

# National Technical Systems Test Report for Electromagnetic Interference (EMI) Testing of the ClearAccess ELO, Printer, & UPS Units

**Prepared For**

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**Performed By**

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A handwritten signature in black ink, appearing to read "Karen Norton", written over a horizontal line.

Karen Norton  
Preparer

A handwritten signature in black ink, appearing to read "Eugene DeVito", written over a horizontal line.

Eugene DeVito  
Program Manager

This report and the information contained herein represents the results of testing of only those articles/products identified in this document and selected by the client. The tests were performed to specifications and/or procedures approved by the client. National Technical Systems ("NTS") makes no representations expressed or implied that such testing fully demonstrates efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it present any statement whatsoever as to the merchantability or fitness of the test article or similar products for a particular purpose. This document shall not be reproduced except in full without written approval from NTS.



### Revision History

Rev.	Description	Issue Date
0	Initial Release	04/07/2022

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### 1.0 Introduction

This document presents the test procedures used and the results obtained during the performance of an Electromagnetic Interference (EMI) test program. The test program was conducted to assess the ability of the specified Equipment Under Test (EUT) to successfully satisfy the requirements listed in Section 2.0.

### 2.0 References

The following references listed below form a part of this document to the extent specified herein.

- Test Specification: FCC Part 15 Class B, VVSG
- Pro V&V, Inc Purchase Order(s) 2021-019, dated 12/01/2021
- National Technical Systems (NTS) Quote(s) OP0602148, dated 11/29/2021
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/1/2017

### 3.0 Product Selection and Description

Pro V&V, Inc selected and provided the following test sample(s) to be used as the Equipment Under Test:

**Table 3.0-1: Product Identification - Equipment Under Test (EUT)**

Item	Qty.	Name/Description	Part Number	Serial Number
1	2	ClearAccess, ELO	N/A	193022853 193022854
2	1	Printer	N/A	460012341W822
3	2	UPS	N/A	AS2126193035 AS21282906644

### 3.1 Security Classification

Non-classified

### 4.0 General Test Requirements

#### 4.1 Test Equipment

The instrumentation used in the performance of these tests is periodically calibrated and standardized within manufacturer's rated accuracies and are traceable to the National Institute of Standards and Technology. The calibration procedures and practices are in accordance with ISO 17025:2017. Certification of calibration is on file subject to inspection by authorized personnel.

#### 4.2 Measurement Uncertainties

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below were calculated using the approach described in CISPR 16-4-2:2018 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of CISPR and therefore no adjustment of the data for measurement uncertainty is required.

**Table 4.2-1: Measurement Uncertainties**

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Radiated Emissions Electric Field	dBuV or dBuA	30-1,000 MHz	± 4.2 dB
		1,000-40,000 MHz	± 6 dB
Conducted Emissions	dBuV/m	150 kHz – 30 MHz	± 2.8 dB



**5.0 Test Descriptions and Results**

**Table 5.0-1: Summary of Test Information & Results**

Section	Test	Specification	Test Facility	Test Date	Part #	Part Name	Serial #	Test Result
5.1	Radiated Emissions	FCC Part 15 Class B, VVSG	Longmont	02/17/2022	N/A	ClearAccess, ELO	193022854	The test items exceeded the Class B limits (see NOD 1). Ferrites were added to the UPS ELO and Printer Cables and a retest was performed. No further anomalies were encountered. The test items met the specified requirements.
						Printer	460012341W822	
						UPS	AS21282906644	
5.2	Conducted Emissions	FCC Part 15 Class B, VVSG	Longmont	02/18/2022	N/A	ClearAccess, ELO	193022853	The test items met the specified requirements.
						Printer	460012341W822	
						UPS	AS2126193035	

The decision rule for Test Results was based on the Test Specification used for testing.

**5.1 Radiated Emissions**

**5.1.1 Test Procedure**

The ClearAccess, ELO, Printer and UPS were subjected to the Radiated Emissions test in accordance with FCC Part 15 Class B, VVSG.

**5.1.2 Test Result**

The test units failed the Radiated Emissions test 0.3dB over Class B QP Limits (see NOD 1). Ferrites were added to the UPS ELO and Printer Cables and the test was repeated. No additional anomalies were noted. The test items met the specified Class B requirements.

**5.1.3 Test Datasheets**

**Radiated Emissions, FCC Part 15**

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 17, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	841 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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Radiated Emissions-Quasi-Peak Data Table					
Vertical					
Frequency (MHz)	Amplitude (dB $\mu$ V/m)	Quasi-peak Limit (dB $\mu$ V/m)	Delta to Limit (dB)	EUT Azimuth (degrees)	Antenna Height (cm)
41.41	26	30	-4	79	116
59.69	22.5	30	-7.5	201	276
64.27	28.3	30	-1.7	238	235
109.22	35.4	35.5	-0.1	351	100
122.15	33.6	35.5	-1.9	20	100
191.99	25.3	35.5	-10.2	99	100
239.84	19.2	37	-17.8	0	100
599.71	25	37	-12	289	320
619.11	26.1	37	-10.9	49	400

## Radiated Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 17, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	841 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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**Radiated Emissions-Quasi-Peak Data Table**  
**Horizontal**

Frequency (MHz)	Amplitude (dB $\mu$ V/m)	Quasi-peak Limit (dB $\mu$ V/m)	Delta to Limit (dB)	EUT Azimuth (degrees)	Antenna Height (cm)
73.33	15.3	30	-14.7	189	400
185.85	20	35.5	-15.5	360	340
245.34	21.2	37	-15.8	75	324
512.41	26.2	37	-10.8	203	400
610.71	31.4	37	-5.6	336	100
625.9	33.8	37	-3.2	0	157
790.48	30.3	37	-6.7	240	280
813.11	29.6	37	-7.4	248	323

The highest emission measured was at **109.22 MHz**, which was **0.1 dB** below the limit.

- “Type” refers to the type of measurement performed. The type of measurement made is based on the requirements of the particular standard:
  - PK = Peak Measurement: RBW is 120kHz, VBW is 3 MHz
  - QP = Quasi-Peak Measurement: RBW is 120kHz, VBW is 3 MHz, and QP Detection is ENABLED
  - AV = Video Average Measurement: RBW is 1 MHz, VBW is 10 Hz
- The “field strength” (FS) emissions level is attained by adding the received amplitude measured (RA), Antenna factor (AF), and cable factor (CF) minus the amplifier gain (AG).  $FS = RA + AF + CF - AG$ . Final measurements are made with the Azimuth, Polarity, Height, and EUT Cables positioned for maximum radiation. If applicable, cables positions are noted in the test log. (Sample Calculation:  $49.6 \text{ dB}\mu\text{V} + 11.4 \text{ dB/m} - 28.8 \text{ dB (CF/AG)} = 32.2 \text{ dB}\mu\text{V/m}$ . **Important Note:** This is a sample calculation only for the purpose of demonstration, and does not reflect data in this report.)
- The “Azm/Pol/Hgt” indicates the turn-table *azimuth*, the antenna *polarity*, and the antenna *height* where the maximum emissions level was measured.
- The “Margin” is with reference to the emissions limit. A positive number indicates that the emission measurement is below the limit. A negative number indicates that the emission measurement exceeds the limit.
- The PRESCAN is a peak measurement and is performed with the RBW set to 120 kHz, VBW set to 3 MHz (30 MHz to 1 GHz), and the RBW set to 1 MHz, VBW set to 100 kHz (> 1 GHz)

5.1.4 Notice of Deviation (NOD)



NOTICE OF DEVIATION

Client:	Pro V&V	Job #:	PR150950	NOD #:	1
P. O. #:	2022-022	Date of Deviation:	2-17-2022	CAR #:	N/A
Notification Made To: (Client Contact)	Client	Notification Made By:	Mike Tidquist		
If notification was not made, provide justification:	N/A				
Date:	2-17-2022	Via:	Verbal		
Test:	Radiated Emissions	Test Item:	Clear Access		
Specification:	FCC Part 15 Class B	Model or P/N:	ELO, Printer, UPS		
Revision/Date:	N/A	Serial Number:	I193922853		

REQUIREMENTS: (Reference paragraph or section of specification)

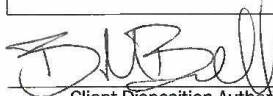


FCC Class B Radiated Emissions QP Limits  
30.0MHz – 88MHz = 30dB, 88MHz – 216MHz = 35.3dB, 216MHz – 960MHz = 37dB, 960MHz – 1000MHz = 43.5dB

DESCRIPTION OF DEVIATION

Failed Radiated Emissions .3dB over Class B QP Limits

DISPOSITIONS/COMMENTS/RECOMMENDATIONS:

Client Added ferrites to the UPS, ELO, Printer power cables and will continue testing

	2/18/22		2/18/2022
Client Disposition Authorization	Date	NTS Quality Representative	Date
	2/18/22	N/A	N/A
NTS Project Manager	Date	Government QAR (if applicable)	Date

NOTE: IT IS THE CLIENT'S RESPONSIBILITY TO ANALYZE AND DISPOSITION DEVIATIONS ON CLIENT TEST PROGRAMS.

FOR NTS QA USE:	Tracking Code: 5
	Risk Level: LOW

Tracking Codes:

1. Employee Error - Training	2. Employee Error - Process	3. Test Equipment Problem	4. Equipment Limitations	5. Customer Item Problem	6. Other
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Risk Levels:

Low	Medium	High
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**5.1.5 Test Photographs**

Figure A1: Radiated Emissions Test Setup – Front Side



Figure A2: Radiated Emissions Test Setup –Right Side



Figure A3: Radiated Emissions Test Setup – Back Side



Figure A4: Radiated Emissions Test Setup – Left Side

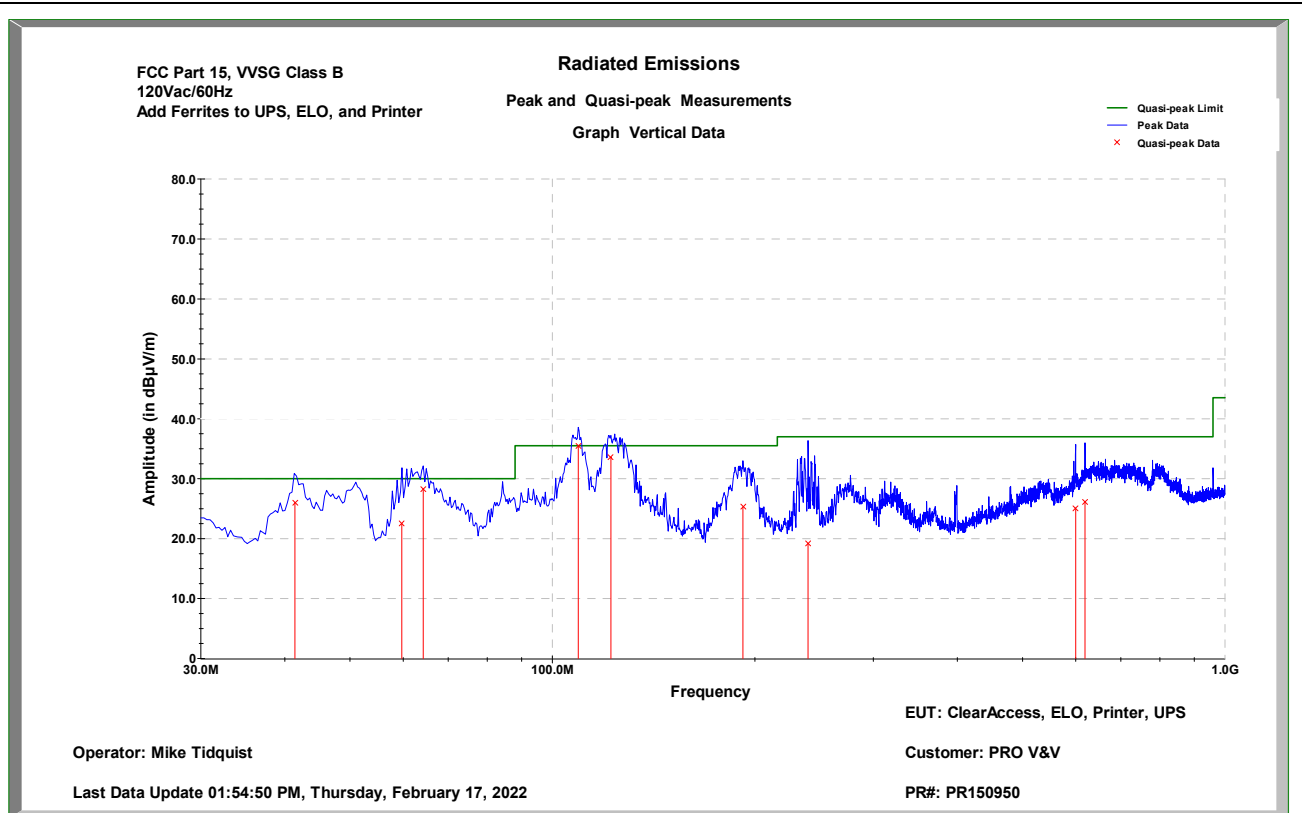
5.1.6 Test Data

**Radiated Emissions, FCC Part 15**

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 17, 2022

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Graph 1: Radiated Emissions Vertical, 30MHz to 1000MHz, Peak Measurements at 10m Distance

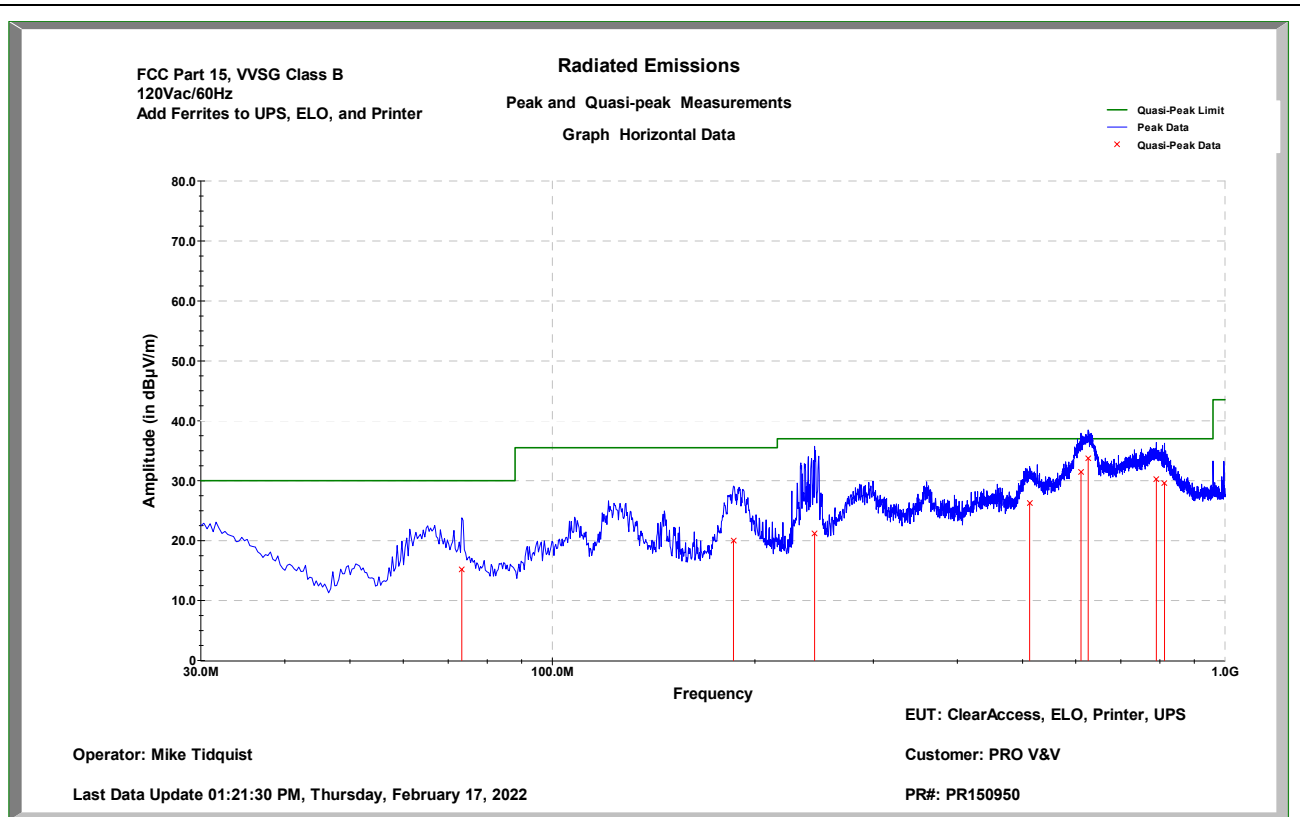
## Radiated Emissions, FCC Part 15

Manufacturer: Pro V&V, Inc.  
 Customer Representative: Michael Walker  
 Model: ClearAccess, ELO  
 Printer  
 UPS  
 Standard Referenced: FCC Part 15 Class B, VVSG

Project Number: PR150950  
 Test Area: 10M #1  
 S/N: I193022853  
 460012341W822  
 AS2126193035  
 Date: February 17, 2022

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Graph 2: Radiated Emissions Horizontal, 30MHz to 1000MHz, Peak Measurements at 10m Distance

5.1.7 Test Equipment List

Table 5.1-1: Radiated Emissions Test Equipment List

**Radiated Emissions, FCC Part 15**

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 17, 2022

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**Test Equipment List**

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1038	Fluke	85	66180455	Multimeter/Frequency Meter	07/30/2021	07/30/2022
1233	Sunol Sciences	SC104V	110305-1	Positioning Controller	NCR	NCR
1234	CIR Enterprises	10m Chamber	001	10m Chamber with 2.5m turntable	06/28/2021	06/28/2023
1266	California Instruments	MX15-1	57961	AC Power Source, 0 - 300 VAC / 16 - 819 Hz / 15kVA	NCR	NCR
1381	Sunol	JB1	A010411	0.03-2 GHz Broadband Hybrid Antenna w/Attenuator	09/21/2021	09/21/2023
1819	Keysight Technologies	N9038A	MY55330008	EMI Receiver (WC059822)	10/08/2021	10/08/2022
1956	Pasternack	PE15A1013	V00140120210 330J010	10 kHz to 1 GHz, 50dB gain, low noise pre-amp	04/28/2021	04/28/2022
1961	ETS-Lindgren	C47213	10176987-1	TILE! Software License Key	NCR	NCR
1962	EXTECH Instruments	Datalogger 42270	1026960	Temperature and Humidity Meter	06/14/2021	06/14/2022

**Calibration Abbreviations**

CAL: Calibration

NCR: No Calibration Required

## 5.2 Conducted Emissions

### 5.2.1 Test Procedure

The ClearAccess, ELO, Printer and UPS were subjected to the Conducted Emissions test in accordance with FCC Part 15 Class B, VVSG.

### 5.2.2 Test Result

The test items met the specified Class B requirements.

### 5.2.3 Test Data

## Conducted Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	1193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	837 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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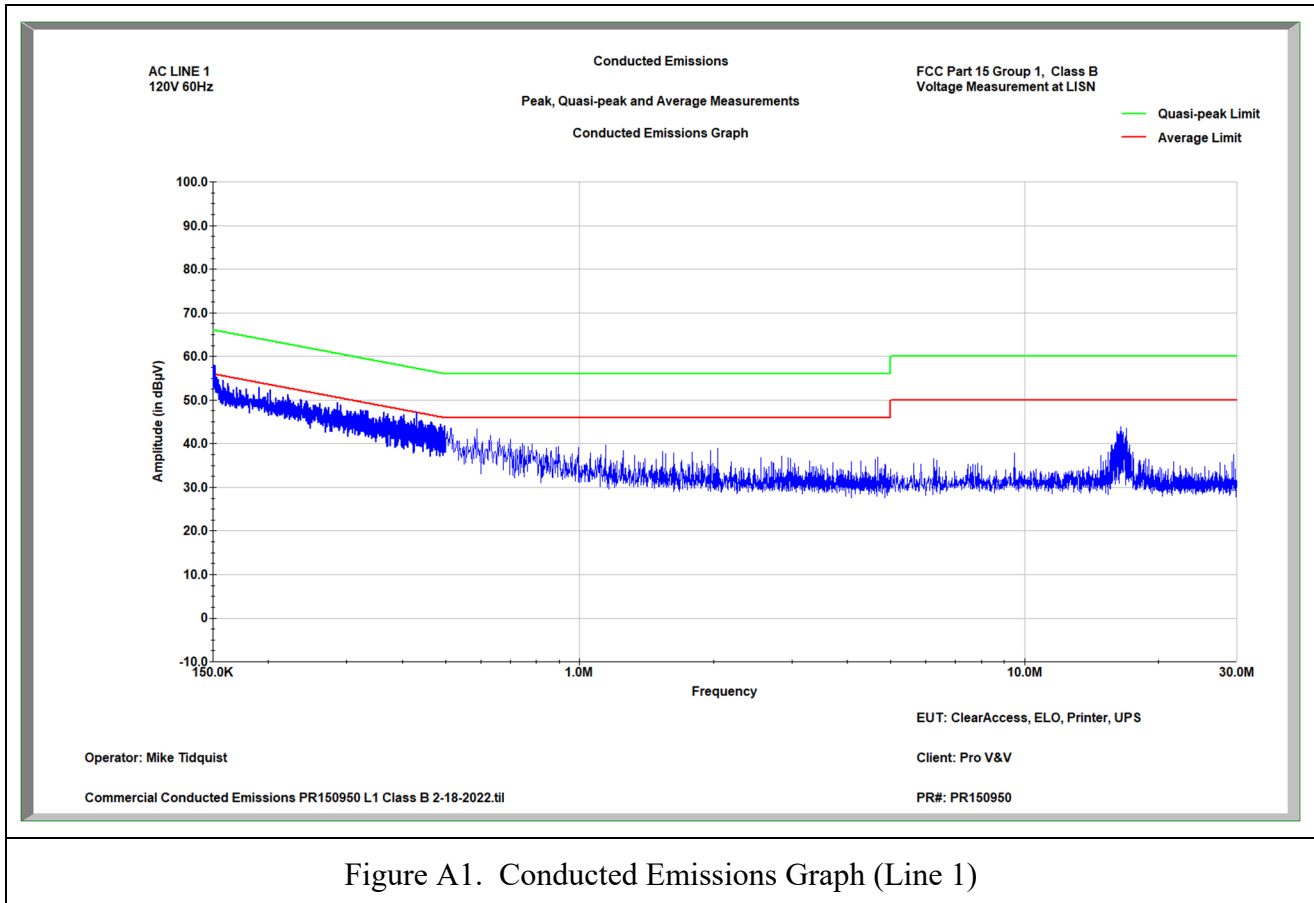


Figure A1. Conducted Emissions Graph (Line 1)



## Conducted Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	837 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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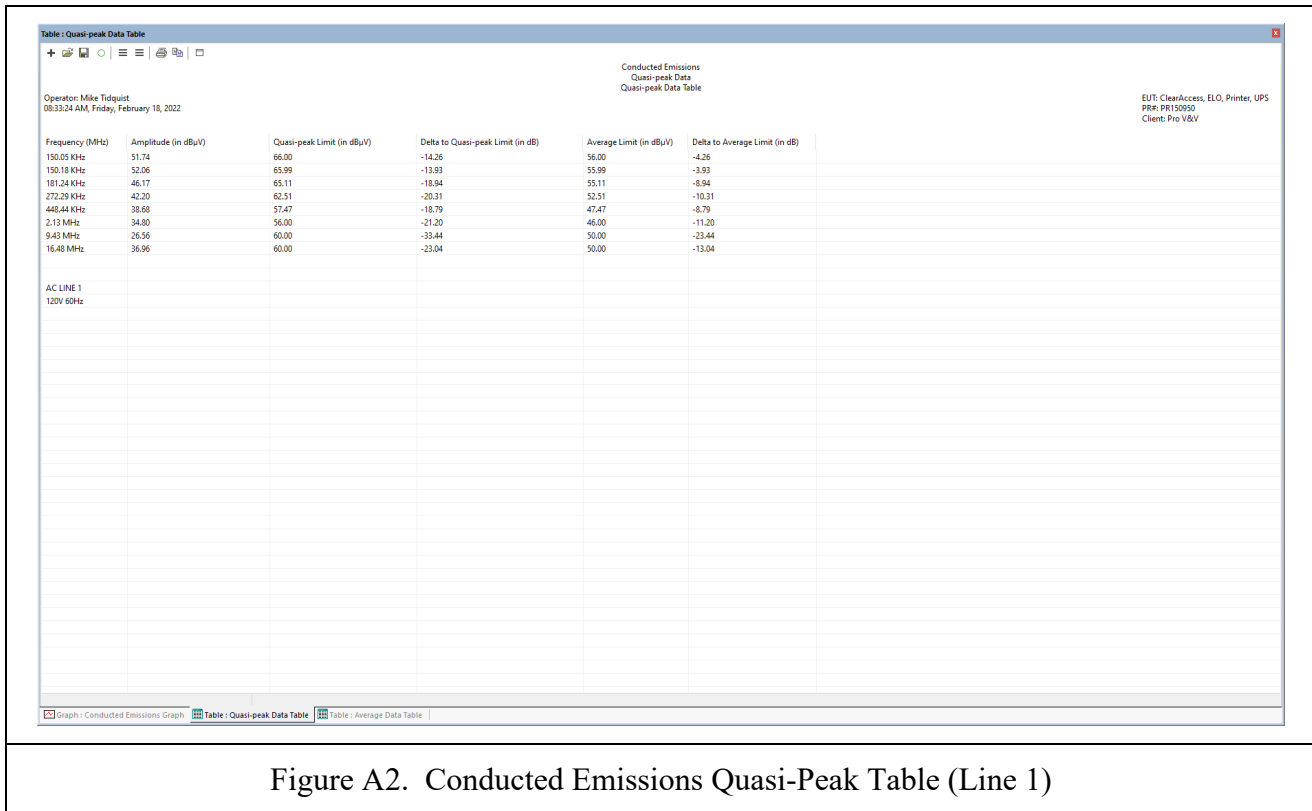


Figure A2. Conducted Emissions Quasi-Peak Table (Line 1)

## Conducted Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	837 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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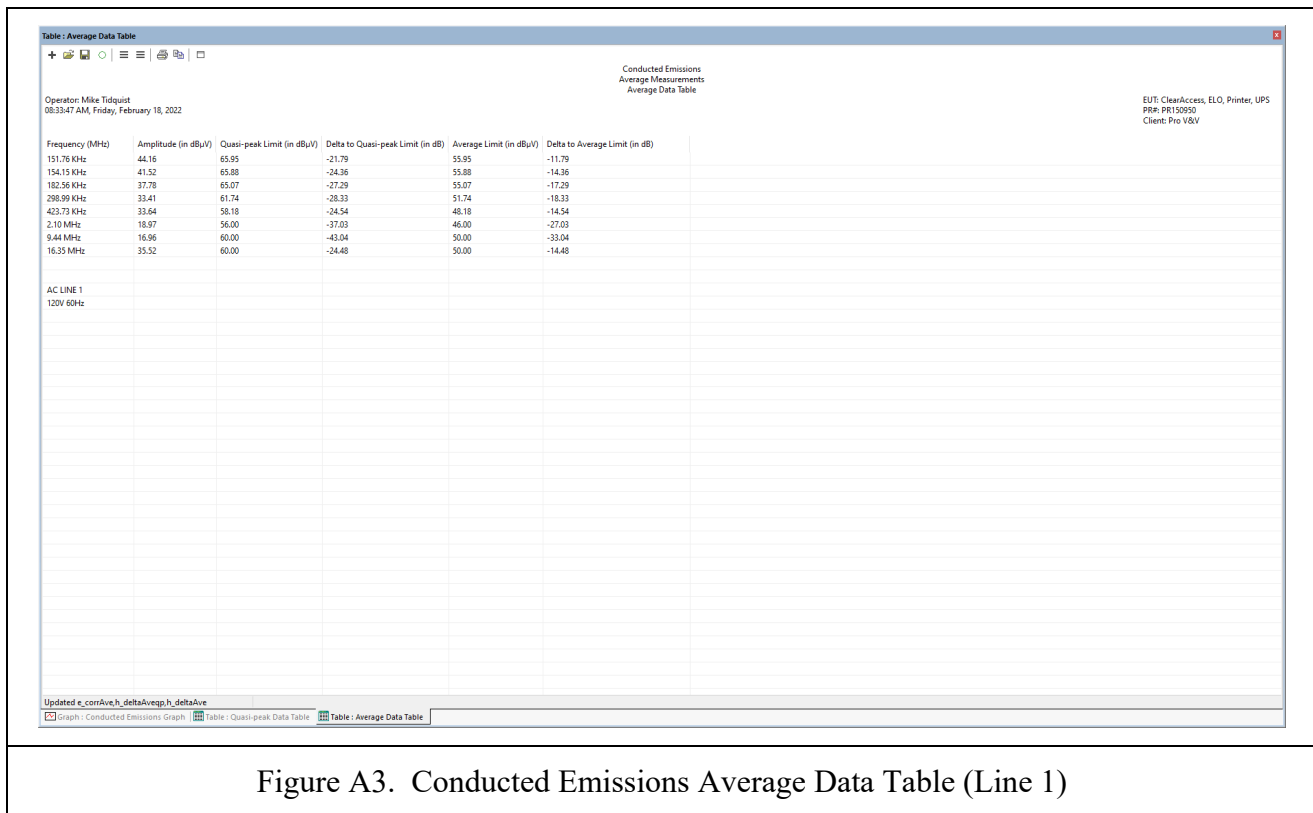


Figure A3. Conducted Emissions Average Data Table (Line 1)

### Conducted Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	837 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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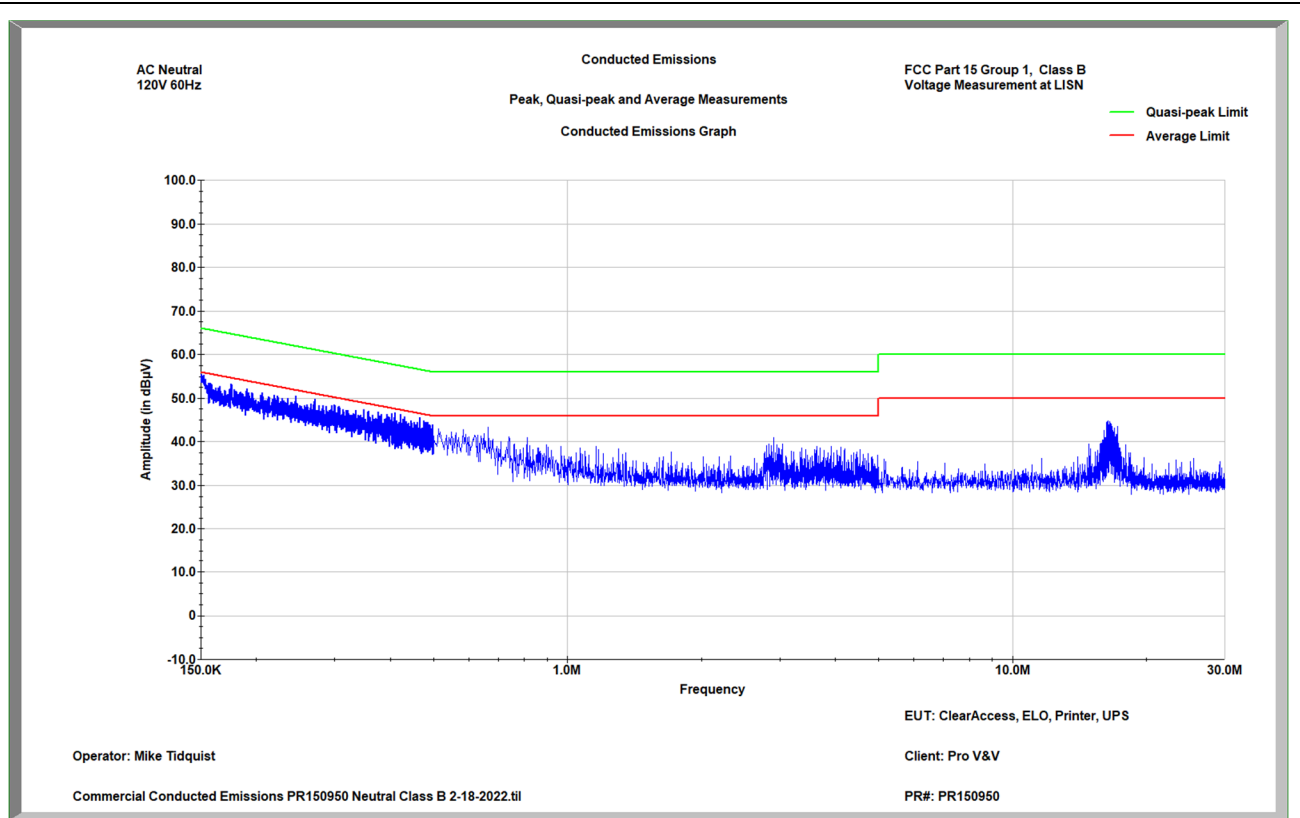


Figure A4. Conducted Emissions Graph (Neutral)

## Conducted Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	837 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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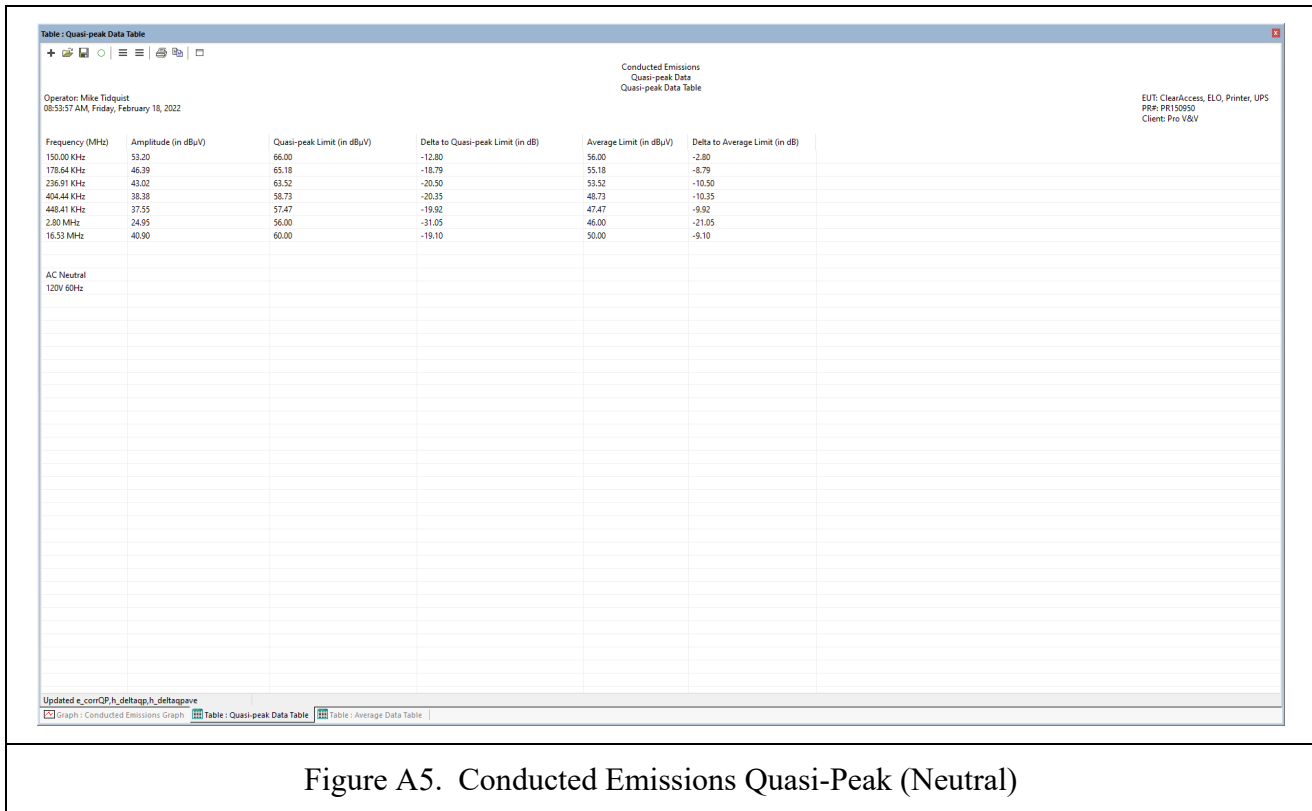


Figure A5. Conducted Emissions Quasi-Peak (Neutral)

## Conducted Emissions, FCC Part 15

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	I193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022
Temperature:	25°C	Humidity:	9%
Input Voltage:	120Vac/60Hz	Pressure:	837 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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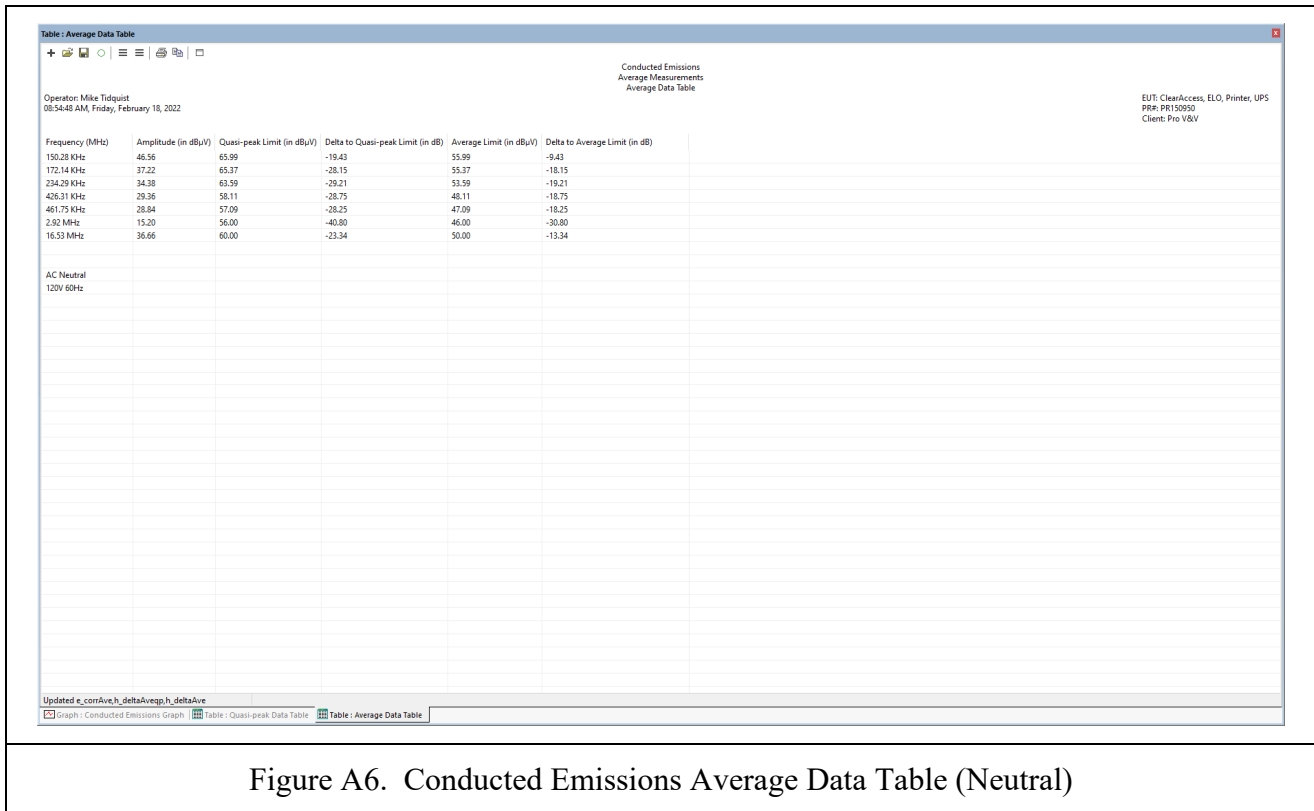


Figure A6. Conducted Emissions Average Data Table (Neutral)

5.2.4 Test Photographs



Figure A7. Conducted Emissions Test Setup – Front Side



Figure A8. Conducted Emissions Test Setup – Right Side



Figure A9. Conducted Emissions Test Setup – Back Side





Figure A10. Conducted Emissions Test Setup – Left Side



5.2.5 Test Equipment List

Table 5.2-1: Conducted Emissions Test Equipment List

**Conducted Emissions, FCC Part 15**

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ClearAccess, ELO Printer UPS	S/N:	1193022853 460012341W822 AS2126193035
Standard Referenced:	FCC Part 15 Class B, VVSG	Date:	February 18, 2022

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**Test Equipment List**

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1017	Pacific Power	TMX 140	0256	4 kVA, 50 Hz Power Source	NCR	NCR
1038	Fluke	85	66180455	Multimeter/Frequency Meter	07/30/2021	07/30/2022
1819	Keysight Technologies	N9038A	MY55330008	EMI Receiver (WC059822)	10/08/2021	10/08/2022
1939	Solar Electronics Company	8012-50-R-25-BNC	SN221373-1B	150kHz to 30MHz LISN	12/08/2021	12/08/2022
1961	ETS-Lindgren	C47213	10176987-1	TILE! Software License Key	NCR	NCR
1966	Extech Instruments	Datalogger 42270	1026957	Temperature and Humidity Meter	01/19/2022	01/19/2023
1973	EXTECH	380460	H.430396	Meter (Milliohm)	11/11/2022	11/11/2023

**Calibration Abbreviations**

CAL: Calibration

NCR: No Calibration Required

6.0 Test Log

EMI Test Log

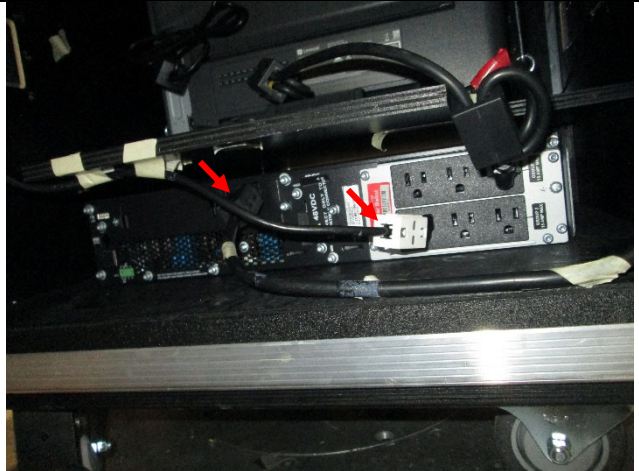
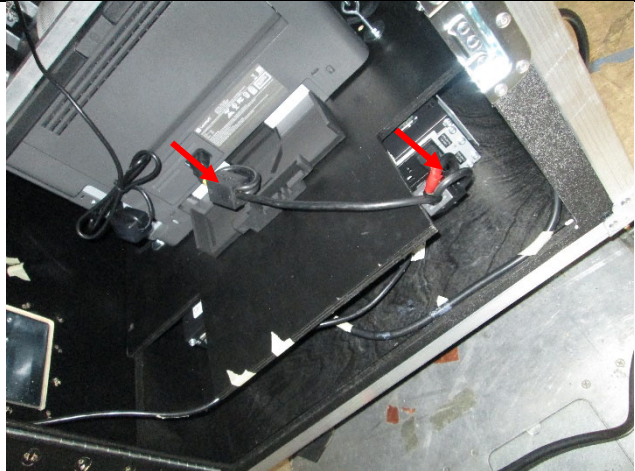
Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Model:	ClearAccess, ELO Printer UPS	S/N:	193022854 1193022853 460012341W822 AS21282906644 AS2126193039 AS2126193035
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Part 15 Class B		

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10m Emissions

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
---		February 17, 2022 0800-0900	Initial Product Setup Time		1.0	Complete	MT
RE		0900-1030	Radiated Emissions, 30 MHz - 1 GHz. FCC Part 15. Class B. 120Vac/60Hz New ELO and UPS		1.5	Fail	MT
RE		1030-1130	Radiated Emissions, 30 MHz - 1 GHz. Vertical Only FCC Part 15. Class B. 120Vac/60Hz New ELO and UPS Reroute Power Cable		1.0	Fail	MT
RE		1130-1230	Radiated Emissions, 30 MHz - 1 GHz. Vertical Only FCC Part 15. Class B. 120Vac/60Hz New ELO and UPS Add Ferrites to UPS, ELO, and Printer		1.5	Complete	MT

Add Ferrites to UPS ELO and Printer Cables



RE		1230-1400	Radiated Emissions, 30 MHz - 1 GHz. Full scan FCC Part 15. Class B. 120Vac/60Hz New ELO and UPS Add Ferrites to UPS, ELO, and Printer		1.5	Pass	MT
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### EMI Test Log

Manufacturer:	Pro V&V, Inc.	Project Number:	PR150950
Model:	ClearAccess, ELO Printer UPS	S/N:	193022854 I193022853 460012341W822 AS21282906644 AS2126193039 AS2126193035
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Part 15 Class B		

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### 10m Emissions

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
CE		1400-1530	Conducted Emissions, 150kHz – 30MHz FCC Part 15. Class B. 120Vac/60Hz Not Sure if Script is running correctly. Will revisit this tomorrow		1.5	---	MT
CE		February 18, 2022 0800-0900	Conducted Emissions, 150kHz – 30MHz FCC Part 15. Class B. 120Vac/60Hz		1.0	Pass	MT



**End of Test Report**