

# Report on the FCC and ISED Testing of the;

Entrust Datacard Corp.

13.56 MHz RFID Module, model 523442

FCC ID: GDI-523442001

IC: 889B-523442001

In accordance with:

FCC Part 15 Subpart C §15.225

ISED RSS-210 Issue 9, August 2016, Amendment  
November 2017



America

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Inspire trust.**

Prepared for: Entrust Datacard Corp.  
1187 Park Place  
Shakopee, MN 55372 USA

## COMMERCIAL-IN-CONFIDENCE

Document Number: NC72152791.1 | Issue: 1

### SIGNATURE

| NAME           | JOB TITLE           | RESPONSIBLE FOR      | ISSUE DATE        |
|----------------|---------------------|----------------------|-------------------|
| Joel Schneider | Senior EMC Engineer | Authorized Signatory | 26 September 2019 |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD America, Inc. document control rules.

FCC Accreditation  
Designation Number US1148 New Brighton, MN Test  
Laboratory

Innovation, Science, and Economic Development Canada  
Accreditation  
Site Number 4512A New Brighton, MN Test Laboratory

### EXECUTIVE SUMMARY

A sample of this product was tested and found to demonstrate compliance with FCC 47 CFR Part 15 Subpart C §15.225, ISED RSS-210 Issue 9 August 2016, Amendment November 2017



A2LA Cert. No. 2955.11

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**Signatures of the individuals responsible for testing the product****ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15 Subpart C and ISSED RSS-210. The sample tested was found to comply with the requirements defined in the applied rules.

| NAME            | RESPONSIBLE FOR | SIGNATURE              |
|-----------------|-----------------|------------------------|
| Greg Jakubowski | EMC testing     | <i>Greg Jakubowski</i> |

If this report is issued in support of the Supplier's Declaration of Conformity type of FCC authorization the following signature block need to be included for the responsible party to sign at a later date.

**Signature of an official of the responsible party, as designated in § 2.909**

| SIGNATURE |         |      |
|-----------|---------|------|
|           |         |      |
| NAME      | COMPANY | DATE |
|           |         |      |



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# 1 Report Summary

## 1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

**Table 1.1-1 Modification Record**

| Issue | Description of Change | Date of Issue     |
|-------|-----------------------|-------------------|
| 1     | First Issue           | 26 September 2019 |

## 1.2 Introduction

|                               |                                                                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Purpose                       | The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and ISED Canada's Radio Standard Specification RSS-210 Certification. |
| Applicant                     | Mark Forster                                                                                                                                                                                  |
| Manufacturer                  | Entrust Datacard Corp.                                                                                                                                                                        |
| Applicant's Email Address     | Mark.forster@entrustdatacard.com                                                                                                                                                              |
| Model Number(s)               | 523442                                                                                                                                                                                        |
| Serial Number(s)              | n/a                                                                                                                                                                                           |
| Hardware Version(s)           | n/a                                                                                                                                                                                           |
| Software Version(s)           | n/a                                                                                                                                                                                           |
| Number of Samples Tested      | 1                                                                                                                                                                                             |
| Test Specification/Issue/Date | FCC 47 CFR Part 15 Subpart C / ISED RSS-210 / Issue 9 / August 2016, Amendment November 2017                                                                                                  |
| Order Number                  | 72152791                                                                                                                                                                                      |
| Date of Receipt of EUT        | 17 September 2019                                                                                                                                                                             |
| Start of Test                 | 17 September 2019                                                                                                                                                                             |
| Finish of Test                | 18 September 2019                                                                                                                                                                             |
| Related Document(s)           | 523442001_Test Plan-PIF Rev 16.docx                                                                                                                                                           |



### 1.3 Summary of Results

The 13.56 MHz RFID module, model 523442, manufactured by Entrust Datacard Corp. meets the requirements of FCC Part 15 Subpart C and ISED Canada's Radio Standards Specification RSS-210 for the tests documented herein. A brief summary of the tests carried out in accordance with the specifications are shown below.

**Table 1.3-1 – Summary of Results**

| Section | FCC § / ISED standard & clause         | Test description                            | Result | Method               |
|---------|----------------------------------------|---------------------------------------------|--------|----------------------|
| 2.1     | 15.203 /                               | Antenna requirement                         | Pass   | n/a                  |
| 2.2     | 15.207 / RSS-Gen 7.2                   | AC power lines conducted emissions          | Pass   | ANSI C63.10-2013 6.2 |
| 2.3     | 15.225(a)(b)(c) / RSS-210 B.6(a)(b)(c) | Operation within the band 13.110-14.010 MHz | Pass   | ANSI C63.10-2013 6.4 |
| 2.4     | 15.225(d) / RSS-210 B.6(d)             | Out of band emissions below 30MHz           | Pass   | ANSI C63.10-2013 6.4 |
| 2.5     | 15.225(d) / RSS-210 B.6(d)             | Out of band emissions 30 - 1000MHz          | Pass   | ANSI C63.10-2013 6.5 |
| 2.6     | 2.1049 / RSS-Gen 6.7                   | Occupied Bandwidth                          | Pass   | ANSI C63.10-2013 6.9 |
| 2.7     | 15.225(e) / RSS-210 B.6                | Frequency stability                         | Pass   | ANSI C63.10-2013 6.8 |

**Table 1.3-2 – Test Accreditation**

| Test Name                                   | Name of Tester  | Accreditation |
|---------------------------------------------|-----------------|---------------|
| AC power lines conducted emissions          | Greg Jakubowski | A2LA          |
| Operation within the band 13.110-14.010 MHz | Greg Jakubowski | A2LA          |
| Out of band emissions below 30MHz           | Greg Jakubowski | A2LA          |
| Out of band emissions 30 - 1000MHz          | Greg Jakubowski | A2LA          |
| Occupied Bandwidth                          | Greg Jakubowski | A2LA          |
| Frequency stability                         | Greg Jakubowski | A2LA          |



## 1.4 Product Information

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a PWA, RFID module.

**Table 1.4.1-1 – Support Equipment Descriptions**

| Make/Model | Description                                                             |
|------------|-------------------------------------------------------------------------|
|            | Laptop computer with power supply                                       |
| 515058-xxx | Mainboard powered by Mega ATS072T-P240, 24 VDC, brick type power supply |

### 1.4.2 Modes of Operation

The single channel device was operated in a continuous on mode at 13.56 MHz in either a CW or modulated state. For radiated emissions, the device was oriented in 3 orthogonal X, Y, and Z axes. The worst-case Y axis is reported in this document.

## 1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

## 1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

**Table 1.6-1 – Modification Record**

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date |
|--------------------|-------------------------------------------------|------------------------|------|
| None               |                                                 |                        |      |

## 1.7 Test Location

TÜV SÜD conducted the following tests at our New Brighton, MN Test Laboratory.

Office address:  
TÜV SÜD America  
141 14th Street NW  
New Brighton, MN 55112 USA



## 2 Test Details

### 2.1 Antenna requirement

#### 2.1.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, §15.203

#### 2.1.2 Conclusion

The antenna is part of the printed circuit board which cannot be detached without damaging the device. Therefore, the antenna meets the requirements of §15.203.

### 2.2 AC power lines conducted emissions

#### 2.2.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, §15.207  
ISED RSS-Gen clause 7.2

#### 2.2.2 Equipment Under Test and Modification State

As shown in §1.2 with modifications if any as shown in §1.6.

#### 2.2.3 Date of Test

18 September 2019

#### 2.2.4 Test Method

The EUT is powered by its main control board which is powered by an AC to DC power supply (PS). The EUT, control board, and PS were placed on a non-conductive table 0.8 m above a reference ground plane and 0.4 m away from a vertical coupling plane. AC power was connected to the PS through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8 m from the boundary of the EUT and bonded to the reference ground plane. The system was assessed against the FCC §15.207 limits.

#### 2.2.5 Environmental Conditions

The EUT was evaluated within the temperature and humidity range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient temperature range of 20°C to 40°C and humidity range of 30% to 80%.



## 2.2.6 Additional Observations

Measurements were performed using BAT-EMC v3.18 automated software. The reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.2.7 for a sample computation.

## 2.2.7 Sample Computation (Mains Terminal Disturbance Voltage)

|                                                       |                  |       |       |
|-------------------------------------------------------|------------------|-------|-------|
| Measuring equipment raw measurement (dBμV) @ 150kHz   |                  |       | 30.0  |
| Correction Factor (dB)                                | TEMC00002 - LISN | 0.03  | 10.53 |
|                                                       | Cable 1          | 10.50 |       |
|                                                       |                  |       |       |
|                                                       |                  |       |       |
| Reported Quasi-peak Final Measurement (dBμV) @ 150kHz |                  |       | 40.53 |

## 2.2.8 Test Results

**Results for Configuration and Mode: Transmit signal continuously on and modulated.**

Performance assessment of the EUT made during this test: **Pass**

Detailed results are shown below.



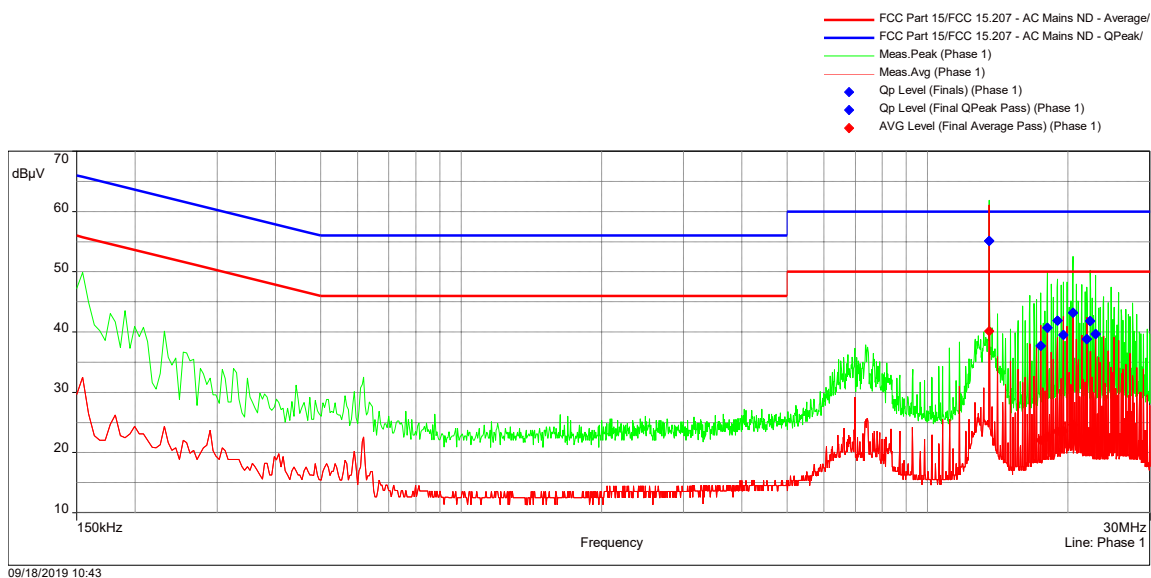


Figure 2.2.8-1 - Graphical Results - AC Mains L1 Plot

Table 2.2.8-1 – Results on the AC Power Port L1

| Frequency  | Average (dBμV) | Average Limit (dBμV) | Average Margin (dB) | QPeak (dBμV) | QPeak Limit (dBμV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 13.56MHz   | 40.14          | 50.00                | -9.86               | 55.13        | 60.00              | -4.87             | Pass   |
| 17.493MHz  | 22.05          | 50.00                | -27.95              | 37.74        | 60.00              | -22.26            | Pass   |
| 18.0555MHz | 22.65          | 50.00                | -27.35              | 40.69        | 60.00              | -19.31            | Pass   |
| 18.9825MHz | 23.53          | 50.00                | -26.47              | 41.91        | 60.00              | -18.09            | Pass   |
| 19.545MHz  | 23.61          | 50.00                | -26.39              | 39.51        | 60.00              | -20.49            | Pass   |
| 20.481MHz  | 24.61          | 50.00                | -25.39              | 43.18        | 60.00              | -16.82            | Pass   |
| 21.9705MHz | 22.76          | 50.00                | -27.24              | 38.83        | 60.00              | -21.17            | Pass   |
| 22.326MHz  | 23.41          | 50.00                | -26.59              | 41.82        | 60.00              | -18.18            | Pass   |
| 22.9065MHz | 22.36          | 50.00                | -27.64              | 39.66        | 60.00              | -20.34            | Pass   |

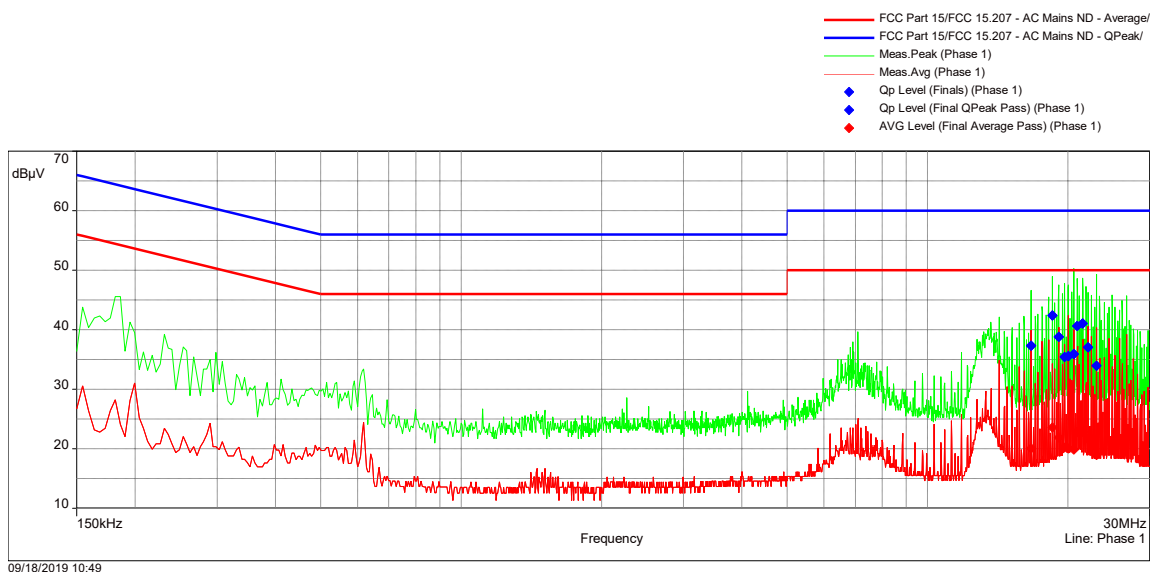


Figure 2.2.8-2 - Graphical Results - AC Mains L2 Plot

Table 2.2.8-2 – Results on the AC Power Port L2

| Frequency  | Average (dBμV) | Average Limit (dBμV) | Average Margin (dB) | QPeak (dBμV) | QPeak Limit (dBμV) | QPeak Margin (dB) | Result |
|------------|----------------|----------------------|---------------------|--------------|--------------------|-------------------|--------|
| 16.674MHz  | 20.08          | 50.00                | -29.92              | 37.36        | 60.00              | -22.64            | Pass   |
| 18.519MHz  | 23.62          | 50.00                | -26.38              | 42.39        | 60.00              | -17.61            | Pass   |
| 19.0995MHz | 21.88          | 50.00                | -28.12              | 38.78        | 60.00              | -21.22            | Pass   |
| 19.662MHz  | 20.19          | 50.00                | -29.81              | 35.42        | 60.00              | -24.58            | Pass   |
| 20.031MHz  | 20.06          | 50.00                | -29.94              | 35.58        | 60.00              | -24.42            | Pass   |
| 20.5935MHz | 19.89          | 50.00                | -30.11              | 35.92        | 60.00              | -24.08            | Pass   |
| 20.9445MHz | 22.85          | 50.00                | -27.15              | 40.66        | 60.00              | -19.34            | Pass   |
| 21.5205MHz | 22.80          | 50.00                | -27.20              | 41.04        | 60.00              | -18.96            | Pass   |
| 22.083MHz  | 21.60          | 50.00                | -28.40              | 37.07        | 60.00              | -22.93            | Pass   |
| 23.019MHz  | 18.92          | 50.00                | -31.08              | 33.94        | 60.00              | -26.06            | Pass   |



## 2.2.9 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN using equipment listed below in Table 2.2.10-1.

Test Area: GRP2

**Table 2.2.10-1 Conducted emissions. Test equipment list**

| Device #  | Manufacturer         | Description            | Model               | Serial #   | Cal Code | Cal Date   | Cal Due    |
|-----------|----------------------|------------------------|---------------------|------------|----------|------------|------------|
| NBLE02991 | Inmet                | Attenuator, 20dB       | 18N10W-20dB         | 2          | B        | 10/29/2018 | 10/29/2019 |
| NBLE11430 | Rohde & Schwarz      | Receiver, 20 Hz-40 GHz | ESI40               | 835193/007 | G        | 04/30/2019 | 04/30/2020 |
| WRLE10945 | Fischer Custom Comm. | LISN                   | FCC-LISN-50-25-2-10 | 120309     | G        | 08/08/2019 | 08/08/2020 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



## **2.3 Operation within the band 13.110-14.010 MHz**

### **2.3.1 Specification Reference**

FCC 47 CFR Part 15 Subpart C, §15.225(a)(b)(c)  
ISED RSS-210 B.6(a)(b)(c)

### **2.3.2 Equipment Under Test and Modification State**

As shown in §1.2 with modifications if any as shown in §1.6.

### **2.3.3 Date of Test**

17 September 2019

### **2.3.4 Test Method**

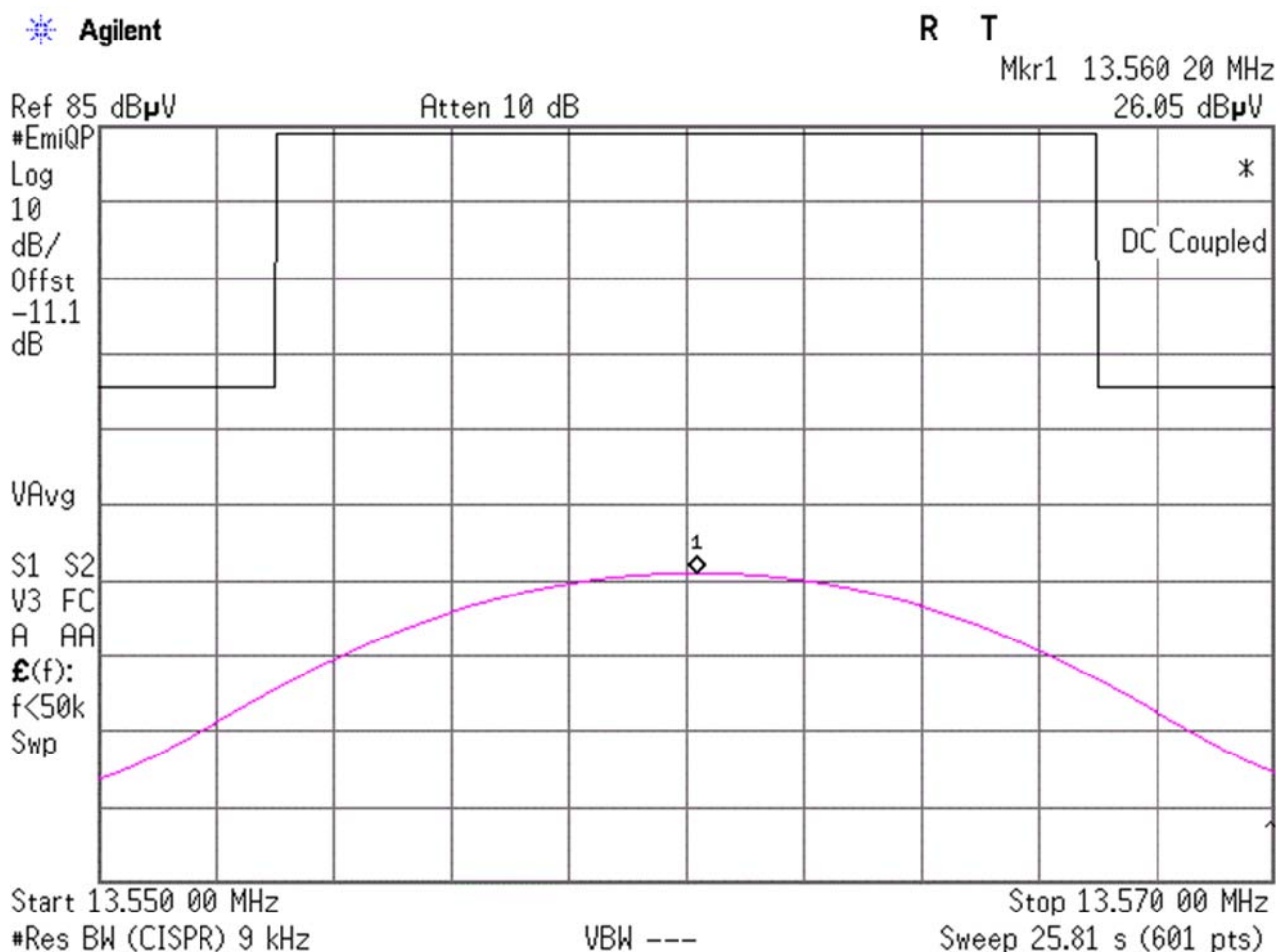
ANSI C63.10: 2013. Section 6.4. Measurements were performed in a semi anechoic chamber. The fundamental emission was measured at 3m & 10m to determine roll off over distance and calculate the extrapolated levels at 30m. The EUT was oriented in 3 orthogonal X, Y, and Z axes. The worst-case Y axis being reported and shown in the test pictures. The final fundamental level and in band emissions were measured at 10m and extrapolated to 30m. The EUT was rotated 360° and the magnetic loop antenna rotated about the vertical axis to maximize emissions. The spectrum analyzer's RBW = 9kHz, detector = CISPR quasi-peak, reference level offset = the antenna correction factor + the distance roll off so that the Y scale = the extrapolated level in dBuV/m at 30m.

### **2.3.5 Environmental Conditions**

The EUT was evaluated within the temperature and humidity range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient temperature range of 20°C to 40°C and humidity range of 30% to 80%.

### **2.3.6 Test Results**

Performance assessment of the EUT made during this test: **Pass.**  
Detailed results are shown below.



**Figure 2.3.6-1 Fundamental field strength. Corrected Y scale = dB $\mu$ V/m at 30 meters**

Ref level offset = 11.1 antenna correction factor + negligible cable loss – 22.2 dB 10m/30m extrapolation

**Table 2.3.6-1 Fundamental field strength**

| Frequency (MHz) | 30 m extrapolated Corrected Level (dB $\mu$ V/m) | 30m Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------------------------------------------|--------------------------|-------------|
| 13.56           | 26.05                                            | 84                       | 57.95       |

Maximum level at 3 meters = 71.15 dB $\mu$ V/m

Maximum level at 10 meters = 48.6 dB $\mu$ V/m

This indicates an extrapolation falloff of 45 dB/decade, or 40 dB/decade as allowed by rules, to be appropriate.

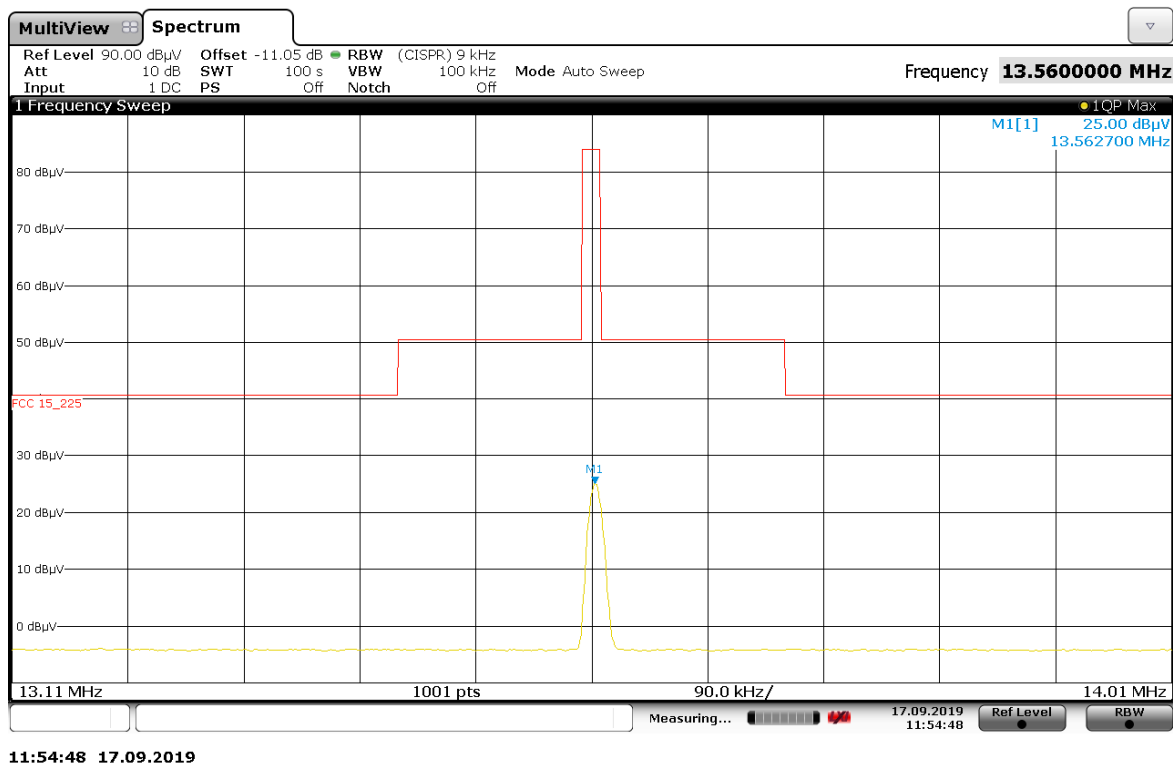


Figure 2.3.6-2 In band emissions 13.11 – 14.01MHz



### 2.3.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN using equipment listed below in Table 2.3.8-1.

Test Area: LTS

**Table 2.3.8-1 Operation within the band. Test equipment list**

| Device #  | Manufacturer         | Description           | Model  | Serial #   | Cal Code | Cal Date   | Cal Due    |
|-----------|----------------------|-----------------------|--------|------------|----------|------------|------------|
| NBLE03366 | Agilent Technologies | Spectrum Analyzer     | E4440A | MY42510427 | G        | 10/23/2018 | 10/23/2019 |
| WRLE02418 | EMCO/EMC Test        | Antenna, Loop         | 6502   | 2215       | G        | 09/25/2018 | 09/25/2020 |
| NBLE11555 | Rohde & Schwarz      | Receiver, 2 Hz-44 GHz | ESW44  | 101537     | G        | 04/26/2019 | 04/26/2020 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



## **2.4 Out of band emissions below 30MHz**

### **2.4.1 Specification Reference**

FCC 47 CFR Part 15 Subpart C, §15.225(d)  
ISED RSS-210 B.6(d)

### **2.4.2 Equipment Under Test and Modification State**

As shown in §1.2 with modifications if any as shown in §1.6.

### **2.4.3 Date of Test**

17 September 2019

### **2.4.4 Test Method**

ANSI C63.10: 2013. Section 6.4. Measurements were performed in a semi anechoic chamber. The emissions were measured at 3m. The spectrum analyzer results were offset corrected so that the Y scale is in dBuV/m at the limit distance. 300m limit 9kHz – 490kHz, 30m limit 490kHz – 30MHz. The offset, within a given frequency range, was determined by summing the worst-case antenna correction factor with a 40dB/decade distance extrapolation. The spectrum analyzer's settings were RBW 9kHz, Detector peak, Trace Max hold. The EUT was rotated 360°. A worst case 9kHz RBW instead of 200Hz was used from 9kHz to 150kHz and peak detector instead of quasi-peak or average.

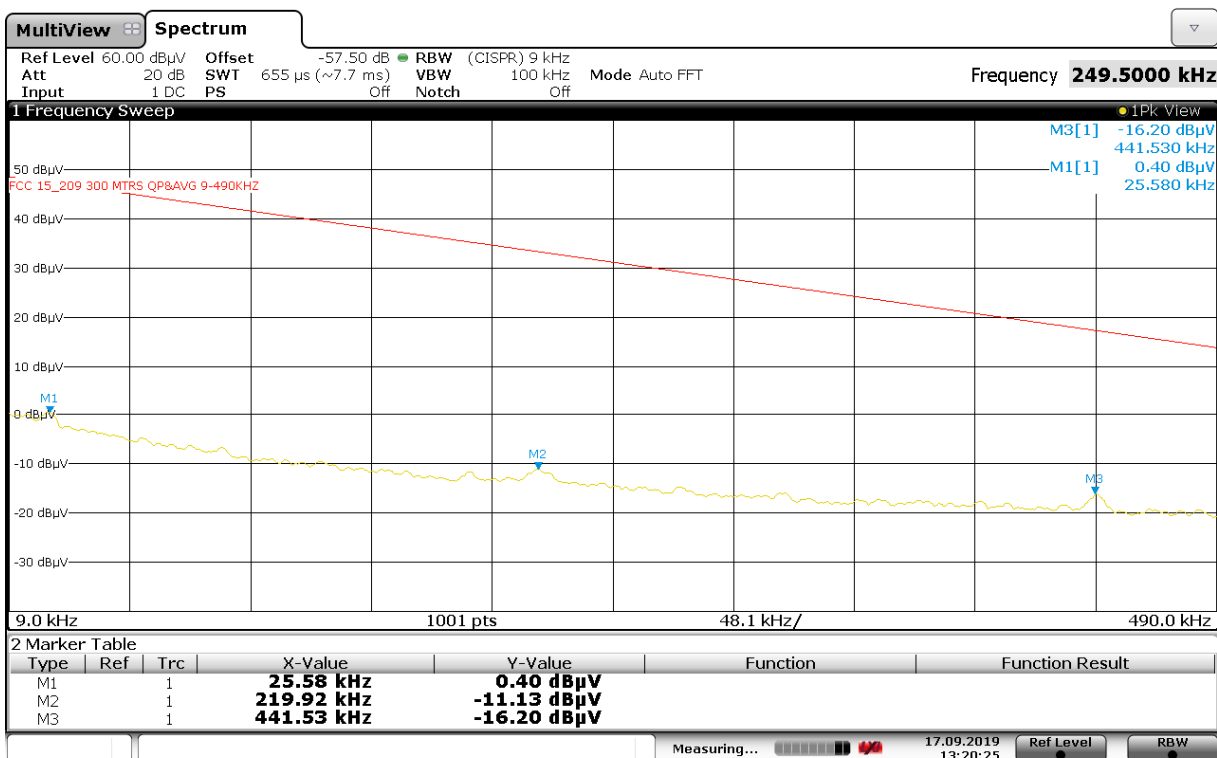
### **2.4.5 Environmental Conditions**

The EUT was evaluated within the temperature and humidity range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient temperature range of 20°C to 40°C and humidity range of 30% to 80%.

### **2.4.6 Test Results**

Performance assessment of the EUT made during this test: **Pass**  
Detailed results are shown below.



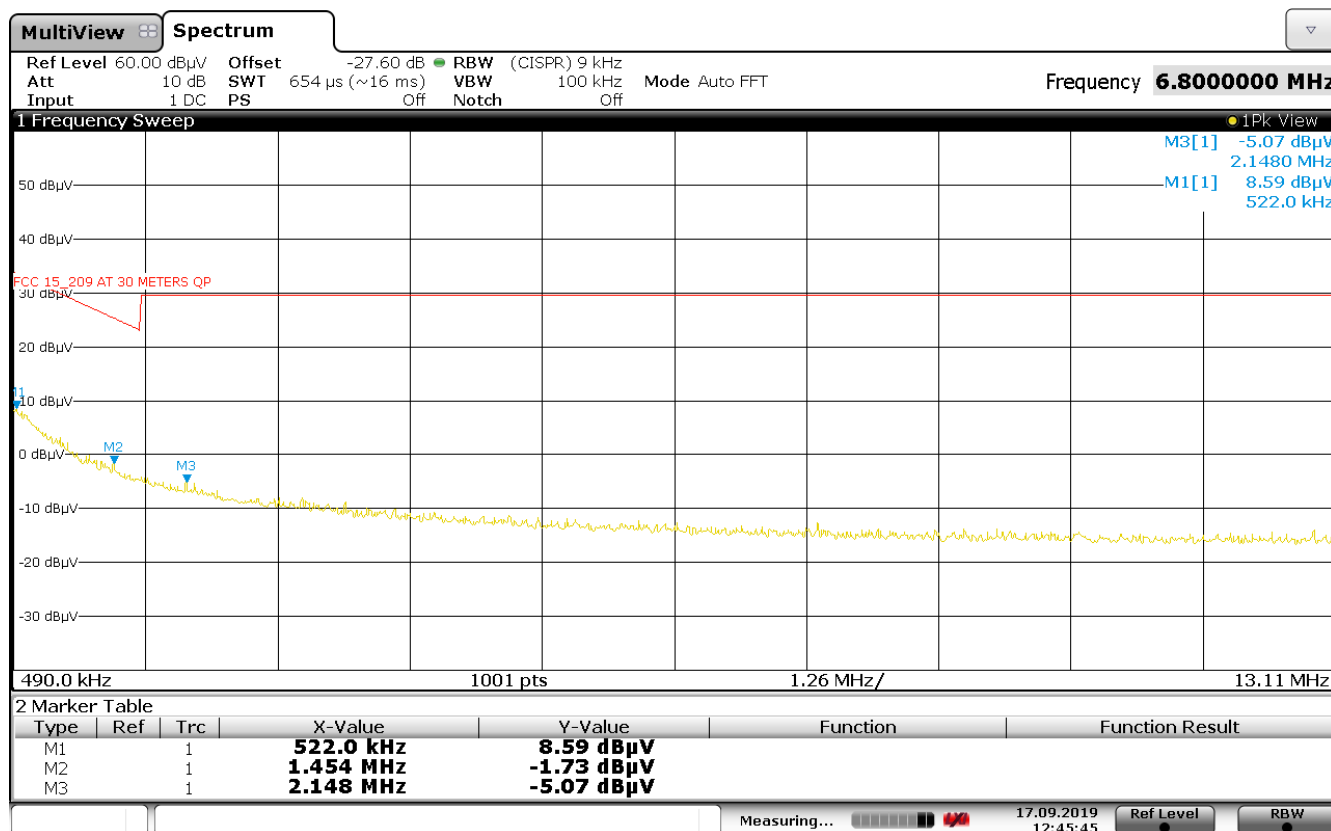


13:20:25 17.09.2019

Figure 2.4.6-1 Out of band emissions 9kHz–490kHz. Corrected Y scale = dBuV/m at 300 meters

Table 2.4.6-1 Field strength levels at 300m. 9kHz–490kHz

| Frequency (kHz) | Corrected Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|--------------------------|----------------|-------------|
| 25.58           | 0.4                      | 39.45          | 39.05       |
| 219.92          | -11.13                   | 20.76          | 31.89       |
| 441.53          | -16.2                    | 14.71          | 30.91       |

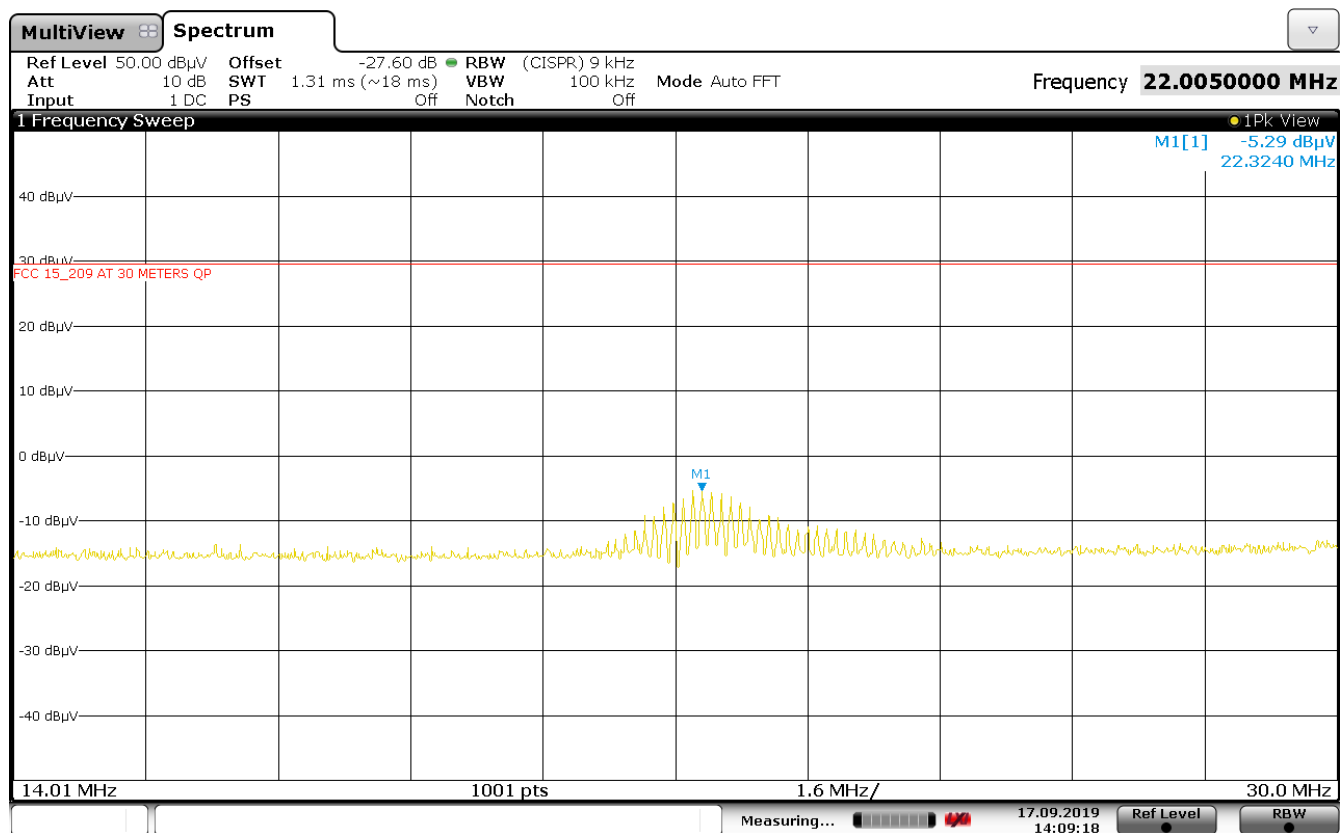


12:45:45 17.09.2019

**Figure 2.4.6-2 Out of band/lower band edge emissions 490kHz–13.11MHz. Corrected Y scale = dBuV/m at 30 meters**

**Table 2.4.6-2 Field strength levels at 30m. 490kHz–13.11MHz**

| Frequency (kHz) | Corrected Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|--------------------------|----------------|-------------|
| 522.0           | 8.59                     | 33.25          | 24.66       |
| 1454            | -1.73                    | 24.35          | 26.08       |
| 2148            | -5.07                    | 29.54          | 34.61       |



14:09:19 17.09.2019

**Figure 2.4.6-3 Out of band/upper band edge emissions 14.01MHz–30MHz. Corrected Y scale = dBuV/m at 30 meters**

**Table 2.4.6-3 Field strength levels at 30m. 14.01MHz–30MHz**

| Frequency (MHz) | Corrected Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|--------------------------|----------------|-------------|
| 22.324          | -5.29                    | 29.54          | 34.83       |



## 2.4.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN using equipment listed below in Table 2.4.8-1.

Test Area: LTS

**Table 2.4.8-1 Out of band emissions below 30MHz. Test equipment list**

| Device #  | Manufacturer         | Description           | Model  | Serial #   | Cal Code | Cal Date   | Cal Due    |
|-----------|----------------------|-----------------------|--------|------------|----------|------------|------------|
| NBLE03366 | Agilent Technologies | Spectrum Analyzer     | E4440A | MY42510427 | G        | 10/23/2018 | 10/23/2019 |
| WRLE02418 | EMCO/EMC Test        | Antenna, Loop         | 6502   | 2215       | G        | 09/25/2018 | 09/25/2020 |
| NBLE11555 | Rohde & Schwarz      | Receiver, 2 Hz-44 GHz | ESW44  | 101537     | G        | 04/26/2019 | 04/26/2020 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



## 2.5 Out of band emissions 30 - 1000MHz

### 2.5.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, §15.225(d)  
ISED RSS-210 B.6(d)

### 2.5.2 Equipment Under Test and Modification State

As shown in §1.2 with modifications if any as shown in §1.6.

### 2.5.3 Date of Test

18 September 2019

### 2.5.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive support 0.8 m above a reference ground plane using a measurement distance of 3m. A pre-scan of the EUT emissions profile was made while varying the antennae-to-EUT azimuth and antennae-to-EUT polarization using a peak detector; measurements were taken at a 3m distance. Using the pre-scan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using Quasi-Peak detector. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification. The frequency range investigated was 30 MHz to 1 GHz. The highest frequency required to be measured was up to 10 times the fundamental or 135.6 MHz. Measurements were done using BAT-EMC v3.18 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.5.6 for sample computation.

### 2.5.5 Environmental Conditions

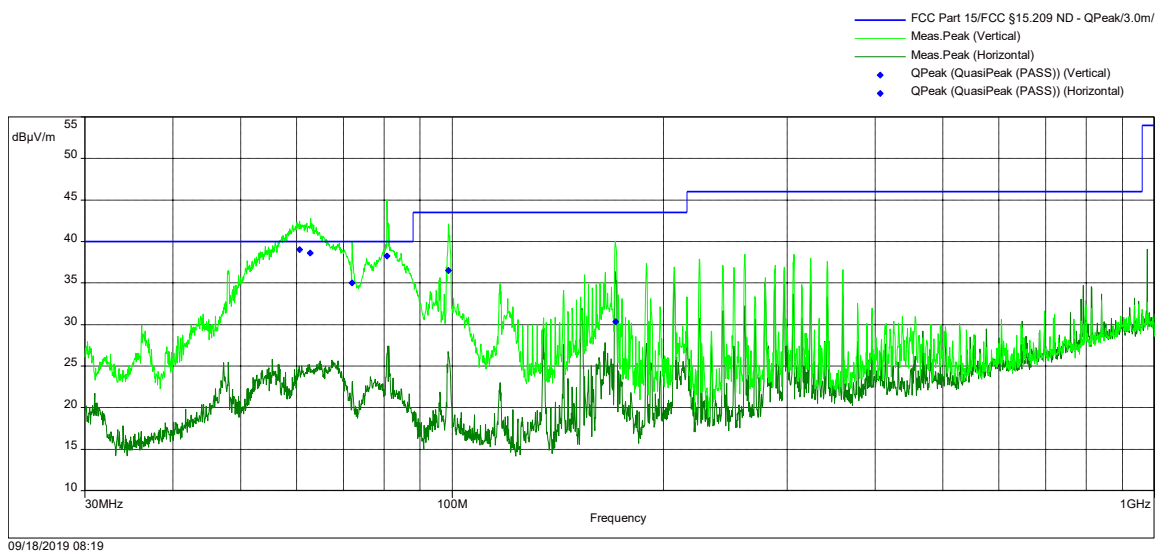
The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

### 2.5.6 Sample Computation (Radiated Emissions)

|                                                        |                     |       |       |
|--------------------------------------------------------|---------------------|-------|-------|
| Measuring equipment raw measurement (dBμV) @ 30 MHz    |                     |       | 20.0  |
| Correction Factor (dB)                                 | Cable 2             | 0.24  | 18.94 |
|                                                        | TEMCO0011 (antenna) | 18.70 |       |
|                                                        |                     |       |       |
|                                                        |                     |       |       |
| Reported Quasi-peak Final Measurement (dBμV/m) @ 30MHz |                     |       | 38.94 |

### 2.5.7 Test Results

Performance assessment of the EUT made during this test: **Pass**  
Detailed results are shown below.



**Figure 2.5.7-1 Graphical Results 30MHz - 1GHz. Horizontal and Vertical Polarization**

**Table 2.5.7-1 Radiated Emissions Data: 30MHz - 1 GHz**

| Frequency    | QP Level (dBμV) | QP Limit (dBμV) | Margin (dB) | Azimuth (°) | Height (m) | Polarization | Result |
|--------------|-----------------|-----------------|-------------|-------------|------------|--------------|--------|
| 60.635492MHz | 39.02           | 40.00           | -0.98       | 330.00      | 1.09       | Vertical     | Pass   |
| 62.827831MHz | 38.61           | 40.00           | -1.39       | 313.00      | 1.87       | Vertical     | Pass   |
| 72.001121MHz | 35.04           | 40.00           | -4.96       | 320.00      | 1.75       | Vertical     | Pass   |
| 80.718782MHz | 38.23           | 40.00           | -1.77       | 175.00      | 1.01       | Vertical     | Pass   |
| 98.749882MHz | 36.50           | 43.50           | -7.00       | 253.00      | 1.02       | Vertical     | Pass   |
| 170.98796MHz | 30.37           | 43.50           | -13.13      | 231.00      | 1.44       | Horizontal   | Pass   |



## 2.5.8 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN using equipment listed below in Table 2.5.9-1.  
Test Area: 3mSAC

**Table 2.5.9-1 Out of band Emissions 30 - 1000MHz. Test equipment list**

| Equipment Description | Equipment Manufacturer | Equipment Model # | Equipment SN# | Asset #   | Frequency Range   | Calibrated On | Calibration Due | Calibration Required (Y or N) |
|-----------------------|------------------------|-------------------|---------------|-----------|-------------------|---------------|-----------------|-------------------------------|
| Antenna - Trilog      | Schwarzbeck            | VULB 9162         | 0254          | NBLE11645 | 30 MHz - 8 GHz    | 3/19/2019     | 3/19/2021       | Yes                           |
| Preamplifier - 8447D  | Hewlett-Packard        | 8447D             | 2944A08773    | NBLE11141 | 100 kHz - 1.3 GHz | 1/4/2019      | 1/4/2020        | Yes                           |
| Receiver - R&S ESU    | Rohde & Schwarz        | ESU 26            | 100379        | WRLE10998 | 20 Hz - 26.5 GHz  | 12/13/2018    | 12/13/2019      | Yes                           |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.

## 2.6 Occupied Bandwidth

### 2.6.1 Specification Reference

FCC 47 CFR Part 2 §2.1049  
ISED RSS-Gen 6.7

### 2.6.2 Equipment Under Test and Modification State

As shown in §1.2 with modifications if any as shown in §1.6.

### 2.6.3 Date of Test

17 September 2019

### 2.6.4 Test Method

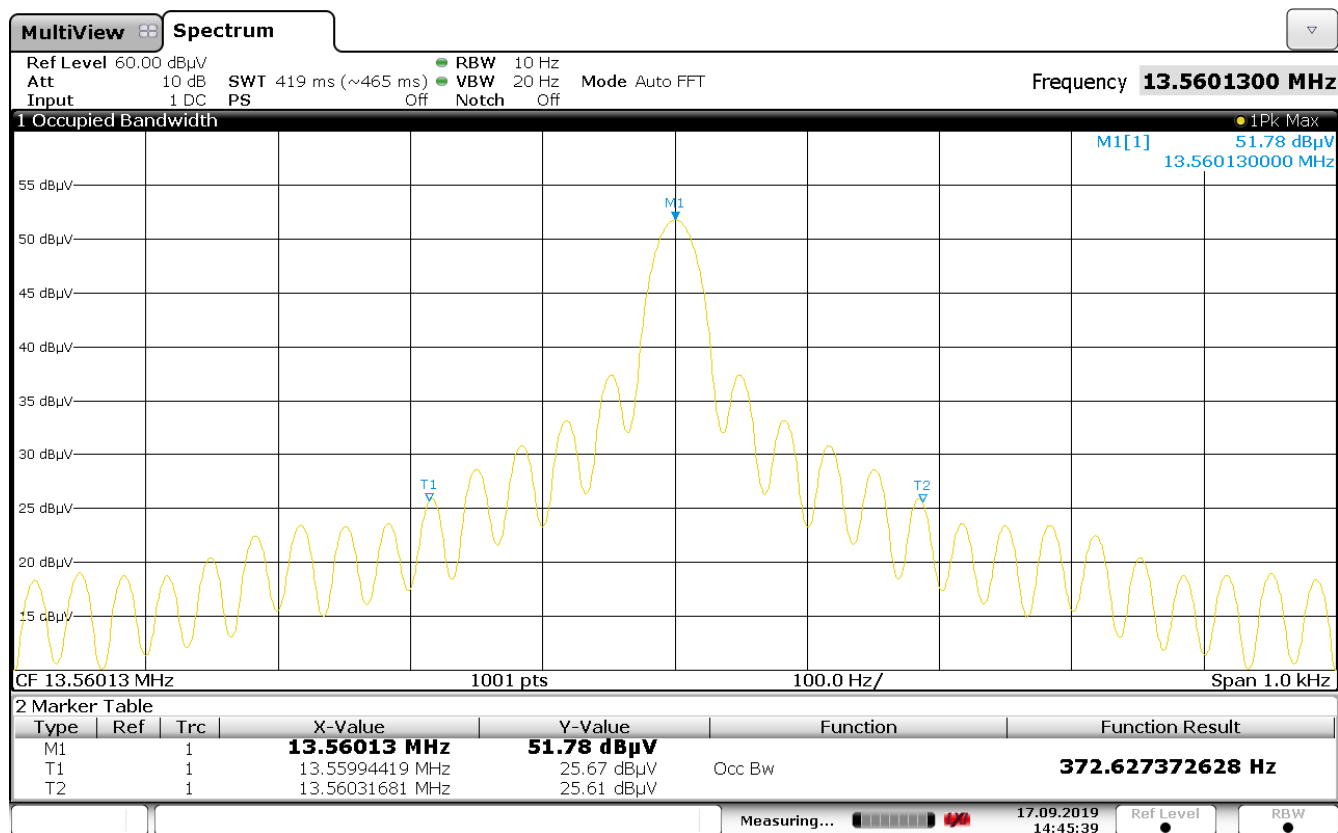
The spectrum analyzer span was set to capture all products of the modulation process. The RBW was set to 1-5% of the estimated bandwidth. The trace was set to max hold with the peak detector. The measurement function of the analyzer was utilized to determine the 99% bandwidth.

### 2.6.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

### 2.6.6 Test Results

Performance assessment of the EUT made during this test: **Pass**  
Detailed results are shown below.



14:45:40 17.09.2019

Figure 2.6.6-1 99% bandwidth





## 2.6.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN using equipment listed below in Table 2.6.8-1.  
Test Area: LTS

**Table 2.6.8-1 Occupied bandwidth. Test equipment list**

| Device #  | Manufacturer         | Description           | Model  | Serial #   | Cal Code | Cal Date   | Cal Due    |
|-----------|----------------------|-----------------------|--------|------------|----------|------------|------------|
| NBLE03366 | Agilent Technologies | Spectrum Analyzer     | E4440A | MY42510427 | G        | 10/23/2018 | 10/23/2019 |
| WRLE02418 | EMCO/EMC Test        | Antenna, Loop         | 6502   | 2215       | G        | 09/25/2018 | 09/25/2020 |
| NBLE11555 | Rohde & Schwarz      | Receiver, 2 Hz-44 GHz | ESW44  | 101537     | G        | 04/26/2019 | 04/26/2020 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.

## 2.7 Frequency stability

### 2.7.1 Specification Reference

FCC 47 CFR Part 15 Subpart C, §15.225(e)  
ISED RSS-210 B.6

### 2.7.2 Equipment Under Test and Modification State

As shown in §1.2 with modifications if any as shown in §1.6.

### 2.7.3 Date of Test

18 September 2019

### 2.7.4 Test Method

ANSI C63.10-2013 6.8.

### 2.7.5 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

### 2.7.6 Test Results

Performance assessment of the EUT made during this test: **Pass**

Detailed results are shown below.  $\pm 0.01\%$  requirement =  $\pm 100$  ppm.

**Table 2.7.6-1 Frequency stability**

| Temp (°C) | Time* (Minutes) | Freq (MHz)  | Tolerance (PPM) | Voltage (%) | Voltage (VDC) |
|-----------|-----------------|-------------|-----------------|-------------|---------------|
| 20.000    | 0.000           | 13.5601288  | 9.50            | 85          | 20.4          |
|           | 2.000           | 13.5601294  | 9.54            | 85          | 20.4          |
|           | 5.000           | 13.5601292  | 9.53            | 85          | 20.4          |
|           | 10.000          | 13.5601282  | 9.45            | 85          | 20.4          |
| 20.000    | 0.000           | 13.5601298  | 9.57            | 115         | 27.6          |
|           | 2.000           | 13.5601304  | 9.62            | 115         | 27.6          |
|           | 5.000           | 13.5601304  | 9.62            | 115         | 27.6          |
|           | 10.000          | 13.5601304  | 9.62            | 115         | 27.6          |
| 50.000    | 0.000           | 13.56010512 | 7.75            | 100         | 24            |
|           | 2.000           | 13.56010463 | 7.72            | 100         | 24            |
|           | 5.000           | 13.56010223 | 7.54            | 100         | 24            |
|           | 10.000          | 13.56010063 | 7.42            | 100         | 24            |
| 40.000    | 0.000           | 13.56010792 | 7.96            | 100         | 24            |
|           | 2.000           | 13.56010832 | 7.99            | 100         | 24            |
|           | 5.000           | 13.56010832 | 7.99            | 100         | 24            |
|           | 10.000          | 13.56010832 | 7.99            | 100         | 24            |
| 30.000    | 0.000           | 13.5601251  | 9.23            | 100         | 24            |
|           | 2.000           | 13.5601253  | 9.24            | 100         | 24            |
|           | 5.000           | 13.56012491 | 9.21            | 100         | 24            |
|           | 10.000          | 13.56012481 | 9.20            | 100         | 24            |
| 20.000    | 0.000           | 13.56014319 | 10.56           | 100         | 24            |
|           | 2.000           | 13.56014329 | 10.57           | 100         | 24            |
|           | 5.000           | 13.56014329 | 10.57           | 100         | 24            |
|           | 10.000          | 13.56014279 | 10.53           | 100         | 24            |
| 10.000    | 0.000           | 13.56015388 | 11.35           | 100         | 24            |
|           | 2.000           | 13.56015388 | 11.35           | 100         | 24            |
|           | 5.000           | 13.56015398 | 11.36           | 100         | 24            |
|           | 10.000          | 13.56015368 | 11.33           | 100         | 24            |
| 0.000     | 0.000           | 13.56014978 | 11.05           | 100         | 24            |
|           | 2.000           | 13.56014988 | 11.05           | 100         | 24            |
|           | 5.000           | 13.56014978 | 11.05           | 100         | 24            |
|           | 10.000          | 13.56014988 | 11.05           | 100         | 24            |
| -10.000   | 0.000           | 13.56012411 | 9.15            | 100         | 24            |
|           | 2.000           | 13.5601262  | 9.31            | 100         | 24            |
|           | 5.000           | 13.5601258  | 9.28            | 100         | 24            |
|           | 10.000          | 13.5601256  | 9.26            | 100         | 24            |
| -20.000   | 0.000           | 13.56007084 | 5.22            | 100         | 24            |
|           | 2.000           | 13.56007384 | 5.45            | 100         | 24            |
|           | 5.000           | 13.56007443 | 5.49            | 100         | 24            |
|           | 10.000          | 13.56007423 | 5.47            | 100         | 24            |



### 2.7.7 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN using equipment listed below in Table 2.7.8-1.

Test Area: LTS

**Table 2.7.8-1 Frequency stability. Test equipment list**

| Device #  | Manufacturer    | Description              | Model        | Serial #   | Cal Code | Cal Date   | Cal Due    |
|-----------|-----------------|--------------------------|--------------|------------|----------|------------|------------|
| NBLE11105 | Sorensen        | Power Supply, DC 33V-33A | XHR33-33-MGA | 1215A01757 | Y        | N/A        | N/A        |
| NBLE11375 | Fluke           | Digital Multimeter       | 115          | 32530450WS | G        | 05/21/2019 | 05/21/2020 |
| NBLE11522 | ESPEC           | Environmental Chamber    | SU-241 (TUV) | 92010168   | G        | 05/21/2019 | 05/21/2020 |
| NBLE11555 | Rohde & Schwarz | Receiver, 2 Hz-44 GHz    | ESW44        | 101537     | G        | 04/26/2019 | 04/26/2020 |

Cal Code G = Calibration performed by an accredited outside source.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.

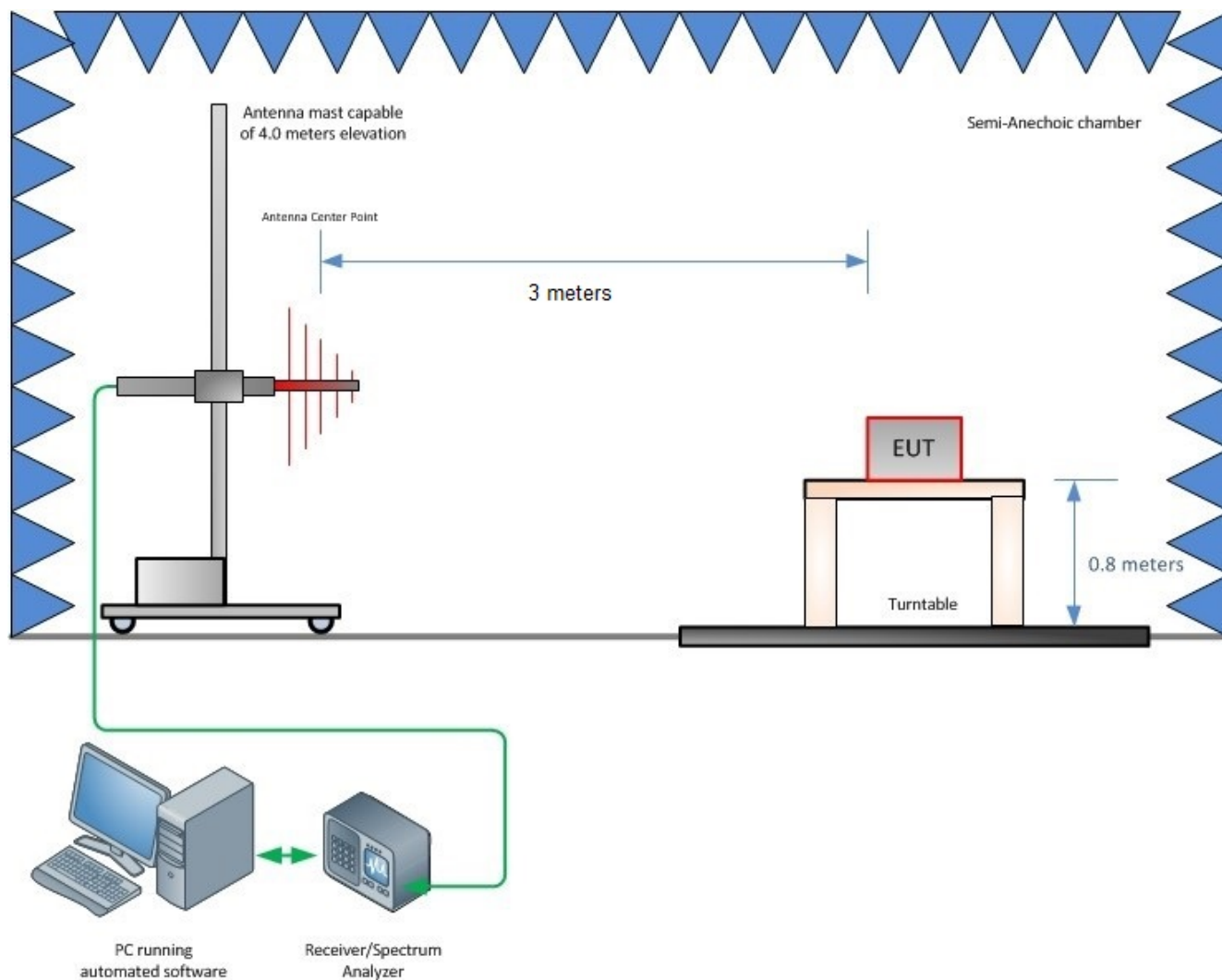


### 3 Measurement Uncertainty

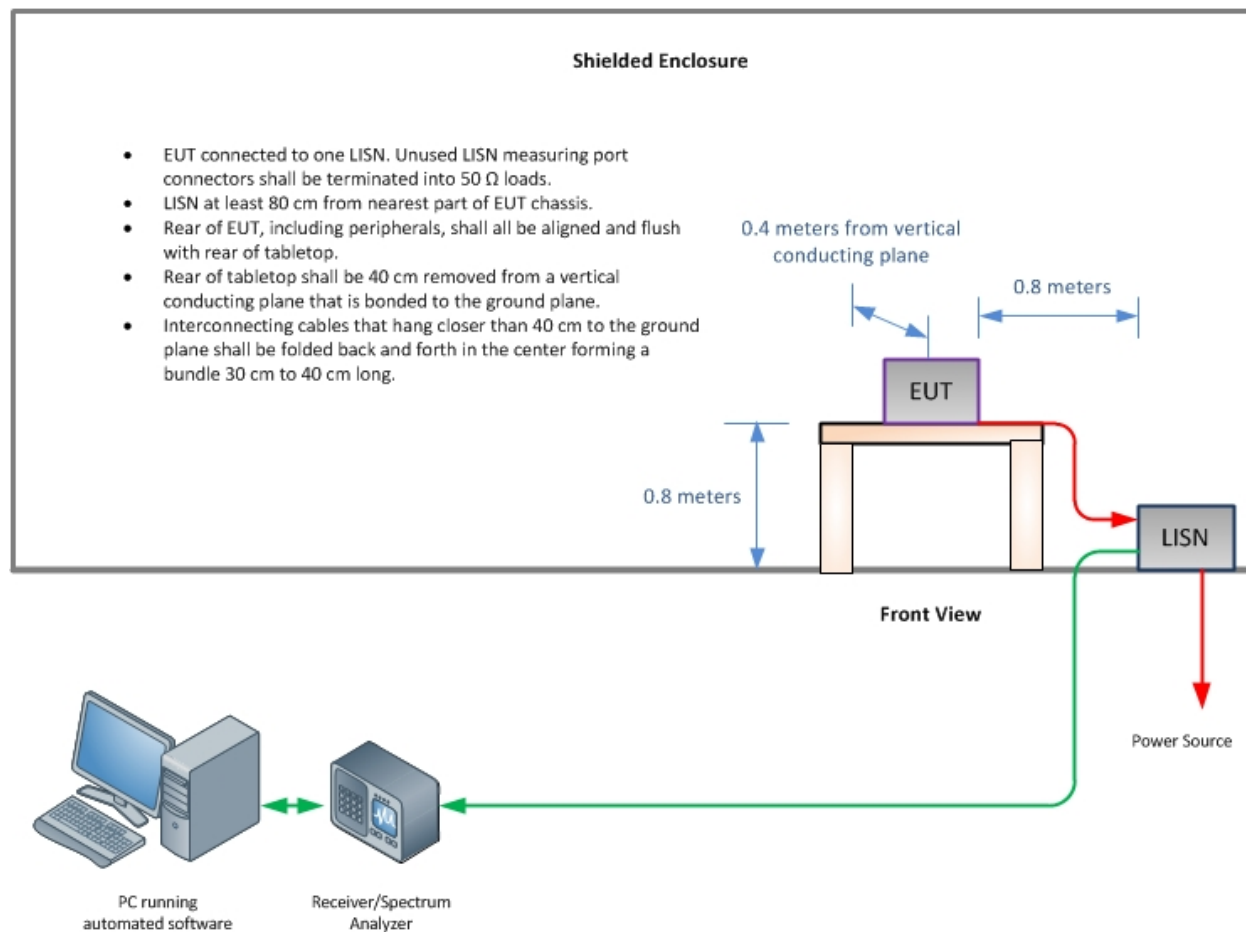
The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. This test system for 30 MHz – 1000 MHz has a measurement uncertainty of  $\pm 5.88$  dB and above 1 GHz a measurement uncertainty of  $\pm 4.47$  dB. The measurement uncertainty values for radiated emissions meet the requirements as expressed in CISPR 16-4-2. The equipment comprising the test systems is calibrated on an annual basis.



## 4 Diagram of Test Set-ups



**Figure 4-1 Radiated Emissions Test Setup 30 – 1000 MHz**

**Figure 4-2 AC Line Conducted Emissions Test Setup**



## 5 Accreditation, Disclaimers and Copyright

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc.'s issued reports.

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## 6 Manufacturer's Test Plan

### Form



#### EMC Test Plan and Product Information Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED VERSION OF THIS DOCUMENT INDICATING THOSE MODIFICATIONS.

**NOTE: This information will be input into your test report as shown below.**

|                                     |                                       |                       |  |
|-------------------------------------|---------------------------------------|-----------------------|--|
| Company:                            | Entrust Datacard Corp                 |                       |  |
| Address:<br>(incl City, State, ZIP) | 1187 Park Place<br>Shakopee, MN 55372 |                       |  |
| Contact:                            | Mark Forster                          | Position:             |  |
| Phone - Office:                     | 952-221-6264                          | Cell:                 |  |
| E-mail Address:                     | Mark.forster@entrustdatacard.com      | Form completion date: |  |

#### General Equipment Description -- NOTE: This info will be input into your test report as shown below

|                              |                  |             |     |
|------------------------------|------------------|-------------|-----|
| EUT Description              | PWA, RFID module |             |     |
| EUT Name                     | RFID Module      |             |     |
| Model No.:                   | 523442           | Serial No.: | n/a |
| Product Options:             | n/a              |             |     |
| Configurations to be tested: | n/a              |             |     |

#### Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised version of this document after testing is complete.)

|                                 |     |
|---------------------------------|-----|
| Modifications since last test:  | n/a |
| Modifications made during test: | n/a |

#### EUT Specifications and Requirements

Length: 3" Width: 1.5" Height: 0.25" Weight: 2oz

#### Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 100-230 VAC (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: 1

Current (Amps/phase(max)): Current (Amps/phase(nominal)):

Other Power to the module is 5V DC

#### Oscillator Frequencies (Please list any and all internally generated frequencies of the Product - clocks, CPUs, etc. The highest frequency will determine the upper frequency range to be tested.)

| Frequency (kHz, MHz, GHz) | Description of Use |
|---------------------------|--------------------|
| Y1 Oscillator 27.12M      | PWA oscillator     |
|                           |                    |
|                           |                    |





## Form



## EMC Test Plan and Product Information Form

## Typical Installation and/or Operating Environment (ie. Hospital, Small Business, Industrial/Factory, etc.)

Office environment, RFID PWA module is installed inside a Entrust Datacard desktop card printer during normal operation

## Test Objective(s):

Please indicate (x) the tests to be performed, entering the applicable standard(s) where noted.

|                                                   |         |  |
|---------------------------------------------------|---------|--|
| <input type="checkbox"/> EMC Directive            | Std(s): |  |
| <input type="checkbox"/> RED Directive            | Std(s): |  |
| <input type="checkbox"/> Medical Device Directive | Std(s): |  |
| <input type="checkbox"/> Vehicle                  | Std(s): |  |
| <input type="checkbox"/> Ag Directive             | Std(s): |  |

## Countries Needed (common standards shown below - "x" those applicable):

|                                                |         |                                                    |                                          |                            |
|------------------------------------------------|---------|----------------------------------------------------|------------------------------------------|----------------------------|
| <input checked="" type="checkbox"/> FCC (USA): | Class   | <input checked="" type="checkbox"/> A (Industrial) | <input type="checkbox"/> B (Residential) |                            |
| <input type="checkbox"/> VCCI (Japan):         | Class   | <input type="checkbox"/> A (Industrial)            | <input type="checkbox"/> B (Residential) |                            |
| <input type="checkbox"/> BSMI (Taiwan):        | Class   | <input type="checkbox"/> A (Industrial)            | <input type="checkbox"/> B (Residential) | (Separate Report required) |
| <input checked="" type="checkbox"/> Canada:    | Class   | <input checked="" type="checkbox"/> A (Industrial) | <input type="checkbox"/> B (Residential) |                            |
| <input type="checkbox"/> Australia             | Class   | <input type="checkbox"/> A (Industrial)            | <input type="checkbox"/> B (Residential) |                            |
| <input type="checkbox"/> Korea:                | Std(s): |                                                    |                                          |                            |
| <input type="checkbox"/> Other:                | Std(s): |                                                    |                                          |                            |

## Other Special Requirements (i.e. Water access, compressed air, etc)

|  |
|--|
|  |
|--|

## Emissions Testing Operating Modes.

Describe what the product is doing during testing. Describe how the product will be exercised during emissions testing and what software is running, if any. If testing multiple operating modes, please describe each one. If testing only one operating mode out of several, please describe why it is considered the worst-case. In addition to operating modes, all ports must be populated to achieve the worst case condition.

|                   |                                                       |
|-------------------|-------------------------------------------------------|
| Operating Mode 1. | Software will allow continuous reading of an RFID tag |
| Operating Mode 2. |                                                       |

## Immunity Testing Operating Modes.

If different than operating mode during emissions testing, describe what the product is doing during test. Describe how the product will be exercised during immunity testing and what software is running, if any. If testing multiple operating modes, please describe each one. If testing only one operating mode out of several, please describe why it is considered the worst-case. In addition to operating modes, all ports must be populated to achieve the worst case condition.

|                        |     |
|------------------------|-----|
| Cycle Time of Product: | n/a |
| Operating Mode 1.      | n/a |
| Operating Mode 2.      | n/a |



## Form



## EMC Test Plan and Product Information Form

## Immunity Testing Performance Criteria and Pass/Fail Criteria.

For immunity testing, it is very important that performance criteria be defined. Please describe what parameters can be monitored, as well as their tolerances, to ensure that the product is operating properly during the immunity testing. Explain what the test operator should monitor during the testing to determine if the product is operating within specified parameters.

n/a

## EUT Interface Ports and Cables

In order to verify all configurations in the report properly, it is generally necessary to populate all ports on the equipment under test. If any ports are to remain unpopulated, the justification for leaving them unpopulated should be noted. (e.g., "diagnostic use only"). Please note that any unpopulated port will be documented in the report, which may exclude it from the scope of compliance as detailed in that report. Please provide as many cables as possible for testing adding rows as needed. **The cable length should represent the maximum length of cable that you specify that can be attached to the product in your instruction manual. TUV SUD AMERICA requires a minimum of 15 feet that will connect to any support equipment that you do not want included in the test field.**

| Type                             | Length tested<br>(in meters) | Qty | Shielding |    |      |
|----------------------------------|------------------------------|-----|-----------|----|------|
|                                  |                              |     | Yes       | No | Type |
| EXAMPLE: Ethernet                | 6                            | 2   |           | X  |      |
| RFID cable, Datacard #525065-001 | 7inch                        | 1   |           | x  |      |
|                                  |                              |     |           |    |      |
|                                  |                              |     |           |    |      |

## Equipment Under Test (EUT) System Components

List and describe all major components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required.

| Description                  | Model #          | Serial # | FCC ID # |
|------------------------------|------------------|----------|----------|
| U3- Near Field Comm frontend | NXP CLRC66301HN1 | n/a      | n/a      |
| U2- 3.3V regulator           | TI LP2985-33DBV  | n/a      | n/a      |
| U4- 5V regulator             | TI REG102NA-A    | n/a      | n/a      |

## Customer Supplied Support Equipment

List and describe all support equipment which is not part of the EUT but that you are providing to exercise and monitor your product. Support equipment is defined as only needed for testing and is not part of the final product to be delivered to the customer (i.e. peripherals, simulators, etc). This information is required for FCC & Taiwan testing.

Mainboard 515058-xxx powered by Mega ATS072T-P240, 24 VDC, brick type power supply

Laptop computer with power supply

## Critical EMI Components (Capacitors, ferrites, etc.)

| Description | Manufacturer | Part # or Value | Qty | Component # / Location |
|-------------|--------------|-----------------|-----|------------------------|
|             |              |                 |     |                        |
|             |              |                 |     |                        |
|             |              |                 |     |                        |

**Form****EMC Test Plan and Product Information Form****EMC Critical Detail**

Describe other EMC Design details used to reduce high frequency noise.

**System Configuration Block Diagram**

Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.

