



# **CERTIFICATION TEST REPORT**

**Report Number. :** 11631998-E5V2

**Applicant :** Verifone, Inc.  
1400 West Stanford Ranch Road  
Rocklin, CA 95765, USA

**Model :** V240m Plus 3GBW

**FCC ID :** B32V240MPLUS

**IC :** 787C-V240MPLUS

**EUT Description :** Mobile Point of Sale Terminal

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS - 210 ISSUE 9  
INDUSTRY CANADA RSS-GEN Issue 4

**Date Of Issue:**

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**Revision History**

| Ver. | Issue Date | Revisions         | Revised By |
|------|------------|-------------------|------------|
| V1   | 08/16/17   | Initial Issue     | D. Coronia |
| V2   | 01/18/18   | Updated Section 7 | D. Coronia |

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Verifone, Inc.  
1400 West Stanford Ranch Road Suite 200  
Rocklin, CA 95765, USA

**EUT DESCRIPTION:** Mobile Point of Sale Terminal

**MODEL:** V240m Plus 3GBW

**SERIAL NUMBER:** 313-855-592

**DATE TESTED:** April 27 to June 08, 2017

| APPLICABLE STANDARDS                     |              |
|------------------------------------------|--------------|
| STANDARD                                 | TEST RESULTS |
| FCC PART 15 SUBPART C                    | Pass         |
| INDUSTRY CANADA RSS-210 Issue 9, Annex B | Pass         |
| INDUSTRY CANADA RSS-GEN Issue 4          | Pass         |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, and FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 9.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 47173 Benicia Street                                       | 47266 Benicia Street                             |
|------------------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> Chamber A (IC:2324B-1) | <input type="checkbox"/> Chamber D (IC:22541-1)  |
| <input type="checkbox"/> Chamber B (IC:2324B-2)            | <input type="checkbox"/> Chamber E (IC: 22541-2) |
| <input type="checkbox"/> Chamber C (IC:2324B-3)            | <input type="checkbox"/> Chamber F (IC: 22541-3) |
|                                                            | <input type="checkbox"/> Chamber G (IC: 22541-4) |
|                                                            | <input type="checkbox"/> Chamber H (IC: 22541-5) |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively and Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                                           | Uncertainty |
|-----------------------------------------------------|-------------|
| Worst Case Conducted Disturbance, 9KHz to 0.15 MHz  | 3.84 dB     |
| Worst Case Conducted Disturbance, 0.15 to 30 MHz    | 3.65 dB     |
| Worst Case Radiated Disturbance, 9KHz to 30 MHz     | 3.15 dB     |
| Worst Case Radiated Disturbance, 30 to 1000 MHz     | 5.36 dB     |
| Worst Case Radiated Disturbance, 1000 to 18000 MHz  | 4.32 dB     |
| Worst Case Radiated Disturbance, 18000 to 26000 MHz | 4.45 dB     |
| Worst Case Radiated Disturbance, 26000 to 40000 MHz | 5.24 dB     |

Uncertainty figures are valid to a confidence level of 95%.

## **5. EQUIPMENT UNDER TEST**

### **5.1. DESCRIPTION OF EUT**

The EUT is the Mobile Point of Sale Terminal which contains an 11a/b/g/n/ac W-LAN + Bluetooth 4.1 combo module.

### **5.2. MAXIMUM FIELD STRENGTH**

The testing was performed at 3 meter. The transmitter maximum E-field at 30 meter distance is 42.92 dBuV/m which is converted from the 3 meter data.

### **5.3. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio used a two turn, inductive loop antenna.

### **5.4. SOFTWARE AND FIRMWARE**

The firmware installed in the EUT during testing was VOS2 – 30640xxx.

### **5.5. WORST-CASE CONFIGURATION AND MODE**

Radiated emission was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that Z-Axis orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z-Axis orientation.

### **5.6. MODIFICATIONS**

No modifications were made during testing.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |            |               |        |
|------------------------|--------------|------------|---------------|--------|
| Description            | Manufacturer | Model      | Serial Number | FCC ID |
| Laptop                 | Lenovo       | 20B7S0A200 | PC015REW      | NA     |
| AC Adapter             | Verifone     | SC1402     | 1708200053701 | NA     |
| AC Adapter             | Verifone     | AM11A-050A | 1650A1P       | NA     |

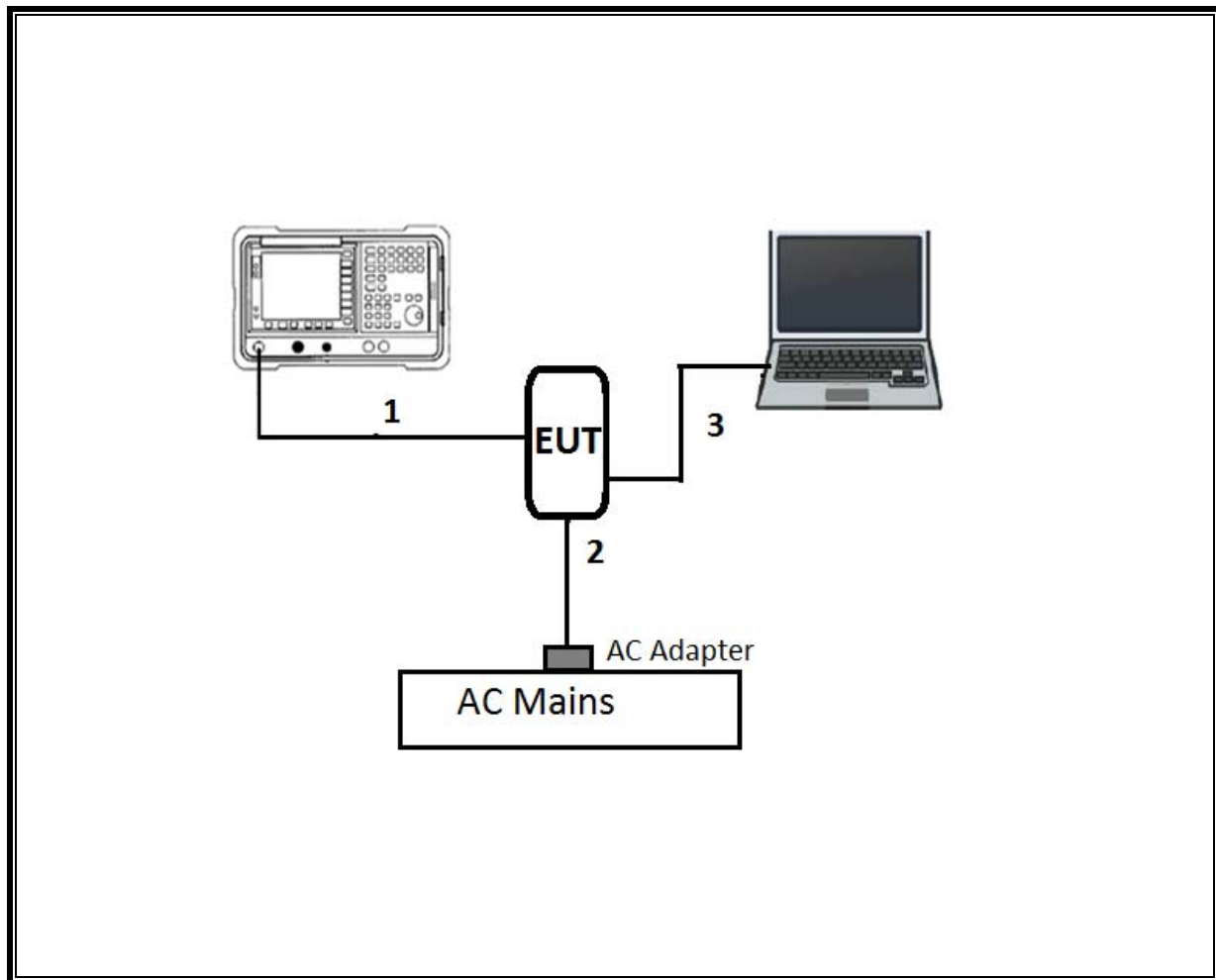
### I/O CABLES (CONDUCTED TEST)

| I/O Cable List |         |                      |                |             |                  |                      |
|----------------|---------|----------------------|----------------|-------------|------------------|----------------------|
| Cable No       | Port    | # of identical ports | Connector Type | Cable Type  | Cable Length (m) | Remarks              |
| 1              | Antenna | 1                    | SMA            | Un-Shielded | 0.1              | To spectrum Analyzer |
| 2              | DC      | 1                    | AC             | Un-shielded | 2                | N/A                  |
| 3              | USB     | 1                    | USB            | Shielded    | 2                | N/A                  |

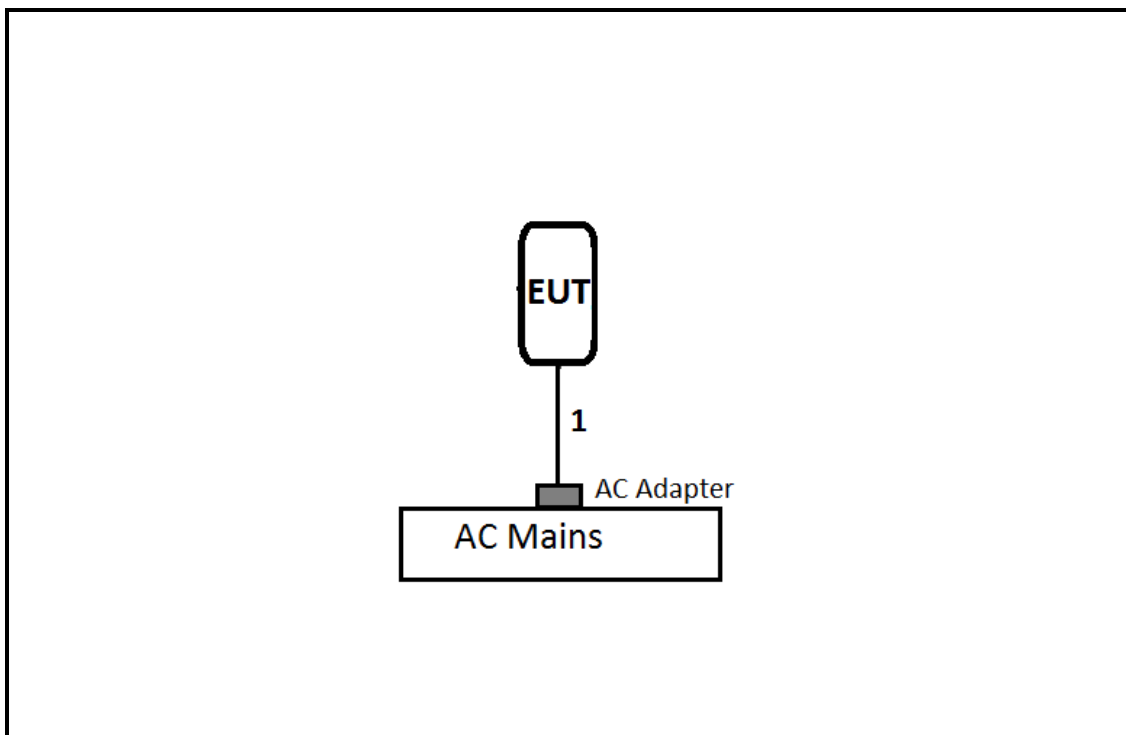
### I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

| I/O Cable List |      |                      |                |             |                  |         |
|----------------|------|----------------------|----------------|-------------|------------------|---------|
| Cable No       | Port | # of identical ports | Connector Type | Cable Type  | Cable Length (m) | Remarks |
| 1              | DC   | 1                    | AC             | Un-shielded | 2                | N/A     |

**CONDUCTED TEST SETUP DIAGRAM**



**RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST                                   |                                 |                         |       |          |
|-------------------------------------------------------|---------------------------------|-------------------------|-------|----------|
| Description                                           | Manufacturer                    | Model                   | Asset | Cal Due  |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad | Sunol Sciences Corp.            | JB3                     | T477  | 06/22/17 |
| Antenna, Active Loop 9kHz-30MHz                       | ETS-Lindgren                    | 6502                    | T1683 | 02/17/18 |
| Amplifier, 10kHz-1GHz                                 | Agilent (Keysight) Technologies | 8447D                   | T15   | 08/26/17 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz                  | Agilent (Keysight) Technologies | N9030A                  | T907  | 01/23/18 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz                  | Agilent (Keysight) Technologies | N9030A                  | T1450 | 01/10/18 |
| Temperature Chamber                                   | Thermotron Industries           | SE-600-10-10            | T80   | 08/21/17 |
| EMI Test Receiver                                     | Rohde & Schwarz                 | ESR                     | T1436 | 01/18/18 |
| LISN                                                  | Fischer Custom Communications   | FCC-LISN-50/250-25-2-01 | T1310 | 06/08/17 |
| Transient Limiter                                     | COM-POWER                       | LIT-930                 | T1457 | 02/24/18 |

NOTE: \*testing is completed before equipment calibration expiration date.

| Test Software List    |              |        |                          |
|-----------------------|--------------|--------|--------------------------|
| Description           | Manufacturer | Model  | Version                  |
| Radiated Software     | UL           | UL EMC | Ver 9.5, Apr 26, 2016    |
| Antenna Port Software | UL           | UL RF  | Ver 5.1.1, July 15, 2016 |

## 7. OCCUPIED BANDWIDTH

### LIMITS

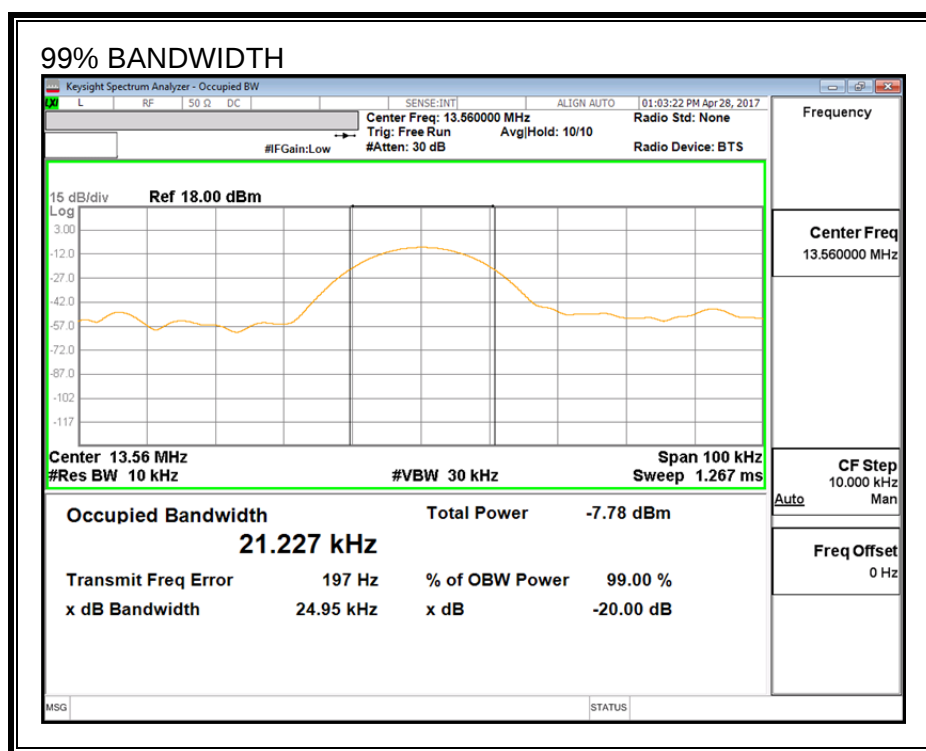
For reporting purposes only. Tested per ANSI C63.10 (6.9.3)

### RESULTS

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 45250 | <b>Date:</b> | 4/28/17 |
|------------|-------|--------------|---------|

| Frequency<br>(MHz) | 99% Bandwidth<br>(kHz) | 20dB Bandwidth<br>(kHz) |
|--------------------|------------------------|-------------------------|
| 13.56              | 21.23                  | 24.95                   |

### 99% Bandwidth



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMIT

§15.225, 15.209

IC RSS-210, Annex B.6 (Transmitter)

IC RSS-GEN, Section 7.1.2 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

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

| Limits for radiated disturbance of an intentional radiator |                 |                          |
|------------------------------------------------------------|-----------------|--------------------------|
| Frequency range (MHz)                                      | Limits (µV/m)   | Measurement Distance (m) |
| 0.009 – 0.490                                              | 2400 / F (kHz)  | 300                      |
| 0.490 – 1.705                                              | 24000 / F (kHz) | 30                       |
| 1.705 – 30.0                                               | 30              | 30                       |
| 30 – 88                                                    | 100**           | 3                        |
| 88 - 216                                                   | 150**           | 3                        |
| 216 – 960                                                  | 200**           | 3                        |
| Above 960                                                  | 500             | 3                        |

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

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

Formula for converting the field strength from µV/m to dBµV/m is:

Limit (dBµV/m) = 20 log limit (µV/m)

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

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

## **TEST PROCEDURE**

ANSI C63.10-2013

The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

## **RESULTS**

No non-compliance noted:

## **KDB 414788 OATS and Chamber Correlation Justification**

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

### 8.1.1. FUNDAMENTAL EMISSION MASK (11.56 – 15.56MHz)



## Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr 30m | Corrected Reading dB(uVolts/meter) | FCC 15.225 Limit | PK Margin (dB) | Azimuth (Degs) |
|--------|-----------------|----------------------|-----|---------------------|----------|---------------|------------------------------------|------------------|----------------|----------------|
| 8      | 12.91997        | 36.18                | Pk  | 10.4                | .6       | -40           | 7.18                               | 29.54            | -22.36         | 0-360          |
| 1      | 12.925          | 44.21                | Pk  | 10.4                | .6       | -40           | 15.21                              | 29.54            | -14.33         | 0-360          |
| 9      | 13.34473        | 48.07                | Pk  | 10.4                | .6       | -40           | 19.07                              | 40.51            | -21.44         | 0-360          |
| 2      | 13.34863        | 49.6                 | Pk  | 10.4                | .6       | -40           | 20.6                               | 40.51            | -19.91         | 0-360          |
| 10     | 13.42251        | 48.79                | Pk  | 10.4                | .6       | -40           | 19.79                              | 50.5             | -30.71         | 0-360          |
| 3      | 13.48588        | 51.95                | Pk  | 10.4                | .6       | -40           | 22.95                              | 50.5             | -27.55         | 0-360          |
| 11     | 13.55822        | 69.59                | Pk  | 10.4                | .6       | -40           | 40.59                              | 84               | -43.41         | 0-360          |
| 4      | 13.56013        | 71.63                | Pk  | 10.4                | .6       | -40           | 42.63                              | 84               | -41.37         | 0-360          |
| 5      | 13.62913        | 52.32                | Pk  | 10.4                | .6       | -40           | 23.32                              | 50.5             | -27.18         | 0-360          |
| 12     | 13.63163        | 50.18                | Pk  | 10.4                | .6       | -40           | 21.18                              | 50.5             | -29.32         | 0-360          |
| 13     | 13.76897        | 48.2                 | Pk  | 10.3                | .5       | -40           | 19                                 | 40.51            | -21.51         | 0-360          |
| 6      | 13.77188        | 51.41                | Pk  | 10.3                | .5       | -40           | 22.21                              | 40.51            | -18.3          | 0-360          |
| 14     | 14.19262        | 39.43                | Pk  | 10.3                | .5       | -40           | 10.23                              | 29.54            | -19.31         | 0-360          |
| 7      | 14.19538        | 40.56                | Pk  | 10.3                | .5       | -40           | 11.36                              | 29.54            | -18.18         | 0-360          |

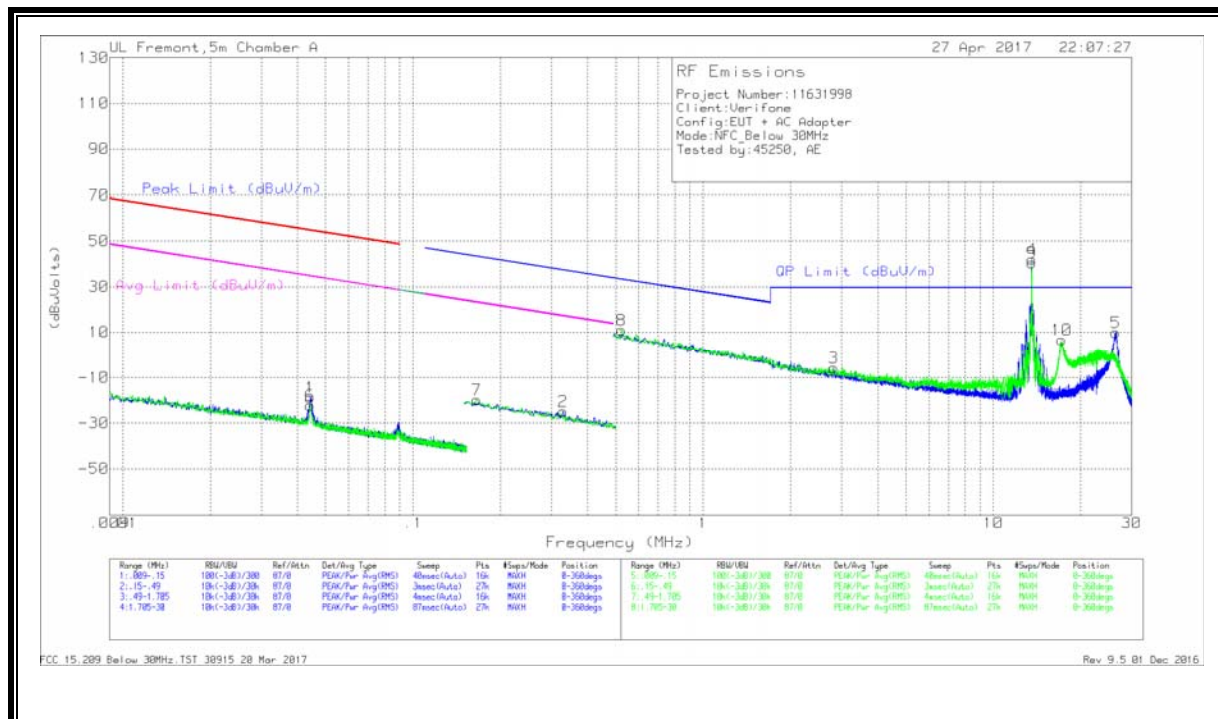
Pk - Peak detector

## Fundamental Frequency

| Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr 30m | Corrected Reading dB(uVolts/meter) | FCC 15.225 Limit | PK Margin (dB) | Azimuth (Degs) | Antenna Position |
|-----------------|----------------------|-----|---------------------|----------|---------------|------------------------------------|------------------|----------------|----------------|------------------|
| 13.56           | 71.92                | Pk  | 10.4                | .6       | -40           | 42.92                              | 84               | -41.08         | 32             | Face on          |
| 13.5601         | 69.63                | Pk  | 10.4                | .6       | -40           | 40.63                              | 84               | -43.37         | 98             | Face off         |

Pk - Peak detector

## 8.1.2. SPURIOUS EMISSIONS (0.09 – 30MHz)



### Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr 300m | Corrected Reading (dBuVolts) | Peak Limit (dBuV/m) | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) |
|--------|-----------------|----------------------|-----|---------------------|----------|----------------|------------------------------|---------------------|-------------|--------------------|-------------|---------------------|-------------|--------------------|-------------|----------------|
| 1      | .04417          | 48.26                | Pk  | 13                  | .1       | -80            | -18.64                       | 54.68               | -73.32      | 34.68              | -53.32      | -                   | -           | -                  | -           | 0-360          |
| 6      | .04424          | 44.75                | Pk  | 13                  | .1       | -80            | -22.15                       | 54.67               | -76.82      | 34.67              | -56.82      | -                   | -           | -                  | -           | 0-360          |
| 7      | .16558          | 48.39                | Pk  | 11.6                | .1       | -80            | -19.91                       | -                   | -           | -                  | -           | 43.24               | -63.15      | 23.24              | -43.15      | 0-360          |
| 2      | .32908          | 43.54                | Pk  | 11.5                | .1       | -80            | -24.86                       | -                   | -           | -                  | -           | 37.26               | -62.12      | 17.26              | -42.12      | 0-360          |

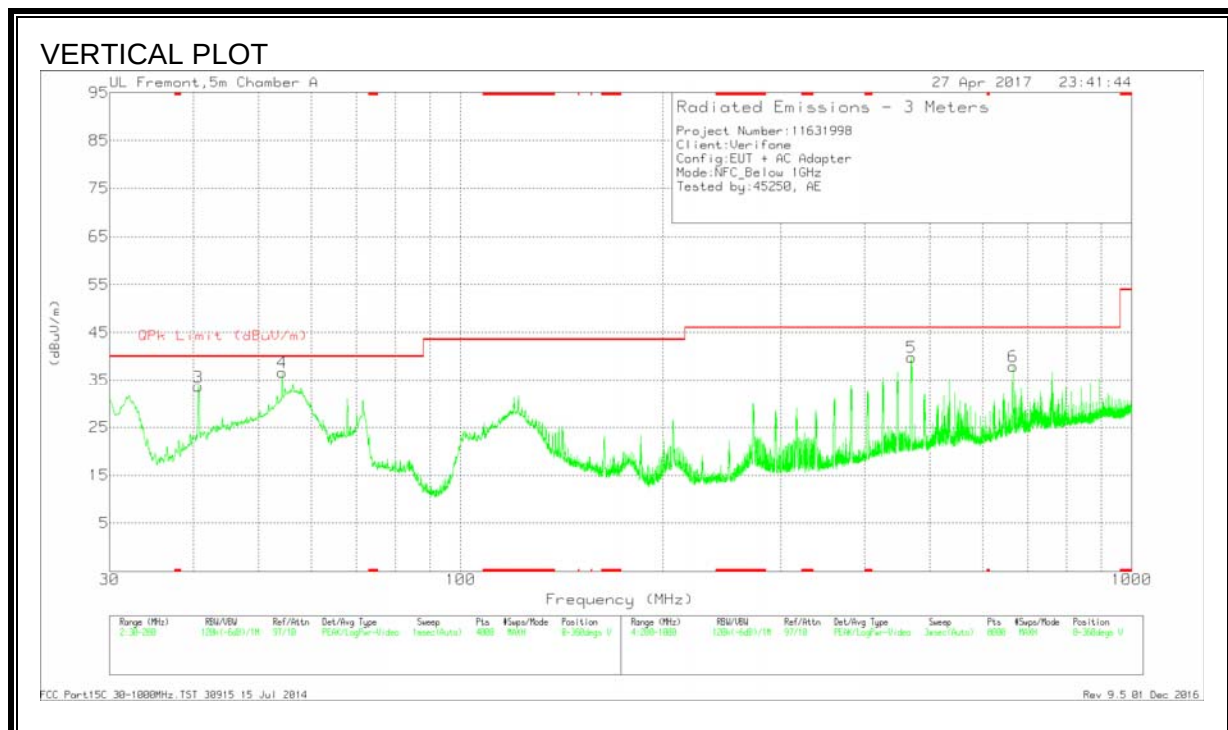
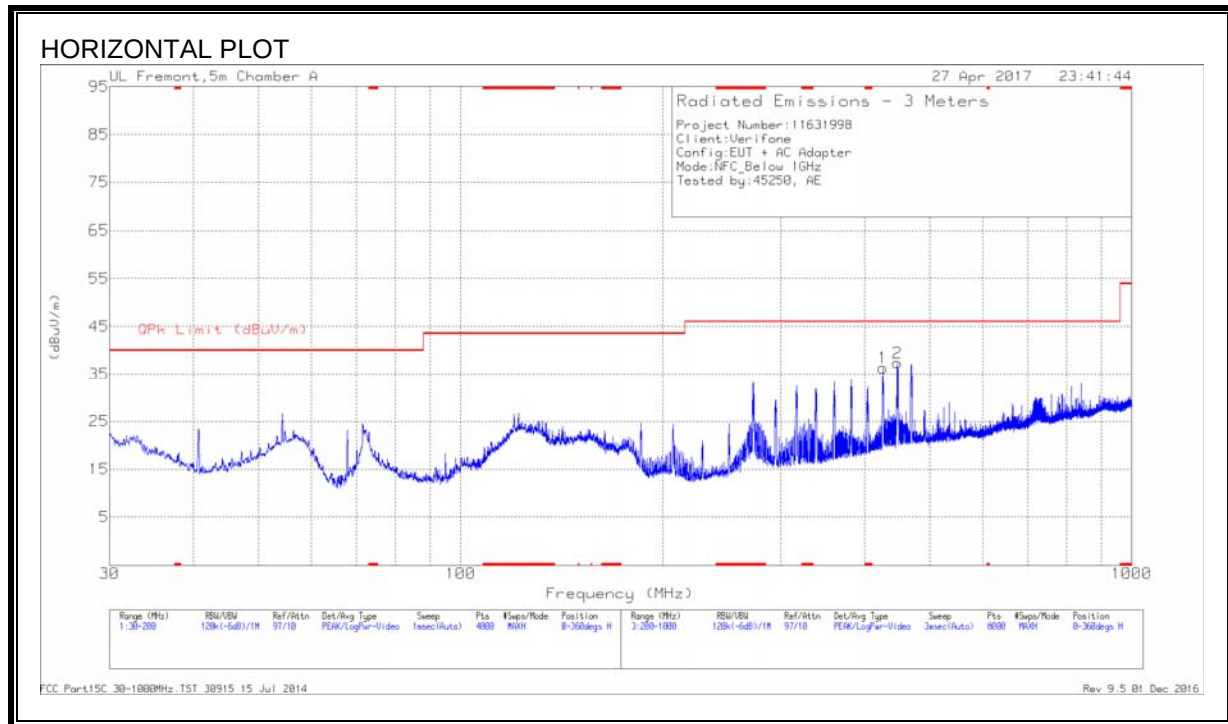
### Pk - Peak detector

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Loop Antenna (dB/m) | Cbl (dB) | Dist Corr 30m | Corrected Reading (dBuVolts) | Peak Limit (dBuV/m) | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | QP Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) |
|--------|-----------------|----------------------|-----|---------------------|----------|---------------|------------------------------|---------------------|-------------|--------------------|-------------|-------------------|-------------|----------------|
| 8      | .52317          | 39.5                 | Pk  | 11.5                | .1       | -40           | 11.1                         | -                   | -           | -                  | -           | 33.23             | -22.13      | 0-360          |
| 3      | 2.8206          | 22.15                | Pk  | 11.7                | .3       | -40           | -5.85                        | -                   | -           | -                  | -           | 29.5              | -35.35      | 0-360          |
| 9      | *13.55998       | 69.6                 | Pk  | 10.4                | .6       | -40           | 40.6                         | -                   | -           | -                  | -           | -                 | -           | 0-360          |
| 4      | *13.56207       | 71.04                | Pk  | 10.4                | .6       | -40           | 42.04                        | -                   | -           | -                  | -           | -                 | -           | 0-360          |
| 10     | 17.19339        | 36.2                 | Pk  | 10                  | .6       | -40           | 6.8                          | -                   | -           | -                  | -           | 29.5              | -22.7       | 0-360          |
| 5      | 26.46243        | 40.66                | Pk  | 8.6                 | .8       | -40           | 10.06                        | -                   | -           | -                  | -           | 29.5              | -19.44      | 0-360          |

\*Note: Fundamental Frequency

Pk - Peak detector

### 8.1.3. TX SPURIOUS EMISSIONS (30 – 1000MHz)



## Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T130 (dB/m) | Amp/Cbl (dB/m) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|----------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 3      | 40.6703         | 47.12                | Pk  | 17.6           | -31.1          | 33.62                      | 40                 | -6.38       | 0-360          | 100         | V        |
| 4      | 54.2313         | 56.54                | Pk  | 11.1           | -31            | 36.64                      | 40                 | -3.36       | 0-360          | 100         | V        |
| 1      | 425.9294        | 44.73                | Pk  | 20.5           | -28.9          | 36.33                      | 46.02              | -9.69       | 0-360          | 101         | H        |
| 2      | 447.8322        | 45.5                 | Pk  | 20.8           | -28.9          | 37.4                       | 46.02              | -8.62       | 0-360          | 101         | H        |
| 5      | 469.435         | 47.19                | Pk  | 21.3           | -28.7          | 39.79                      | 46.02              | -6.23       | 0-360          | 101         | V        |
| 6      | 665.0605        | 42.65                | Pk  | 23.7           | -28.4          | 37.95                      | 46.02              | -8.07       | 0-360          | 101         | V        |

Pk - Peak detector

## Radiated Emissions

| Frequency (MHz) | Meter Reading (dBuV) | Det | AF T130 (dB/m) | Amp/Cbl (dB/m) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|-----|----------------|----------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 54.2342         | 54.98                | Qp  | 11.1           | -31            | 35.08                      | 40                 | -4.92       | 103            | 103         | V        |

Qp - Quasi-Peak detector

## 9. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207

IC RSS-GEN, Section 7.2.2

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 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 band edges.

| Frequency range<br>(MHz)                                                                                                                                                         | Limits (dB $\mu$ V) |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|
|                                                                                                                                                                                  | Quasi-peak          | Average  |
| 0.15 to 0.50                                                                                                                                                                     | 66 to 56            | 56 to 46 |
| 0.50 to 5                                                                                                                                                                        | 56                  | 46       |
| 5 to 30                                                                                                                                                                          | 60                  | 50       |
| Notes:<br>1. The lower limit shall apply at the transition frequencies<br>2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. |                     |          |

### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

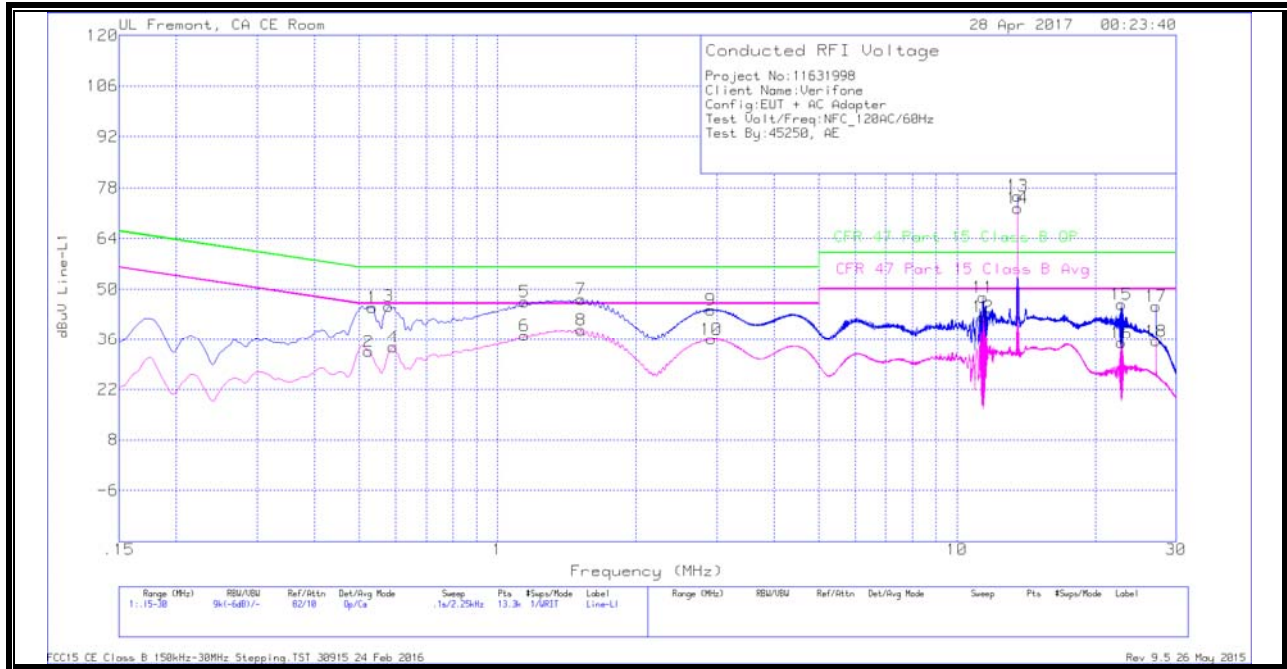
Line conducted data is recorded for both Line 1 (HOT) and Line 2 (NEUTRAL).

### RESULTS

No non-compliance noted.

**EUT WITH ANTENNA**

**LINE 1 RESULTS**



# WORST EMISSIONS

| Range 1: Line-L1 .15 - 30MHz |                 |                      |     |         |                 |              |                        |                           |                |                            |                       |
|------------------------------|-----------------|----------------------|-----|---------|-----------------|--------------|------------------------|---------------------------|----------------|----------------------------|-----------------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN L1 | LC Cables C1&C3 | Limiter (dB) | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR) Margin (dB) |
| 1                            | .53475          | 34.82                | Qp  | 0       | .1              | 10.1         | 45.02                  | 56                        | -10.98         | -                          | -                     |
| 2                            | .5235           | 22.47                | Ca  | 0       | .1              | 10.1         | 32.67                  | -                         | -              | 46                         | -13.33                |
| 3                            | .57975          | 35.11                | Qp  | 0       | .1              | 10.1         | 45.31                  | 56                        | -10.69         | -                          | -                     |
| 4                            | .59325          | 23.62                | Ca  | 0       | .1              | 10.1         | 33.82                  | -                         | -              | 46                         | -12.18                |
| 5                            | 1.14675         | 36.35                | Qp  | 0       | .1              | 10.1         | 46.55                  | 56                        | -9.45          | -                          | -                     |
| 6                            | 1.1445          | 26.86                | Ca  | 0       | .1              | 10.1         | 37.06                  | -                         | -              | 46                         | -8.94                 |
| 7                            | 1.5225          | 37.04                | Qp  | 0       | .1              | 10.1         | 47.24                  | 56                        | -8.76          | -                          | -                     |
| 8                            | 1.52025         | 28.49                | Ca  | 0       | .1              | 10.1         | 38.69                  | -                         | -              | 46                         | -7.31                 |
| 9                            | 2.90625         | 34.1                 | Qp  | 0       | .1              | 10.1         | 44.3                   | 56                        | -11.7          | -                          | -                     |
| 10                           | 2.9175          | 25.85                | Ca  | 0       | .1              | 10.1         | 36.05                  | -                         | -              | 46                         | -9.95                 |
| 11                           | 11.40225        | 37.39                | Qp  | 0       | .2              | 10.2         | 47.79                  | 60                        | -12.21         | -                          | -                     |
| 12                           | 11.40225        | 31.95                | Ca  | 0       | .2              | 10.2         | 42.35                  | -                         | -              | 50                         | -7.65                 |
| 13                           | *13.56          | 65.16                | Qp  | .1      | .2              | 10.2         | 75.66                  | -                         | -              | -                          | -                     |
| 14                           | *13.56          | 61.98                | Ca  | .1      | .2              | 10.2         | 72.48                  | -                         | -              | -                          | -                     |
| 15                           | 22.76025        | 35.03                | Qp  | .1      | .3              | 10.4         | 45.83                  | 60                        | -14.17         | -                          | -                     |
| 16                           | 22.803          | 24.28                | Ca  | .1      | .3              | 10.4         | 35.08                  | -                         | -              | 50                         | -14.92                |
| 17                           | 27.12075        | 34.33                | Qp  | .1      | .3              | 10.5         | 45.23                  | 60                        | -14.77         | -                          | -                     |
| 18                           | 27.12075        | 24.65                | Ca  | .1      | .3              | 10.5         | 35.55                  | -                         | -              | 50                         | -14.45                |

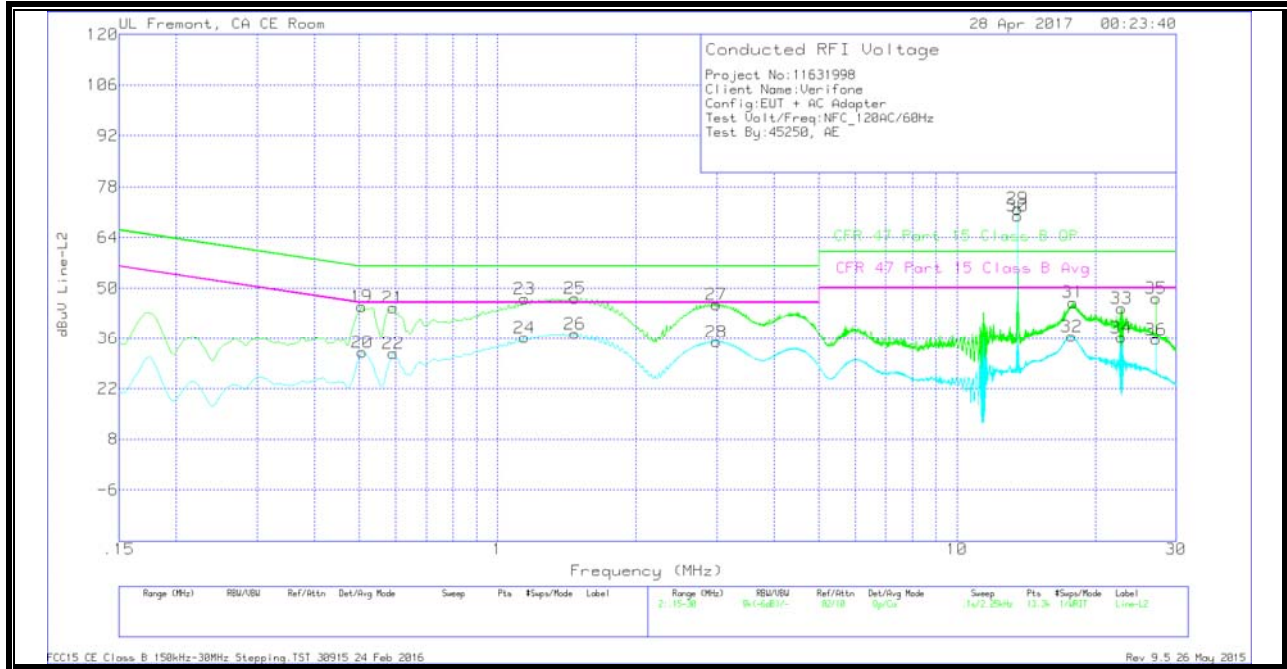
\* - *indicates fundamental frequency*

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: Markers 13 and 14 are the 13.56MHz NFC Fundamental

**LINE 2 RESULTS**



# **WORST EMISSIONS**

| Range 2: Line-L2 .15 - 30MHz |                 |                      |     |         |                 |              |                        |                           |                |                            |                       |
|------------------------------|-----------------|----------------------|-----|---------|-----------------|--------------|------------------------|---------------------------|----------------|----------------------------|-----------------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN L2 | LC Cables C2&C3 | Limiter (dB) | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR) Margin (dB) |
| 19                           | .5055           | 34.73                | Qp  | 0       | .1              | 10.1         | 44.93                  | 56                        | -11.07         | -                          | -                     |
| 20                           | .50775          | 21.85                | Ca  | 0       | .1              | 10.1         | 32.05                  | -                         | -              | 46                         | -13.95                |
| 21                           | .59325          | 34.46                | Qp  | 0       | .1              | 10.1         | 44.66                  | 56                        | -11.34         | -                          | -                     |
| 22                           | .59325          | 21.56                | Ca  | 0       | .1              | 10.1         | 31.76                  | -                         | -              | 46                         | -14.24                |
| 23                           | 1.1445          | 36.83                | Qp  | 0       | .1              | 10.1         | 47.03                  | 56                        | -8.97          | -                          | -                     |
| 24                           | 1.1445          | 26.13                | Ca  | 0       | .1              | 10.1         | 36.33                  | -                         | -              | 46                         | -9.67                 |
| 25                           | 1.47525         | 36.98                | Qp  | 0       | .1              | 10.1         | 47.18                  | 56                        | -8.82          | -                          | -                     |
| 26                           | 1.47413         | 27.15                | Ca  | 0       | .1              | 10.1         | 37.35                  | -                         | -              | 46                         | -8.65                 |
| 27                           | 2.99175         | 35.21                | Qp  | 0       | .1              | 10.1         | 45.41                  | 56                        | -10.59         | -                          | -                     |
| 28                           | 2.994           | 24.86                | Ca  | 0       | .1              | 10.1         | 35.06                  | -                         | -              | 46                         | -10.94                |
| 29                           | *13.56          | 61.49                | Qp  | .1      | .2              | 10.2         | 71.99                  | -                         | -              | -                          | -                     |
| 30                           | *13.56          | 59.51                | Ca  | .1      | .2              | 10.2         | 70.01                  | -                         | -              | -                          | -                     |
| 31                           | 17.87775        | 35.49                | Qp  | 0       | .3              | 10.3         | 46.09                  | 60                        | -13.91         | -                          | -                     |
| 32                           | 17.75175        | 26.06                | Ca  | 0       | .3              | 10.3         | 36.66                  | -                         | -              | 50                         | -13.34                |
| 33                           | 22.794          | 33.76                | Qp  | 0       | .3              | 10.4         | 44.46                  | 60                        | -15.54         | -                          | -                     |
| 34                           | 22.794          | 25.62                | Ca  | 0       | .3              | 10.4         | 36.32                  | -                         | -              | 50                         | -13.68                |
| 35                           | 27.12075        | 36.27                | Qp  | .1      | .3              | 10.5         | 47.17                  | 60                        | -12.83         | -                          | -                     |
| 36                           | 27.12075        | 24.92                | Ca  | .1      | .3              | 10.5         | 35.82                  | -                         | -              | 50                         | -14.18                |

**\* - indicates fundamental frequency**

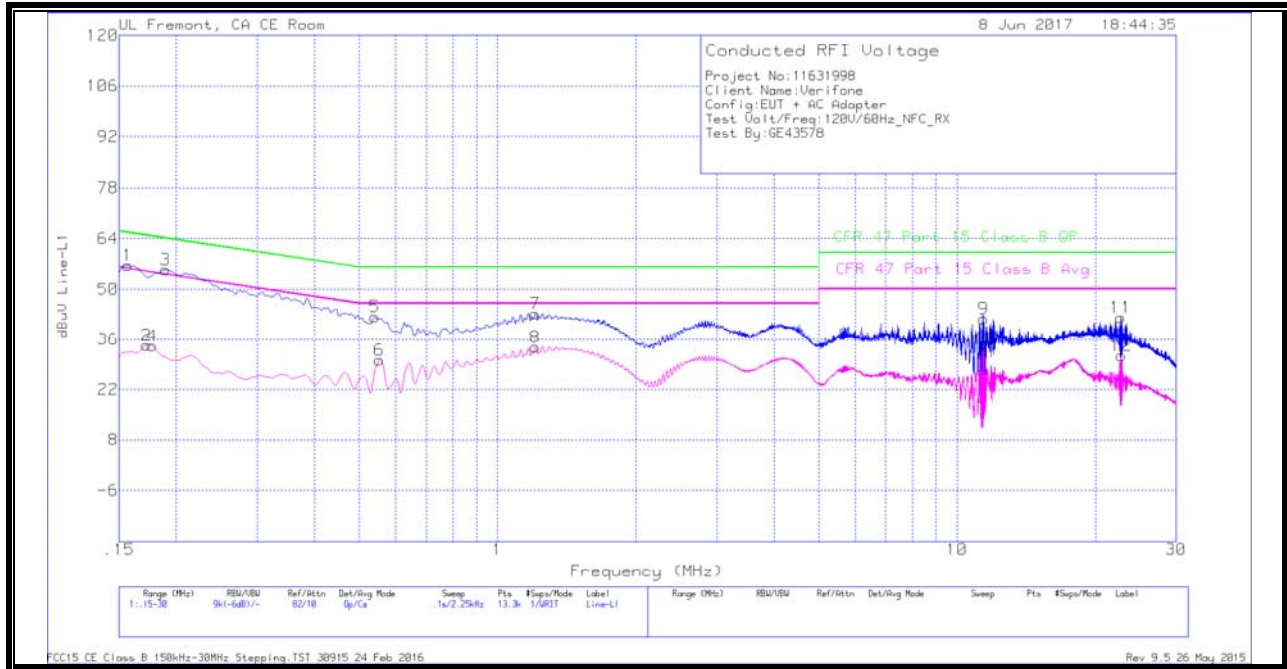
Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: Markers 29 and 30 are the 13.56MHz NFC Fundamental

**EUT WITH TERMINATOR AT ANTENNA PORT**

**LINE 1 RESULTS**



# WORST EMISSIONS

| Range 1: Line-L1 .15 - 30MHz |                 |                      |     |         |                 |              |                        |                           |                |                            |                       |
|------------------------------|-----------------|----------------------|-----|---------|-----------------|--------------|------------------------|---------------------------|----------------|----------------------------|-----------------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN L1 | LC Cables C1&C3 | Limiter (dB) | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR) Margin (dB) |
| 1                            | .15675          | 46.42                | Qp  | 0       | .1              | 10.1         | 56.62                  | 65.63                     | -9.01          | -                          | -                     |
| 2                            | .1725           | 24.11                | Ca  | 0       | .1              | 10.1         | 34.31                  | -                         | -              | 54.84                      | -20.53                |
| 3                            | .18938          | 45.24                | Qp  | 0       | .1              | 10.1         | 55.44                  | 64.06                     | -8.62          | -                          | -                     |
| 4                            | .177            | 23.97                | Ca  | 0       | .1              | 10.1         | 34.17                  | -                         | -              | 54.63                      | -20.46                |
| 5                            | .5415           | 32.13                | Qp  | 0       | .1              | 10.1         | 42.33                  | 56                        | -13.67         | -                          | -                     |
| 6                            | .55275          | 20.04                | Ca  | 0       | .1              | 10.1         | 30.24                  | -                         | -              | 46                         | -15.76                |
| 7                            | 1.20975         | 33.06                | Qp  | 0       | .1              | 10.1         | 43.26                  | 56                        | -12.74         | -                          | -                     |
| 8                            | 1.20975         | 23.61                | Ca  | 0       | .1              | 10.1         | 33.81                  | -                         | -              | 46                         | -12.19                |
| 9                            | 11.418          | 31.43                | Qp  | 0       | .2              | 10.2         | 41.83                  | 60                        | -18.17         | -                          | -                     |
| 10                           | 11.418          | 22.72                | Ca  | 0       | .2              | 10.2         | 33.12                  | -                         | -              | 50                         | -16.88                |
| 11                           | 22.74225        | 31.41                | Qp  | .1      | .3              | 10.4         | 42.21                  | 60                        | -17.79         | -                          | -                     |
| 12                           | 22.78725        | 20.6                 | Ca  | .1      | .3              | 10.4         | 31.4                   | -                         | -              | 50                         | -18.6                 |

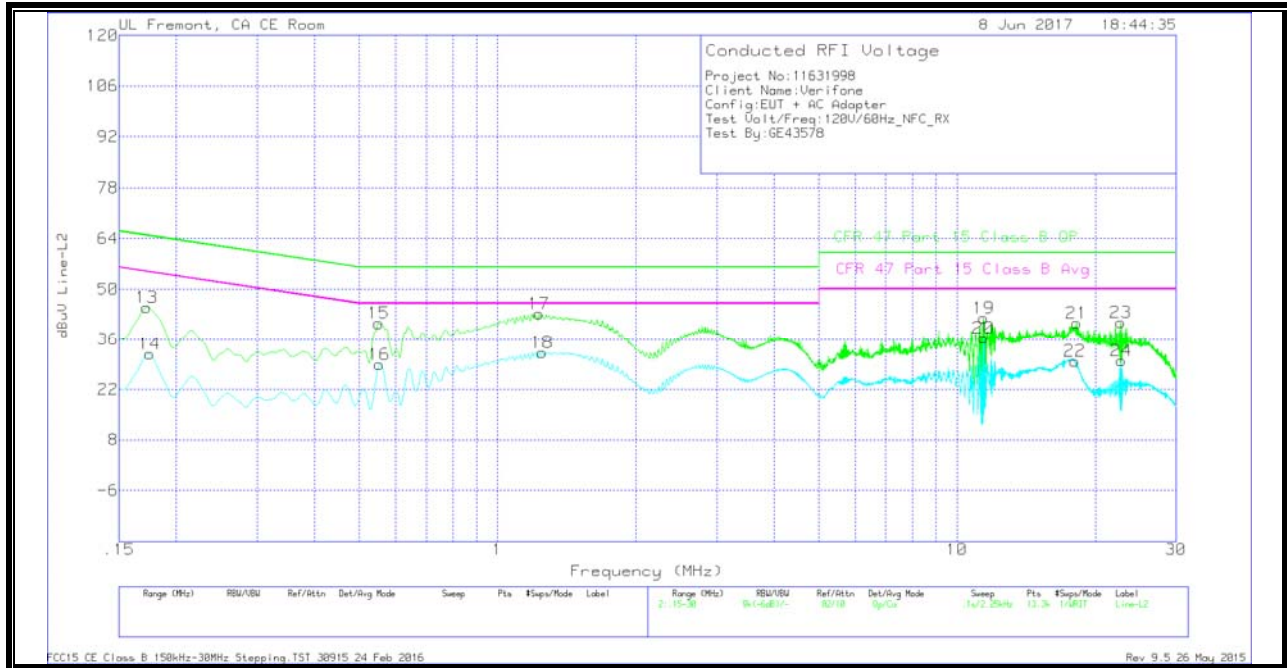
\* - indicates fundamental frequency

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: Markers 13 and 14 are the 13.56MHz NFC Fundamental

## LINE 2 RESULTS



# WORST EMISSIONS

| Range 2: Line-L2 .15 - 30MHz |                 |                      |     |         |                 |              |                        |                           |                |                            |                       |
|------------------------------|-----------------|----------------------|-----|---------|-----------------|--------------|------------------------|---------------------------|----------------|----------------------------|-----------------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN L2 | LC Cables C2&C3 | Limiter (dB) | Corrected Reading dBuV | CFR 47 Part 15 Class B QP | QP Margin (dB) | CFR 47 Part 15 Class B Avg | Av(CISPR) Margin (dB) |
| 13                           | .1725           | 34.74                | Qp  | 0       | .1              | 10.1         | 44.94                  | 64.84                     | -19.9          | -                          | -                     |
| 14                           | .17475          | 21.78                | Ca  | 0       | .1              | 10.1         | 31.98                  | -                         | -              | 54.73                      | -22.75                |
| 15                           | .5505           | 30.33                | Qp  | 0       | .1              | 10.1         | 40.53                  | 56                        | -15.47         | -                          | -                     |
| 16                           | .55275          | 18.71                | Ca  | 0       | .1              | 10.1         | 28.91                  | -                         | -              | 46                         | -17.09                |
| 17                           | 1.23225         | 32.97                | Qp  | 0       | .1              | 10.1         | 43.17                  | 56                        | -12.83         | -                          | -                     |
| 18                           | 1.2525          | 22.15                | Ca  | 0       | .1              | 10.1         | 32.35                  | -                         | -              | 46                         | -13.65                |
| 19                           | 11.4135         | 31.58                | Qp  | 0       | .2              | 10.2         | 41.98                  | 60                        | -18.02         | -                          | -                     |
| 20                           | 11.4135         | 26.05                | Ca  | 0       | .2              | 10.2         | 36.45                  | -                         | -              | 50                         | -13.55                |
| 21                           | 18.1995         | 30.09                | Qp  | 0       | .3              | 10.3         | 40.69                  | 60                        | -19.31         | -                          | -                     |
| 22                           | 18.03975        | 19.32                | Ca  | 0       | .3              | 10.3         | 29.92                  | -                         | -              | 50                         | -20.08                |
| 23                           | 22.73775        | 30.15                | Qp  | 0       | .3              | 10.4         | 40.85                  | 60                        | -19.15         | -                          | -                     |
| 24                           | 22.78275        | 19.3                 | Ca  | 0       | .3              | 10.4         | 30                     | -                         | -              | 50                         | -20                   |

**\* - indicates fundamental frequency**

Qp - Quasi-Peak detector

Ca - CISPR average detection

Note: Markers 29 and 30 are the 13.56MHz NFC Fundamental

## 10. FREQUENCY STABILITY

### LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency, over a temperature variation of 0 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### TEST PROCEDURE

ANSI C63.10

### RESULTS

|            |       |              |           |
|------------|-------|--------------|-----------|
| <b>ID:</b> | 43578 | <b>Date:</b> | 4/29/2017 |
|------------|-------|--------------|-----------|

| Reference Frequency: EUT Channel 13.56 MHz @ 20°C<br>Limit: $\pm 100$ ppm = 1.356 kHz |             |                                               |              |                   |              |                   |               |                   |               |                             |
|---------------------------------------------------------------------------------------|-------------|-----------------------------------------------|--------------|-------------------|--------------|-------------------|---------------|-------------------|---------------|-----------------------------|
| Power Supply                                                                          | Envir. Temp | Frequency Deviation Measured with Time Elapse |              |                   |              |                   |               |                   |               |                             |
| (Vdc)                                                                                 | (°C)        | Startup (MHz)                                 | Delta (ppm)  | @ 2 mins (MHz)    | Delta (ppm)  | @ 5 mins (MHz)    | Delta (ppm)   | @ 10 mins (MHz)   | Delta (ppm)   | Limit (ppm)                 |
| 3.70                                                                                  | 50          | 13.5600321                                    | -0.391       | 13.5600331        | -0.465       | 13.5600371        | -0.760        | 13.5600394        | -0.929        | $\pm 100$                   |
| 3.70                                                                                  | 40          | 13.5600268                                    | 0.000        | 13.5600264        | 0.029        | 13.5600260        | 0.059         | 13.5600263        | 0.037         | $\pm 100$                   |
| 3.70                                                                                  | 30          | 13.5600295                                    | -0.199       | 13.5600291        | -0.170       | 13.5600284        | -0.118        | 13.5600279        | -0.081        | $\pm 100$                   |
| <b>3.70</b>                                                                           | <b>20</b>   | <b>13.5600268</b>                             | <b>0.000</b> | <b>13.5600262</b> | <b>0.044</b> | <b>13.5600285</b> | <b>-0.125</b> | <b>13.5600314</b> | <b>-0.339</b> | <b><math>\pm 100</math></b> |
| 3.70                                                                                  | 10          | 13.5600945                                    | -4.993       | 13.5600926        | -4.853       | 13.5600880        | -4.513        | 13.5600821        | -4.078        | $\pm 100$                   |
| 3.70                                                                                  | 0           | 13.5601117                                    | -6.261       | 13.5601111        | -6.217       | 13.5601100        | -6.136        | 13.5601089        | -6.055        | $\pm 100$                   |
| 3.15                                                                                  | 20          | 13.5600215                                    | 0.392        | 13.5600221        | 0.345        | 13.5600202        | 0.487         | 13.5600191        | 0.568         | $\pm 100$                   |
| 4.255                                                                                 | 20          | 13.5600187                                    | 0.597        | 13.5600183        | 0.627        | 13.5600133        | 0.996         | 13.5600099        | 1.246         | $\pm 100$                   |