

**COMPLIANCE WORLDWIDE INC.  
TEST REPORT 201-24**

**In Accordance with the Requirements of  
FCC PART 15.209, SUBPART C**

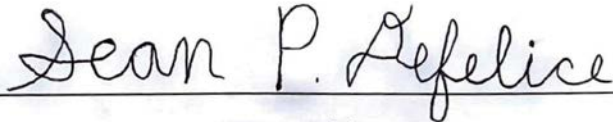
**Issued to  
Napco Security Technologies, Inc.  
333 Bayview Avenue  
Amityville, NY 11701**

**for the  
R-PH 125 kHz Proximity Card Reader  
Model: R-PH**

**FCC ID: AD8R-PH**

**Report Issued on June 28, 2024**

**Tested by**



Sean P. Defelice

**Reviewed By**



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## Table of Contents

|                                                                   |    |
|-------------------------------------------------------------------|----|
| 1 Scope .....                                                     | 3  |
| 2 Product Details.....                                            | 3  |
| 2.1 Manufacturer .....                                            | 3  |
| 2.2 Model Number .....                                            | 3  |
| 2.3 Serial Number .....                                           | 3  |
| 2.4 Description .....                                             | 3  |
| 2.5 Power Source .....                                            | 3  |
| 2.6 Hardware Revision.....                                        | 3  |
| 2.7 Software Revision .....                                       | 3  |
| 2.8 Modulation Type .....                                         | 3  |
| 2.9 Operating Frequencies .....                                   | 3  |
| 2.10 EMC Modifications .....                                      | 3  |
| 3 Product Configuration .....                                     | 3  |
| 3.1 Operational Characteristics & Software .....                  | 3  |
| 3.2 EUT Hardware .....                                            | 3  |
| 3.3 EUT Cables/Transducers.....                                   | 3  |
| 3.4 Support Equipment .....                                       | 4  |
| 3.5 Block Diagram.....                                            | 4  |
| 4 Measurements Parameters .....                                   | 5  |
| 4.1 Measurement Equipment and Software Used to Perform Test ..... | 5  |
| 4.2 Measurement & Equipment Setup.....                            | 5  |
| 4.3 Measurement Procedure .....                                   | 5  |
| 5 Choice of Equipment for Test Suits .....                        | 6  |
| 5.1 Choice of Model .....                                         | 6  |
| 5.2 Presentation.....                                             | 6  |
| 5.3 Choice of Operating Frequencies .....                         | 6  |
| 6 Measurement Summary .....                                       | 7  |
| 7 Measurement Data .....                                          | 8  |
| 7.1 Antenna Requirement .....                                     | 8  |
| 7.2 Radiated Field Strength of Fundamental .....                  | 8  |
| 7.3 Emission Bandwidth.....                                       | 10 |
| 7.4 Combined Spurious Harmonic Emissions .....                    | 11 |
| 7.5 Spurious Radiated Emissions .....                             | 12 |
| 7.6 Power Line Conducted Emissions .....                          | 18 |
| 7.7 Conducted Emissions Test Results .....                        | 19 |
| 8 Test Site Description.....                                      | 23 |
| 9 Test Setup Images.....                                          | 24 |

## 1. Scope

This test report certifies that the Napco Security Technologies R-PH 125 kHz Proximity Card Reader, as tested, meets the FCC Part 15.209 Subpart C requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated, and a retest may be required. Measurement Uncertainty will not be applied to any of the measurement / testing results in this test report to determine pass/fail criteria per the Decision Rule as defined in ISO/IEC Guide 17025-2017 Clause 3.7.

## 2. Product Details

- 2.1. Manufacturer:** Napco Security Technologies  
**2.2. Model Number:** R-PH  
**2.3. Serial Number:** Preproduction  
**2.4. Description:** The R-PH 125 kHz Proximity Card Reader is used for scanning passive ID cards in a security environment. Connection is provided via a Wiegand interface.  
**2.5. Power Source:** 7 - 16 VDC from control panel  
**2.6. Hardware Revision:** N/A  
**2.7. Software Revision:** N/A  
**2.8. Modulation Type:** Pulse Modulation  
**2.9. Operating Frequency:** 125 kHz  
**2.10. EMC Modifications:** None

## 3. Product Configuration

### 3.1. Operational Characteristics & Software

Once powered is applied to the product via the support equipment the EUT is configured to transmit continuously.

### 3.2. EUT Hardware

| Manufacturer                | Model/Part # / Options | Serial Number | Volts | Freq (Hz) | Description/Function     |
|-----------------------------|------------------------|---------------|-------|-----------|--------------------------|
| Napco Security Technologies | R-PH                   | Preproduction | 7-16  | VDC       | 125 kHz Prox Card Reader |

### 3.3. EUT Cables/Transducers

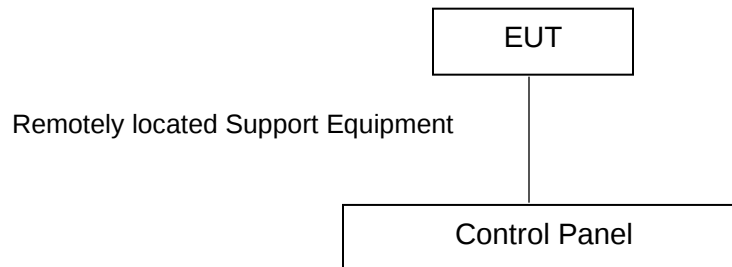
| Cable Type     | Length | Shield | From | To    |
|----------------|--------|--------|------|-------|
| 24 AWG Wiegand | 10M    | No     | EUT  | Panel |

### 3. Product Configuration (continued)

#### 3.4. Support Equipment

| Device | Manufacturer | Model | Serial # |
|--------|--------------|-------|----------|
| None   |              |       |          |

#### 3.5. Block Diagram



## 4. Measurements Parameters

### 4.1. Measurement Equipment and Software Used to Perform Test

| Device                                       | Manufacturer    | Model No. | Serial No. | Cal Due    | Interval |
|----------------------------------------------|-----------------|-----------|------------|------------|----------|
| EMI Test Receiver, 9kHz - 7GHz <sup>1</sup>  | Rohde & Schwarz | ESR7      | 101156     | 10/26/2024 | 3 Years  |
| EMI Test Receiver, 10 Hz - 7GHz <sup>1</sup> | Rohde & Schwarz | ESR7      | 101770     | 7/23/2025  | 1 Year   |
| Loop Antenna 9 kHz - 30 MHz                  | EMCO            | 6512      | 9309-1139  | 4/14/2025  | 3 Years  |
| Loop Antenna 20 Hz – 5 MHz                   | ETS-Lindgren    | 6511      | 00108119   | 3/31/2025  | 3 Years  |
| Biconilog Antenna, 30 MHz - 2 GHz            | Sunol Sciences  | JB1       | A050913    | 7/1/2024   | 3 Years  |
| Digital Barometer                            | Control Company | 4195      | ID236      | 3/15/2025  | 1 Year   |

<sup>1</sup> ESR7      Firmware revision: V3.48, SP3 Date installed: 09/30/2020

| Manufacturer         | Software Description            | Title or Model #      | Rev. | Report Sections                          |
|----------------------|---------------------------------|-----------------------|------|------------------------------------------|
| Compliance Worldwide | Test Report Generation Software | Test Report Generator | 1.0  | Used to process conducted emissions data |

### 4.2. Measurement & Equipment Setup

|                                       |                                                                                                         |
|---------------------------------------|---------------------------------------------------------------------------------------------------------|
| Test Dates:                           | June 20 <sup>th</sup> , 21 <sup>st</sup> , 2024                                                         |
| Test Engineer:                        | Sean Defelice                                                                                           |
| Normal Site Temperature (15 – 35 °C): | 20.5                                                                                                    |
| Relative Humidity (20 - 75 %RH):      | 46 %                                                                                                    |
| Frequency Range:                      | 9 kHz to 1 GHz                                                                                          |
| Measurement Distance:                 | 3 Meters                                                                                                |
| EMI Receiver IF Bandwidth:            | 200 Hz – 10 to 150 kHz<br>9 kHz – 150 kHz to 30 MHz<br>120 kHz - 30 MHz to 1 GHz<br>1 MHz - Above 1 GHz |
| EMI Receiver Avg Bandwidth:           | >= 3 * RBW                                                                                              |
| Detector Function:                    | Peak, QP - 30 MHz to 1 GHz<br>Peak, Avg - Above 1 GHz<br>Unless otherwise specified.                    |

### 4.3 Measurement Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15, Subpart C - Intentional Radiators, notably Section 15.209, Radiated emission limits; general requirements and ANSI C63.10:2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

## 5. Choice of Equipment for Test Suites

### 5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

### 5.2. Presentation

The test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

### 5.3. Choice of Operating Frequencies

The transmitter in the unit under test utilizes a single operating frequency at approximately 125 kHz.

## 6. Measurements Summary

| Test Requirement                       | FCC Rule Requirement    | Report Section | Result    |
|----------------------------------------|-------------------------|----------------|-----------|
| Antenna requirement                    | 15.203                  | 7.1            | Compliant |
| Radiated Field Strength of Fundamental | 15.209(a)               | 7.2            | Compliant |
| Emission Bandwidth                     | 15.209<br>Not Specified | 7.3            | Compliant |
| Combined Spurious Harmonic Emissions   | 15.209                  | 7.4            | Compliant |
| Spurious Radiated Emissions            | 15.209                  | 7.5            | Compliant |
| Power Line Conducted Emissions         | 15.207                  | 7.6<br>7.7     | Compliant |

## 7. Measurement Data

### 7.1. Antenna Requirement (15.203)

Requirement: 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.

Status: For the 125 kHz transmitter, the device under test utilizes an internal, PCB mounted coil antenna. There is no user access to this antenna.

### 7.2. Radiated Field Strength of Fundamental (15.209, Section (a))

Requirement: 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:

For 125 kHz: Field Strength ( $\mu\text{V/m}$ ) =  $2400/F(\text{kHz})$  at 300 meters.  
 Field Strength ( $\mu\text{V/m}$ ) =  $2400/125.000$   
 Field Strength ( $\mu\text{V/m}$ ) = 19.20  
 Field Strength ( $\text{dB}\mu\text{V/m}$ ) =  $20 \text{ LOG}_{10}(19.20)$   
 Field Strength ( $\text{dB}\mu\text{V/m}$ ) = 25.67 at 300 meters.

Test Notes: From 110 kHz to 490 kHz, the field strength limit employs an average detector (FCC Part 15.209(d)).

Reference ANSI C63.10-2013 sections 5.3.2 and 6.4.4.2. The following formula was used to extrapolate the measurement distance to the limit distance:

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left( \frac{d_{\text{near field}}}{d_{\text{measure}}} \right) - 20 \log \left( \frac{d_{\text{limit}}}{d_{\text{near field}}} \right) \quad \text{Equation 1}$$

|                                                                                                             |             |
|-------------------------------------------------------------------------------------------------------------|-------------|
| $FS_{\text{limit}}$ is the calculation of field strength at the limit distance ( $\text{dB}\mu\text{V/m}$ ) | <b>6.97</b> |
| $FS_{\text{max}}$ is the measured field strength, expressed in ( $\text{dB}\mu\text{V/m}$ ) (average)       | 86.97       |
| $d_{\text{near field}}$ is the $\lambda/2\pi$ distance (Meters)                                             | 381.97      |
| $d_{\text{measure}}$ is the distance of the measurement point from the EUT (Meters)                         | 3.00        |
| $d_{\text{limit}}$ is the reference limit distance (Meters)                                                 | 300.00      |

Since  $d_{\text{near field}}$  is greater than  $d_{\text{limit}}$ , the measurement formula was simplified to:

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log (d_{\text{limit}}/d_{\text{measure}}).$$

Results: Compliant

## 7. Measurement Data (continued)

### 7.2. Radiated Field Strength of Fundamental (15.209, Section (a), RSS-GEN Table 6)

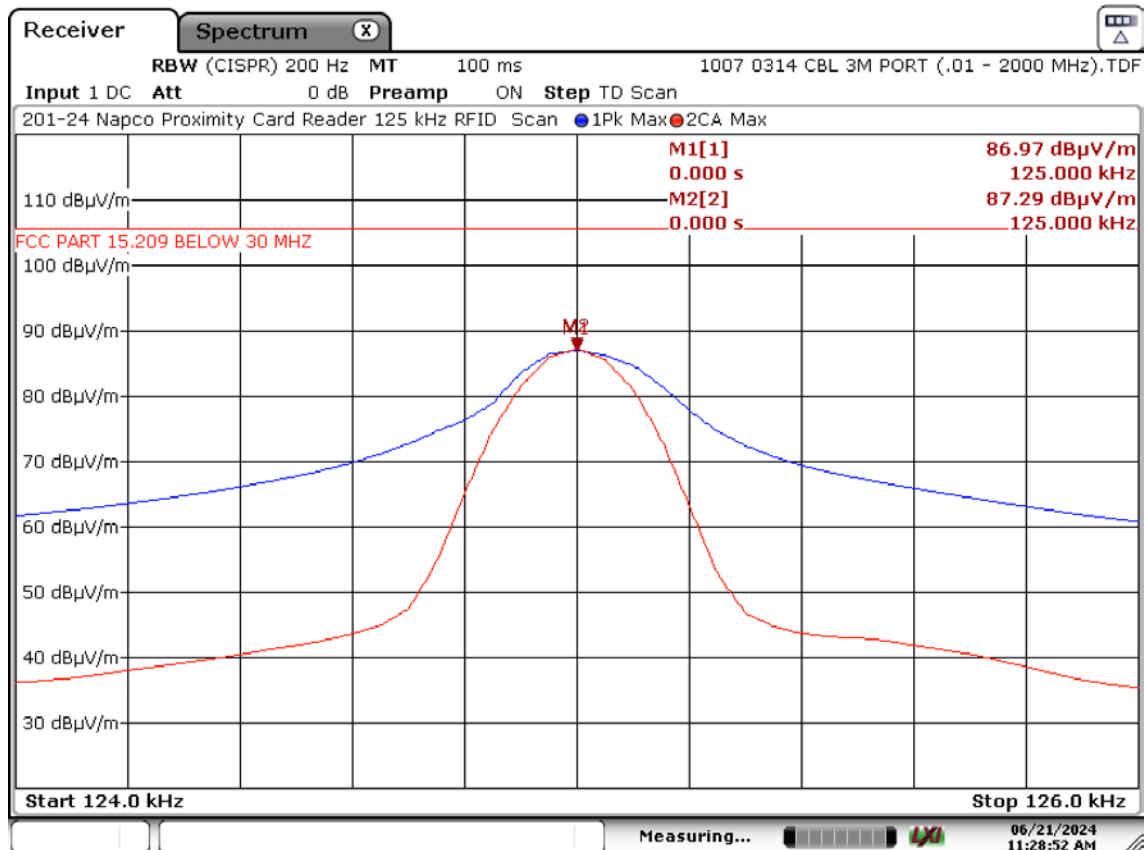
#### 7.2.1. Worst Case Radiated Field Strength of Fundamental

| Freq.<br>(MHz) | Amplitude <sup>1</sup><br>(dBμV/m) | Duty<br>Cycle<br>Correction <sup>2</sup> | Corr.<br>Ampl. <sup>2</sup><br>(dBμV/m) | FCC<br>15.209 Limit<br>(dBμV/m) | Margin<br>(dB) | Ant<br>Position | Ant<br>Height | Turntable<br>Azimuth | Result    |
|----------------|------------------------------------|------------------------------------------|-----------------------------------------|---------------------------------|----------------|-----------------|---------------|----------------------|-----------|
|                | Average                            | dB                                       | Average                                 | (Average)                       |                | Par/Per         | cm            | Deg                  |           |
| 0.125000       | 6.97                               | 0.00                                     | 6.97                                    | 25.67                           | -18.70         | Par             | 100           | 354                  | Compliant |

<sup>1</sup> Measurement has been extrapolated from 3 meters to 300 meters using Equation 1 on the previous page.

<sup>2</sup> The test signal was transmitting at close to a 100% duty cycle. Therefore, a correction factor to the peak field strength is not necessary.

#### 7.2.2. Worst Case Radiated Field Strength of Fundamental @ 3 Meters



Date: 21.JUN.2024 11:28:53

## 7. Measurement Data (continued)

### 7.3. Emission Bandwidth (FCC Sections 15.209, RSS-210 Section A2.3)

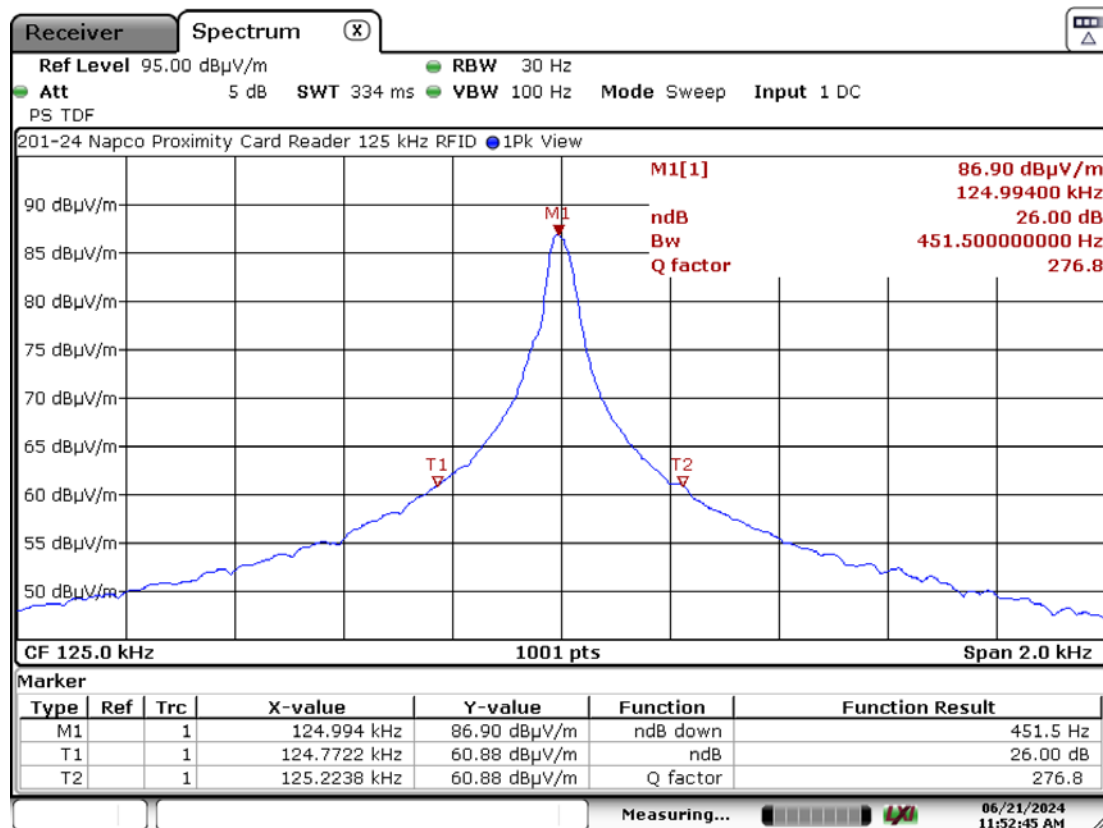
Requirement: For FCC Part 15.209, the bandwidth requirement is not specified. The 26 dB bandwidth has been included as part of this test report.

Test Note: Reference ANSI C63.10-2013, Section 6.9.1. for the bandwidth measurement method.

#### 7.3.1. -26 dB Bandwidth of the Fundamental Frequency

| Fundamental Frequency | -26 dB Bandwidth | Required Bandwidth | Result |
|-----------------------|------------------|--------------------|--------|
| (MHz)                 | (kHz)            | (kHz)              |        |
| 0.125                 | 0.4515           | Not Specified      | N/A    |

#### 7.3.2. Emission Bandwidth Measurement Results



Date: 21.JUN.2024 11:52:45

## 7. Measurement Data (continued)

### 7.4. Combined Spurious Harmonic Emissions (FCC Part 15.209)

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

Test Note: The following table represents the worst-case measurement of each harmonic emission.

Results: Compliant

| Freq.<br>(MHz) | Measured Field Strength<br>(dB $\mu$ V/m) |                       | Limit<br>(dB $\mu$ V/m) |          | Margin<br>(dB $\mu$ V/m) <sup>2</sup> |          | w/c<br>Antenna<br>Position<br>(Par/Per<br>G Par) | Turntable<br>Position<br>(Deg) | Result    |
|----------------|-------------------------------------------|-----------------------|-------------------------|----------|---------------------------------------|----------|--------------------------------------------------|--------------------------------|-----------|
|                | Peak                                      | Quasi-Pk <sup>1</sup> | Peak                    | Quasi-Pk | Peak                                  | Quasi-Pk |                                                  |                                |           |
| 0.250          | 49.89                                     | 31.60                 | 119.64                  | 99.64    | -66.88                                | -57.32   | Par                                              | 354                            | Compliant |
| 0.375          | 45.23                                     | 42.80                 | 116.12                  | 96.12    | -67.00                                | -58.76   | Par                                              | 344                            | Compliant |
| 0.500          | 50.52                                     | 31.98                 | 93.63                   | 73.63    | -45.79                                | -33.12   | Per                                              | 354                            | Compliant |
| 0.625          | 34.48                                     | 30.89                 | 91.69                   | 71.69    | -44.26                                | -32.37   | Par                                              | 354                            | Compliant |
| 0.750          | 36.31                                     | 25.11                 | 90.11                   | 70.11    | -48.06                                | -30.74   | Per                                              | 354                            | Compliant |
| 0.875          | 28.93                                     | 23.60                 | 88.78                   | 68.78    | -44.11                                | -29.44   | Par                                              | 354                            | Compliant |
| 1.000          | 43.66                                     | 20.58                 | 87.62                   | 67.62    | -43.96                                | -28.27   | Per                                              | 180                            | Compliant |
| 1.125          | 29.46                                     | 19.94                 | 86.60                   | 66.60    | -38.18                                | -24.23   | Par                                              | 348                            | Compliant |
| 1.250          | 36.33                                     | 26.39                 | 85.69                   | 65.69    | -42.26                                | -26.76   | Per                                              | 210                            | Compliant |

<sup>1</sup> The measurements made at 250 kHz and 375 kHz utilized a CISPR average detector.

## 7. Measurement Data (continued)

### 7.5. Spurious Radiated Emissions (15.209)

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

Regulatory Limits: FCC Part 15.209

| Frequency Range (MHz) | Distance (Meters) | Limit (dBμV/m) <sup>1</sup> |
|-----------------------|-------------------|-----------------------------|
| 0.009 to 0.490        | 3                 | 128.5 to 93.8               |
| 0.490 to 1.705        | 3                 | 73.8 to 63.0                |
| 1.705 to 30           | 3                 | 69.5                        |
| 30 to 88              | 3                 | 40.0                        |
| 88 to 216             | 3                 | 43.5                        |
| 216 to 960            | 3                 | 46.0                        |
| >960                  | 3                 | 54.0                        |

<sup>1</sup> Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise, a quasi-peak detector is used.

Procedure: Test measurements were made in accordance with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

Results: Compliant. The device under test met the spurious radiated emissions requirements.

Sample Calculation: Final Result (dBμV/m) = Measurement Value (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) – Pre-amplifier Gain (dB) Internal or External.

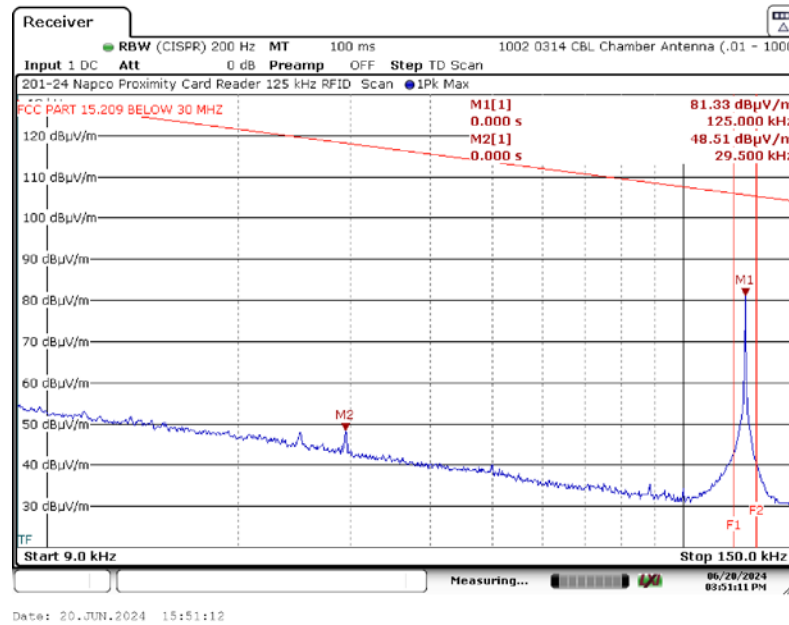
**Note:** All correction factors are loaded into the measurement instrument prior to testing to determine the final result.

## 7. Measurement Data (continued)

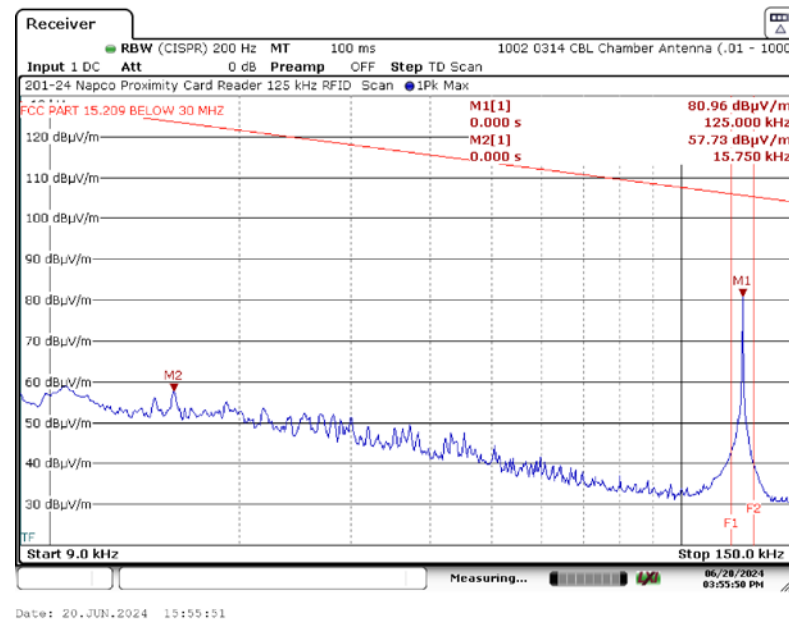
### 7.5. Spurious Radiated Emissions Test Results (15.209) (continued)

#### 7.5.1. 9 kHz to 150 kHz

##### 7.5.1.1. Parallel Receive Antenna Orientation



##### 7.5.1.2. Perpendicular Receive Antenna Orientation

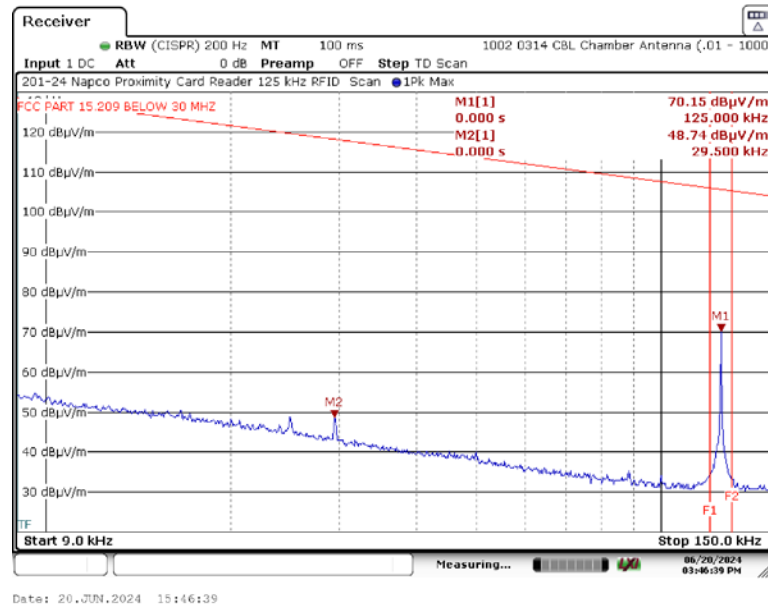


## 7. Measurement Data (continued)

### 7.5. Spurious Radiated Emissions Test Results (15.209) (continued)

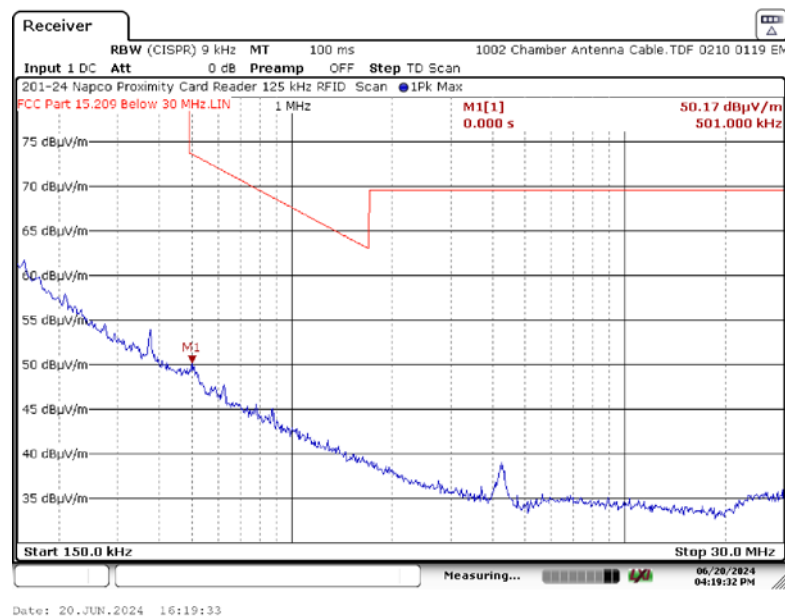
#### 7.5.1. 9 kHz to 150 kHz

##### 7.5.1.3. Ground Parallel Receive Antenna Orientation



#### 7.5.2. 150 kHz to 30 MHz

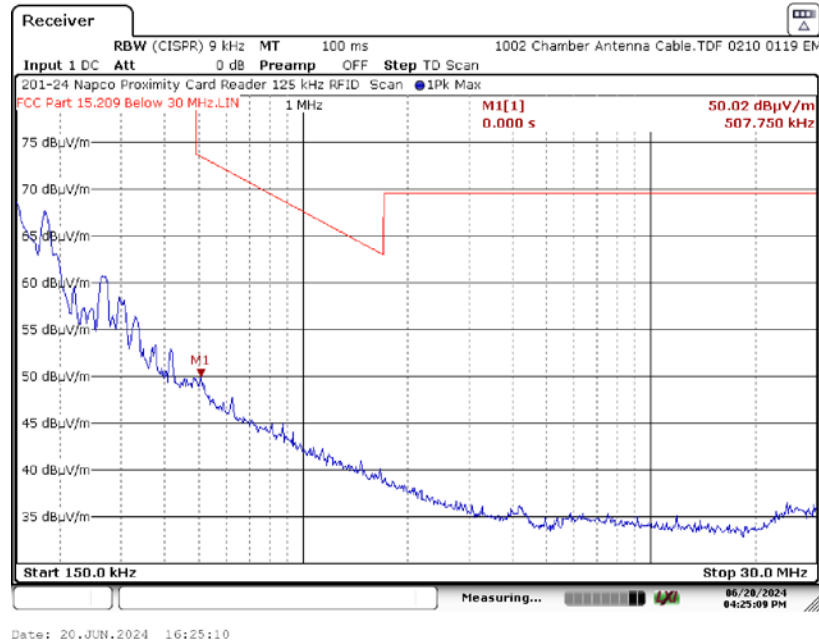
##### 7.5.2.1. Parallel Receive Antenna Orientation



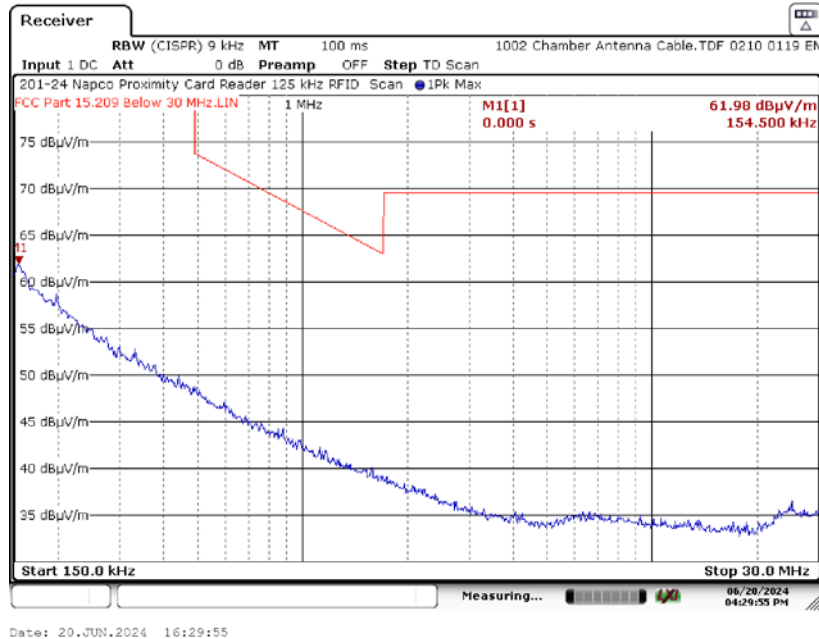
## 7. Measurement Data (continued)

### 7.5. Spurious Radiated Emissions Test Results (15.209) (continued)

#### 7.5.2.2. Perpendicular Receive Antenna Orientation



#### 7.5.2.3. Ground Parallel Receive Antenna Orientation

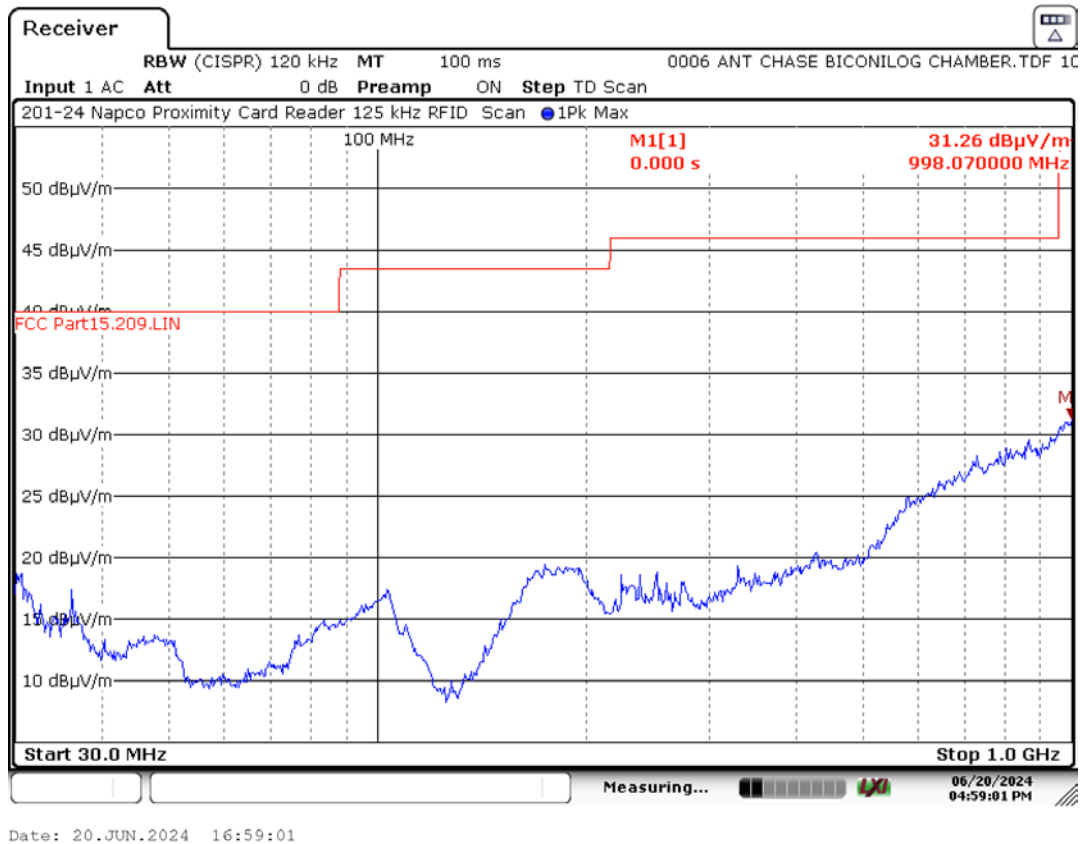


## 7. Measurement Data (continued)

### 7.5. Spurious Radiated Emissions Test Results (15.209) (continued)

#### 7.5.3. 30 MHz to 1 GHz

##### 7.5.3.1. Horizontal Polarity

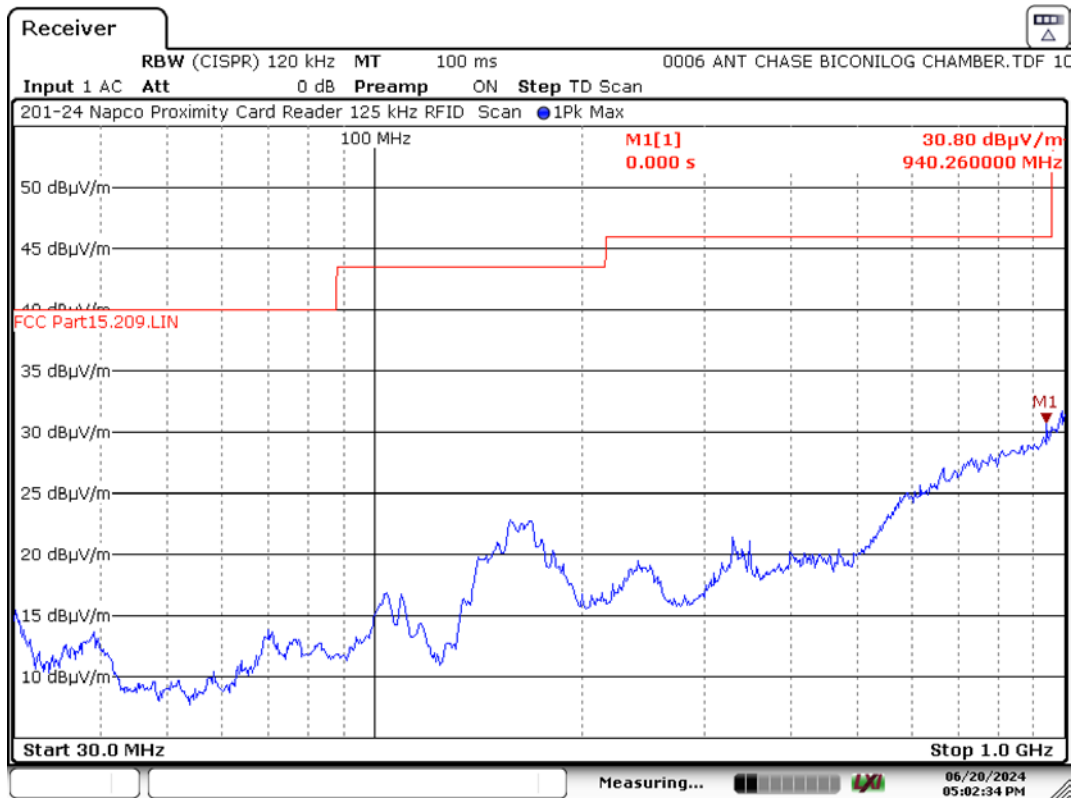


## 7. Measurement Data (continued)

### 7.5. Spurious Radiated Emissions Test Results (15.209) (continued)

#### 7.5.3. 30 MHz to 1 GHz

#### 7.5.3.2. Vertical Polarity



Date: 20.JUN.2024 17:02:35

## 7. Measurement Data (continued)

### 7.6. Power Line Conducted Emissions (15.207)

**Requirement:** 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 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms 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. (FCC Part 15.207(a).

Regulatory Limits: FCC Part 15.207

| Frequency Range (MHz)                            | Limits (dB $\mu$ V) |           |
|--------------------------------------------------|---------------------|-----------|
|                                                  | Quasi-Peak          | Average   |
| 0.15 to 0.50                                     | 66 to 56*           | 56 to 46* |
| 0.50 to 5.0                                      | 56                  | 46        |
| 5.0 to 30.0                                      | 60                  | 50        |
| * Decreases with the logarithm of the frequency. |                     |           |

### Measurement & Equipment Setup

|                             |                             |
|-----------------------------|-----------------------------|
| Test Date:                  | 6/24/2024                   |
| Test Engineer:              | Sean Defelice               |
| Site Temperature (°C):      | 20.5                        |
| Relative Humidity (%RH):    | 46                          |
| Frequency Range:            | 0.15 MHz to 30 MHz          |
| EMI Receiver IF Bandwidth:  | 9 kHz                       |
| EMI Receiver Avg Bandwidth: | $\geq 3$ * RBW (IF) BW      |
| Detector Functions:         | Peak, Quasi-Peak. & Average |
| Measurement Uncertainty     | $\pm 3.40$ dB               |

**Procedure:** Test measurements were made in accordance with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

**Results:** Compliant

**Sample Calculation:** Final Result = Measurement Value + LISN Factor + Cable Loss.

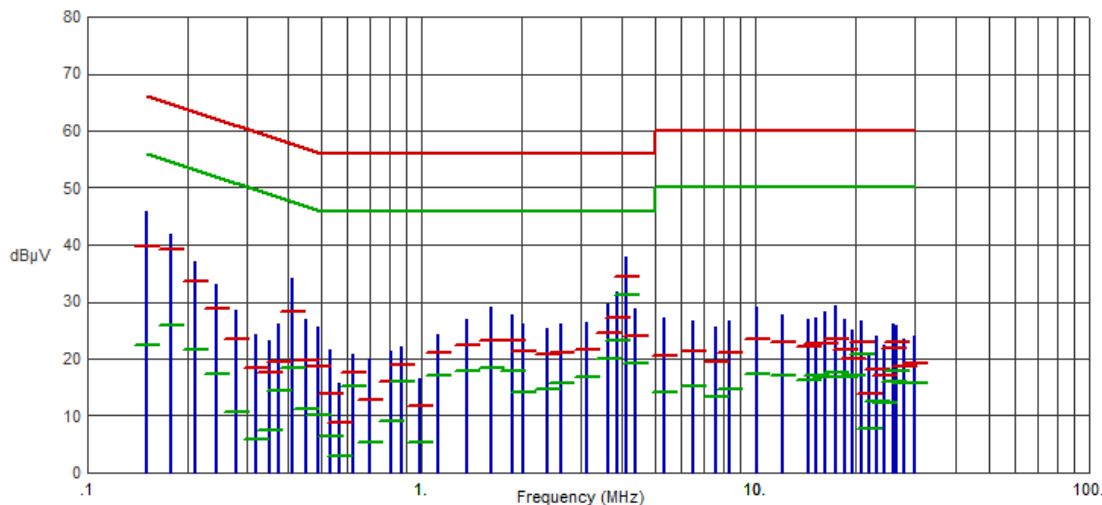
**Note:** All correction factors are loaded into the measurement instrument prior to testing to determine the final result.

## 7.7 Conducted Emissions Test Results

### 7.7.1. 120 Volts, 60 Hz Phase

Test No.: 202-24, 120 Volts, 60 Hz Phase

FCC, Class B



| Frequency (MHz) | Pk Amp (dBμV) | QP Amp (dBμV) | QP Limit (dBμV) | QP Margin (dB) | Avg Amp (dBμV) | Avg Limit (dBμV) | Avg Margin (dB) | Comments |
|-----------------|---------------|---------------|-----------------|----------------|----------------|------------------|-----------------|----------|
| .1500           | 45.81         | 39.75         | 66.00           | -26.25         | 22.40          | 56.00            | -33.60          |          |
| .1770           | 41.80         | 39.11         | 64.63           | -25.52         | 25.82          | 54.63            | -28.81          |          |
| .2108           | 37.02         | 33.65         | 63.17           | -29.52         | 21.61          | 53.17            | -31.56          |          |
| .2445           | 32.95         | 28.73         | 61.94           | -33.21         | 17.35          | 51.94            | -34.59          |          |
| .2783           | 28.41         | 23.54         | 60.87           | -37.33         | 10.77          | 50.87            | -40.10          |          |
| .3210           | 24.27         | 18.45         | 59.68           | -41.23         | 5.92           | 49.68            | -43.76          |          |
| .3503           | 23.24         | 17.51         | 58.96           | -41.45         | 7.56           | 48.96            | -41.40          |          |
| .3750           | 26.14         | 19.37         | 58.39           | -39.02         | 14.34          | 48.39            | -34.05          |          |
| .4088           | 34.24         | 28.18         | 57.67           | -29.49         | 18.44          | 47.67            | -29.23          |          |
| .4515           | 26.88         | 19.82         | 56.85           | -37.03         | 11.15          | 46.85            | -35.70          |          |
| .4920           | 25.60         | 18.74         | 56.13           | -37.39         | 10.07          | 46.13            | -36.06          |          |
| .5325           | 21.65         | 13.97         | 56.00           | -42.03         | 6.46           | 46.00            | -39.54          |          |
| .5708           | 15.78         | 8.77          | 56.00           | -47.23         | 2.97           | 46.00            | -43.03          |          |
| .6248           | 20.87         | 17.52         | 56.00           | -38.48         | 15.24          | 46.00            | -30.76          |          |
| .6990           | 20.09         | 12.68         | 56.00           | -43.32         | 5.28           | 46.00            | -40.72          |          |
| .8070           | 21.46         | 15.99         | 56.00           | -40.01         | 9.04           | 46.00            | -36.96          |          |
| .8745           | 22.16         | 19.04         | 56.00           | -36.96         | 16.12          | 46.00            | -29.88          |          |
| .9848           | 16.66         | 11.69         | 56.00           | -44.31         | 5.22           | 46.00            | -40.78          |          |
| 1.1243          | 24.35         | 20.96         | 56.00           | -35.04         | 17.03          | 46.00            | -28.97          |          |
| 1.3740          | 27.05         | 22.33         | 56.00           | -33.67         | 17.75          | 46.00            | -28.25          |          |
| 1.6238          | 29.15         | 23.33         | 56.00           | -32.67         | 18.38          | 46.00            | -27.62          |          |
| 1.8758          | 27.66         | 23.08         | 56.00           | -32.92         | 17.98          | 46.00            | -28.02          |          |
| 2.0108          | 26.24         | 21.42         | 56.00           | -34.58         | 14.16          | 46.00            | -31.84          |          |
| 2.3753          | 25.25         | 20.68         | 56.00           | -35.32         | 14.78          | 46.00            | -31.22          |          |
| 2.6250          | 26.03         | 21.11         | 56.00           | -34.89         | 15.73          | 46.00            | -30.27          |          |
| 3.1245          | 26.48         | 21.72         | 56.00           | -34.28         | 16.93          | 46.00            | -29.07          |          |
| 3.6240          | 29.53         | 24.64         | 56.00           | -31.36         | 20.12          | 46.00            | -25.88          |          |
| 3.8760          | 31.79         | 27.30         | 56.00           | -28.70         | 23.21          | 46.00            | -22.79          |          |
| 4.1235          | 37.99         | 34.28         | 56.00           | -21.72         | 31.29          | 46.00            | -14.71          |          |
| 4.3755          | 28.70         | 23.88         | 56.00           | -32.12         | 19.20          | 46.00            | -26.80          |          |
| 5.3093          | 27.29         | 20.48         | 60.00           | -39.52         | 14.24          | 50.00            | -35.76          |          |

## 7.7. Conducted Emissions Test Results (continued)

### 7.7.1. 120 Volts, 60 Hz Phase (continued)

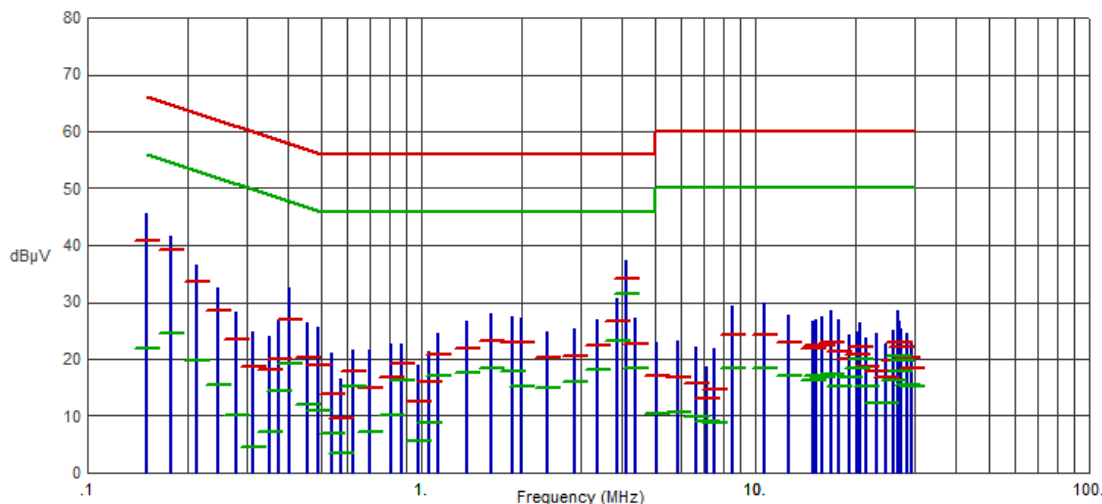
| Frequency (MHz) | Pk Amp (dBμV) | QP Amp (dBμV) | QP Limit (dBμV) | QP Margin (dB) | Avg Amp (dBμV) | Avg Limit (dBμV) | Avg Margin (dB) | Comments |
|-----------------|---------------|---------------|-----------------|----------------|----------------|------------------|-----------------|----------|
| 6.5085          | 26.77         | 21.33         | 60.00           | -38.67         | 15.28          | 50.00            | -34.72          |          |
| 7.6268          | 25.66         | 19.47         | 60.00           | -40.53         | 13.33          | 50.00            | -36.67          |          |
| 8.3760          | 26.68         | 21.11         | 60.00           | -38.89         | 14.78          | 50.00            | -35.22          |          |
| 10.1243         | 29.09         | 23.41         | 60.00           | -36.59         | 17.40          | 50.00            | -32.60          |          |
| 12.1245         | 27.62         | 23.05         | 60.00           | -36.95         | 17.11          | 50.00            | -32.89          |          |
| 14.3745         | 26.85         | 22.06         | 60.00           | -37.94         | 16.17          | 50.00            | -33.83          |          |
| 15.1238         | 27.29         | 22.55         | 60.00           | -37.45         | 17.06          | 50.00            | -32.94          |          |
| 16.1228         | 28.29         | 22.58         | 60.00           | -37.42         | 16.85          | 50.00            | -33.15          |          |
| 17.3760         | 29.22         | 23.42         | 60.00           | -36.58         | 17.49          | 50.00            | -32.51          |          |
| 18.6248         | 26.88         | 21.55         | 60.00           | -38.45         | 16.82          | 50.00            | -33.18          |          |
| 19.6238         | 24.95         | 20.04         | 60.00           | -39.96         | 17.19          | 50.00            | -32.81          |          |
| 20.8748         | 26.72         | 22.89         | 60.00           | -37.11         | 20.90          | 50.00            | -29.10          |          |
| 21.8715         | 20.79         | 13.84         | 60.00           | -46.16         | 7.79           | 50.00            | -42.21          |          |
| 23.1248         | 23.91         | 18.01         | 60.00           | -41.99         | 12.47          | 50.00            | -37.53          |          |
| 24.3735         | 22.41         | 17.02         | 60.00           | -42.98         | 12.18          | 50.00            | -37.82          |          |
| 25.8765         | 26.26         | 21.77         | 60.00           | -38.23         | 16.13          | 50.00            | -33.87          |          |
| 26.4863         | 25.89         | 23.05         | 60.00           | -36.95         | 17.79          | 50.00            | -32.21          |          |
| 27.8745         | 23.53         | 18.73         | 60.00           | -41.27         | 15.63          | 50.00            | -34.37          |          |
| 29.8725         | 23.89         | 19.10         | 60.00           | -40.90         | 15.64          | 50.00            | -34.36          |          |

## 7.7. Conducted Emissions Test Results (continued)

### 7.7.2. 120 Volts, 60 Hz Neutral

Test No.: 202-24, 120 Volts, 60 Hz Neutral

FCC, Class B



| Frequency (MHz) | Pk Amp (dBμV) | QP Amp (dBμV) | QP Limit (dBμV) | QP Margin (dB) | Avg Amp (dBμV) | Avg Limit (dBμV) | Avg Margin (dB) | Comments |
|-----------------|---------------|---------------|-----------------|----------------|----------------|------------------|-----------------|----------|
| .1500           | 45.58         | 40.68         | 66.00           | -25.32         | 21.92          | 56.00            | -34.08          |          |
| .1770           | 41.64         | 39.21         | 64.63           | -25.42         | 24.51          | 54.63            | -30.12          |          |
| .2130           | 36.50         | 33.64         | 63.09           | -29.45         | 19.75          | 53.09            | -33.34          |          |
| .2468           | 32.58         | 28.66         | 61.86           | -33.20         | 15.48          | 51.86            | -36.38          |          |
| .2783           | 28.21         | 23.43         | 60.87           | -37.44         | 10.15          | 50.87            | -40.72          |          |
| .3143           | 24.85         | 18.78         | 59.86           | -41.08         | 4.49           | 49.86            | -45.37          |          |
| .3525           | 23.88         | 18.02         | 58.90           | -40.88         | 7.17           | 48.90            | -41.73          |          |
| .3750           | 26.75         | 20.11         | 58.39           | -38.28         | 14.40          | 48.39            | -33.99          |          |
| .4043           | 32.52         | 26.88         | 57.76           | -30.88         | 19.11          | 47.76            | -28.65          |          |
| .4538           | 26.44         | 20.28         | 56.81           | -36.53         | 12.01          | 46.81            | -34.80          |          |
| .4920           | 25.57         | 19.04         | 56.13           | -37.09         | 10.97          | 46.13            | -35.16          |          |
| .5370           | 21.08         | 13.93         | 56.00           | -42.07         | 6.87           | 46.00            | -39.13          |          |
| .5730           | 16.58         | 9.61          | 56.00           | -46.39         | 3.38           | 46.00            | -42.62          |          |
| .6248           | 21.56         | 17.84         | 56.00           | -38.16         | 15.30          | 46.00            | -30.70          |          |
| .6990           | 21.50         | 14.96         | 56.00           | -41.04         | 7.22           | 46.00            | -38.78          |          |
| .8070           | 22.75         | 16.90         | 56.00           | -39.10         | 10.25          | 46.00            | -35.75          |          |
| .8745           | 22.76         | 19.20         | 56.00           | -36.80         | 16.19          | 46.00            | -29.81          |          |
| .9803           | 18.83         | 12.55         | 56.00           | -43.45         | 5.68           | 46.00            | -40.32          |          |
| 1.0568          | 21.37         | 15.89         | 56.00           | -40.11         | 8.91           | 46.00            | -37.09          |          |
| 1.1243          | 24.60         | 20.81         | 56.00           | -35.19         | 17.01          | 46.00            | -28.99          |          |
| 1.3740          | 26.56         | 21.98         | 56.00           | -34.02         | 17.60          | 46.00            | -28.40          |          |
| 1.6260          | 28.06         | 23.18         | 56.00           | -32.82         | 18.28          | 46.00            | -27.72          |          |
| 1.8735          | 27.47         | 22.88         | 56.00           | -33.12         | 17.75          | 46.00            | -28.25          |          |
| 2.0040          | 27.27         | 22.87         | 56.00           | -33.13         | 15.24          | 46.00            | -30.76          |          |
| 2.3753          | 24.69         | 20.22         | 56.00           | -35.78         | 15.03          | 46.00            | -30.97          |          |
| 2.8748          | 25.38         | 20.55         | 56.00           | -35.45         | 16.01          | 46.00            | -29.99          |          |
| 3.3743          | 26.95         | 22.45         | 56.00           | -33.55         | 18.07          | 46.00            | -27.93          |          |
| 3.8760          | 30.69         | 26.75         | 56.00           | -29.25         | 23.13          | 46.00            | -22.87          |          |
| 4.1235          | 37.35         | 34.12         | 56.00           | -21.88         | 31.34          | 46.00            | -14.66          |          |
| 4.3733          | 27.07         | 22.56         | 56.00           | -33.44         | 18.31          | 46.00            | -27.69          |          |
| 5.0438          | 22.88         | 17.05         | 60.00           | -42.95         | 10.45          | 50.00            | -39.55          |          |

## 7.7. Conducted Emissions Test Results (continued)

### 7.7.2. 120 Volts, 60 Hz Neutral (continued)

| Frequency (MHz) | Pk Amp (dBμV) | QP Amp (dBμV) | QP Limit (dBμV) | QP Margin (dB) | Avg Amp (dBμV) | Avg Limit (dBμV) | Avg Margin (dB) | Comments |
|-----------------|---------------|---------------|-----------------|----------------|----------------|------------------|-----------------|----------|
| 5.8785          | 23.13         | 16.86         | 60.00           | -43.14         | 10.54          | 50.00            | -39.46          |          |
| 6.6255          | 22.08         | 15.61         | 60.00           | -44.39         | 9.78           | 50.00            | -40.22          |          |
| 7.1250          | 18.78         | 13.07         | 60.00           | -46.93         | 8.99           | 50.00            | -41.01          |          |
| 7.5503          | 21.88         | 14.69         | 60.00           | -45.31         | 8.72           | 50.00            | -41.28          |          |
| 8.5133          | 29.32         | 24.14         | 60.00           | -35.86         | 18.32          | 50.00            | -31.68          |          |
| 10.6260         | 29.85         | 24.18         | 60.00           | -35.82         | 18.34          | 50.00            | -31.66          |          |
| 12.6240         | 27.64         | 22.98         | 60.00           | -37.02         | 17.06          | 50.00            | -32.94          |          |
| 14.8740         | 26.75         | 21.93         | 60.00           | -38.07         | 16.17          | 50.00            | -33.83          |          |
| 15.1238         | 27.03         | 22.41         | 60.00           | -37.59         | 17.06          | 50.00            | -32.94          |          |
| 15.8730         | 27.41         | 22.36         | 60.00           | -37.64         | 16.73          | 50.00            | -33.27          |          |
| 16.8743         | 28.50         | 22.90         | 60.00           | -37.10         | 17.42          | 50.00            | -32.58          |          |
| 17.8710         | 26.98         | 21.22         | 60.00           | -38.78         | 15.31          | 50.00            | -34.69          |          |
| 19.1243         | 24.16         | 20.03         | 60.00           | -39.97         | 16.90          | 50.00            | -33.10          |          |
| 20.1233         | 24.83         | 20.77         | 60.00           | -39.23         | 18.30          | 50.00            | -31.70          |          |
| 20.6228         | 26.30         | 22.26         | 60.00           | -37.74         | 19.92          | 50.00            | -30.08          |          |
| 21.3743         | 23.67         | 18.75         | 60.00           | -41.25         | 15.32          | 50.00            | -34.68          |          |
| 23.1248         | 24.46         | 17.82         | 60.00           | -42.18         | 12.17          | 50.00            | -37.83          |          |
| 24.6233         | 22.78         | 16.87         | 60.00           | -43.13         | 12.20          | 50.00            | -37.80          |          |
| 25.8743         | 25.07         | 19.69         | 60.00           | -40.31         | 16.38          | 50.00            | -33.62          |          |
| 26.6100         | 28.63         | 22.84         | 60.00           | -37.16         | 20.47          | 50.00            | -29.53          |          |
| 27.1590         | 26.63         | 22.85         | 60.00           | -37.15         | 17.78          | 50.00            | -32.22          |          |
| 27.3413         | 25.44         | 22.01         | 60.00           | -37.99         | 19.65          | 50.00            | -30.35          |          |
| 28.6238         | 24.60         | 20.24         | 60.00           | -39.76         | 15.60          | 50.00            | -34.40          |          |
| 29.3730         | 22.85         | 18.32         | 60.00           | -41.68         | 15.15          | 50.00            | -34.85          |          |

## 8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Industry Canada standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1**) and VCCI (Member number 3168) under registration number A-0274.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 11, AS/NZS CISPR 14-1, AS/NZS CISPR 15, AS/NZS CISPR 32, Chinese-Taipei (Taiwan) BSMI CNS 15936 and Korea (RRA) KS C 9811, KS C 9814-1, KS C 9815, KS C 9832, KS C 9610-6-3 & KS C 9610-6-4.

The radiated emissions test site is a 3- and 10-meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5-meter ground plane and a 2.4 x 2.4 meter vertical wall.

The radiated emissions test site for measurements above 1GHz is a 3 Meter open area test site (OATS) with a 3.6 by 3.6-meter anechoic absorber floor patch to achieve a quasi-free space measurement environment per ANSI C63.4/C63.10 and CISPR 16-1-4 standards.

The sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or tabletop.

## 9. Test Setup Images

### 9.1. Radiated Emissions – Front View



## 9. Test Setup Images

### 9.2. Radiated Emissions – Rear View Below 30 MHz



## 9. Test Setup Images

### 9.3. Radiated Emissions – Rear View 30 MHz to 1 GHz



**9. Test Images (continued)**

9.4. Conducted Emissions, Front View



**9. Test Images (continued)**

9.5. Conducted Emissions, Rear View

