# Test Report

Bureau Veritas Consumer Products Services

| | |
|---|---|
| Report No | ET1639-5 |
| Client | ASSA ABLOY Inc. |
| Address | 110 Sargent Drive<br>New Haven, CT 06511 |
| Phone | 203-821-5724 |
| Items tested | IN-BIKP (Model BLE9117K) |
| FCC ID | U4A-MODBLE9117K |
| IC | 6982A-MODBLE9117K |
| FRN | 0016550824 |
| Equipment Type | Digital Transmission System |
| Equipment Code | DTS |
| Emission Designator | 1M85F1D |
| FCC/IC Rule Parts | CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2 |
| Test Dates | Apr 2 - Aug 5, 2019 |
| Results | As detailed within this report |
| Prepared by | Anna Vancheva<br>Anna Vancheva – EMC Engineer |
| Authorized by | Yunus Fazlioglu – Sr. Engineer |
| Issue Date | 9/232019 |
| Conditions of Issue | This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 33 of this report. |

Bureau Veritas Consumer Products Services 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.

ACCREDITED Cert No. 1627-01

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Form Final Report REV 7-20-07 (DW)

## *Summary and Test Methodology*

Between Apr 2 and Aug 5, 2019 we tested the IN-BIKP (Model BLE9117K) for compliance with the following requirements:

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

EUT transmits in the 2402-2480MHz frequency range. Emissions were measured with the EUT in its intended upright installation orientation. EUT has an internal detachable PCB antenna with -3.1dBi gain.

All testing was performed according to the following rules/procedures/documents;

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2, ISED Canada RSS-Gen Issue 5, FCC KDB 558074 D01 15.247 Measurement Guidance v05r01 and ANSI C63.10-2013.

AC mains conducted emission testing was performed for both 24VDC and PoE(48VDC) configurations.

Following bandwidths were used during radiated and conducted spurious emissions testing.

| Frequency | RBW | VBW |
|---|---|---|
| 9kHz-150kHz | 200Hz | 1kHz |
| 150kHz-30MHz | 9kHz | 30kHz |
| 30MHz-1GHz | 120kHz | 1MHz |
| 1GHz-25GHz | 1MHz | 3MHz |

We found that the product met the above requirements with modification. See “Modifications Required for Compliance” section of this report. The test sample was received in good condition.

## *Product Tested - Configuration Documentation*

| EUT Configuration | | | |
|---|---|---|---|
| **Work Order:** | S1639 | | |
| **Company:** | Assa Abloy | | |
| **Company Address:** | 110 Sargent Drive | | |
| | New Haven, CT 06511 | | |
| | | | |
| **Contact:** | Dave DeBiase | | |
| | | | |
| | Product Marketing Name | Model Number | **SN** |
| **EUT:** | IN-BIKP | BLE9117K | 1,2 |
| **EUT Description:** | Lock Controller | | |
| **EUT Tx Frequency:** | 125kHz (LF RFID), 13.56MHz (HF RFID), 2402-2480MHz (BLE) | | |

| Port Label | Port Type | # ports | # populated | cable type | shielded | ferrites | length (m) | in/out | under test | comment |
|---|---|---|---|---|---|---|---|---|---|---|
| Ethernet Door | Ethernet | 1 | 1 | Ethernet | No | Yes | 1.5 | in | yes | |
| Power DC | Power DC | 1 | 1 | Power DC | No | No | 5 | in | yes | |
| Ethernet frame | Ethernet | 1 | 1 | Ethernet | Yes | No | 4.5 | in | yes | |
| Power AC | Power AC | 1 | 1 | Power DC | No | yes | 5 | in | yes | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

**Software Operating Mode Description:**

All radios are transmitting during testing.

## *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 | See “Modifications Required for Compliance” section below. |
| 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 | EUT has an internal detachable PCB antenna with 3.1dBi 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 |
| 8.8 | | | 15.207 | EUT meets the AC Line conducted emissions requirements of this section. |
| | | | 15.247 | The unit complies with the requirements of 15.247 |
| | | RSS 247 | | The unit complies with the requirements of RSS-247 |
| 6.7 | | | | Occupied Bandwidth measurements were made. |

## *Modifications Required for Compliance*

PoE configuration for radiated emissions was tested with ferrite Laird 28B0473-200 on all four Ethernet pairs.

## *Test Results*

## DTS (6dB) Bandwidth

*The minimum 6 dB bandwidth shall be at least 500 kHz.* [15.247(a) (2)]

### MEASUREMENTS / RESULTS

**6dB Bandwidth**

**Date:** 4/12/2019 **Work Order:** T1639
**Engineer:** CCH **Operating Voltage/Frequency:** Battery
**Temp:** 20°C **Humidity:** 32% **Pressure:** 1001mBar
**Measurement Type:** Conducted
**Notes:**

| Frequency (MHz) | Reading (kHz) | 6dB Bandwidth Limit (kHz) | 6dB Bandwidth Result (Pass/Fail) |
|---|---|---|---|
| 2402 | 745.4 | ≥500 | Pass |
| 2440 | 786.4 | ≥500 | Pass |
| 2480 | 740.1 | ≥500 | Pass |

**Test Site:** CEMI-2 **Cable:** none **Attenuator:** Asset #2121
**Analyzer:** 1118472

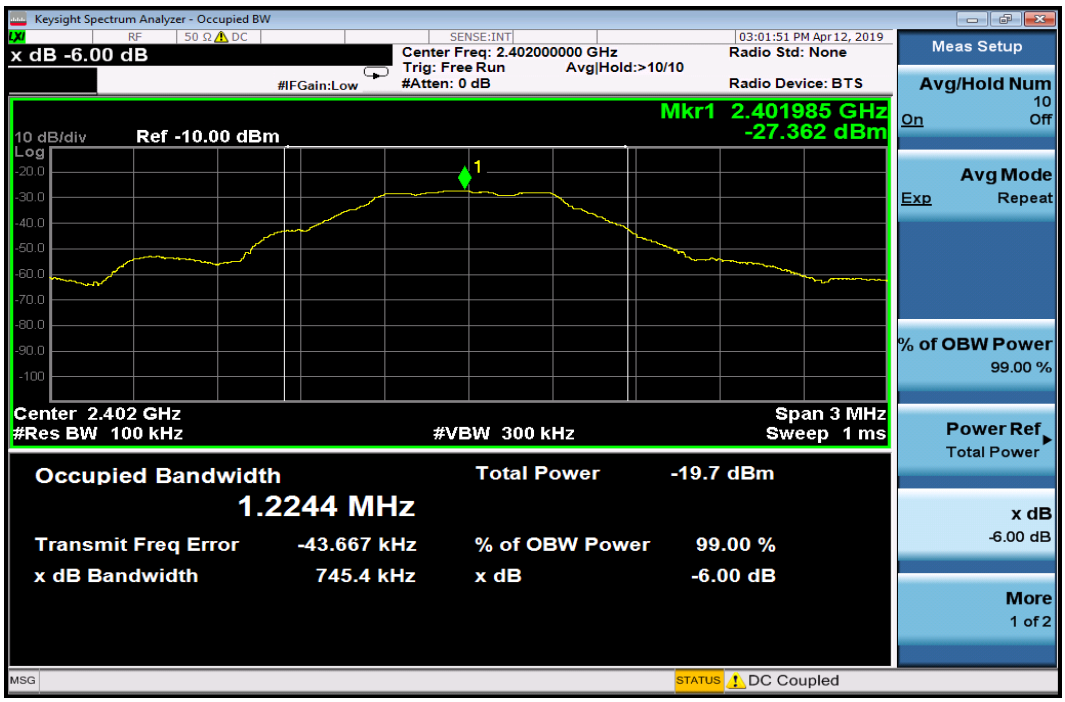
Rev. 7/30/2019

| Spectrum Analyzers / Receivers /Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due | Calibrated on |
|---|---|---|---|---|---|---|---|---|
| Rental EXA Signal Analyzer(1118472) | 9KHz-26.5GHz | N9010A-526;K | AT | MY51170010 | 1118472 | I | 8/10/2019 | 8/10/2018 |

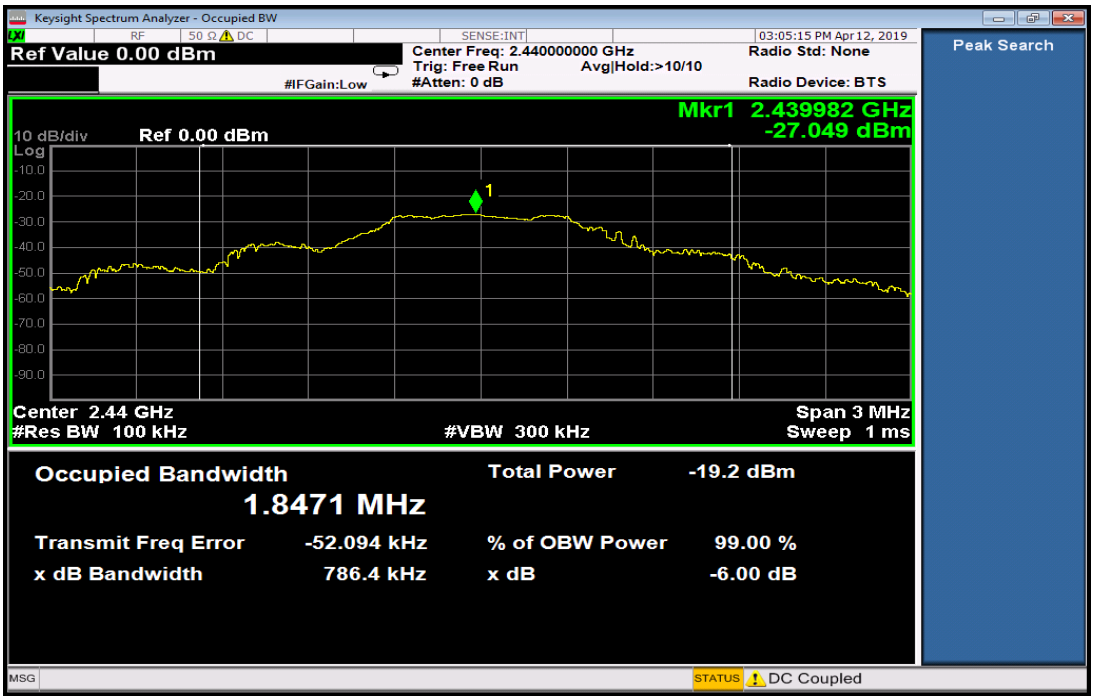
| Conducted Test Sites (Mains / Telco) | FCC Code | VCCI Code | Cat | Calibration Due | Calibrated on |
|---|---|---|---|---|---|
| CEMI 2 | 719150 | A-0015 | III | NA | N/A |

| Attenuators | Range | MN | Mfr | SN | Asset | Cat | Calibration Due | Calibrated on |
|---|---|---|---|---|---|---|---|---|
| API - 30dB 20W Attenuator | 9KHz-40GHz | 89-30-11 | API Weinschel | 703 | 2121 | II | 3/23/2020 | 3/23/2019 |

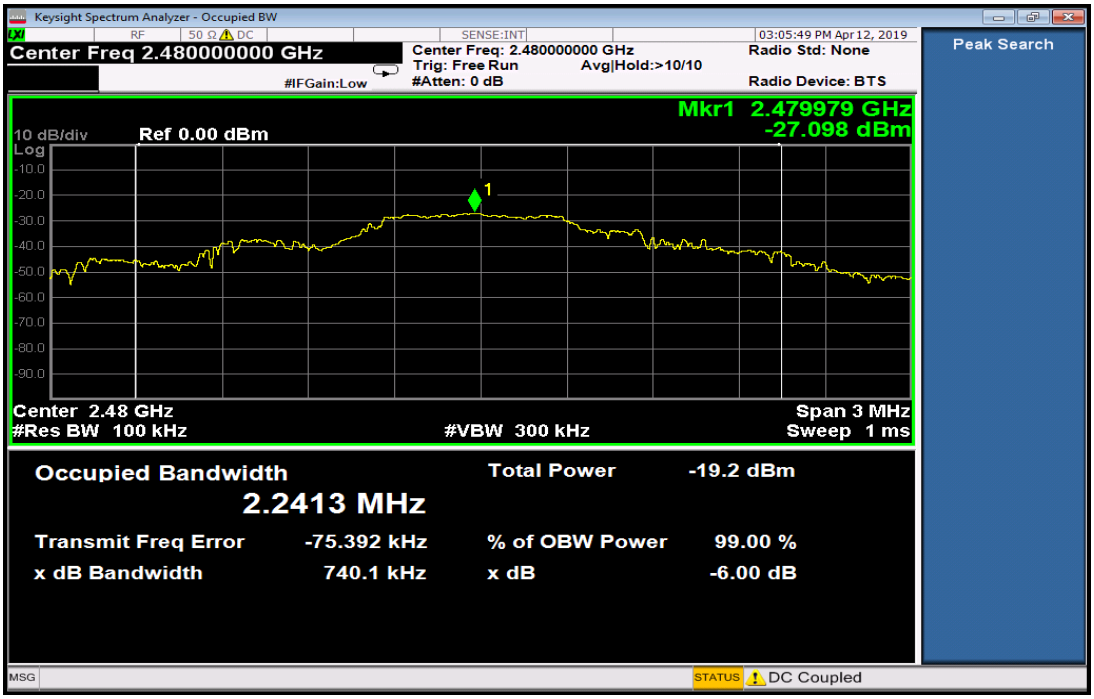
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.




Low channel 6dB bandwidth




Middle channel 6dB bandwidth




High channel 6dB bandwidth

## Occupied Bandwidth

### REQUIREMENT

*When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is its 99% emission bandwidth, as calculated or measured.*
[RSS-GEN Issue 5 Section 6.7]

### MEASUREMENTS / RESULTS

**99% Occupied Bandwidth**

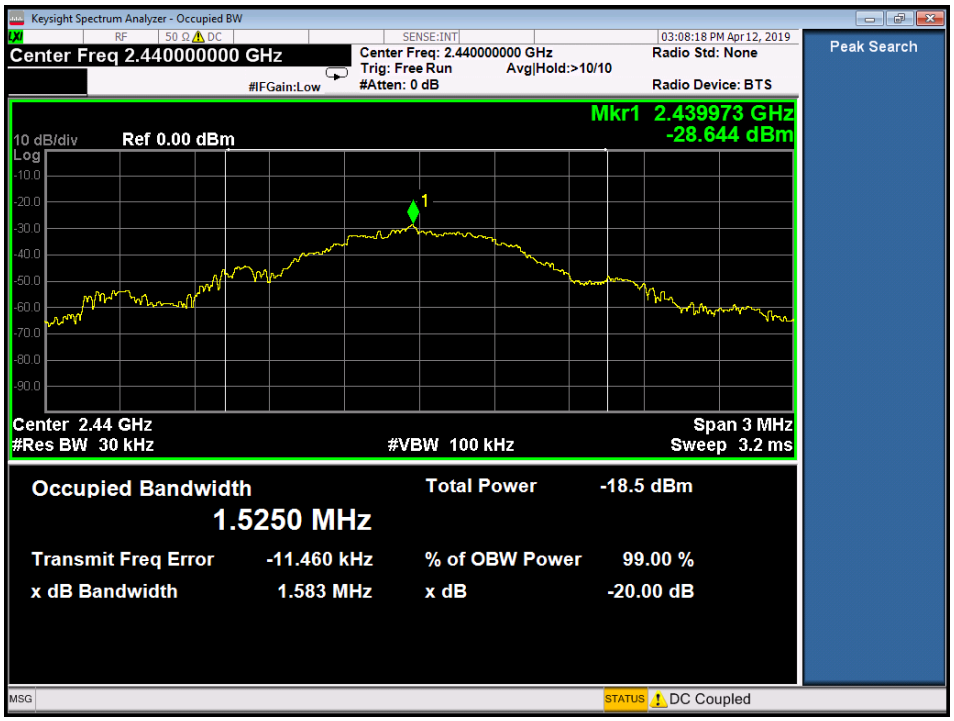
**Date:** 4/12/2019 **Work Order:** T1639
**Engineer:** CCH **Operating Voltage/Frequency:** Battery
**Temp:** 20°C **Humidity:** 32% **Pressure:** 1001mBar
**Measurement Type:** Conducted
**Notes:**

| Frequency (MHz) | 99% OBW (MHz) |
|---|---|
| 2402 | 1.0762 |
| 2440 | 1.5250 |
| 2480 | 1.8494 |

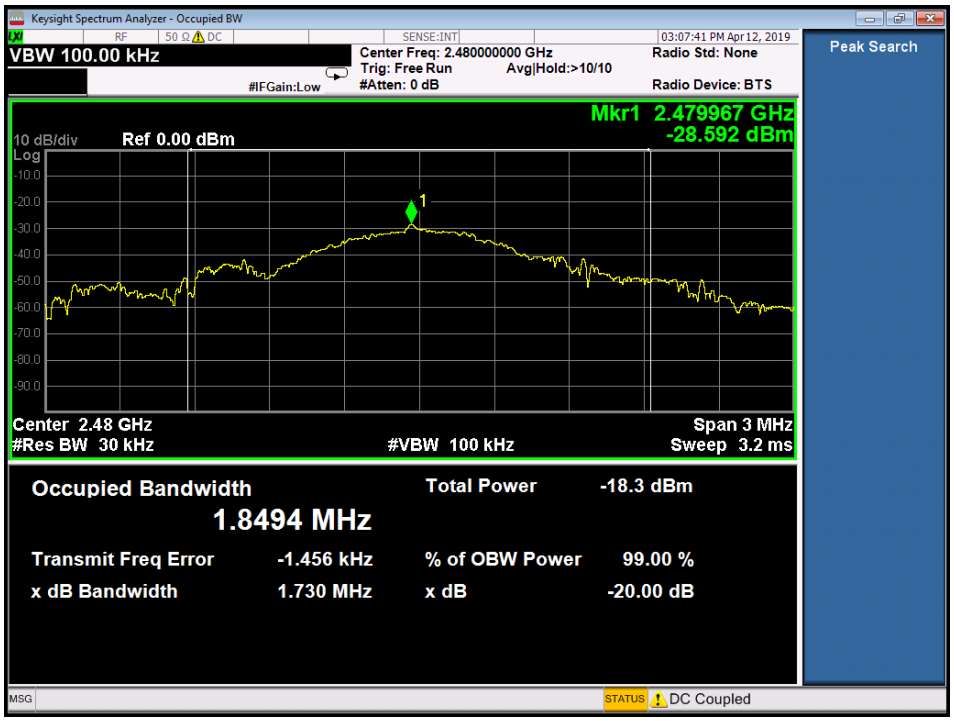
**Test Site:** CEMI-2 **Cable:** none **Attenuator:** Asset #2121
**Analyzer:** 1118472

Copyright Curtis-Straus LLC 2000

Low channel 99% OBW




Middle channel 99% OBW




High channel 99% OBW

## Peak Output Power

### LIMIT

1 Watt [15.247(b) (3)]

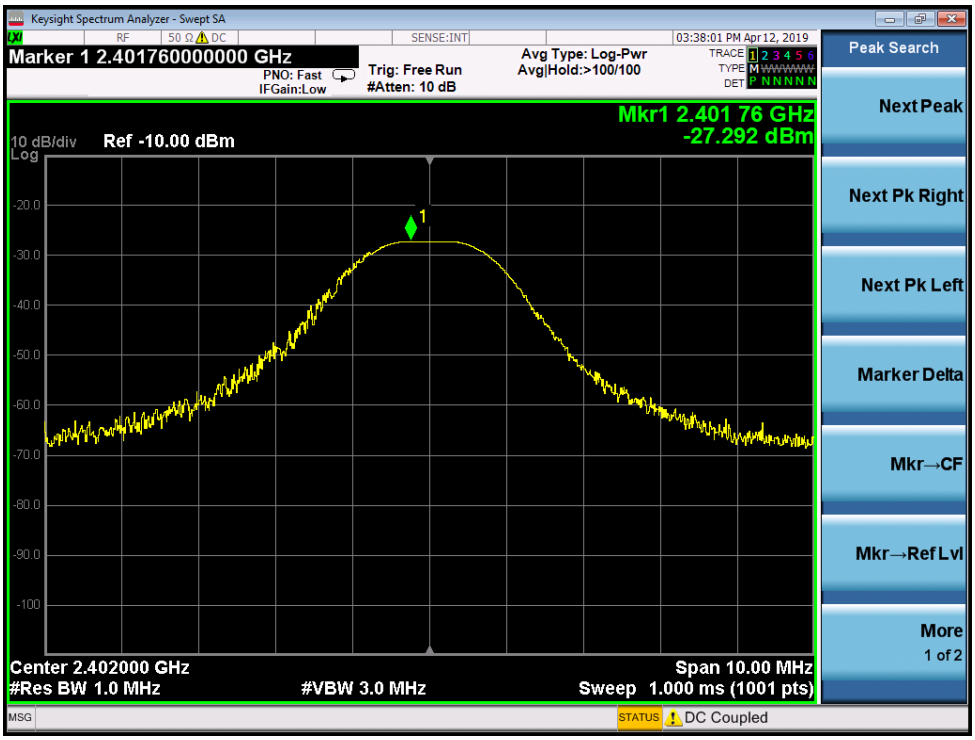
### MEASUREMENTS / RESULTS

**Peak Output Power**

**Date:** 4/12/2019 **Work Order:** T1639
**Engineer:** CCH **Operating Voltage/Frequency:** Battery
**Temp:** 20°C **Humidity:** 32% **Pressure:** 1001mBar
**Measurement Type:** Conducted
**Notes:**

| Frequency (MHz) | Peak Reading (dBm) | Cable Loss (dB) | Attenuator Loss (dB) | Peak Output Power (dBm) | Limit (dBm) | Margin (dB) | Result (Pass/Fail) |
|---|---|---|---|---|---|---|---|
| 2402 | -27.29 | 0.00 | 29.61 | 2.32 | 30.0 | -27.68 | Pass |
| 2440 | -27.06 | 0.00 | 29.61 | 2.55 | 30.0 | -27.45 | Pass |
| 2480 | -26.94 | 0.00 | 29.61 | 2.67 | 30.0 | -27.33 | Pass |

**Test Site:** CEMI-2 **Cable:** none **Attenuator:** Asset #2121
**Analyzer:** 1118472
Peak Output Power (dBm)= Peak Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)




Low channel peak output power

Middle channel peak output power

High channel peak output power

## Peak Power Spectral Density

### LIMIT

*…the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.* [15.247(e)]

### MEASUREMENTS / RESULTS

**Peak Power Spectral Density**

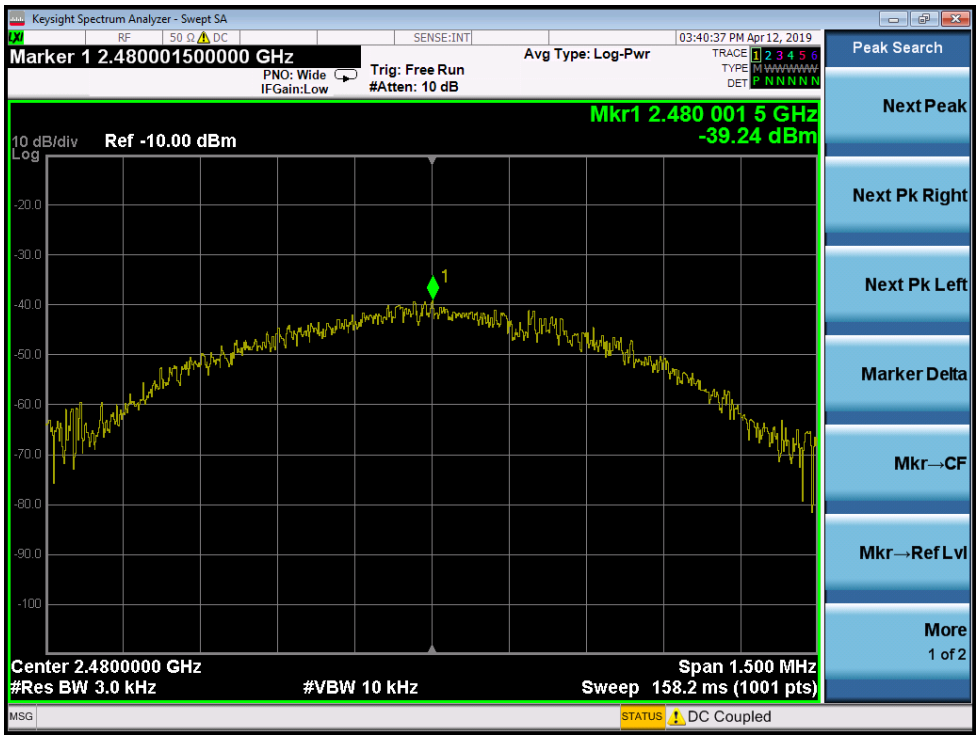
**Date:** 4/12/2019 **Work Order:** T1639
**Engineer:** CCH **Operating Voltage/Frequency:** Battery
**Temp:** 20°C **Humidity:** 32% **Pressure:** 1001mBar
**Measurement Type:** Conducted
**Notes:**

| Frequency (MHz) | Peak Reading (dBm) | Cable Loss (dB) | Attenuator Loss (dB) | Peak PSD (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| 2402 | -39.02 | 0.00 | 29.61 | -9.41 | 8.0 | -17.41 | Pass |
| 2440 | -39.44 | 0.00 | 29.61 | -9.83 | 8.0 | -17.83 | Pass |
| 2480 | -39.24 | 0.00 | 29.61 | -9.63 | 8.0 | -17.63 | Pass |

**Test Site:** CEMI-2 **Cable:** none **Attenuator:** Asset #2121
**Analyzer:** 1118472
**PSD(dBm) = Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)**

Low channel Power Spectral Density

Middle channel Power Spectral Density




High channel Power Spectral Density

## Conducted Bandedges

Bandedges must be more than 20dB below the value of the fundamental.

Low channel

High channel

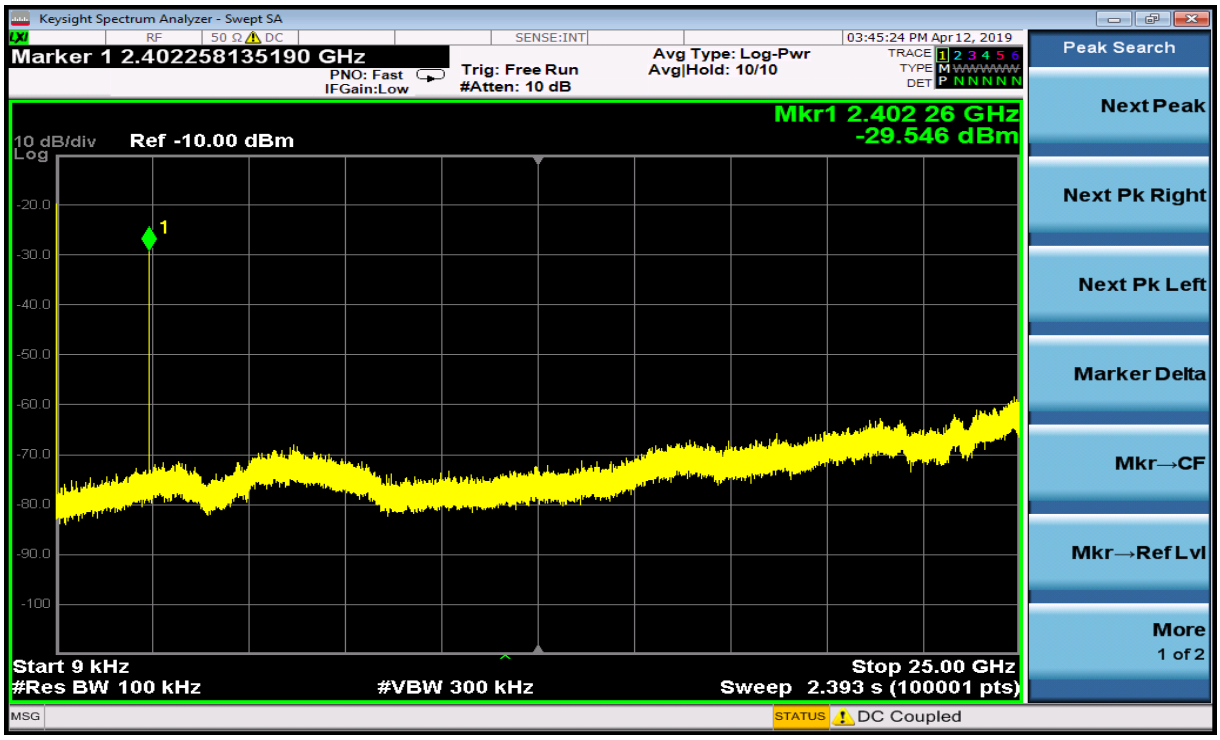
## Conducted Spurious Emissions

### LIMITS

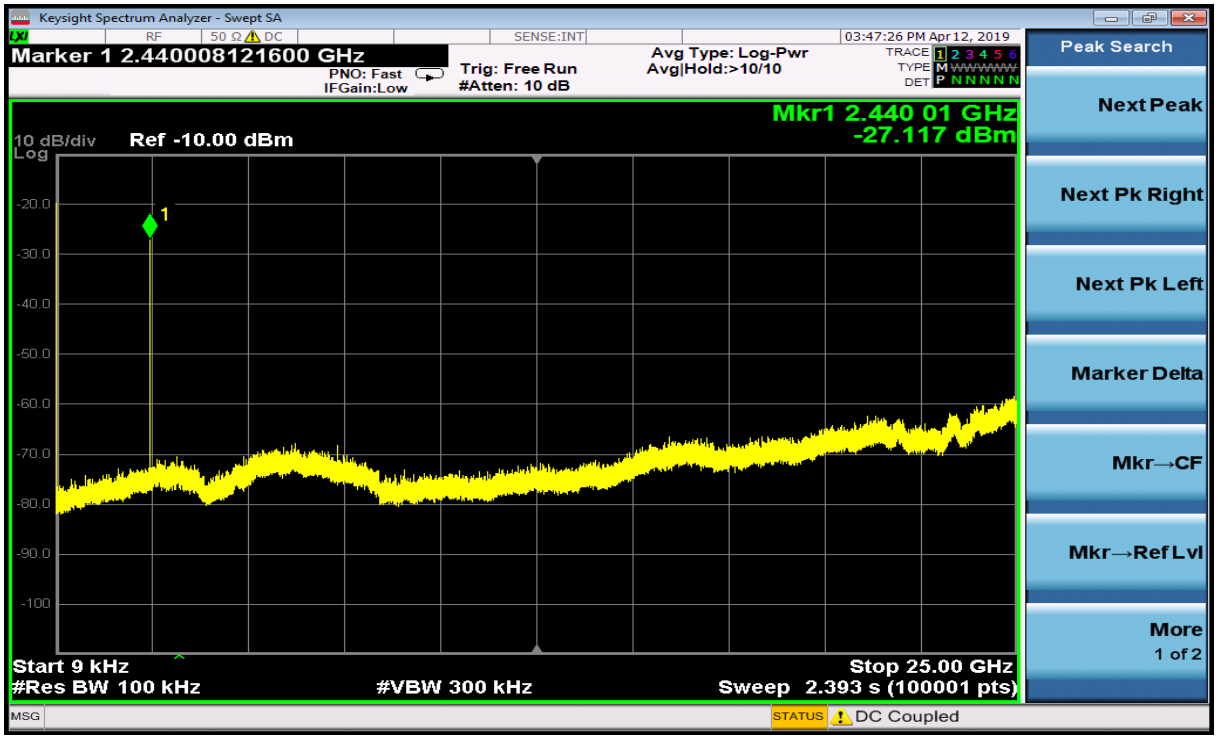
*In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB …*
[15.247(d)]

Conducted spurious emissions at the antenna port were measured in accordance with ANSI C63.10-2013 Section 11.11.

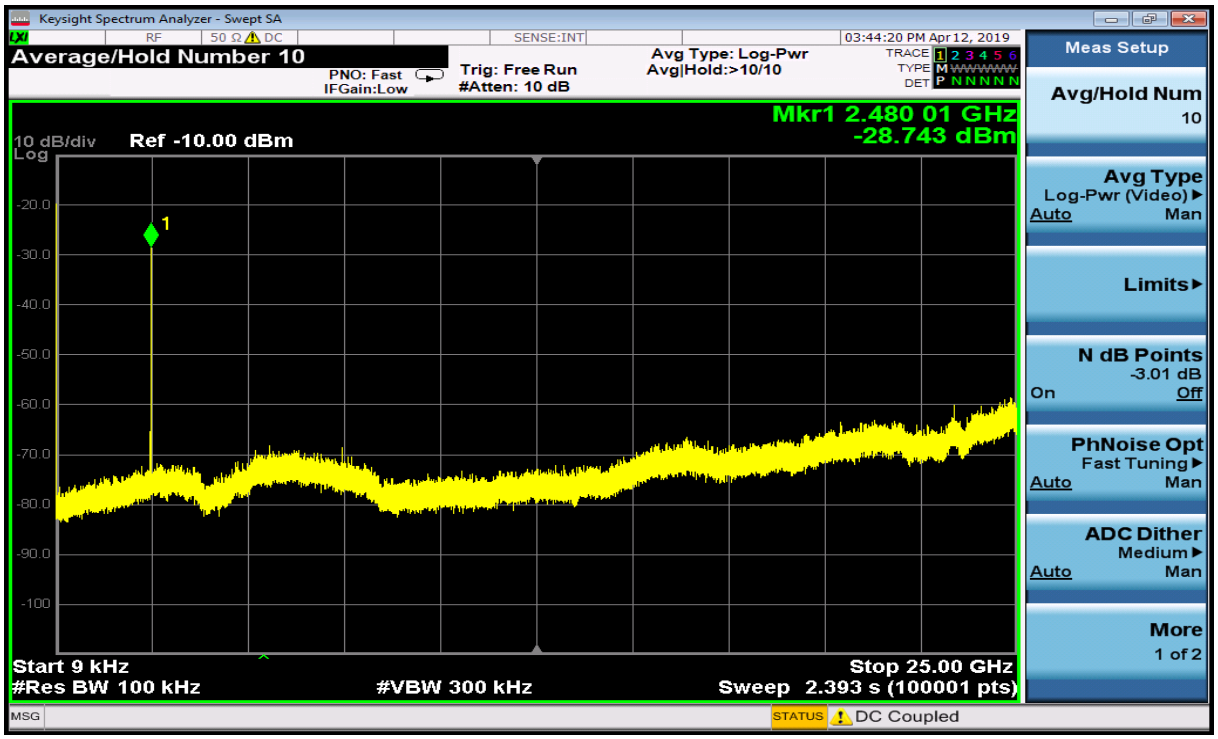
Frequency range up to 25GHz was investigated for all 3 channels (low, middle and high) at the EUT antenna port. No emissions within 20dB of their corresponding fundamental were found.




Low channel conducted spurious emissions




Middle channel conducted spurious emissions




High channel conducted spurious emissions

# Radiated Band Edges

## Radiated Emissions Table

**Date:** 05-Apr-19 **Work Order:** T1639
**Engineer:** Chris Hamel **EUT Operating Voltage/Frequency:** Battery
**Temp:** 21.1°C **Humidity:** 22% **Pressure:** 1012mBar
**Measurement Distance:** 3 m
**Notes:** BLE band edges

| Antenna Polarization (H / V) | Frequency (MHz) | Peak Reading (dBµV) | Average Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBµV/m) | Adjusted Avg Reading (dBµV/m) | FCC Class B High Frequency - Peak Limit (dBµV/m) | FCC Class B High Frequency - Peak Margin (dB) | FCC Class B High Frequency - Peak Result (Pass/Fail) | FCC Class B High Frequency - Average Limit (dBµV/m) | FCC Class B High Frequency - Average Margin (dB) | FCC Class B High Frequency - Average Result (Pass/Fail) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low | | | | | | | | | | | | | | |
| V | 2390.0 | 16.1 | 16.1 | 0.0 | 28.5 | 3.1 | 47.7 | 47.7 | 74.0 | -26.3 | Pass | 54.0 | -6.3 | Pass |
| V | 2387.0 | 20.5 | 4.8 | 0.0 | 28.5 | 3.1 | 52.1 | 36.4 | 74.0 | -21.9 | Pass | 54.0 | -17.6 | Pass |
| V | 2331.0 | 21.0 | 4.8 | 0.0 | 28.2 | 3.0 | 52.2 | 36.0 | 74.0 | -21.8 | Pass | 54.0 | -18.0 | Pass |
| High | | | | | | | | | | | | | | |
| V | 2483.5 | 18.4 | 5.1 | 0.0 | 28.6 | 3.2 | 50.2 | 36.9 | 74.0 | -23.8 | Pass | 54.0 | -17.1 | Pass |
| V | 2491.2 | 20.4 | 6.1 | 0.0 | 28.6 | 3.2 | 52.2 | 37.9 | 74.0 | -21.8 | Pass | 54.0 | -16.1 | Pass |

***Table Result:*** Pass by -6.3 dB ***Worst Freq:*** 2390.0 MHz

**Test Site:** EMI Chamber 1 **Cable 1:** Asset #2606 **Cable 2:** Asset #2456 **Cable 3:** ---
**Analyzer:** Asset # 1170725 **Preamp:** None **Antenna:** Black Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.214
Copyright Curtis-Straus LLC 2000
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

## Test Equipment Used

| Rev. 4/2/2019 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Spectrum Analyzers / Receivers /Preselectors** | **Range** | **MN** | **Mfr** | **SN** | **Asset** | **Cat** | **Calibration Due** |
| Rental MXE EMI Receiver(1170725) | 20Hz-26.5GHz | N9038A | Agilent | MY51210151 | 1170725 | I | 4/10/2019 |
| | | | | | | | |
| **Radiated Emissions Sites** | **FCC Code** | **IC Code** | **VCCI Code** | **Range** | **Asset** | **Cat** | **Calibration Due** |
| EMI Chamber 1 | 719150 | 2762A-6 | A-0015 | 1-18GHz | 1685 | I | 12/7/2020 |
| | | | | | | | |
| **Antennas** | **Range** | **MN** | **Mfr** | **SN** | **Asset** | **Cat** | **Calibration Due** |
| Black Horn | 1-18GHz | 3115 | EMCO | 9703-5148 | 56 | I | 9/6/2020 |
| | | | | | | | |
| **Meteorological Meters/Chambers** | | **MN** | **Mfr** | **SN** | **Asset** | **Cat** | **Calibration Due** |
| Weather Clock (Pressure Only) | | BA928 | Oregon Scientific | C3166-1 | 831 | I | 5/15/2020 |
| TH A#2084 | | HTC-1 | HDE | | 2084 | II | 4/23/2019 |
| | | | | | | | |
| **Cables** | **Range** | | **Mfr** | | | **Cat** | **Calibration Due** |
| Asset #2456 | 9KHz-18GHz | | MegaPhase | | | II | 10/31/2019 |
| Asset #2606 | 9KHz-18GHz | | MegaPhase | | | II | 4/2/2020 |
| | | | | | | | |
| All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard. | | | | | | | |

# Radiated Spurious Emissions

## LIMITS

*Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).*
[15.247(d)]

## MEASUREMENTS / RESULTS

Curtis Straus - a Bureau Veritas Company — Work Order - T1639
Radiated Emissions Electric Field 3m Distance — EUT Power Input - Battery
Top Peaks Horizontal 30-1000MHz — Test Site - CH-1
Operator: AKZ — Conditions - 24°C; 17%RH; 1016mBar
Notes:
BLE low channel

Data Taken at April 04, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_209 (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_109_Class_B (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31.116 | 25 | 3 | 28 | 40 | -12 | PASS | | 40 | -12 | PASS | | 250 | 225 |
| 393.241 | 33.5 | -1.5 | 32 | 46 | -14 | PASS | | 46 | -14 | PASS | | 100 | 0 |
| 420.352 | 35.6 | -1 | 34.7 | 46 | -11.3 | PASS | | 46 | -11.4 | PASS | | 200 | 180 |
| 433.908 | 33 | -1 | 32 | 46 | -14 | PASS | | 46 | -14 | PASS | | 200 | 0 |
| 447.464 | 34 | -0.6 | 33.4 | 46 | -12.6 | PASS | | 46 | -12.6 | PASS | | 200 | 135 |
| 930.014 | 30.3 | 6.6 | 37 | 46 | -9 | PASS | -9 | 46 | -9.1 | PASS | -9.1 | 250 | 45 |

Curtis Straus - a Bureau Veritas Company — Work Order - T1639
Radiated Emissions Electric Field 3m Distance — EUT Power Input - Battery
Top Peaks Vertical 30-1000MHz — Test Site - CH-1
Operator: AKZ — Conditions - 24°C; 17%RH; 1016mBar
Notes:
BLE low channel

Data Taken at April 04, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_209 (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_109_Class_B (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | Turntable Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.145 | 24.7 | 3.6 | 28.4 | 40 | -11.6 | PASS | -11.6 | 40 | -11.6 | PASS | -11.6 | 200 | 315 |
| 40.694 | 30.8 | -4.5 | 26.3 | 40 | -13.7 | PASS | | 40 | -13.7 | PASS | | 100 | 90 |
| 267.965 | 36.7 | -4.5 | 32.2 | 46 | -13.8 | PASS | | 46 | -13.8 | PASS | | 200 | 90 |
| 268.984 | 36.8 | -4.4 | 32.4 | 46 | -13.6 | PASS | | 46 | -13.7 | PASS | | 200 | 90 |
| 271.942 | 36.1 | -4.2 | 31.9 | 46 | -14.1 | PASS | | 46 | -14.2 | PASS | | 200 | 90 |
| 924.728 | 26.9 | 6.7 | 33.7 | 46 | -12.3 | PASS | | 46 | -12.4 | PASS | | 100 | 315 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: CCH
Notes:
BLE low channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Average Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1725.5 | 43.9 | 36.2 | -8.5 | 35.4 | 74 | -38.6 | PASS | | 27.8 | 54 | -26.2 | PASS | |
| 2103 | 43.5 | 35.6 | -5.2 | 38.4 | 74 | -35.6 | PASS | | 30.4 | 54 | -23.6 | PASS | |
| 3334.3 | 44.2 | 34.8 | -3 | 41.2 | 74 | -32.8 | PASS | | 31.8 | 54 | -22.2 | PASS | |
| 4803.6 | 53.6 | 47.2 | -1.8 | 51.9 | 74 | -22.1 | PASS | -22.1 | 45.5 | 54 | -8.5 | PASS | -8.5 |
| 5658.1 | 42.9 | 34 | 0.7 | 43.6 | 74 | -30.4 | PASS | | 34.7 | 54 | -19.3 | PASS | |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: CCH
Notes:
BLE low channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1406.3 | 45 | 36.1 | -9.4 | 35.6 | 74 | -38.4 | PASS | | 26.8 | 54 | -27.2 | PASS | |
| 2106.6 | 44.5 | 35.7 | -5.2 | 39.3 | 74 | -34.7 | PASS | | 30.6 | 54 | -23.4 | PASS | |
| 4108.7 | 42.3 | 34 | -1.9 | 40.4 | 74 | -33.6 | PASS | | 32.1 | 54 | -21.9 | PASS | |
| 4803.5 | 47.3 | 38.6 | -1.8 | 45.6 | 74 | -28.4 | PASS | -28.4 | 36.9 | 54 | -17.1 | PASS | -17.1 |
| 5696.3 | 43.3 | 34.1 | 0.7 | 44.1 | 74 | -29.9 | PASS | | 34.9 | 54 | -19.1 | PASS | |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: CCH
Notes:
BLE low channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Test Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Test Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9608.8 | 48.3 | 39.6 | 6.1 | 54.3 | 83.5 | -29.2 | PASS | | 45.7 | 63.5 | -17.8 | PASS | |
| 12274.2 | 44.9 | 34.4 | 9.4 | 54.2 | 83.5 | -29.3 | PASS | | 43.7 | 63.5 | -19.8 | PASS | |
| 17848.4 | 45.1 | 35.4 | 14 | 59 | 83.5 | -24.5 | PASS | -24.5 | 49.3 | 63.5 | -14.2 | PASS | -14.2 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: CCH
Notes:
BLE low channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at 'April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7206.1 | 43.6 | 36.7 | 4 | 47.5 | 83.5 | -36 | PASS | | 40.6 | 63.5 | -22.9 | PASS | |
| 9607.8 | 44.3 | 36.2 | 6.1 | 50.3 | 83.5 | -33.2 | PASS | | 42.3 | 63.5 | -21.2 | PASS | |
| 12698.6 | 44 | 34.1 | 10.2 | 54.2 | 83.5 | -29.3 | PASS | | 44.2 | 63.5 | -19.3 | PASS | |
| 17853 | 45.6 | 35.3 | 14 | 59.6 | 83.5 | -23.9 | PASS | -23.9 | 49.3 | 63.5 | -14.2 | PASS | -14.2 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Operator: AKZ
Notes:
BLE mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1016mBar

Data Taken at April 04, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_209 (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_109_Class_B (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.218 | 25.5 | 3.6 | 29 | 40 | -11 | PASS | | 40 | -11 | PASS | | 150 | 270 |
| 230.499 | 37.4 | -6 | 31.4 | 46 | -14.6 | PASS | | 46 | -14.7 | PASS | | 100 | 135 |
| 393.241 | 34 | -1.5 | 32.6 | 46 | -13.4 | PASS | | 46 | -13.4 | PASS | | 100 | 135 |
| 420.352 | 32.4 | -1 | 31.4 | 46 | -14.6 | PASS | | 46 | -14.6 | PASS | | 200 | 180 |
| 447.464 | 35.3 | -0.6 | 34.6 | 46 | -11.4 | PASS | | 46 | -11.4 | PASS | | 200 | 135 |
| 930.014 | 32.7 | 6.6 | 39.3 | 46 | -6.7 | PASS | -6.7 | 46 | -6.7 | PASS | -6.7 | 100 | 45 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Operator: AKZ
Notes:
BLE mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1016mBar

Data Taken at April 04, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_209 (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_109_Class_B (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | Turntable Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31.552 | 25.2 | 2.6 | 27.8 | 40 | -12.2 | PASS | | 40 | -12.2 | PASS | | 200 | 270 |
| 40.694 | 31.5 | -4.5 | 27 | 40 | -13 | PASS | | 40 | -13 | PASS | | 100 | 270 |
| 270.026 | 36.3 | -4.3 | 32 | 46 | -14 | PASS | | 46 | -14 | PASS | | 200 | 90 |
| 309.772 | 35.3 | -3.4 | 31.9 | 46 | -14.1 | PASS | | 46 | -14.2 | PASS | | 150 | 225 |
| 766.739 | 27.8 | 5.4 | 33.2 | 46 | -12.8 | PASS | | 46 | -12.8 | PASS | | 200 | 90 |
| 953.416 | 27.5 | 6.7 | 34.2 | 46 | -11.8 | PASS | -11.8 | 46 | -11.9 | PASS | -11.9 | 150 | 0 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: CCH
Notes:
BLE mid channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Average Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1730.1 | 45.5 | 35.6 | -8.5 | 37 | 74 | -37 | PASS | | 27.1 | 54 | -26.9 | PASS | |
| 2184.5 | 44.1 | 34.7 | -5 | 39.1 | 74 | -34.9 | PASS | | 29.7 | 54 | -24.3 | PASS | |
| 4880.4 | 53.4 | 46.5 | -0.9 | 52.4 | 74 | -21.6 | PASS | -21.6 | 45.5 | 54 | -8.5 | PASS | -8.5 |
| 5337.2 | 40.2 | 33 | 1.2 | 41.4 | 74 | -32.6 | PASS | | 34.2 | 54 | -19.8 | PASS | |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: CCH
Notes:
BLE mid channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1728.1 | 43.7 | 35.7 | -8.5 | 35.3 | 74 | -38.7 | PASS | | 27.2 | 54 | -26.8 | PASS | |
| 2139.8 | 46.3 | 35.5 | -5.1 | 41.2 | 74 | -32.8 | PASS | | 30.4 | 54 | -23.6 | PASS | |
| 3162.3 | 44 | 34.2 | -2.3 | 41.7 | 74 | -32.3 | PASS | | 31.9 | 54 | -22.1 | PASS | |
| 4103 | 43.3 | 33.8 | -1.9 | 41.5 | 74 | -32.5 | PASS | | 32 | 54 | -22 | PASS | |
| 4879.4 | 47.9 | 41.4 | -1 | 47 | 74 | -27 | PASS | -27 | 40.4 | 54 | -13.6 | PASS | -13.6 |
| 5995.2 | 42.5 | 33.8 | 1 | 43.5 | 74 | -30.5 | PASS | | 34.9 | 54 | -19.1 | PASS | |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: CCH
Notes:
BLE mid channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Test Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Test Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12726.5 | 42.9 | 34 | 10 | 52.9 | 83.5 | -30.6 | PASS | | 44.1 | 63.5 | -19.4 | PASS | |
| 16083.4 | 45.5 | 35.4 | 11.5 | 57 | 83.5 | -26.5 | PASS | | 46.9 | 63.5 | -16.6 | PASS | |
| 17967.4 | 43.7 | 35.1 | 14 | 57.7 | 83.5 | -25.8 | PASS | -25.8 | 49.1 | 63.5 | -14.4 | PASS | -14.4 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: CCH
Notes:
BLE mid channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7320.7 | 47.4 | 37.1 | 3.5 | 50.9 | 83.5 | -32.6 | PASS | | 40.7 | 63.5 | -22.8 | PASS | |
| 12221.1 | 42.9 | 34.3 | 9.5 | 52.3 | 83.5 | -31.2 | PASS | | 43.8 | 63.5 | -19.7 | PASS | |
| 14920.7 | 44.1 | 34.3 | 11.3 | 55.4 | 83.5 | -28.1 | PASS | | 45.6 | 63.5 | -17.9 | PASS | |
| 17989.8 | 44.2 | 35 | 13.9 | 58.1 | 83.5 | -25.4 | PASS | -25.4 | 48.9 | 63.5 | -14.6 | PASS | -14.6 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Operator: AKZ
Notes:
BLE high channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1016mBar

Data Taken at April 04, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_209 (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_109_Class_B (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.558 | 25.1 | 3.3 | 28.4 | 40 | -11.6 | PASS | -11.6 | 40 | -11.6 | PASS | -11.6 | 200 | 135 |
| 244.079 | 37.3 | -5.4 | 31.8 | 46 | -14.2 | PASS | | 46 | -14.2 | PASS | | 100 | 135 |
| 393.216 | 33.5 | -1.5 | 32.1 | 46 | -13.9 | PASS | | 46 | -14 | PASS | | 250 | 315 |
| 420.352 | 34.5 | -1 | 33.5 | 46 | -12.5 | PASS | | 46 | -12.5 | PASS | | 100 | 180 |
| 447.464 | 34.2 | -0.6 | 33.6 | 46 | -12.4 | PASS | | 46 | -12.4 | PASS | | 200 | 0 |
| 876.81 | 27.6 | 5.7 | 33.3 | 46 | -12.7 | PASS | | 46 | -12.7 | PASS | | 100 | 135 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Operator: AKZ
Notes:
BLE high channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1016mBar

Data Taken at April 04, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_209 (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_109_Class_B (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | Turntable Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.34 | 25.4 | 3.5 | 28.9 | 40 | -11.1 | PASS | -11.1 | 40 | -11.1 | PASS | -11.1 | 100 | 0 |
| 264.91 | 36.3 | -4.9 | 31.4 | 46 | -14.6 | PASS | | 46 | -14.6 | PASS | | 200 | 135 |
| 268.111 | 36.4 | -4.5 | 31.9 | 46 | -14.1 | PASS | | 46 | -14.2 | PASS | | 200 | 135 |
| 269.784 | 36 | -4.3 | 31.7 | 46 | -14.3 | PASS | | 46 | -14.3 | PASS | | 200 | 135 |
| 271.797 | 36.6 | -4.2 | 32.4 | 46 | -13.6 | PASS | | 46 | -13.7 | PASS | | 200 | 135 |
| 890.196 | 27.5 | 6.1 | 33.6 | 46 | -12.4 | PASS | | 46 | -12.5 | PASS | | 150 | 225 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: CCH
Notes:
BLE high channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Average Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2130.6 | 43.7 | 35.5 | -5 | 38.6 | 74 | -35.4 | PASS | | 30.5 | 54 | -23.5 | PASS | |
| 3305.8 | 43.9 | 34.8 | -2.9 | 41 | 74 | -33 | PASS | | 31.9 | 54 | -22.1 | PASS | |
| 4138.5 | 42 | 33.9 | -1.9 | 40.1 | 74 | -33.9 | PASS | | 32 | 54 | -22 | PASS | |
| 4880.6 | 53.5 | 48.3 | -0.9 | 52.6 | 74 | -21.4 | PASS | -21.4 | 47.4 | 54 | -6.6 | PASS | -6.6 |
| 5599.7 | 42.6 | 34 | 0.9 | 43.5 | 74 | -30.5 | PASS | | 34.9 | 54 | -19.1 | PASS | |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: CCH
Notes:
BLE high channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1726.6 | 43.9 | 36.7 | -8.5 | 35.5 | 74 | -38.5 | PASS | | 28.3 | 54 | -25.7 | PASS | |
| 2109.9 | 44.5 | 35.4 | -5.1 | 39.4 | 74 | -34.6 | PASS | | 30.2 | 54 | -23.8 | PASS | |
| 3796.2 | 43 | 33.6 | -1.8 | 41.1 | 74 | -32.9 | PASS | | 31.8 | 54 | -22.2 | PASS | |
| 4880.4 | 47.9 | 40.2 | -0.9 | 46.9 | 74 | -27.1 | PASS | -27.1 | 39.2 | 54 | -14.8 | PASS | -14.8 |
| 5463.1 | 42.5 | 33.6 | 1.4 | 43.9 | 74 | -30.1 | PASS | | 35 | 54 | -19 | PASS | |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: CCH
Notes:
BLE high channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Test Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Test Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12773.2 | 43.3 | 33.6 | 10.1 | 53.4 | 83.5 | -30.1 | PASS | | 43.8 | 63.5 | -19.7 | PASS | |
| 17902.7 | 45.2 | 34.8 | 14.1 | 59.3 | 83.5 | -24.2 | PASS | -24.2 | 48.9 | 63.5 | -14.6 | PASS | -14.6 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: CCH
Notes:
BLE high channel

Work Order - T1639
EUT Power Input - Batteries
Test Site - CH1
Conditions - 21.1°C; 22%RH; 1012mBar

Data Taken at April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7440.6 | 43.4 | 35.1 | 4.1 | 47.5 | 83.5 | -36 | PASS | | 39.2 | 63.5 | -24.3 | PASS | |
| 12100.1 | 42.3 | 34.3 | 9.2 | 51.5 | 83.5 | -32 | PASS | | 43.6 | 63.5 | -19.9 | PASS | |
| 17956.8 | 44.1 | 35 | 14 | 58.1 | 83.5 | -25.4 | PASS | -25.4 | 49 | 63.5 | -14.5 | PASS | -14.5 |

## Radiated Emissions Table

**Date:** 05-Apr-19 **Work Order:** T1639
**Engineer:** CCH **EUT Operating Voltage/Frequency:** Battery
**Temp:** 21°C **Humidity:** 22% **Pressure:** 1012mBar
**Frequency Range:** 18-26.5GHz **Measurement Distance:** 0.1 m
**Notes:** BLE all channels **EUT Max Freq:**
No emissions found

| Antenna Polarization (H / V) | Frequency (MHz) | Peak Reading (dBµV) | Average Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBµV/m) | Adjusted Avg Reading (dBµV/m) | FCC 15.209 - Peak Limit (dBµV/m) | FCC 15.209 - Peak Margin (dB) | FCC 15.209 - Peak Result (Pass/Fail) | FCC 15.209 - Average Limit (dBµV/m) | FCC 15.209 - Average Margin (dB) | FCC 15.209 - Average Result (Pass/Fail) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | No emissions found | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

***Table Result:*** Pass by N/A dB ***Worst Freq:*** N/A MHz

**Test Site:** EMI Chamber 1 **Cable 1:** Asset #2323 **Cable 2:** --- **Cable 3:** ---
**Analyzer:** Asset# 1170725 **Preamp:** 18-26.5GHz **Antenna:** 18-26.5GHz Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.214 Copyright Curtis-Straus LLC 2000
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

## 125kHz RFID, 13.56MHz RFID and BLE simultaneous transmission:

No emissions found in 9kHz-30MHz range.

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Operator: AKZ
Notes:
All radios on, BLE at mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 04:12:27 PM, Tuesday, April 02, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_109_Class_B (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_209 (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.145 | 24.6 | 3.6 | 28.2 | 40 | -11.8 | PASS | | 40 | -11.8 | PASS | | 200 | 270 |
| 40.67 | 30.4 | -4.5 | 26 | 40 | -14 | PASS | | 40 | -14 | PASS | | 150 | 0 |
| 54.226 | 33.9 | -10.6 | 23.2 | 40 | -16.8 | PASS | | 40 | -16.8 | PASS | | 250 | 180 |
| 257.635 | 36.1 | -5.2 | 30.9 | 46 | -15.1 | PASS | | 46 | -15.1 | PASS | | 100 | 315 |
| 352.549 | 30.3 | -2 | 28.3 | 46 | -17.7 | PASS | | 46 | -17.7 | PASS | | 100 | 180 |
| 942.721 | 27.6 | 6.7 | 34.4 | 46 | -11.7 | PASS | -11.7 | 46 | -11.6 | PASS | -11.6 | 250 | 45 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Operator: AKZ
Notes:
All radios on, BLE at mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 04:12:27 PM, Tuesday, April 02, 2019

| Frequency (MHz) | Peak Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Lim1: FCC_pt15_109_Class_B (dBµV/m) | Lim1 Margin (dB) | Lim1 Test Results (Pass/Fail) | Worst Margin Lim1 (dB) | Lim2: FCC_pt15_209 (dBµV/m) | Lim2 Margin (dB) | Lim2 Test Results (Pass/Fail) | Worst Margin Lim2 (dB) | Antenna Height (cm) | Turntable Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.315 | 24.4 | 3.5 | 27.9 | 40 | -12.1 | PASS | | 40 | -12.1 | PASS | | 200 | 315 |
| 40.67 | 40.6 | -4.5 | 36.1 | 40 | -3.9 | PASS | -3.9 | 40 | -3.9 | PASS | -3.9 | 100 | 90 |
| 54.226 | 39.8 | -10.6 | 29.2 | 40 | -10.8 | PASS | | 40 | -10.8 | PASS | | 200 | 225 |
| 264.934 | 39.7 | -4.9 | 34.8 | 46 | -11.2 | PASS | | 46 | -11.2 | PASS | | 200 | 45 |
| 266.947 | 39.5 | -4.6 | 35 | 46 | -11 | PASS | | 46 | -11 | PASS | | 200 | 45 |
| 268.038 | 39.1 | -4.5 | 34.6 | 46 | -11.5 | PASS | | 46 | -11.4 | PASS | | 200 | 45 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: AKZ
Notes:
All radios on, BLE at mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1020mBar

Data Taken at 11:51:06 AM, Friday, April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Average Margin (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4870.4 | 42.5 | 33.5 | -0.4 | 42.1 | 74 | -31.9 | PASS | | 33.2 | 54 | -20.8 | PASS | | 275 | 243 |
| 4884.4 | 47.9 | 38.5 | -0.1 | 47.7 | 74 | -26.3 | PASS | -26.3 | 38.3 | 54 | -15.7 | PASS | -15.7 | 210 | 31 |
| 5273.9 | 41.4 | 33.3 | 0.7 | 42.1 | 74 | -31.9 | PASS | | 34 | 54 | -20 | PASS | | 100 | 7 |
| 5323.1 | 41.3 | 33.4 | 1.1 | 42.5 | 74 | -31.5 | PASS | | 34.6 | 54 | -19.4 | PASS | | 288 | 23 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: AKZ
Notes:
All radios on, BLE at mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1020mBar

Data Taken at 11:51:06 AM, Friday, April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5327.1 | 42.7 | 33.5 | 1.2 | 43.9 | 74 | -30.1 | PASS | -30.1 | 34.6 | 54 | -19.4 | PASS | -19.4 | 225 | 263 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: AKZ
Notes:
All radios on, BLE at mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1020mBar

Data Taken at 11:02:23 AM, Friday, April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Test Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Test Results (Pass/Fail) | Worst Avg Margin (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7326.6 | 54.5 | 47.7 | 3.3 | 57.8 | 83.5 | -25.7 | PASS | | 51 | 63.5 | -12.5 | PASS | -12.5 | 140 | 198 |
| 10533.4 | 53.7 | 34.4 | 7.2 | 60.9 | 83.5 | -22.6 | PASS | -22.6 | 41.6 | 63.5 | -21.9 | PASS | | 150 | 66 |
| 17898.2 | 43.9 | 35 | 14 | 57.8 | 83.5 | -25.7 | PASS | | 48.9 | 63.5 | -14.6 | PASS | | 199 | 94 |

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: AKZ
Notes:
All radios on, BLE at mid channel

Work Order - T1639
EUT Power Input - Battery
Test Site - CH-1
Conditions - 24°C; 17%RH; 1020mBar

Data Taken at 11:02:23 AM, Friday, April 05, 2019

| Frequency (MHz) | Raw Peak Reading (dBµV) | Raw Avg Reading (dBµV) | Correction Factor (dB/m) | Adjusted Peak Amplitude (dBµV/m) | Pk Lim: FCC_pt15_209_Peak (dBµV/m) | Peak Margin (dB) | Peak Results (Pass/Fail) | Worst Peak Margin (dB) | Adjusted Avg Amplitude (dBµV/m) | Av Lim: FCC_pt15_209_Average (dBµV/m) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) | Antenna Height (cm) | EUT Azimuth (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7325.2 | 62.3 | 55.5 | 3.3 | 65.6 | 83.5 | -17.9 | PASS | -17.9 | 58.7 | 63.5 | -4.8 | PASS | -4.8 | 146 | 339 |
| 10532.1 | 49.2 | 34.5 | 7.2 | 56.4 | 83.5 | -27.1 | PASS | | 41.7 | 63.5 | -21.8 | PASS | | 200 | 309 |
| 17898.2 | 45.3 | 35 | 14 | 59.3 | 83.5 | -24.2 | PASS | | 49 | 63.5 | -14.5 | PASS | | 190 | 21 |

## Radiated Emissions Table

**Date:** 05-Apr-19 **Work Order:** T1639
**Engineer:** AKZ **EUT Operating Voltage/Frequency:** Battery
**Temp:** 24°C **Humidity:** 17% **Pressure:** 1020mbar
**Frequency Range:** 18-25GHz **Measurement Distance:** 0.1 m
**Notes:** All radios on. BLE mid channel

| Antenna Polarization (H / V) | Frequency (MHz) | Peak Reading (dBµV) | Average Reading (dBµV) | Preamp Factor (dB) | Antenna Factor (dB/m) | Cable Factor (dB) | Adjusted Peak Reading (dBµV/m) | Adjusted Avg Reading (dBµV/m) | FCC 15.209 High Frequency - Peak Limit (dBµV/m) | FCC 15.209 High Frequency - Peak Margin (dB) | FCC 15.209 High Frequency - Peak Result (Pass/Fail) | FCC 15.209 High Frequency - Average Limit (dBµV/m) | FCC 15.209 High Frequency - Average Margin (dB) | FCC 15.209 High Frequency - Average Result (Pass/Fail) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No emissions were found in this range | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Test Site:** EMI Chamber 1 **Cable 1:** Asset #2324 **Cable 2:** --- **Cable 3:** ---
**Analyzer:** --- **Preamp:** 18-26.5GHz **Antenna:** 18-26.5GHz Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.214
Copyright Curtis-Straus LLC 2000
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

# Test Equipment Used

Rev. 4/9/2019

| Spectrum Analyzers / Receivers /Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---|---|---|---|---|---|---|---|
| Rental MXE EMI Receiver(1170725) | 20Hz-26.5GHz | N9038A | Agilent | MY51210151 | 1170725 | I | 4/10/2019 |

| Radiated Emissions Sites | FCC Code | IC Code | VCCI Code | Range | Asset | Cat | Calibration Due |
|---|---|---|---|---|---|---|---|
| EMI Chamber 1 | 719150 | 2762A-6 | A-0015 | 30-1000MHz | 1685 | I | 12/7/2020 |
| EMI Chamber 1 | 719150 | 2762A-6 | A-0015 | 1-18GHz | 1685 | I | 12/7/2020 |

| Preamps /Couplers Attenuators / Filters | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---|---|---|---|---|---|---|---|
| Red | 0.009-2000MHz | ZFL-1000-LN | CS | N/A | 798 | II | 1/29/2020 |
| 2310 PA | 1-1000MHz | PAM-103 | COM-POWER | 441175 | 2310 | II | 10/29/2019 |
| 8449B HF Preamp | 1-18GHz | 8449B | Agilent | 1149055 | | II | 11/26/2019 |
| HF (Yellow) | 18-26.5GHz | AFS4-18002650-60-8P-4 | CS | 467559 | 1266 | II | 10/24/2019 |

| Antennas | Range | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---|---|---|---|---|---|---|---|
| Red-White Bilog | 30-2000MHz | JB1 | Sunol | A091604-1 | 1105 | I | 8/21/2019 |
| Black Horn | 1-18GHz | 3115 | EMCO | 9703-5148 | 56 | I | 9/6/2020 |
| HF (White) Horn | 18-26.5GHz | 801-WLM | Waveline | 758 | 758 | III | Verify before Use |
| Blue Horn | 1-18Ghz | 3117 | ETS | 157647 | 1861 | I | 3/9/2021 |

| Meteorological Meters/Chambers | | MN | Mfr | SN | Asset | Cat | Calibration Due |
|---|---|---|---|---|---|---|---|
| Weather Clock (Pressure Only) | | BA928 | Oregon Scientific | C3166-1 | 831 | I | 5/15/2020 |
| Asset #2656 | | 1235C97 | Control Company | 181683818 | 2656 | I | 10/23/2020 |

| Cables | Range | | Mfr | | | Cat | Calibration Due |
|---|---|---|---|---|---|---|---|
| Asset #2456 | 9KHz-18GHz | | MegaPhase | | | II | 10/31/2019 |
| Asset #2467 | 9KHz-18GHz | | MegaPhase | | | II | 10/31/2019 |
| Asset #2323 | 1-26.5GHz | TM26-S1S1-120 | MEGAPHASE | 17139101 002 | 2323 | II | 8/9/2019 |
| Asset #2606 | 9KHz-18GHz | | MegaPhase | | | II | 4/2/2020 |

## AC Line Conducted Emissions

### LIMITS

| Frequency of emission (MHz) | Quasi-peak limit (dBµV) | Average limit (dBµV) |
|---|---|---|
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

[47 CFR 15.207(a)]

### MEASUREMENTS / RESULTS

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT Line tested: Line Phase
EUT Mode of Operation: 24 VDC

Work Order # - T1639
EUT Power Input - 24VDC
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 12:38:55 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Pk Reading (dBµV) | Correction Factor (dB) | Adjusted Pk Amplitude (dBµV) | QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV) | Margin to the QP Limit (dB) | Pk to QP Limit Results (Pass/Fail) | Worst Margin (QP Limit) (dB) |
|---|---|---|---|---|---|---|---|
| 0.158 | 38.8 | 20.2 | 59 | 65.6 | -6.5 | PASS | -6.5 |
| 0.194 | 34.3 | 20.2 | 54.4 | 63.9 | -9.4 | PASS | |
| 0.219 | 35.1 | 20.2 | 55.3 | 62.8 | -7.5 | PASS | |
| 0.247 | 32.2 | 20.3 | 52.4 | 61.9 | -9.4 | PASS | |
| 0.375 | 28.4 | 20.1 | 48.5 | 58.4 | -9.9 | PASS | |
| 13.559 | 30.4 | 20.5 | 50.9 | 60 | -9.1 | PASS | |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Final Average Detector Data
Notes:
EUT Line tested: Line Phase
EUT Mode of Operation: 24 VDC

Work Order # - T1639
EUT Power Input - 24VDC
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 12:38:55 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Avg Reading (dBµV) | Correction Factor (dB) | Adjusted Avg Amplitude (dBµV) | Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|
| 0.149 | 2.4 | | | | | | |
| 0.155 | 15.2 | 20.1 | 35.3 | 55.7 | -20.4 | PASS | |
| 0.168 | 15.1 | 20.1 | 35.3 | 55 | -19.8 | PASS | |
| 0.175 | 15.2 | 20.3 | 35.5 | 54.7 | -19.2 | PASS | |
| 0.218 | 13.5 | 20.2 | 33.7 | 52.9 | -19.2 | PASS | |
| 0.393 | 10.2 | 20 | 30.2 | 48 | -17.8 | PASS | -17.8 |
| 0.574 | 7.3 | 19.9 | 27.1 | 46 | -18.9 | PASS | |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT: Neutral
EUT Mode of Operation: 24V DC

Work Order # - T1639
EUT Power Input - 24VDC
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 12:19:42 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Pk Reading (dBµV) | Correction Factor (dB) | Adjusted Pk Amplitude (dBµV) | QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV) | Margin to the QP Limit (dB) | Pk to QP Limit Results (Pass/Fail) | Worst Margin (QP Limit) (dB) |
|---|---|---|---|---|---|---|---|
| 0.207 | 31.1 | 20.3 | 51.4 | 63.3 | -11.9 | PASS | |
| 0.251 | 29.2 | 20.3 | 49.5 | 61.7 | -12.2 | PASS | |
| 0.278 | 29.8 | 20.2 | 50 | 60.9 | -10.8 | PASS | |
| 0.336 | 30.4 | 20.2 | 50.5 | 59.3 | -8.8 | PASS | -8.8 |
| 0.419 | 26.5 | 20.1 | 46.7 | 57.5 | -10.8 | PASS | |
| 13.56 | 30.6 | 20.5 | 51.1 | 60 | -8.9 | PASS | |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Final Average Detector Data
Notes:
EUT: Neutral
EUT Mode of Operation: 24V DC

Work Order # - T1639
EUT Power Input - 24VDC
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 12:19:42 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Avg Reading (dBµV) | Correction Factor (dB) | Adjusted Avg Amplitude (dBµV) | Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|
| 0.189 | 13.3 | 20.2 | 33.5 | 54.1 | -20.6 | PASS | |
| 0.225 | 11.6 | 20.2 | 31.8 | 52.6 | -20.8 | PASS | |
| 0.235 | 11.4 | 20.2 | 31.7 | 52.3 | -20.6 | PASS | |
| 0.264 | 13.5 | 20.2 | 33.8 | 51.3 | -17.6 | PASS | |
| 0.379 | 10.4 | 20 | 30.4 | 48.3 | -17.9 | PASS | |
| 13.557 | 20.5 | 20.5 | 41 | 50 | -9 | PASS | -9 |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUTBLE9117K: Line
EUT Mode of Operation: PoE

Work Order # - T1639
EUT Power Input - PoE (48VDC)
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 04:39:44 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Pk Reading (dBµV) | Correction Factor (dB) | Adjusted Pk Amplitude (dBµV) | QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV) | Margin to the QP Limit (dB) | Pk to QP Limit Results (Pass/Fail) | Worst Margin (QP Limit) (dB) |
|---|---|---|---|---|---|---|---|
| 0.184 | 37.3 | 20.3 | 57.5 | 64.3 | -6.8 | PASS | |
| 0.213 | 34.9 | 20.2 | 55.1 | 63.1 | -8 | PASS | |
| 0.269 | 29.3 | 20.2 | 49.5 | 61.2 | -11.7 | PASS | |
| 0.629 | 26.8 | 20.2 | 47 | 56 | -9 | PASS | |
| 0.734 | 26.6 | 19.9 | 46.5 | 56 | -9.5 | PASS | |
| **Frequency (MHz)** | **Raw QP Reading (dBµV)** | **Factor (dB)** | **Amplitude (dBµV)** | **Mains_FCC&CISP (dBµV)** | **Limit (dB)** | **QP Limit Results (Pass/Fail)** | **(QP Limit) (dB)** |
| 10.975 | 18.271 | 20.5 | 38.8 | 60 | -21.2 | PASS | -21.2 |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Final Average Detector Data
Notes:
EUTBLE9117K: Line
EUT Mode of Operation: PoE

Work Order # - T1639
EUT Power Input - PoE (48 VDC)
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 04:39:44 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Avg Reading (dBµV) | Correction Factor (dB) | Adjusted Avg Amplitude (dBµV) | Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|
| 0.157 | 15.1 | 20.2 | 35.3 | 55.6 | -20.4 | PASS | |
| 0.159 | 15.2 | 20.2 | 35.3 | 55.5 | -20.2 | PASS | |
| 0.231 | 19.9 | 20.2 | 40.1 | 52.4 | -12.3 | PASS | |
| 0.629 | 25.2 | 20.2 | 45.4 | 46 | -0.6 | PASS | -0.6 |
| 0.733 | 25.2 | 19.9 | 45.1 | 46 | -0.9 | PASS | |
| 13.56 | 19.2 | 20.5 | 39.7 | 50 | -10.3 | PASS | |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT:BLE9117K Neutral
EUT Mode of Operation: PoE

Work Order # - T1639
EUT Power Input - PoE (48 VDC)
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 04:21:25 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Pk Reading (dBµV) | Correction Factor (dB) | Adjusted Pk Amplitude (dBµV) | QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV) | Margin to the QP Limit (dB) | Pk to QP Limit Results (Pass/Fail) | Worst Margin (QP Limit) (dB) |
|---|---|---|---|---|---|---|---|
| 0.157 | 33 | 20.2 | 53.2 | 65.6 | -12.4 | PASS | |
| 0.419 | 27 | 20.1 | 47.2 | 57.5 | -10.3 | PASS | |
| 0.522 | 30.9 | 20 | 50.9 | 56 | -5.1 | PASS | |
| 0.73 | 29.7 | 20 | 49.7 | 56 | -6.3 | PASS | |
| 0.837 | 23.3 | 20.2 | 43.5 | 56 | -12.5 | PASS | |
| **Frequency (MHz)** | **Raw QP Reading (dBµV)** | **Factor (dB)** | **Amplitude (dBµV)** | **Mains_FCC&CISP (dBµV)** | **Limit (dB)** | **QP Limit Results (Pass/Fail)** | **(QP Limit) (dB)** |
| 0.63 | 24.738 | 20.2 | 44.9 | 56 | -11.1 | PASS | -11.1 |

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Final Average Detector Data
Notes:
EUT:BLE9117K Neutral
EUT Mode of Operation: PoE

Work Order # - T1639
EUT Power Input - PoE (48 VDC)
Test Site - CEMI-2
Conditions: - 22.5°C; 48.8%RH; 1009mBar
Test Engineer - AV

Data Taken at 04:21:25 PM, Monday, August 05, 2019

| Frequency (MHz) | Raw Avg Reading (dBµV) | Correction Factor (dB) | Adjusted Avg Amplitude (dBµV) | Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV) | Avg Margin (dB) | Avg Results (Pass/Fail) | Worst Avg Margin (dB) |
|---|---|---|---|---|---|---|---|
| 0.524 | 16.7 | 20 | 36.7 | 46 | -9.3 | PASS | |
| 0.629 | 23.9 | 20.2 | 44.1 | 46 | -1.9 | PASS | -1.9 |
| 0.734 | 24.1 | 19.9 | 44 | 46 | -2 | PASS | |

## Test Equipment Used

Rev. 7/30/2019

| Spectrum Analyzers / Receivers /Preselectors | Range | MN | Mfr | SN | Asset | Cat | Calibration Due | Calibrated on |
|---|---|---|---|---|---|---|---|---|
| Rental MXE EMI Receiver(1168255) | 20Hz-8.4GHz | N9038A | Agilent | MY53290009 | 1168255 | I | 8/23/2019 | 8/23/2018 |
| **LISNs/Measurement Probes** | **Range** | **MN** | **Mfr** | **SN** | **Asset** | **Cat** | **Calibration Due** | **Calibrated on** |
| LISN Asset 1732 | 150kHz-30MHz | LI-150A | Com-Power | 201094 | 1732 | I | 3/19/2020 | 3/19/2019 |
| LISN Asset 1733 | 150kHz-30MHz | LI-150A | Com-Power | 201095 | 1733 | I | 3/19/2020 | 3/19/2019 |
| **Conducted Test Sites (Mains / Telco)** | **FCC Code** | | **VCCI Code** | | | **Cat** | **Calibration Due** | **Calibrated on** |
| CEMI 2 | 719150 | | A-0015 | | | III | NA | N/A |
| **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 #2655 | | 1235C97 | Control Company | 181683829 | 2655 | I | 4/3/2020 | 4/3/2019 |
| **Cables** | **Range** | | **Mfr** | | | **Cat** | **Calibration Due** | **Calibrated on** |
| CEMI-02 | 9kHz - 2GHz | | C-S | | | II | 4/10/2020 | 4/10/2019 |

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

## *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)<br>NIST<br>CISPR | <br>5.6dB<br>4.6dB | <br>N/A<br>5.2dB (Ucispr) |
| 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<br>NIST<br>CISPR | <br>3.9dB<br>3.6dB | <br>N/A<br>3.6dB (Ucispr) |
| 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:<br>• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency | <br>3.4%<br>0.3dB | <br>5%<br>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 CURTIS-STRAUS (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 were 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.

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 Curtis-Straus may use to delegate the performance of work can be provided upon request.