

December 18, 2024

HID Global Corporation (US)  
611 Center Ridge Dr.  
Austin, TX 78753  
USA

Dear Nic Holmes,

Enclosed is the EMC test report for compliance testing of HID Global Corporation (US), HID Signo PIV Contact Reader, tested to the requirements of:

- FCC Part 15C and RSS-210 Issue 11

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely,



Nancy LaBrecque  
Documentation Department  
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIRA133283\_FCC\_IC\_LF RFID Rev 2

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Eurofins MET Laboratories Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.



**125kHz RFID  
Test Report**

for the

**HID Global Corporation (US)  
HID Signo PIV Contact Reader (Model: 40TC)**

Tested under the FCC and ISED Certification Rules for  
FCC Part 15C and RSS-210 Issue 11



Bryan Taylor, Wireless Team Lead  
Electromagnetic Compatibility Lab



Nancy LaBrecque  
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.



Matthew Hinojosa  
EMC Manager, Austin Electromagnetic Compatibility Lab

## Report Status Sheet

| Revision | Report Date | Reason for Revision         |
|----------|-------------|-----------------------------|
| Ø        | 12/18/2024  | Initial Issue.              |
| 1        | 11/07/2024  | Customer Requested Changes. |
| 2        | 12/18/2024  | Reviewer Requested Changes. |

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## Executive Summary

### A. Purpose of Test

An EMC evaluation was performed to determine compliance of the HID Global Corporation (US) HID Signo PIV Contact Reader, with the requirements of FCC Part 15C and RSS-210 Issue 11. In accordance with FCC Part 15C and RSS-210 Issue 11, the following data is presented in support of the Certification of the HID Signo PIV Contact Reader. HID Global Corporation (US) should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the HID Signo PIV Contact Reader, has been **permanently** discontinued.

### B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15C and RSS-210, in accordance with HID Global Corporation (US), under purchase order number HID022810. All tests were conducted using measurement procedures ANSI C63.4-2014 and C63.10-2013.

| FCC Reference      | ISED Reference                 | Description                        | Compliance |
|--------------------|--------------------------------|------------------------------------|------------|
| Part 15 §15.203    | ---                            | Antenna Requirement                | Compliant  |
| Part 15 §15.207(a) | RSS-Gen (8.8)                  | Conducted Emission Limits          | Compliant  |
| Part 15 §15.215    | ---                            | 20dB Occupied Bandwidth            | Compliant  |
| ---                | RSS-Gen (6.7)                  | 99% Occupied Bandwidth             | Compliant  |
| Part 15 §15.209    | RSS-210 (7.2)<br>RSS-Gen (8.9) | General Field Strength Limitations | Compliant  |

**Table 1. Executive Summary**

## Equipment Configuration

### A. Overview

Eurofins E&E North America was contracted by HID Global Corporation (US) to perform testing on the HID Signo PIV Contact Reader.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the HID Global Corporation (US) HID Signo PIV Contact Reader.

The results obtained relate only to the item(s) tested.

|                                       |                                                         |              |
|---------------------------------------|---------------------------------------------------------|--------------|
| <b>Product Name:</b>                  | HID Signo PIV Contact Reader                            |              |
| <b>Model(s) Tested:</b>               | 40TC                                                    |              |
| <b>FCCID:</b>                         | JQ6-SIGNO40TC                                           |              |
| <b>ICID:</b>                          | 2236B-SIGNO40TC                                         |              |
| <b>Sample Number:</b>                 | 24775-17                                                |              |
| <b>Equipment Specifications:</b>      | Primary Power:                                          | 12VDC        |
|                                       | Type of Modulation(s):                                  | ASK          |
|                                       | Equipment Code:                                         | DCD          |
|                                       | Maximum field Strength:                                 | 67.43 dBuV/m |
|                                       | Antenna Type:                                           | loop         |
|                                       | EUT Frequency Ranges:                                   | 125kHz       |
| <b>Analysis:</b>                      | The results obtained relate only to the item(s) tested. |              |
| <b>Environmental Test Conditions:</b> | Temperature: 15-35° C                                   |              |
|                                       | Relative Humidity: 30-60%                               |              |
|                                       | Barometric Pressure: 860-1060 mbar                      |              |
| <b>Evaluated by:</b>                  | Bryan Taylor and Sergio Gutierrez                       |              |
| <b>Test Date(s):</b>                  | 8/26/2024 to 8/31/2024                                  |              |

**Table 2. EUT Summary Table**

## B. References

|                                        |                                                                                                                                                                       |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CFR 47, Part 15, Subpart C</b>      | Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies |
| <b>ANSI C63.4:2014</b>                 | Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz                                |
| <b>ISO/IEC 17025:2017</b>              | General Requirements for the Competence of Testing and Calibration Laboratories                                                                                       |
| <b>ANSI C63.10-2013</b>                | American National Standard for Testing Unlicensed Wireless Devices                                                                                                    |
| <b>RSS-210 Issue 11: December 2019</b> | Licence-Exempt Radio Apparatus: Category I Equipment                                                                                                                  |
| <b>RSS-Gen Issue 5: April 2018</b>     | General Requirements for Compliance of Radio Apparatus                                                                                                                |

**Table 3. References**

## C. Test Site

Eurofins MET Laboratories Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

All testing was performed at Eurofins E&E North America, 13501 McCallen Pass, Austin, TX 78753. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

### ISED Lab Info:

CAB Identifier: US0004  
Company Number: 2043D

### FCC Lab Info:

Designation Number: US1127

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

Correlation between semi-anechoic chamber and OATS:

Two calibrated Loop antennas were used on an OATS. One antenna was driven by a signal generator with a known power. The receive antenna was initially placed 1m away from the transmit antenna. The two antennas were placed parallel to each other. The receive antenna was in turn connected to a calibrated spectrum analyzer. The emissions were swept from 9 kHz to 30 MHz. The receive antenna was then rotated 90 degrees and measurements re-taken. Additional measurements were taken when the receive antenna was placed at 3meters. This same setup was taken to inside the semi-anechoic chamber and the measurements repeated.

The data was used to correlate the semi-anechoic chamber and OATS.

## D. Measurement Uncertainty

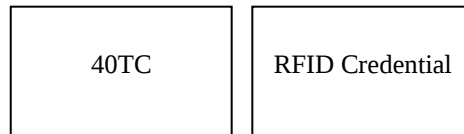
| Test Method                                | Typical Expanded Uncertainty | K | Confidence Level |
|--------------------------------------------|------------------------------|---|------------------|
| Occupied Bandwidth Measurements            | ±4.52 Hz                     | 2 | 95%              |
| Conducted Power Measurements               | ±2.74 dB                     | 2 | 95%              |
| Power Spectral Density Measurements        | ±2.74 dB                     | 2 | 95%              |
| Conducted Spurious Emissions               | ±2.80 dB                     | 2 | 95%              |
| Conducted Emissions (Mains)                | ±2.97 dB                     | 2 | 95%              |
| Radiated Spurious Emissions (9kHz – 1GHz)  | ±2.95 dB                     | 2 | 95%              |
| Radiated Spurious Emissions (1GHz - 40GHz) | ±3.54 dB                     | 2 | 95%              |

**Table 4. Uncertainty Calculations Summary**

## E. Description of Test Sample

HID Signo PIV Contact Reader is a Access Control credential reader that is equipped with LF, HF, BLE and Contact card read ability.

The intended use of the product is for gaining secure access into building, sites or places via the use of a secure credential in the form of a LF credential card, HF credential card, NFC enabled smart phone, BLE Mobile credential or Contact chip credential.



**Figure 1. Block Diagram of Test Configuration**

## F. Equipment Configuration

A 13.56MHz credential was placed in the field in front of the HID Signo PIV Contact Reader which was configured to allow continuous reading whilst the credential was present.

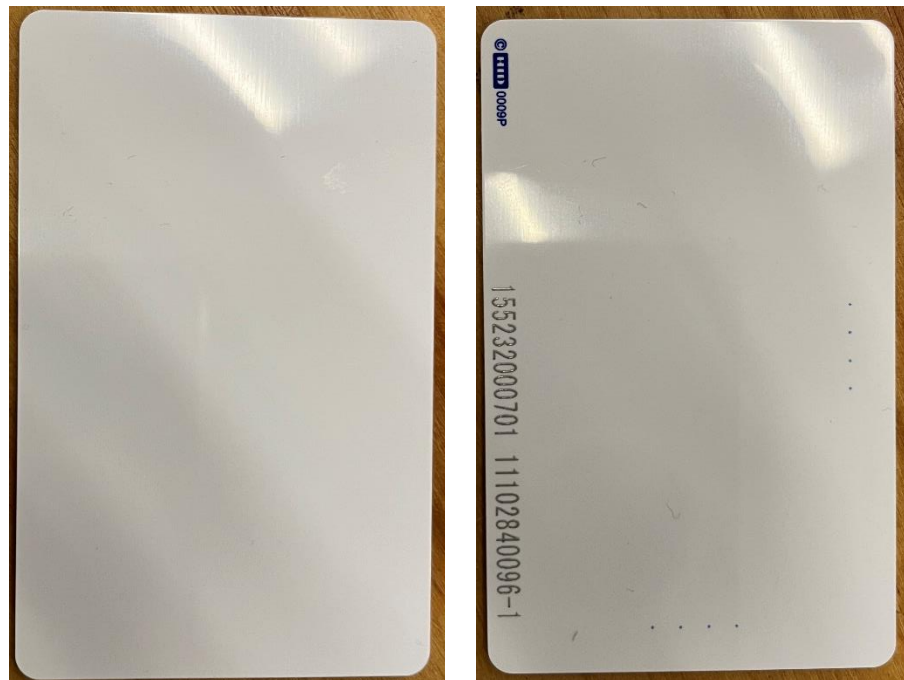
## G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

| Name/Description | Manufacturer    | Model Number | Serial Number | *Customer Supplied Calibration Data |
|------------------|-----------------|--------------|---------------|-------------------------------------|
| None             | Laptop Computer | Lenovo       | ThinkPad      | None                                |

**Table 5. Support Equipment**

The RFID credential used during the testing is shown below:



**Figure 2: Front / Back Photo of the 125kHz RFID Credential**

## H. Ports and Cabling Information

| Ref. Id | Port Name on EUT | Cable Description or reason for no cable | Qty | Length as tested (m) | Max Length (m) | Shielded? (Y/N) | Termination Box ID & Port Name |
|---------|------------------|------------------------------------------|-----|----------------------|----------------|-----------------|--------------------------------|
| ---     | DC Input         | DC Input                                 | 1   | 1m                   | ---            | No              | 12V DC Power Source            |

**Table 6. Ports and Cabling Information**

## I. Mode of Operation

The RF credential was placed in the field in front of the HID Signo PIV Contact Reader which was configured to allow continuous reading whilst the credential was present.

| Transmit Band | Modulation | Channel Frequencies Tested | Exercising Method      |
|---------------|------------|----------------------------|------------------------|
| 125kHz        | ASK        | 125kHz                     | 125kHz RFID Credential |

Table 7. Test Channels Utilized

## J. Modifications

### a) Modifications to EUT

No modifications were made to the EUT.

### b) Modifications to Test Standard

No modifications were made to the test standard.

## K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to HID Global Corporation (US) upon completion of testing.

## Antenna Requirements

### § 15.203      Antenna Requirement

**Test Requirement:**      **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

**Test Results:**      The HID Signo PIV Contact Reader was compliant with this requirement. The antenna is permanently attached to the unit.

**Test Engineer(s):**      Bryan Taylor

**Test Date(s):**      8/26/2024

## Conducted Emissions

### § 15.207(a) Conducted Emissions Limits

**Test Requirement(s):** § 15.207 (a): For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50  $\Omega$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency range<br>(MHz) | § 15.207(a), Conducted Limit (dB $\mu$ V) |         |
|--------------------------|-------------------------------------------|---------|
|                          | Quasi-Peak                                | Average |
| * 0.15 - 0.5             | 66 - 56                                   | 56 - 46 |
| 0.5 - 5                  | 56                                        | 46      |
| 5 - 30                   | 60                                        | 50      |

**Table 8. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)**

Note: \*Decreases with the logarithm of the frequency.

## RSS-GEN (8.8) AC Power-Line Conducted Emissions Limits

**Test Requirement(s):** **RSS-GEN (8.8):** Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in the below figure, as measured using a 50  $\mu$ H / 50  $\Omega$  line impedance stabilization network (LISN). This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in the below figure shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

| Frequency<br>(MHz) | Conducted Limit (dB $\mu$ V) |                       |
|--------------------|------------------------------|-----------------------|
|                    | Quasi-Peak                   | Average               |
| * 0.15-0.5         | 66 to 56                     | 56 to 46 <sup>1</sup> |
| 0.5-5              | 56                           | 46                    |
| 5-30               | 60                           | 50                    |

**Table 9. AC Power Line Conducted Emissions Limits**

Note: \*Decreases with the logarithm of the frequency.

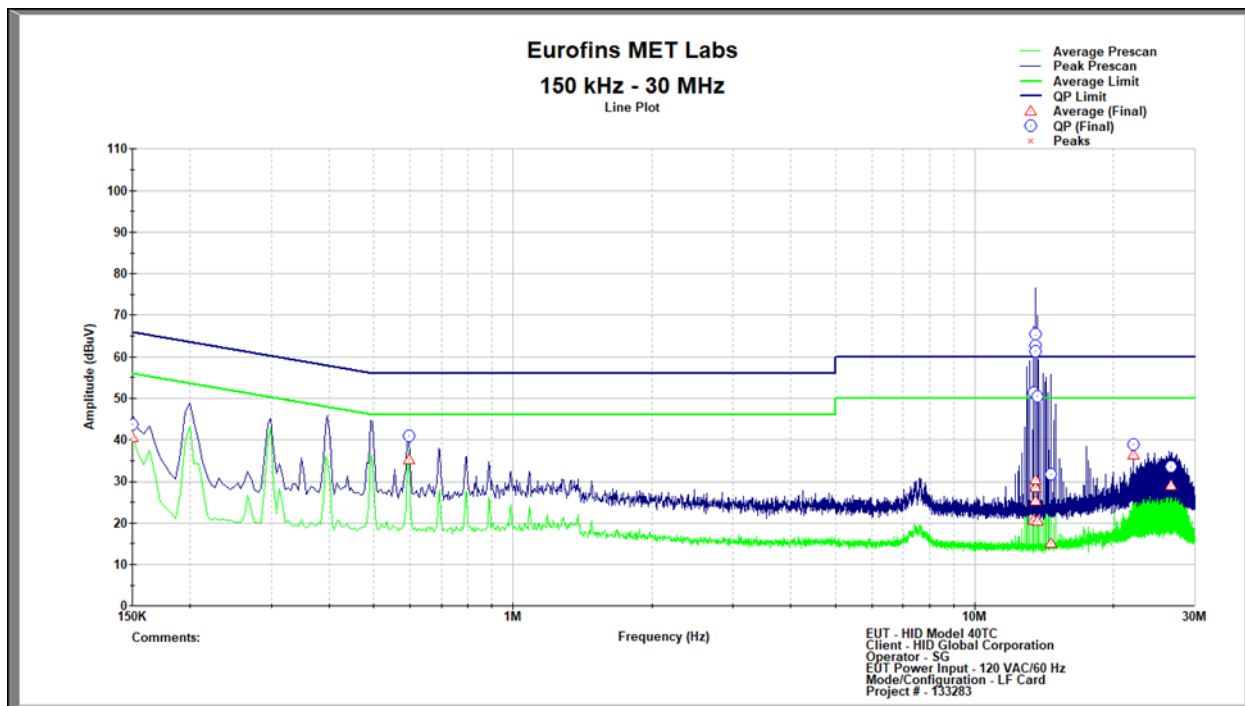
**Test Procedure:** The EUT was placed on a 0.8 m-high non-conducting table above a ground plane. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013 "Procedures for Compliance Testing of Unlicensed Wireless Devices"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50  $\Omega$ /50  $\mu$ H LISN as the input transducer to an EMI receiver.

**Test Results:** The HID Signo PIV Contact Reader was compliant with this requirement.

**Test Engineer(s):** Sergio Gutierrez

**Test Date(s):** 8/28/2024

## Conducted Emissions Test Results



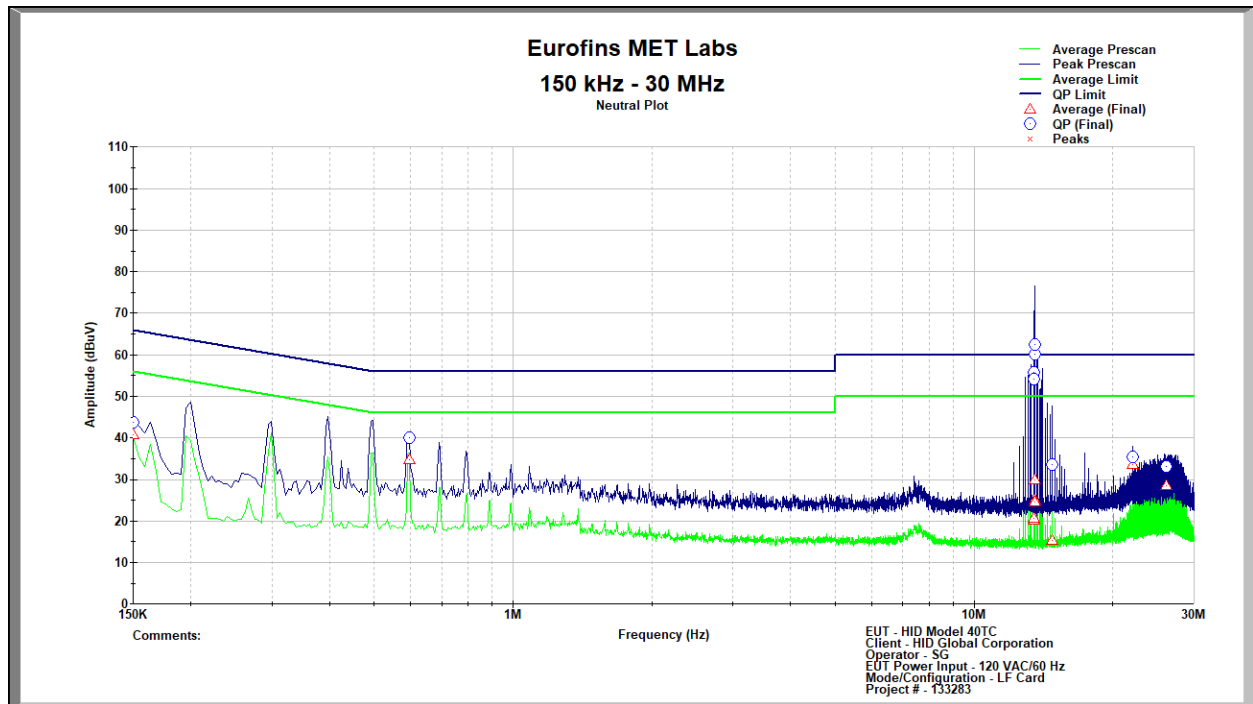
### Conducted Emissions, Phase Test Results<sup>1</sup>

| Frequency (MHz) | Quasi-Peak (dBμV) | Quasi-Peak Limit (dBμV) | Quasi-Peak Margin (dB) | Average (dBμV) | Average Limit (dBμV) | Average Margin (dB) |
|-----------------|-------------------|-------------------------|------------------------|----------------|----------------------|---------------------|
| 0.150           | 43.694            | 66.000                  | 22.306                 | 40.505         | 56.000               | 15.495              |
| 0.596           | 40.863            | 56.000                  | 15.137                 | 35.238         | 46.000               | 10.762              |
| 13.399          | 51.427            | 60.000                  | 8.573                  | 20.508         | 50.000               | 29.492              |
| 13.706          | 50.420            | 60.000                  | 9.580                  | 20.281         | 50.000               | 29.719              |
| 14.614          | 31.688            | 60.000                  | 28.312                 | 15.125         | 50.000               | 34.875              |
| 22.125          | 38.807            | 60.000                  | 21.193                 | 36.299         | 50.000               | 13.701              |
| 26.676          | 33.508            | 60.000                  | 26.492                 | 28.855         | 50.000               | 21.145              |

Table 10. Conducted Emissions Phase, Test Results

<sup>1</sup>The large signal at 13.56MHz is from the RFID reader onboard that operates at that frequency.

## Conducted Emissions Test Results



Conducted Emissions, Neutral, Test Results<sup>2</sup>

| Frequency (MHz) | Quasi-Peak (dBμV) | Quasi-Peak Limit (dBμV) | Quasi-Peak Margin (dB) | Average (dBμV) | Average Limit (dBμV) | Average Margin (dB) |
|-----------------|-------------------|-------------------------|------------------------|----------------|----------------------|---------------------|
| 0.150           | 43.775            | 66.000                  | 22.225                 | 40.647         | 56.000               | 15.353              |
| 0.596           | 40.110            | 56.000                  | 15.890                 | 34.764         | 46.000               | 11.236              |
| 13.480          | 55.696            | 60.000                  | 4.304                  | 20.147         | 50.000               | 29.853              |
| 13.489          | 54.137            | 60.000                  | 5.863                  | 20.551         | 50.000               | 29.449              |
| 14.781          | 33.581            | 60.000                  | 26.419                 | 15.261         | 50.000               | 34.739              |
| 22.130          | 35.515            | 60.000                  | 24.485                 | 33.643         | 50.000               | 16.357              |
| 26.163          | 33.084            | 60.000                  | 26.916                 | 28.375         | 50.000               | 21.625              |

Table 11. Conducted Emissions, Neutral, Test Results

<sup>2</sup>The large signal at 13.56MHz is from the RFID reader onboard that operates at that frequency.

## Occupied Bandwidth Measurements

### § 15.215(c) 20 dB Occupied Bandwidth

**Test Requirement(s):** § 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

**Test Procedure:** The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer. Per ANSI C63.10: 2020 the RBW should be between 1% and 5% of the occupied bandwidth.

**Test Results:** The HID Signo PIV Contact Reader was compliant with this requirement.

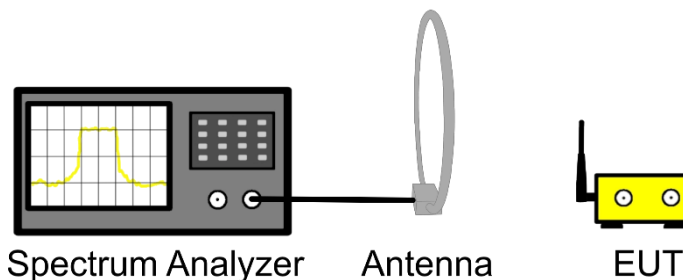
## RSS-GEN (6.7) 99% Occupied Bandwidth

**Test Requirements:** The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

**Test Procedure:** The EUT was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer. Per ANSI C63.10: 2020 the RBW should be between 1% and 5% of the occupied bandwidth.

**Test Engineer(s):** Bryan Taylor

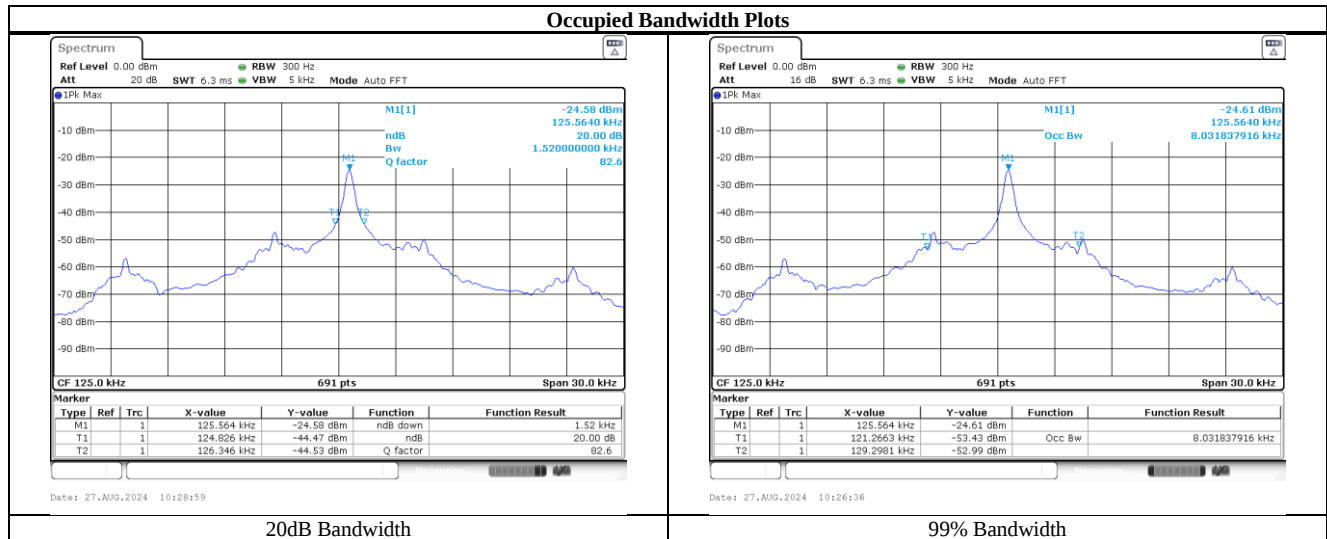
**Test Date(s):** 8/27/2024



**Figure 3. 20 dB Bandwidth and 99% Bandwidth Test Setup**

| Center Frequency (kHz) | 20 dB Bandwidth | 99% Bandwidth |
|------------------------|-----------------|---------------|
| 125kHz                 | 1.52kHz         | 8.03kHz       |

Table 12. Occupied Bandwidth Test Results



## Electromagnetic Compatibility Criteria for Intentional Radiators

### Radiated Emissions Limits; General Requirements

#### Test Requirement(s):

**§15.209 (a)** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                 | Field strength (microvolts/meter) | Measurement distance (meters) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| 0.009-0.490                                                                                                                                                                                                                                                                                                                                     | 2400/F(kHz)                       | 300                           |
| 0.490-1.705                                                                                                                                                                                                                                                                                                                                     | 24000/F(kHz)                      | 30                            |
| 1.705-30.0                                                                                                                                                                                                                                                                                                                                      | 30                                | 30                            |
| 30-88                                                                                                                                                                                                                                                                                                                                           | 100 (40dBuV/m) **                 | 3                             |
| 88-216                                                                                                                                                                                                                                                                                                                                          | 150 (43.5dBuV/m)**                | 3                             |
| 216-960                                                                                                                                                                                                                                                                                                                                         | 200 (46.0dBuV/m)**                | 3                             |
| Above 960                                                                                                                                                                                                                                                                                                                                       | 500 (54.0dBuV/m)                  | 3                             |
| ** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. |                                   |                               |

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in [§§ 15.31](#), [15.33](#), and [15.35](#) for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

(f) In accordance with [§ 15.33\(a\)](#), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in [§ 15.109](#) and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in [§ 15.205](#), the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in [§ 15.109](#) that are applicable to the incorporated digital device.

(g) Perimeter protection systems may operate in the 54–72 MHz and 76–88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

## RSS-210 (7.2) General Field Strength Limits

**Test Requirement(s):** RSS-Gen includes the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this standard.

Unless otherwise indicated, unwanted emissions of transmitters and receivers are permitted to fall within the restricted frequency bands listed in RSS-Gen and the TV bands 54-72 MHz, 76-88 MHz, 174-216 MHz and 470-602 MHz; however, fundamental emissions are prohibited in these bands, except where equipment operation is permitted in the applicable RSS.

### RSS-Gen (8.9) Transmitter Emission Limits

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

| Table 5 – General field strength limits at frequencies above 30 MHz |                              |  |
|---------------------------------------------------------------------|------------------------------|--|
| Frequency (MHz)                                                     | Field strength (µV/m at 3 m) |  |
| 30 – 88                                                             | 100                          |  |
| 88 – 216                                                            | 150                          |  |
| 216 – 960                                                           | 200                          |  |
| Above 960                                                           | 500                          |  |

| Table 6 – General field strength limits at frequencies below 30 MHz |                                          |                          |
|---------------------------------------------------------------------|------------------------------------------|--------------------------|
| Frequency                                                           | Magnetic field strength (H-Field) (µA/m) | Measurement distance (m) |
| 9 - 490 kHz <sup>Note 1</sup>                                       | 6.37/F (F in kHz)                        | 300                      |
| 490 - 1705 kHz                                                      | 63.7/F (F in kHz)                        | 30                       |
| 1.705 - 30 MHz                                                      | 0.08                                     | 30                       |

**Note 1:** The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

**Test Procedure:**

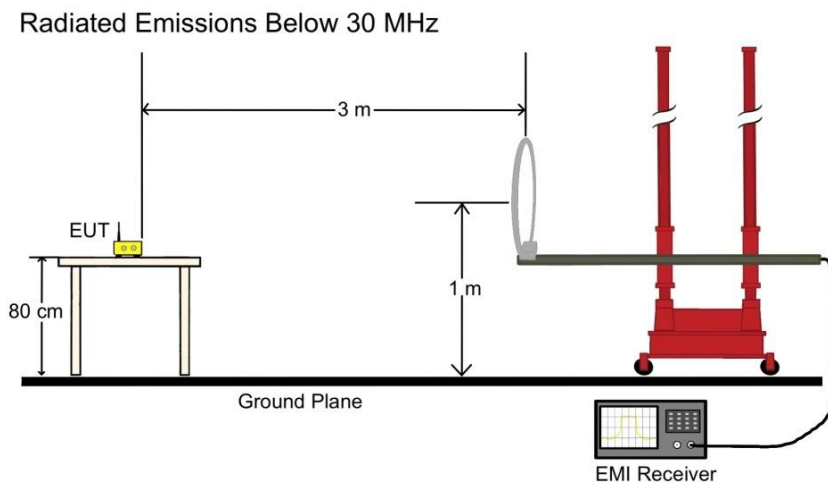
The EUT was set to transmit and placed on a 0.8 m-high wooden stand inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.10: 2013 were used. For measurements below 30 MHz a loop antenna placed 3m away from the unit was used. For measurements above 30 MHz a biconalog antenna placed 10 m away from the unit was used. Measurements below 30 MHz were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. Measurements above 30 MHz were conducted with the biconalog antenna in the vertical and horizontal polarizations. A peak detector was used to perform a pre-scan from 9 kHz to 10 times the fundamental frequency. Spurious emissions within 20 dB of the applicable limit were measured using a quasi-peak detector and recorded in the subsequent section. Peak emissions that were observed over the applicable limit were determined to be digital emissions subject to the requirements of FCC Part 15 Subpart B and ICES-003 subsection 6.2 for Class A devices.

The measurements made at 3 m with the loop antenna (below 30MHz) were then extrapolated to 30m or 300 m using the following correction factors which were applied to the limit.

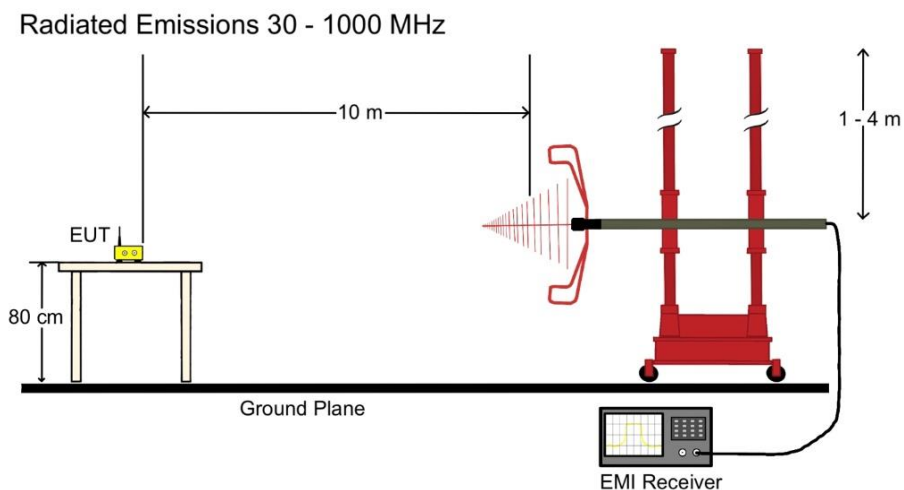
$$40\log(30/3) = 40 \text{ dB}$$
$$40\log(300/3) = 80 \text{ dB}$$

The measurements made at 10 m with the biconilog antenna (above 30MHz) were then extrapolated to the 3m using the following correction factor which were applied to the limit.

$$20\log(10/3) = 10.46 \text{ dB}$$



**Figure 4: Radiated Emissions (Below 30MHz), Test Setup**



**Figure 5. Radiated Emissions (Above 30MHz), Test Setup**

**Test Results:** The HID Signo PIV Contact Reader was compliant with the general radiated emission limits.

**Test Engineer(s):** Sergio Gutierrez

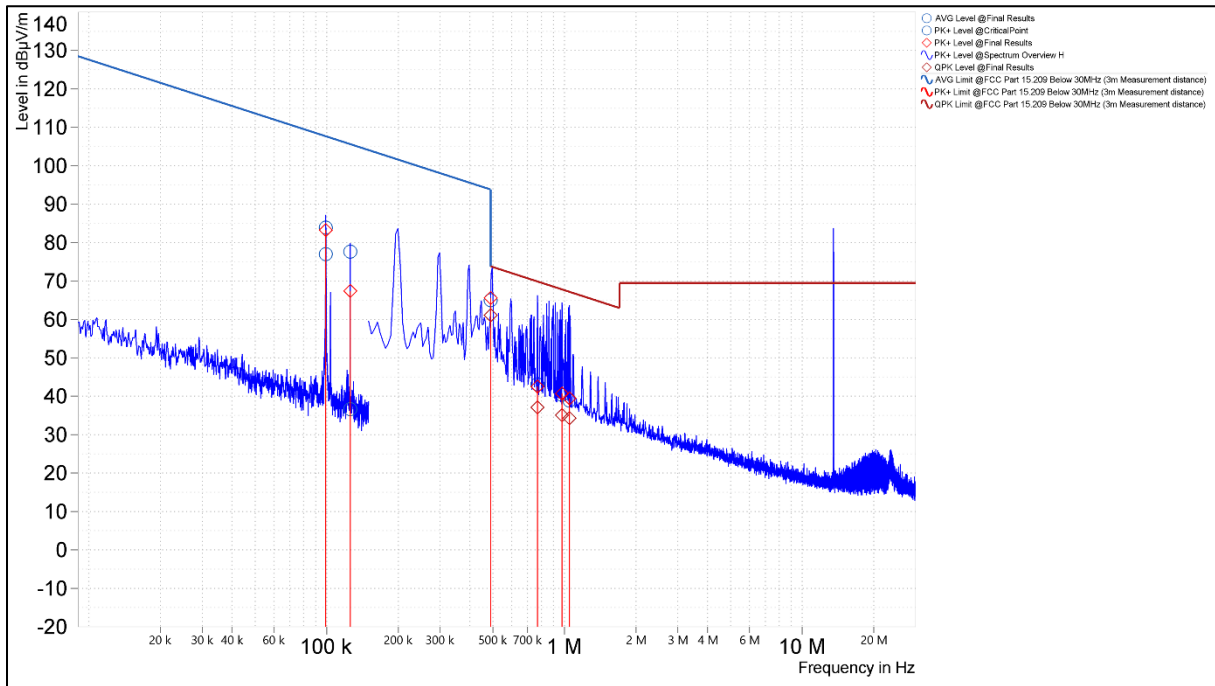
**Test Date(s):** 8/30/2024

| Frequency [MHz] | Peak Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Correction [dB] | Polarization | Azimuth [deg] | Antenna Height [m] | Meas. BW [kHz] | Result |
|-----------------|---------------------|----------------|-------------|-----------------|--------------|---------------|--------------------|----------------|--------|
| 0.099           | 83.20               | 107.67         | 24.46       | 11.31           | H            | 257.9         | 1                  | 0.200          | Pass   |
| 0.099           | 86.51               | 107.67         | 21.16       | 11.31           | V            | 320.5         | 1                  | 0.200          | Pass   |
| 0.126           | 67.43               | 105.62         | 38.19       | 11.31           | H            | 289.2         | 1                  | 0.200          | Pass   |
| 0.490           | 65.57               | 73.80          | 8.23        | 11.32           | H            | 342.2         | 1                  | 9.000          | Pass   |
| 0.497           | 69.25               | 73.69          | 4.44        | 11.28           | V            | 347.9         | 1                  | 9.000          | Pass   |
| 0.771           | 42.52               | 69.86          | 27.33       | 11.46           | H            | 231           | 1                  | 9.000          | Pass   |
| 0.978           | 40.65               | 67.79          | 27.14       | 11.67           | H            | 263           | 1                  | 9.000          | Pass   |
| 1.050           | 39.46               | 67.17          | 27.71       | 11.77           | H            | 189.1         | 1                  | 9.000          | Pass   |

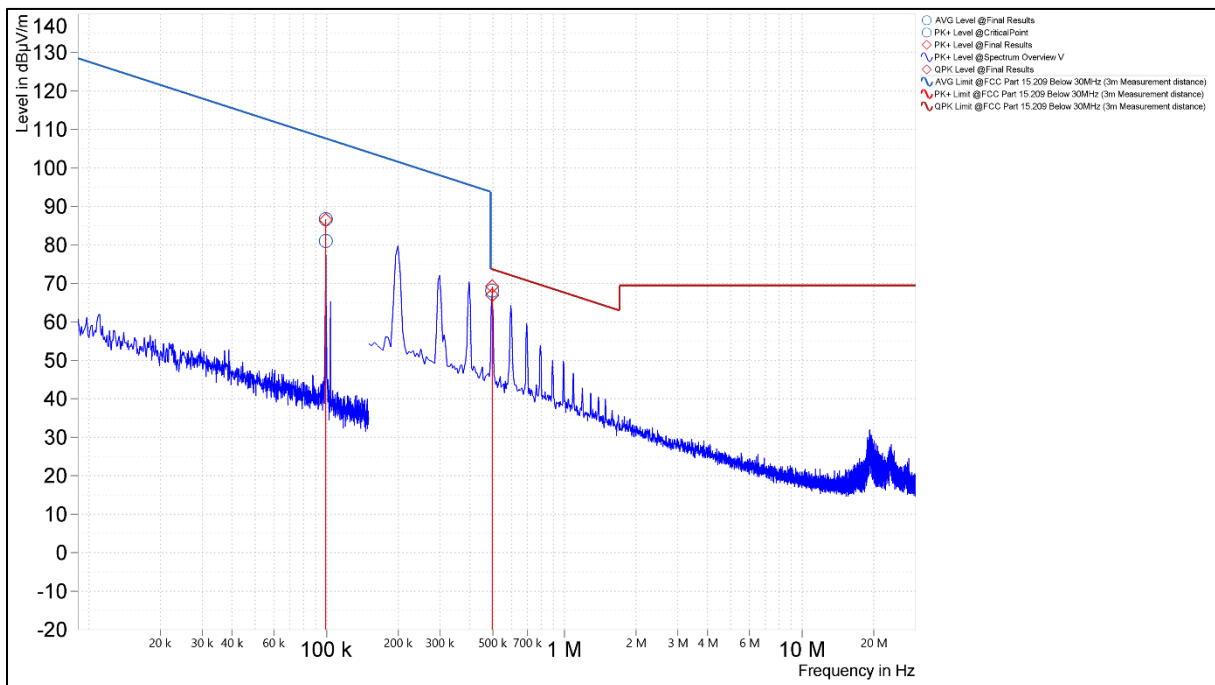
Table 13. Radiated Spurious Emissions 9kHz – 30MHz

| Frequency [MHz] | QPK Level [dBμV/m] | QPK Limit [dBμV/m] | QPK Margin [dB] | Correction [dB] | Polarization | Azimuth [deg] | Antenna Height [m] | Meas. BW [kHz] | Comment |
|-----------------|--------------------|--------------------|-----------------|-----------------|--------------|---------------|--------------------|----------------|---------|
| 52.230          | 31.87              | 39.55              | 7.68            | -13.65          | V            | 81.6          | 1.18               | 120.000        | Pass    |
| 52.380          | 30.14              | 39.55              | 9.41            | -13.58          | H            | 360.5         | 2.77               | 120.000        | Pass    |
| 54.240          | 31.08              | 39.55              | 8.47            | -13.77          | H            | 197           | 3.93               | 120.000        | Pass    |
| 54.240          | 34.14              | 39.55              | 5.41            | -13.94          | V            | 76.4          | 1.24               | 120.000        | Pass    |
| 63.960          | 25.03              | 39.55              | 14.52           | -13.04          | H            | 289.6         | 3.75               | 120.000        | Pass    |
| 64.710          | 29.93              | 39.55              | 9.62            | -12.88          | V            | 218.7         | 1.07               | 120.000        | Pass    |
| 66.360          | 32.78              | 39.55              | 6.77            | -12.79          | H            | 271.7         | 2.86               | 120.000        | Pass    |
| 66.390          | 38.41              | 39.55              | 1.14            | -12.86          | V            | 333.4         | 1.02               | 120.000        | Pass    |
| 128.010         | 29.21              | 43.07              | 13.86           | -6.75           | V            | 278.7         | 1.55               | 120.000        | Pass    |
| 149.160         | 37.68              | 43.07              | 5.39            | -7.61           | H            | 137.8         | 2.01               | 120.000        | Pass    |
| 162.720         | 37.24              | 43.07              | 5.83            | -7.77           | H            | 156.8         | 1.85               | 120.000        | Pass    |
| 162.720         | 36.08              | 43.07              | 6.99            | -7.87           | V            | 223.6         | 1.09               | 120.000        | Pass    |
| 176.280         | 35.11              | 43.07              | 7.96            | -8.33           | V            | 155.5         | 1.11               | 120.000        | Pass    |
| 255.990         | 39.51              | 45.57              | 6.06            | -7.67           | H            | 304.6         | 0.99               | 120.000        | Pass    |
| 384.000         | 38.35              | 45.57              | 7.22            | -3.59           | H            | 340.1         | 1.78               | 120.000        | Pass    |
| 384.000         | 41.19              | 45.57              | 4.38            | -3.49           | V            | 334.2         | 1.08               | 120.000        | Pass    |
| 768.000         | 37.90              | 45.57              | 7.67            | 4.40            | V            | 295.2         | 1.92               | 120.000        | Pass    |

Table 14. Radiated Spurious Emissions Above 30MHz

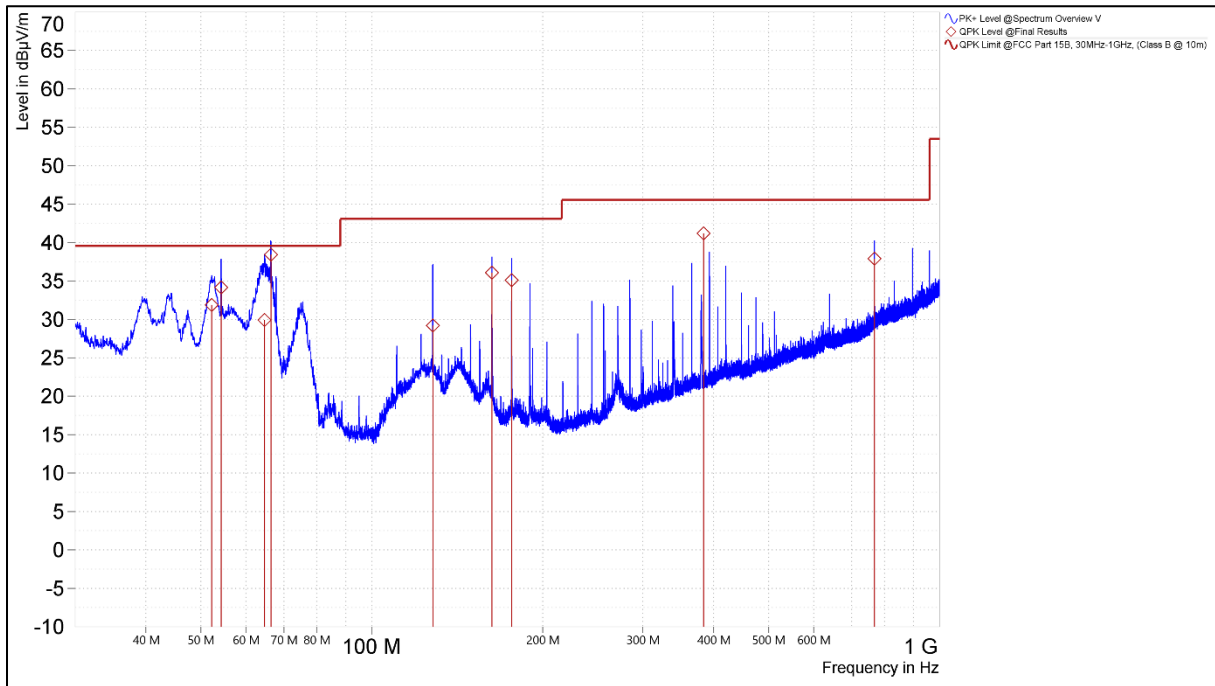


**Figure 6. Spurious Emissions Below 30MHz, (Coplanar Loop<sup>3</sup>)**

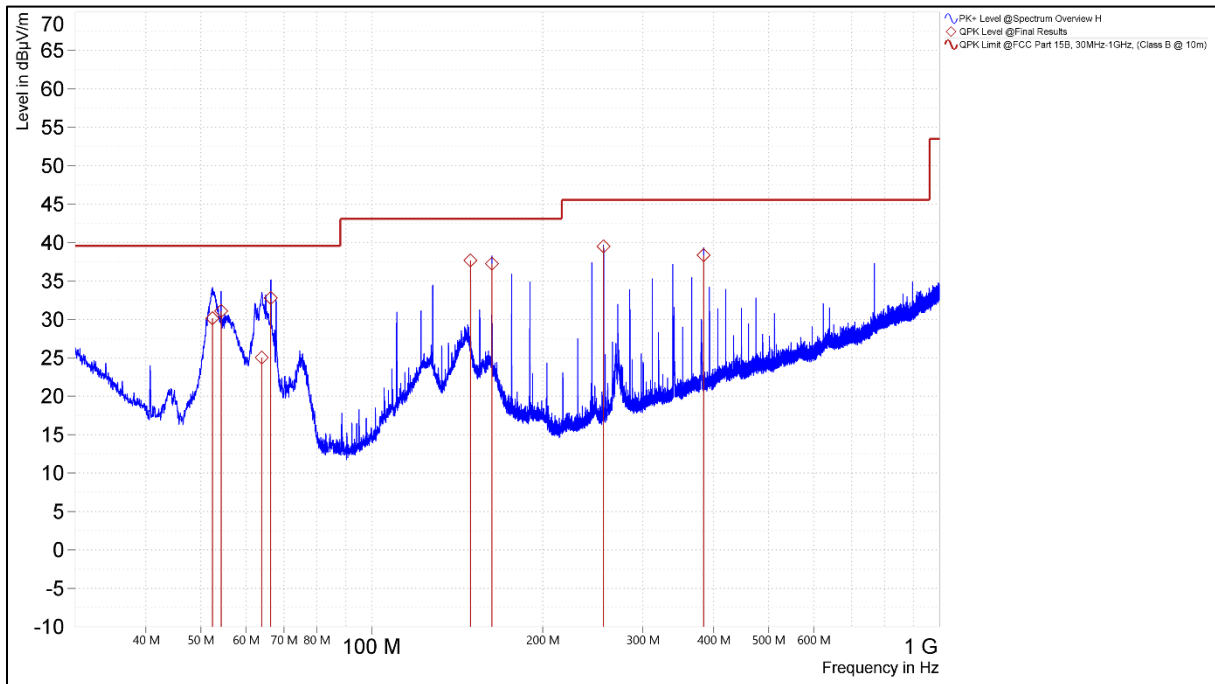


**Figure 7. Spurious Emissions Below 30MHz, (Coaxial Loop<sup>3</sup>)**

<sup>3</sup> Note, the HID Signo PIV Contact Reader also includes a 13.56MHz RFID reader onboard. This signal shows up on the plots but does not indicate a failing result. The 13.56MHz fundamental was subjected to a different limit with results in a separate report.



**Figure 8. Spurious Emissions 30MHz – 1GHz, (Vertical Polarity)**



**Figure 9. Spurious Emissions 30MHz – 1GHz, (Horizontal Polarity)**

## Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

| MET Asset # | Description                      | Manufacturer       | Model                  | Last Cal Date | Cal Due Date |
|-------------|----------------------------------|--------------------|------------------------|---------------|--------------|
| 1A1234      | Signal Analyzer                  | Rohde & Schwarz    | FSV40                  | 01/23/2023    | 01/23/2025   |
| 1A1250      | Receiver                         | Rohde & Schwarz    | ESW44                  | 04/08/2024    | 04/08/2025   |
| 1A1176      | Active Loop Antenna (9KHz-30MHz) | ETS-Lindgren       | 6502                   | 8/22/2024     | 08/22/2026   |
| 1A1147      | Bi-Log Antenna                   | Suno Sciences Corp | JB3                    | 04/06/2023    | 04/06/2025   |
| 1A1047      | Horn Antenna (1GHz – 18GHz)      | ETS - Lindgren     | 3117                   | 06/26/2024    | 06/26/2025   |
| 1A1161      | Horn Antenna (18GHz – 40GHz)     | ETS Lindgren       | 3116C                  | 08/01/2024    | 08/01/2026   |
| 1A1065      | EMI Receiver                     | Rohde & Schwarz    | ESCI                   | 08/20/2024    | 08/20/2025   |
| 1A1177      | Pulse Limiter                    | Rohde & Schwarz    | ESH3Z2                 | 12/14/2023    | 12/14/2024   |
| 1A1122      | LISN                             | TESEQ              | NNB 51                 | 09/21/2023    | 09/21/2024   |
| 1A1149      | DC Milliohm Meter                | GW Instek          | GOM-802                | 09/20/2023    | 09/20/2024   |
| 1A1117      | Digital Multimeter               | Fluke              | 87 III                 | 11/6/2023     | 11/06/2024   |
| 1A1225      | Environmental Chamber            | Espec              | EXP-2H/New             | 5/15/2024     | 05/15/2025   |
| 1A1099      | Generator                        | Com-Power          | CGO-51000              | See Note      |              |
| 1A1088      | Preamplifier                     | Rohde & Schwarz    | TS-PR1                 | See Note      |              |
| 1A1044      | Generator                        | Com-Power          | CG-520                 | See Note      |              |
| 1A1073      | Multi Device Controller          | ETS                | 2090                   | See Note      |              |
| 1A1074      | System Controller                | Panasonic          | WV-CU101               | See Note      |              |
| 1A1080      | Multi-Device                     | ETS                | 2090                   | See Note      |              |
| 1A1180      | Preamplifier                     | Miteq              | AMF-7D-01001800-22-10P | See Note      |              |

**Table 15. Test Equipment List**

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

# End of Report