 3.3V Battery  
 Test Site - CH1  
 Conditions - 24.7°C; 44.7%RH; 1008mBar  
 Test Engineer - CCH/AV  
 EUT Maximum Frequency - 2480MHz

Notes:  
 BLE Mid Zigbee High

Data Taken at June 14, 2019

| Frequency (MHz) | Raw Peak Reading (dBμV) | Raw Avg Reading (dBμV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBμV/m) | Pk Lim: FCC_pt15_2 09_Peak (dBμV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBμV/m) | Av Lim: FCC_pt15_2 09_Average (dBμV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|-----------------|-------------------------|------------------------|--------------------------|----------------------------------|-------------------------------------|------------------|--------------------------|------------------------|---------------------------------|----------------------------------------|-----------------|-------------------------|-----------------------|
| 10531.5         | 30.4                    | 22.1                   | 18.5                     | 48.8                             | 83.5                                | -34.7            | PASS                     |                        | 40.5                            | 63.5                                   | -23             | PASS                    |                       |
| 10586.4         | 39.7                    | 22.1                   | 18.4                     | 58.1                             | 83.5                                | -25.4            | PASS                     |                        | 40.5                            | 63.5                                   | -23             | PASS                    |                       |
| 16463.9         | 32.8                    | 23.4                   | 25.2                     | 58                               | 83.5                                | -25.5            | PASS                     |                        | 48.6                            | 63.5                                   | -14.9           | PASS                    |                       |
| 17881.2         | 32.8                    | 22.7                   | 27.7                     | 60.5                             | 83.5                                | -23              | PASS                     | -23                    | 50.4                            | 63.5                                   | -13.1           | PASS                    | -13.1                 |

|                                                                                                                                                                |                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bureau Veritas Consumer Product Services Inc.<br>Radiated Emissions Electric Field 1m Distance<br>6-18GHz Horizontal Data<br><br>Notes:<br>BLE Mid Zigbee High | Work Order - T1200<br>EUT Power Input - 3.3V Battery<br>Test Site - CH1<br>Conditions - 24.7°C; 44.7%RH; 1008mBar<br>Test Engineer - CCH/AV<br>EUT Maximum Frequency - 2480MHz |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Data Taken at June 14, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak Test<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Test<br>Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|-------------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|------------------------------------|-----------------------------|
| 10531.3            | 37.6                          | 22.1                         | 18.5                           | 56.1                                      | 83.5                                         | -27.4                  | PASS                                |                              | 40.5                                     | 63.5                                            | -23                | PASS                               |                             |
| 10586.9            | 35.3                          | 22.1                         | 18.4                           | 53.7                                      | 83.5                                         | -29.8                  | PASS                                |                              | 40.5                                     | 63.5                                            | -23                | PASS                               |                             |
| 12598.2            | 30.1                          | 21.6                         | 21.9                           | 52                                        | 83.5                                         | -31.5                  | PASS                                |                              | 43.5                                     | 63.5                                            | -20                | PASS                               |                             |
| 16289.9            | 33                            | 23.5                         | 25.2                           | 58.2                                      | 83.5                                         | -25.3                  | PASS                                |                              | 48.7                                     | 63.5                                            | -14.8              | PASS                               |                             |
| 17929.2            | 31.6                          | 22.4                         | 27.9                           | 59.5                                      | 83.5                                         | -24                    | PASS                                | -24                          | 50.3                                     | 63.5                                            | -13.2              | PASS                               | -13.2                       |

### 6-18GHz BLE Mid Zigbee High

|                                                                                                                                                              |                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bureau Veritas Consumer Product Services Inc.<br>Radiated Emissions Electric Field 1m Distance<br>6-18GHz Vertical Data<br><br>Notes:<br>BLE 2468 Zigbee Low | Work Order - T1200<br>EUT Power Input - 3.3V Battery<br>Test Site - CH1<br>Conditions - 24.7°C; 44.7%RH; 1008mBar<br>Test Engineer - CCH/AV<br>EUT Maximum Frequency - 2480MHz |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Data Taken at June 14, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak Test<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Test<br>Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|-------------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|------------------------------------|-----------------------------|
| 7216.5             | 48.8                          | 42.1                         | 15.6                           | 64.5                                      | 83.5                                         | -19                    | PASS                                | -19                          | 57.8                                     | 63.5                                            | -5.7               | PASS                               | -5.7                        |
| 7278.6             | 33.9                          | 26                           | 15.7                           | 49.7                                      | 83.5                                         | -33.8                  | PASS                                |                              | 41.7                                     | 63.5                                            | -21.8              | PASS                               |                             |
| 10531              | 36.2                          | 22.1                         | 18.5                           | 54.6                                      | 83.5                                         | -28.9                  | PASS                                |                              | 40.5                                     | 63.5                                            | -23                | PASS                               |                             |
| 10586.8            | 36.1                          | 22.1                         | 18.4                           | 54.5                                      | 83.5                                         | -29                    | PASS                                |                              | 40.5                                     | 63.5                                            | -23                | PASS                               |                             |
| 16477              | 32.4                          | 23.4                         | 25.2                           | 57.7                                      | 83.5                                         | -25.8                  | PASS                                |                              | 48.6                                     | 63.5                                            | -14.9              | PASS                               |                             |
| 17849.3            | 31.4                          | 22.8                         | 27.4                           | 58.8                                      | 83.5                                         | -24.7                  | PASS                                |                              | 50.1                                     | 63.5                                            | -13.4              | PASS                               |                             |

|                                                                                                                                                                |                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bureau Veritas Consumer Product Services Inc.<br>Radiated Emissions Electric Field 1m Distance<br>6-18GHz Horizontal Data<br><br>Notes:<br>BLE 2468 Zigbee Low | Work Order - T1200<br>EUT Power Input - 3.3V Battery<br>Test Site - CH1<br>Conditions - 24.7°C; 44.7%RH; 1008mBar<br>Test Engineer - CCH/AV<br>EUT Maximum Frequency - 2480MHz |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Data Taken at June 14, 2019

| Frequency<br>(MHz) | Raw Peak<br>Reading<br>(dBμV) | Raw Avg<br>Reading<br>(dBμV) | Correction<br>Factor<br>(dB/m) | Adjusted<br>Peak<br>Amplitude<br>(dBμV/m) | Pk Lim:<br>FCC_pt15_2<br>09_Peak<br>(dBμV/m) | Peak<br>Margin<br>(dB) | Peak Test<br>Results<br>(Pass/Fail) | Worst Peak<br>Margin<br>(dB) | Adjusted<br>Avg<br>Amplitude<br>(dBμV/m) | Av Lim:<br>FCC_pt15_2<br>09_Average<br>(dBμV/m) | Avg Margin<br>(dB) | Avg Test<br>Results<br>(Pass/Fail) | Worst Avg<br>Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------------|------------------------|-------------------------------------|------------------------------|------------------------------------------|-------------------------------------------------|--------------------|------------------------------------|-----------------------------|
| 7213.5             | 49                            | 42                           | 15.6                           | 64.6                                      | 83.5                                         | -18.9                  | PASS                                | -18.9                        | 57.6                                     | 63.5                                            | -5.9               | PASS                               | -5.9                        |
| 9618.2             | 36.8                          | 29.9                         | 17.5                           | 54.3                                      | 83.5                                         | -29.2                  | PASS                                |                              | 47.3                                     | 63.5                                            | -16.2              | PASS                               |                             |
| 10531.5            | 34.6                          | 22.1                         | 18.5                           | 53.1                                      | 83.5                                         | -30.4                  | PASS                                |                              | 40.5                                     | 63.5                                            | -23                | PASS                               |                             |
| 10586.9            | 30.3                          | 22.1                         | 18.4                           | 48.7                                      | 83.5                                         | -34.8                  | PASS                                |                              | 40.5                                     | 63.5                                            | -23                | PASS                               |                             |
| 16365.1            | 33.6                          | 23.4                         | 25.3                           | 58.9                                      | 83.5                                         | -24.6                  | PASS                                |                              | 48.7                                     | 63.5                                            | -14.8              | PASS                               |                             |
| 17872.1            | 32.6                          | 22.8                         | 27.6                           | 60.2                                      | 83.5                                         | -23.3                  | PASS                                |                              | 50.3                                     | 63.5                                            | -13.2              | PASS                               |                             |

### 6-18GHz BLE High Zigbee Low



| Radiated Emissions Table                                                                                           |                    |                        |                                |                       |                          |                      |                                   |                                  |                                          |                |                       |                                      |                |                       |
|--------------------------------------------------------------------------------------------------------------------|--------------------|------------------------|--------------------------------|-----------------------|--------------------------|----------------------|-----------------------------------|----------------------------------|------------------------------------------|----------------|-----------------------|--------------------------------------|----------------|-----------------------|
| Date: 16-Jun-19                                                                                                    |                    |                        | Company: Assa Abloy            |                       |                          |                      |                                   |                                  | Work Order: T1200                        |                |                       |                                      |                |                       |
| Engineer: Chris Hamel                                                                                              |                    |                        | EUT Desc: R100 Zigbee with BLE |                       |                          |                      |                                   |                                  | EUT Operating Voltage/Frequency: 3.3V DC |                |                       |                                      |                |                       |
| Temp: 23.7°C                                                                                                       |                    |                        | Humidity: 41%                  |                       |                          |                      |                                   |                                  | Pressure: 1010mBar                       |                |                       |                                      |                |                       |
| Frequency Range: 18-25GHz                                                                                          |                    |                        |                                |                       |                          |                      |                                   | Measurement Distance: 0.1 m      |                                          |                |                       |                                      |                |                       |
| Notes: Tested BLE Low with Zigbee Mid, BLE Mid with Zigbee High, BLE 2468MHz with Zigbee Low<br>No Emissions found |                    |                        |                                |                       |                          |                      |                                   | EUT Max Freq: 2480MHz            |                                          |                |                       |                                      |                |                       |
| Antenna Polarization<br>(H / V)                                                                                    | Frequency<br>(MHz) | Peak Reading<br>(dBµV) | Average Reading<br>(dBµV)      | Preamp Factor<br>(dB) | Antenna Factor<br>(dB/m) | Cable Factor<br>(dB) | Adjusted Peak Reading<br>(dBµV/m) | Adjusted Avg Reading<br>(dBµV/m) | FCC Class B High Frequency - Peak        |                |                       | FCC Class B High Frequency - Average |                |                       |
|                                                                                                                    |                    |                        |                                |                       |                          |                      |                                   |                                  | Limit<br>(dBµV/m)                        | Margin<br>(dB) | Result<br>(Pass/Fail) | Limit<br>(dBµV/m)                    | Margin<br>(dB) | Result<br>(Pass/Fail) |
|                                                                                                                    |                    |                        |                                | ---                   | ---                      | ---                  | ---                               | ---                              | ---                                      | ---            | ---                   | ---                                  | ---            | ---                   |
|                                                                                                                    |                    |                        |                                | ---                   | ---                      | ---                  | ---                               | ---                              | ---                                      | ---            | ---                   | ---                                  | ---            | ---                   |
| Table Result: Pass by N/A dB Worst Freq: N/A MHz                                                                   |                    |                        |                                |                       |                          |                      |                                   |                                  |                                          |                |                       |                                      |                |                       |
| Test Site: EMI Chamber 2                                                                                           |                    |                        | Cable 1: Asset #2323           |                       |                          |                      |                                   |                                  | Cable 2: ---                             |                |                       | Cable 3: ---                         |                |                       |
| Analyzer: Asset # 2093                                                                                             |                    |                        | Preamp: 18-26.5GHz             |                       |                          |                      |                                   |                                  | Antenna: 18-26.5GHz Horn                 |                |                       | Preselector: ---                     |                |                       |
| CSsoft Radiated Emissions Calculator v 1.017.215                                                                   |                    |                        |                                |                       |                          |                      |                                   |                                  |                                          |                |                       |                                      |                |                       |
| Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor                                         |                    |                        |                                |                       |                          |                      |                                   |                                  |                                          |                |                       |                                      |                |                       |
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## 18-25GHz All channel configurations.

Rev. 6/7/2019

| Spectrum Analyzers / Receivers/Preselectors | Range        | MN                    | Mfr               | SN         | Asset   | Cat | Calibration Due   | Calibrated on |
|---------------------------------------------|--------------|-----------------------|-------------------|------------|---------|-----|-------------------|---------------|
| 2093 MXE EMI Receiver                       | 20Hz-26.5GHz | N9038A                | Agilent           | MY51210181 | 2093    | I   | 11/21/2019        | 11/21/2018    |
| Rental MXE EMI Receiver(1170725)            | 20Hz-26.5GHz | N9038A                | Agilent           | MY51210151 | 1170725 | I   | 5/30/2020         | 5/30/2019     |
| Radiated Emissions Sites                    | FCC Code     | IC Code               | VCCI Code         | Range      | Asset   | Cat | Calibration Due   | Calibrated on |
| EMI Chamber 1                               | 719150       | 2762A-6               | A-0015            | 30-1000MHz | 1685    | I   | 12/7/2020         | 12/7/2018     |
| EMI Chamber 1                               | 719150       | 2762A-6               | A-0015            | 1-18GHz    | 1685    | I   | 12/7/2020         | 12/7/2018     |
| EMI Chamber 2                               | 719150       | 2762A-7               | A-0015            | 30-1000MHz | 1686    | I   | 12/7/2020         | 12/7/2018     |
| EMI Chamber 2                               | 719150       | 2762A-7               | A-0015            | 1-18GHz    | 1686    | I   | 12/7/2020         | 12/7/2018     |
| Preamps/Couplers Attenuators / Filters      | Range        | MN                    | Mfr               | SN         | Asset   | Cat | Calibration Due   | Calibrated on |
| 2311 PA                                     | 1-1000MHz    | PAM-103               | COM-POWER         | 441174     | 2311    | II  | 10/29/2019        | 10/29/2018    |
| 87405C HF Preamp                            | 0.1-18GHz    | 87405C                | Agilent           | 1199899    |         | II  | 11/21/2019        | 11/21/2018    |
| 8449B HF Preamp                             | 1-18GHz      | 8449B                 | Agilent           | 1149055    |         | II  | 11/26/2019        | 11/26/2018    |
| HF (Yellow)                                 | 18-26.5GHz   | AFS4-18002650-60-8P-4 | CS                | 467559     | 1266    | II  | 10/24/2019        | 10/24/2018    |
| Antennas                                    | Range        | MN                    | Mfr               | SN         | Asset   | Cat | Calibration Due   | Calibrated on |
| Red-Brown Bilog                             | 30-2000MHz   | JB1                   | Sunol             | A0032406   | 1218    | I   | 3/11/2021         | 3/11/2019     |
| HF (White) Horn                             | 18-26.5GHz   | 801-WLM               | Waveline          | 758        | 758     | III | Verify before Use | date of test  |
| Blue Horn                                   | 1-18Ghz      | 3117                  | ETS               | 157647     | 1861    | I   | 3/9/2021          | 3/9/2019      |
| Small Loop                                  | 10kHz-30MHz  | PLA-130/A             | ARA               | 1024       | 755     | I   | 7/23/2020         | 7/23/2018     |
| Meteorological Meters/Chambers              |              | MN                    | Mfr               | SN         | Asset   | Cat | Calibration Due   | Calibrated on |
| Weather Clock (Pressure Only)               |              | BA928                 | Oregon Scientific | C3166-1    | 831     | I   | 5/15/2020         | 5/15/2018     |
| Asset #2656                                 |              | 1235C97               | Control Company   | 181683818  | 2656    | I   | 4/3/2020          | 4/3/2019      |
| Asset #2660                                 |              | 1235C97               | Control Company   | 181659682  | 2660    | I   | 4/3/2020          | 4/3/2019      |
| Cables                                      | Range        |                       | Mfr               |            |         | Cat | Calibration Due   | Calibrated on |
| Asset #2455                                 | 9KHz-18GHz   |                       | MegaPhase         |            |         | II  | 10/29/2019        | 10/29/2018    |
| Asset #2456                                 | 9KHz-18GHz   |                       | MegaPhase         |            |         | II  | 10/31/2019        | 10/31/2018    |
| Asset #2465                                 | 9KHz-18GHz   |                       | MegaPhase         |            |         | II  | 10/31/2019        | 10/31/2018    |
| Asset #2467                                 | 9KHz-18GHz   |                       | MegaPhase         |            |         | II  | 10/31/2019        | 10/31/2018    |
| Asset #2585                                 | 9KHz-18GHz   |                       | Pasternack        |            |         | II  | 5/24/2020         | 5/24/2019     |
| Asset #2606                                 | 9KHz-18GHz   |                       | MegaPhase         |            |         | II  | 4/2/2020          | 4/2/2019      |

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

## Test Equipment Used



Bureau Veritas Consumer Products Services Inc.  
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



## Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

| Measurement                                                                           | Expanded Uncertainty k=2 | Maximum allowable uncertainty |
|---------------------------------------------------------------------------------------|--------------------------|-------------------------------|
| Radiated Emissions (30-1000MHz)                                                       | 5.6dB                    | N/A                           |
| NIST                                                                                  | 4.6dB                    | 5.2dB (Ucisprr)               |
| CISPR                                                                                 |                          |                               |
| Radiated Emissions (1-26.5GHz)                                                        | 4.6dB                    | N/A                           |
| Radiated Emissions (above 26.5GHz)                                                    | 4.9dB                    | N/A                           |
| Magnetic Radiated Emissions                                                           | 5.6dB                    | N/A                           |
| Conducted Emissions                                                                   |                          |                               |
| NIST                                                                                  | 3.9dB                    | N/A                           |
| CISPR                                                                                 | 3.6dB                    | 3.6dB (Ucisprr)               |
| Telco Conducted Emissions (Current)                                                   | 2.9dB                    | N/A                           |
| Telco Conducted Emissions (Voltage)                                                   | 4.4dB                    | N/A                           |
| Electrostatic Discharge                                                               | 11.5%                    | N/A                           |
| Radiated RF Immunity (Uniform Field)                                                  | 1.6dB                    | N/A                           |
| Electrical Fast Transients                                                            | 23.1%                    | N/A                           |
| Surge                                                                                 | 23.1%                    | N/A                           |
| Conducted RF Immunity                                                                 | 3dB                      | N/A                           |
| Magnetic Immunity                                                                     | 12.8%                    | N/A                           |
| Dips and Interrupts                                                                   | 2.3V                     | N/A                           |
| Harmonics                                                                             | 3.5%                     | N/A                           |
| Flicker                                                                               | 3.5%                     | N/A                           |
| Radio frequency (@ 2.4GHz)                                                            | $3.23 \times 10^{-8}$    | $1 \times 10^{-7}$            |
| RF power, conducted                                                                   | 0.40dB                   | 0.75dB                        |
| Maximum frequency deviation:                                                          |                          |                               |
| • Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency | 3.4%                     | 5%                            |
|                                                                                       | 0.3dB                    | 3dB                           |
| Adjacent channel power                                                                | 1.9dB                    | 3dB                           |
| Conducted spurious emission of transmitter, valid up to 12.75GHz                      | 2.39dB                   | 3dB                           |
| Conducted emission of receivers                                                       | 1.3dB                    | 3dB                           |
| Radiated emission of transmitter, valid up to 26.5GHz                                 | 3.9dB                    | 6dB                           |
| Radiated emission of transmitter, valid up to 80GHz                                   | 3.3dB                    | 6dB                           |
| Radiated emission of receiver, valid up to 26.5GHz                                    | 3.9dB                    | 6dB                           |
| Radiated emission of receiver, valid up to 80GHz                                      | 3.3dB                    | 6dB                           |
| Humidity                                                                              | 2.37%                    | 5%                            |
| Temperature                                                                           | 0.7°C                    | 1.0°C                         |
| Time                                                                                  | 4.1%                     | 10%                           |
| RF Power Density, Conducted                                                           | 0.4dB                    | 3dB                           |
| DC and low frequency voltages                                                         | 1.3%                     | 3%                            |
| Voltage (AC, <10kHz)                                                                  | 1.3%                     | 2%                            |
| Voltage (DC)                                                                          | 0.62%                    | 1%                            |
| The above reflects a 95% confidence level                                             |                          |                               |



## Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and Bureau Veritas Consumer Products Services Inc. (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.
14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.



15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder. The complete list of the Approved Subcontractors Bureau Veritas Consumer Products Services Inc. may use to delegate the performance of work can be provided upon request.

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