

# National Technical Systems Test Report for Electromagnetic Interference (EMI) Testing of the FVT

**Prepared For**

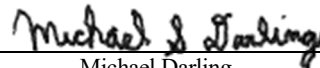
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**Prepared By**

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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 "Michael Darling", written over a horizontal line.

Michael Darling  
EMI Department Manager



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### Revision History

Rev.	Description	Issue Date
0	ITR-PR121029-00	03/30/2021
1	Section 5.1 – corrected calibration information for Asset # 1281.	10/06/2021

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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 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.

- Pro V&V, Inc. Purchase Order(s) 2020-005,2020-007,Signed COS, dated 07/02/2020,10/21/2020,02/11/2021
- National Technical Systems (NTS) Quote(s) OP0565856, dated 10/22/2020
- NTS Corporate Quality Policy Manual, Revision 9, dated 9/20/2018
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/1/2017
- Test Specification: EAC 2005 VVSG

### 3.0 Product Selection and Description

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

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

Item	Qty.	Name/Description	Part Number	Serial Number
1	1	FVT	FVT	FVT-BBU-002

### 3.1 Security Classification

Non-classified

### 4.0 General Test Requirements

#### 4.1 Test Equipment

NTS-provided equipment is calibrated according to ISO/IEC 17025:2017(E) and calibration is traceable to the National Institute of Standards and Technology (NIST). Calibration records are maintained on file at NTS.

#### 4.2 Measurement Uncertainties

Measurement uncertainty data is available upon request.

#### 4.3 Notice of Deviation

In accordance with NTS' quality procedures, when the EUT is observed to exceed or display susceptibility, a Notice of Deviation (NOD) document is generated by the technician performing the test. This NOD documents the requirement, how the EUT deviated from the requirement, and allows room for resolution of the deviation.

This document is reviewed and approved by the NTS Program Manager or Engineer and the NTS Quality Assurance Representative, and then forwarded to the customer contact. Once mitigated (or passed over), the steps taken to correct the deviation (or simply instruction from the customer to continue testing) are recorded in the NOD and a copy of the NOD is integrated into the body of the report, in the appropriate location.



## 5.0 Test Descriptions and Results

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

Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Test Result*
5.1	Electrostatic Discharge	EAC 2005 VVSG	Longmont	01/13/2021 - 01/13/2021	FVT	FVT-BBU-002	Complied
5.2	Radiated RF Immunity	EAC 2005 VVSG	Longmont	09/14/2020 - 09/14/2020	FVT	FVT-BBU-002	Complied
5.3	Electrical Fast Transient / Burst	EAC 2005 VVSG	Longmont	01/13/2021 - 01/13/2021	FVT	FVT-BBU-002	Complied
5.4	Surge Immunity	EAC 2005 VVSG	Longmont	01/12/2021 - 01/12/2021	FVT	FVT-BBU-002	Complied
5.5	Conducted RF Immunity	EAC 2005 VVSG	Longmont	01/13/2021 - 01/13/2021	FVT	FVT-BBU-002	Complied
5.6	Power Frequency H-Field Immunity	EAC 2005 VVSG	Longmont	01/13/2021 - 01/13/2021	FVT	FVT-BBU-002	Complied
5.7	Voltage Dips and Interruptions	EAC 2005 VVSG	Longmont	01/11/2021 - 01/11/2021	FVT	FVT-BBU-002	Complied

\*The decision rule used to state compliance is in accordance with the test specification used for testing. Unless otherwise noted, testing was performed in accordance with the latest published version of test specification at time of test.

## 5.1 Electrostatic Discharge

### Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Unisyn/Pr0V&V	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	FVT-BBU-002
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021
Temperature:	23.5°C	Humidity:	32%
Input Voltage:	120Vac/60Hz	Pressure:	834 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Casey Lockhart		

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Test Location	Voltage Level (kV)	Polarity		Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass / Fail
		+	-					
Indirect Discharge Points								
VCP	8	x	x	10	1	Front Side	A	Pass
VCP	8	x	x	10	1	Left Side	A	Pass
VCP	8	x	x	10	1	Right Side	A	Pass
VCP	8	x	x	10	1	Back Side	A	Pass
HCP	8	x	x	10	1	Edge of HCP at Front of UUT	A	Pass
Contact Discharge Points - <b>RED</b> Arrows.								
Figure A2	8	x	x	10	1		A	Pass
Figure A3	8	x	x	10	1		A	Pass
Figure A4	8	x	x	10	1		A	Pass
Figure A5	8	x	x	10	1		A	Pass
Figure A6	8	x	x	10	1			
Air Discharge Points - <b>BLUE</b> Arrows.								
Figure A2	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	---
Figure A3	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	---
Figure A4	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	---
Figure A5	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	---
Figure A6	2, 4, 8, 15	x	x	10	1		A	Pass

---

### Electrostatic Discharge per IEC / EN 61000-4-2

---

Manufacturer: Unisyn/Pr0V&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: FVT-BBU-002

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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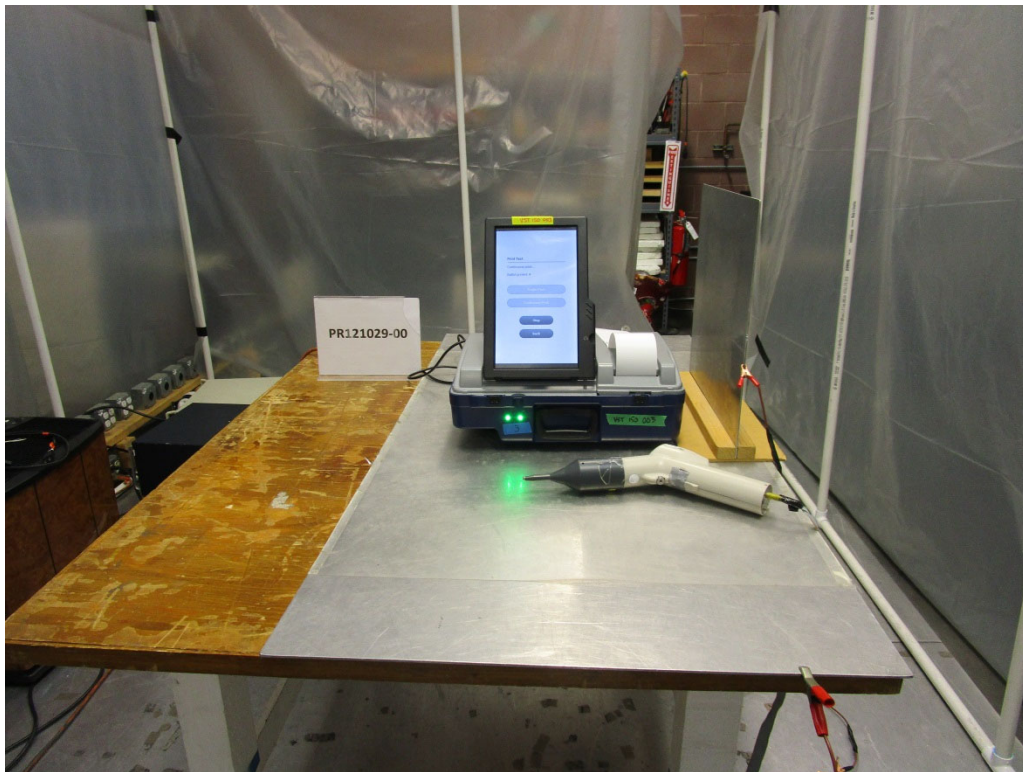


Figure A1. Electrostatic Discharge Test Setup.

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## Electrostatic Discharge per IEC / EN 61000-4-2

---

Manufacturer: Unisyn/Pr0V&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: FVT-BBU-002

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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Figure A2. Electrostatic Discharge Test Setup.



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### Electrostatic Discharge per IEC / EN 61000-4-2

---

Manufacturer: Unisyn/PrOV&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: FVT-BBU-002

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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Figure A3. Electrostatic Discharge Test Setup.

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### Electrostatic Discharge per IEC / EN 61000-4-2

---

Manufacturer: Unisyn/Pr0V&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: FVT-BBU-002

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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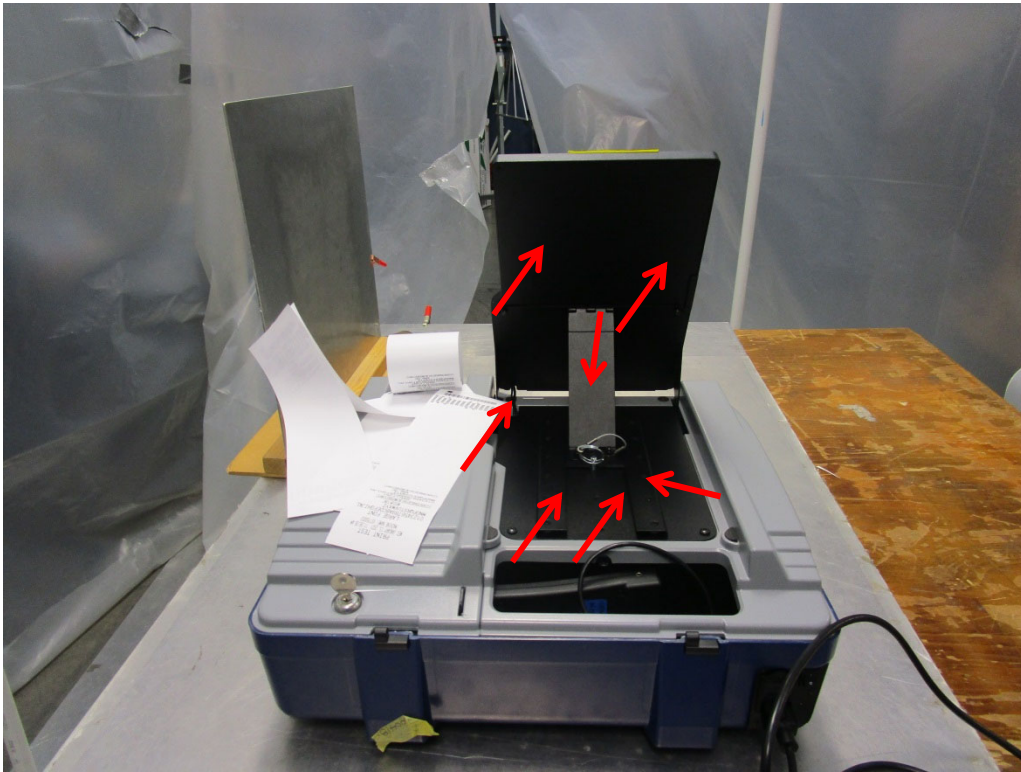


Figure A4. Electrostatic Discharge Test Setup.

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### Electrostatic Discharge per IEC / EN 61000-4-2

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Manufacturer: Unisyn/Pr0V&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: FVT-BBU-002

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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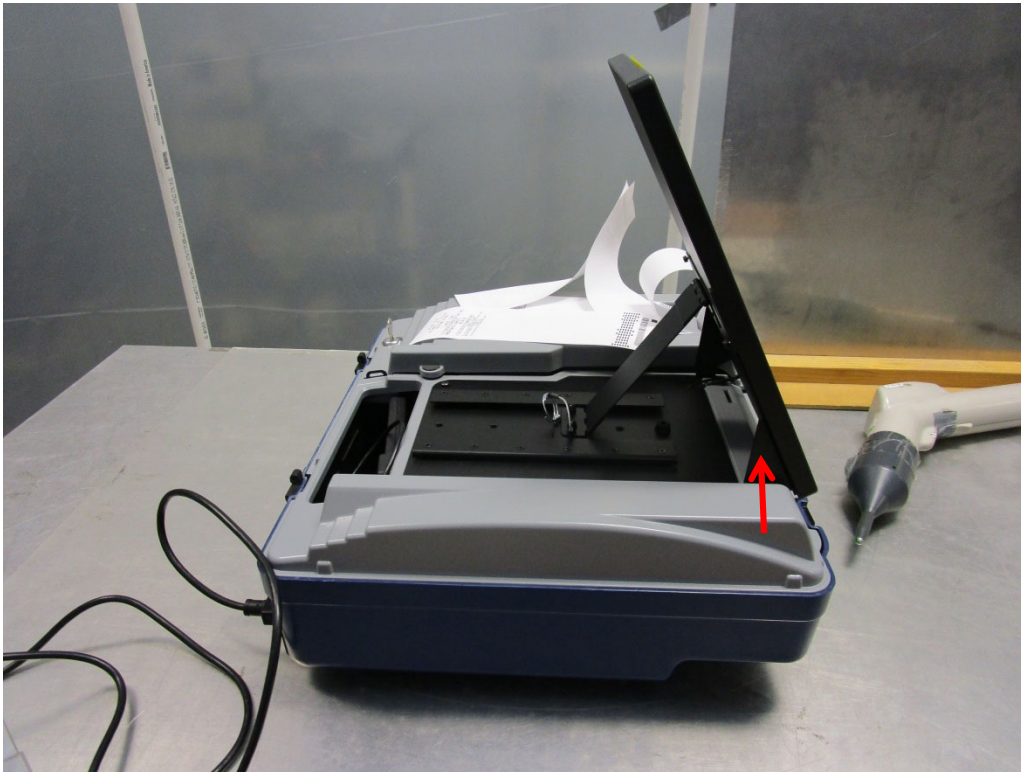


Figure A5. Electrostatic Discharge Test Setup.

### Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer: Unisyn/Pr0V&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: FVT-BBU-002

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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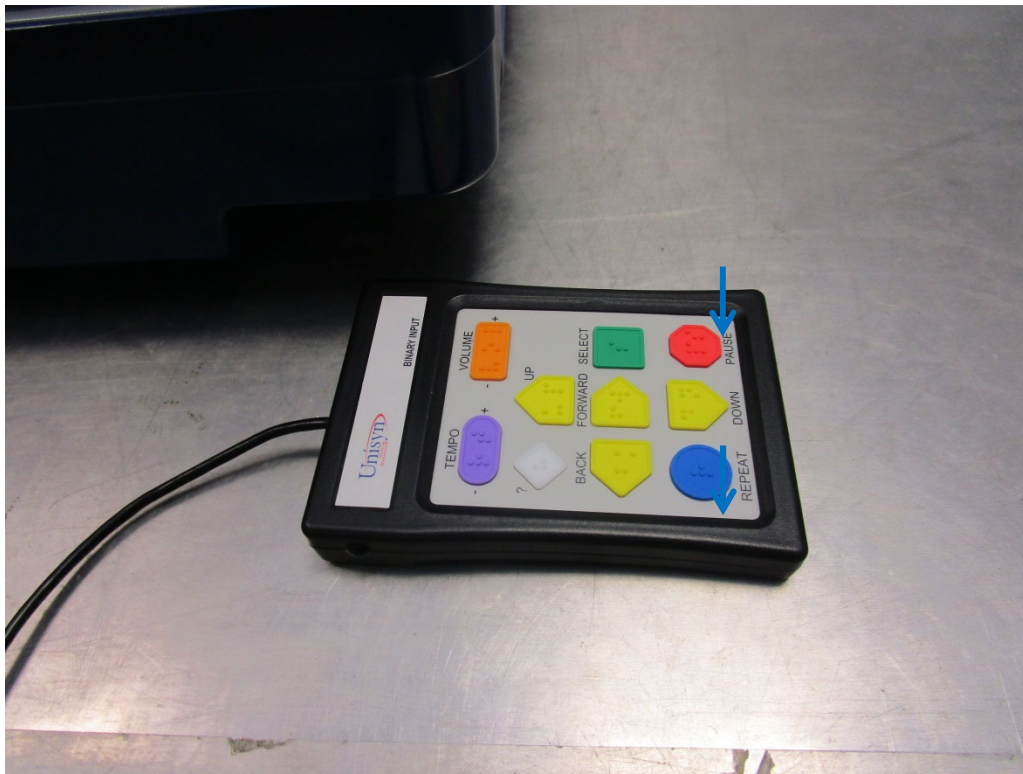


Figure A6. Electrostatic Discharge Test Setup.



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**Electrostatic Discharge per IEC / EN 61000-4-2**

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Manufacturer:	Unisyn/PrOV&V	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	FVT-BBU-002
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021

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**Test Equipment List**

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1041	Fluke	83-3	70130434	Multimeter/Frequency Meter	06/29/2020	06/29/2021
1281	EMC Partner	ESD3000	284	ESD Test System	01/30/2020	01/30/2021
1901	EXTECH	445703	0617	Hygrometer-Thermometer (WC059899)	06/29/2020	06/29/2021



**5.2 Radiated RF Immunity**

**Radiated RF Immunity per IEC / EN 61000-4-3**

Manufacturer:	Unisyn	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP0
Model:	FVT	S/N:	FVT-BBU-001
Standard Referenced:	IEC 61000-4-3	Date:	September 14, 2020
Temperature:	24°C	Humidity:	34%
Input Voltage:	120Vac/60Hz	Pressure:	846mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Kevin Johnson		

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Frequency (MHz)	Modulation			Step Size (%)	Field (V/m)	Polarity (V or H)	Dwell (sec)	Comments	Criteria Met	Pass / Fail	
	Type	%	Freq								
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	<b>Front side</b>	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	<b>Right Side</b>	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	<b>Back Side</b>	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	<b>Left Side</b>	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass

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### Radiated RF Immunity per IEC / EN 61000-4-3

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Manufacturer:	Unisyn	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP0
Model:	FVT	S/N:	FVT-BBU-001
Standard Referenced:	IEC 61000-4-3	Date:	September 14, 2020

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Figure B1. Radiated RF Immunity Test Setup – Front Side.

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## Radiated RF Immunity per IEC / EN 61000-4-3

---

Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP0
Model:	FVT	S/N:	FVT-BBU-001
Standard Referenced:	IEC 61000-4-3	Date:	September 14, 2020

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Figure B2. Radiated RF Immunity Test Setup – Right Side.



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### Radiated RF Immunity per IEC / EN 61000-4-3

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Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP0
Model:	FVT	S/N:	FVT-BBU-001
Standard Referenced:	IEC 61000-4-3	Date:	September 14, 2020

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Figure B3. Radiated RF Immunity Test Setup – Back Side.

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### Radiated RF Immunity per IEC / EN 61000-4-3

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Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP0
Model:	FVT	S/N:	FVT-BBU-001
Standard Referenced:	IEC 61000-4-3	Date:	September 14, 2020

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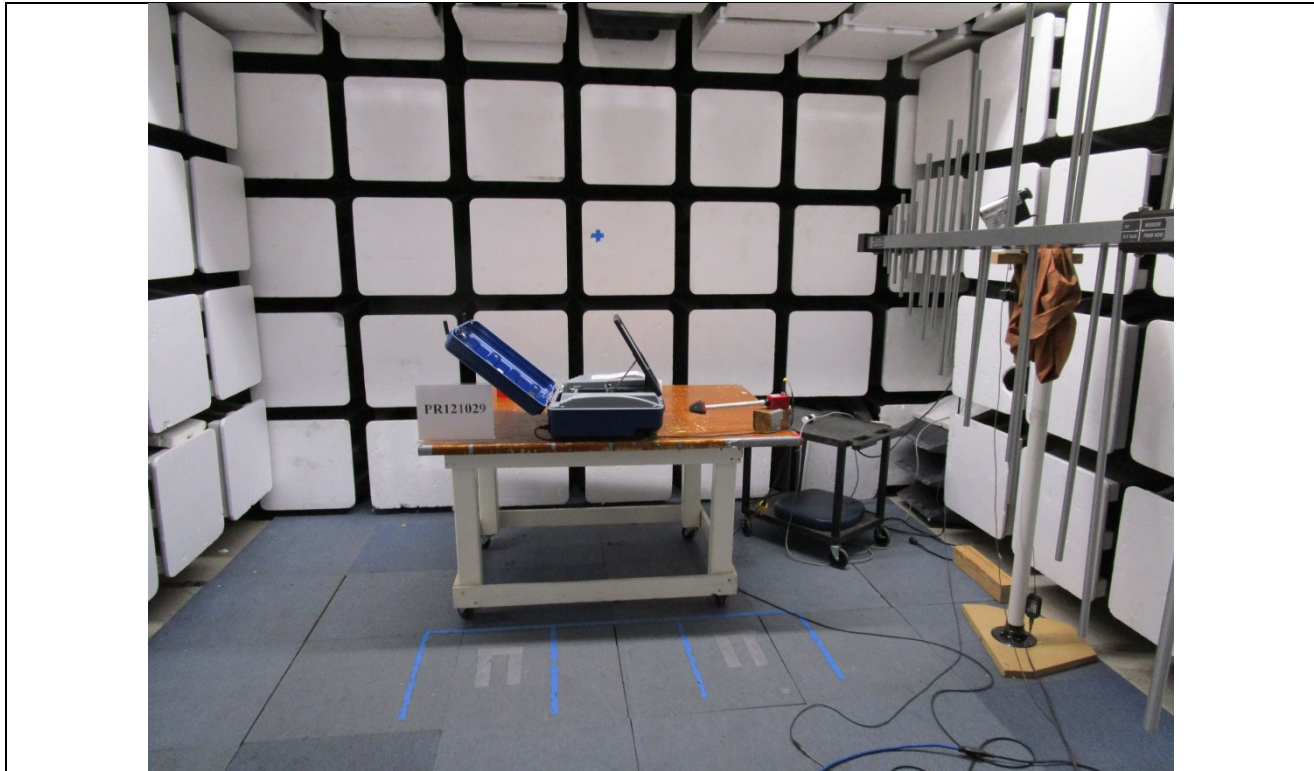


Figure B4. Radiated RF Immunity Test Setup – Left Side.

### Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Unisyn	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP0
Model:	FVT	S/N:	FVT-BBU-001
Standard Referenced:	IEC 61000-4-3	Date:	September 14, 2020

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### Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1181	EMCI	RFS	V2.5.8	Initial Release 02 July 2004	NA	NA
1323	Rohde&Schwarz	SMT03	100204	Signal Generator, 5 kHz to 3 GHz	05/05/2020	05/05/2021
1454	Giga-tronics	GT-8888A	8888A0338	10 MHz to 8 GHz, +20 dBm, 25 Vdc Power Meter (WC07)	07/20/2020	07/20/2021
1456	Werlatone	C3908-10	98095	1500 Watts, 50 dB Dual Directional Coupler (WC0597)	06/29/2020	06/29/2021
1476	ETS Lindgren	HI-6053	00144805	10 MHz to 40 GHz Isotropic Electric Field Probe	04/27/2020	04/27/2021
1478	Ophir	5127F	1100	RF Amplifier, 200 Watt, 20 - 1000 MHz	NA	NA
1722	ETS -Lindgren	3142B	1624	Antenna	NA	NA
1761	Braden Shielding Systems	RF Shield Room	N/A	GP0	05/15/2020	05/15/2021
1901	EXTECH	445703	0617	Hygrometer-Thermometer (WC059899)	06/29/2020	06/29/2021



**5.3 Electrical Fast Transient / Burst**

**Electrical Fast Transient/Burst per IEC / EN 61000-4-4**

Manufacturer:	Unisyn/ProV&V	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021
Temperature:	23.4°C	Humidity:	25%
Input Voltage:	120Vac/60Hz	Pressure:	834 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Casey Lockhart		

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Voltage (kV)	Polarity		Time (sec)	Injection Type	L 1	L 2	L 3	N	P E	Rep Freq.	Comments	Criteria Met	Pass / Fail
	+	-											
2.0	x		60	CDN	x					100k Hz	AC	A	Pass
2.0		x	60	CDN	x					100k Hz		A	Pass
2.0	x		60	CDN		x				100k Hz		A	Pass
2.0		x	60	CDN		x				100k Hz		A	Pass
2.0	x		60	CDN					x	100k Hz		A	Pass
2.0		x	60	CDN					x	100k Hz		A	Pass
2.0	x		60	CDN	x	x			x	100k Hz		A	Pass
2.0		x	60	CDN	x	x			x	100k Hz		A	Pass

---

### Electrical Fast Transient/Burst per IEC / EN 61000-4-4

---

Manufacturer: Unisyn/ProV&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: VST 150 003

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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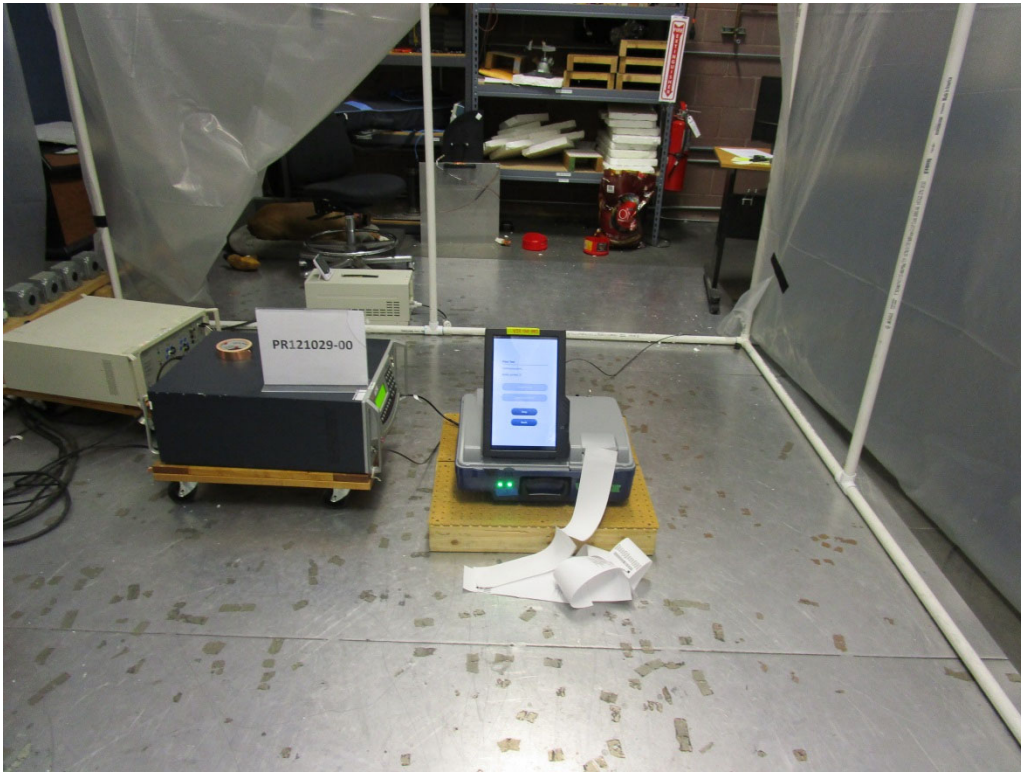


Figure C1. Electrical Fast Transient Test Setup.



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### Electrical Fast Transient/Burst per IEC / EN 61000-4-4

---

Manufacturer: Unisyn/ProV&V

Project Number: PR121029-00  
B80802

Customer Representative: Michael Walker

Test Area: GP #1

Model: FVT

S/N: VST 150 003

Standard Referenced: EAC 2005 VVSG

Date: January 13, 2021

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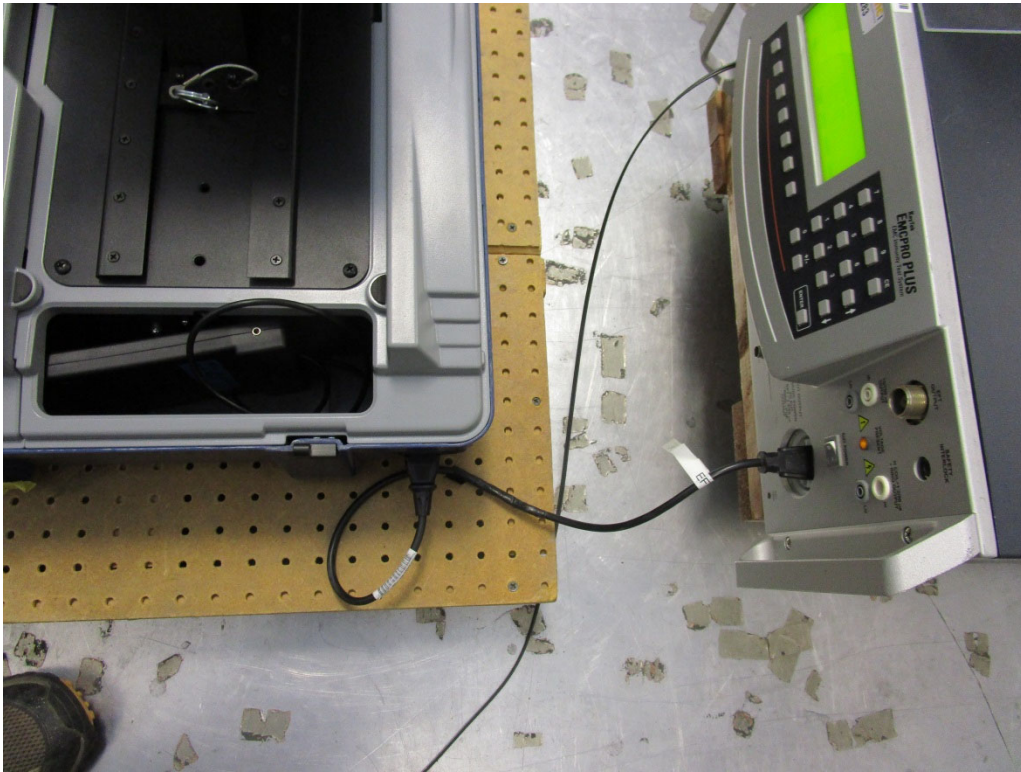


Figure C2. Electrical Fast Transient Test Setup – AC Mains.



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**Electrical Fast Transient/Burst per IEC / EN 61000-4-4**

---

Manufacturer:	Unisyn/ProV&V	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021

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**Test Equipment List**

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1283	KeyTek	EMCPro Plus	0601237	Advanced EMC Immunity Tester	10/22/2020	10/22/2021
1372	Tektronix	TDS2002B	C103489	Oscilloscope, 60 MHz, 2-channel (WC059683)	06/29/2020	06/29/2021
1901	EXTECH	445703	0617	Hygrometer-Thermometer (WC059899)	06/29/2020	06/29/2021



**5.4 Surge Immunity**

**Surge Immunity per IEC / EN 61000-4-5**

Manufacturer:	Unisyn	Project Number:	PR121029-00
Customer Representative:	Michael Walker	Test Area:	GP #2
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 12, 2021
Temperature:	24°C	Humidity:	27%
Input Voltage:	120Vac/60Hz	Pressure:	840 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	T. Wittig		

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Voltage (kV)	Polarity		L 1	L 2	L 3	N	P E	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
	+	-											
0.5	x		x			x		0	5	30	Differential Mode	A	Pass
0.5		x	x			x		0	5	30		A	Pass
0.5	x		x			x		90	5	30		A	Pass
0.5		x	x			x		90	5	30		A	Pass
0.5	x		x			x		180	5	30		A	Pass
0.5		x	x			x		180	5	30		A	Pass
0.5	x		x			x		270	5	30		A	Pass
0.5		x	x			x		270	5	30		A	Pass
0.5	x		x			x		0	5	30	Common Mode Line	A	Pass
0.5		x	x			x		0	5	30		A	Pass
0.5	x		x			x		90	5	30		A	Pass
0.5		x	x			x		90	5	30		A	Pass
0.5	x		x			x		180	5	30		A	Pass
0.5		x	x			x		180	5	30		A	Pass
0.5	x		x			x		270	5	30		A	Pass
0.5		x	x			x		270	5	30		A	Pass
0.5	x					x	x	0	5	30	Common Mode Neutral	A	Pass
0.5		x				x	x	0	5	30		A	Pass
0.5	x					x	x	90	5	30		A	Pass
0.5		x				x	x	90	5	30		A	Pass
0.5	x					x	x	180	5	30		A	Pass
0.5		x				x	x	180	5	30		A	Pass
0.5	x					x	x	270	5	30		A	Pass
0.5		x				x	x	270	5	30		A	Pass
1.0	x		x			x		0	5	45	Differential Mode	A	Pass





### Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Unisyn	Project Number:	PR121029-00
Customer Representative:	Michael Walker	Test Area:	GP #2
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 12, 2021
Temperature:	24°C	Humidity:	27%
Input Voltage:	120Vac/60Hz	Pressure:	840 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	T. Wittig		

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Voltage (kV)	Polarity		L 1	L 2	L 3	N	P E	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
	+	-											
1.0		x	x			x		0	5	45		A	Pass
1.0	x		x			x		90	5	45		A	Pass
1.0		x	x			x		90	5	45		A	Pass
1.0	x		x			x		180	5	45		A	Pass
1.0		x	x			x		180	5	45		A	Pass
1.0	x		x			x		270	5	45		A	Pass
1.0		x	x			x		270	5	45		A	Pass
1.0	x		x				x	0	5	45	Common Mode Line	A	Pass
1.0		x	x				x	0	5	45		A	Pass
1.0	x		x				x	90	5	45		A	Pass
1.0		x	x				x	90	5	45		A	Pass
1.0	x		x				x	180	5	45		A	Pass
1.0		x	x				x	180	5	45		A	Pass
1.0	x		x				x	270	5	45		A	Pass
1.0		x	x				x	270	5	45		A	Pass
1.0	x					x	x	0	5	45	Common Mode Neutral	A	Pass
1.0		x				x	x	0	5	45		A	Pass
1.0	x					x	x	90	5	45		A	Pass
1.0		x				x	x	90	5	45		A	Pass
1.0	x					x	x	180	5	45		A	Pass
1.0		x				x	x	180	5	45		A	Pass
1.0	x					x	x	270	5	45		A	Pass
1.0		x				x	x	270	5	45		A	Pass
2.0	x		x			x		0	5	45	Differential Mode	A	Pass
2.0		x	x			x		0	5	45		A	Pass
2.0	x		x			x		90	5	45		A	Pass



### Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Unisyn	Project Number:	PR121029-00
Customer Representative:	Michael Walker	Test Area:	GP #2
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 12, 2021
Temperature:	24°C	Humidity:	27%
Input Voltage:	120Vac/60Hz	Pressure:	840 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	T. Wittig		

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Voltage (kV)	Polarity		L 1	L 2	L 3	N	P E	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
	+	-											
2.0		x	x			x		90	5	45		A	Pass
2.0	x		x			x		180	5	45		A	Pass
2.0		x	x			x		180	5	45		A	Pass
2.0	x		x			x		270	5	45		A	Pass
2.0		x	x			x		270	5	45		A	Pass
2.0	x		x				x	0	5	60	Common Mode Line	A	Pass
2.0		x	x				x	0	5	60		A	Pass
2.0	x		x				x	90	5	60		A	Pass
2.0		x	x				x	90	5	60		A	Pass
2.0	x		x				x	180	5	60		A	Pass
2.0		x	x				x	180	5	60		A	Pass
2.0	x		x				x	270	5	60		A	Pass
2.0		x	x				x	270	5	60		A	Pass
2.0	x					x	x	0	5	60	Common Mode Neutral	A	Pass
2.0		x				x	x	0	5	60		A	Pass
2.0	x					x	x	90	5	60		A	Pass
2.0		x				x	x	90	5	60		A	Pass
2.0	x					x	x	180	5	60		A	Pass
2.0		x				x	x	180	5	60		A	Pass
2.0	x					x	x	270	5	60		A	Pass
2.0		x				x	x	270	5	60		A	Pass

---

### Surge Immunity per IEC / EN 61000-4-5

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Manufacturer: Unisyn  
Customer Representative: Michael Walker  
Model: FVT  
Standard Referenced: EAC 2005 VVSG

Project Number: PR121029-00  
Test Area: GP #2  
S/N: VST 150 003  
Date: January 12, 2021

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Figure D1. Surge Immunity Test Setup.



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## Surge Immunity per IEC / EN 61000-4-5

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Manufacturer: Unisyn  
Customer Representative: Michael Walker  
Model: FVT  
Standard Referenced: EAC 2005 VVSG

Project Number: PR121029-00  
Test Area: GP #2  
S/N: VST 150 003  
Date: January 12, 2021

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### Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1013	KeyTek	EMC Pro	0008347	Advanced EMC Immunity Tester	10/22/2020	10/22/2021
1038	Fluke	85	66180455	Multimeter/Frequency Meter	05/26/2020	05/26/2021
1184	KeyTek	CE Ware	4.0	KeyTek EMC Pro Control Software for EFT, Surge, H-F	NA	NA
1295	California Instruments Corporation	CTS-115-230	S72726	PACS-1 Power Analyzer Compliance Test System (WC05	08/20/2020	08/20/2021
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	02/24/2020	02/24/2021
1901	EXTECH	445703	0617	Hygrometer-Thermometer (WC059899)	06/29/2020	06/29/2021
1902	EXTECH	445703	1218-1	Hygrometer-Thermometer (WC059900)	06/29/2020	06/29/2021



**5.5 Conducted RF Immunity**

**Conducted RF Immunity per IEC / EN 61000-4-6**

Manufacturer:	Unisyn	Project Number:	PR121029-00
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021
Temperature:	23.7°C	Humidity:	25%
Input Voltage:	120Vac/60Hz	Pressure:	834 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Casey Lockhart		

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Frequency (MHz)	Modulation			Level (Vrms)	Dwell (sec)	Comments	Criteria Met	Pass / Fail
	Type	%	Freq					
0.150 – 80.0	AM	80	1 kHz	10	3	AC using M3 CDN	A	Pass

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### Conducted RF Immunity per IEC / EN 61000-4-6

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Manufacturer: Unisyn  
Customer Representative: Michael Walker  
Model: FVT  
Standard Referenced: EAC 2005 VVSG

Project Number: PR121029-00  
Test Area: GP #1  
S/N: VST 150 003  
Date: September 16, 2020

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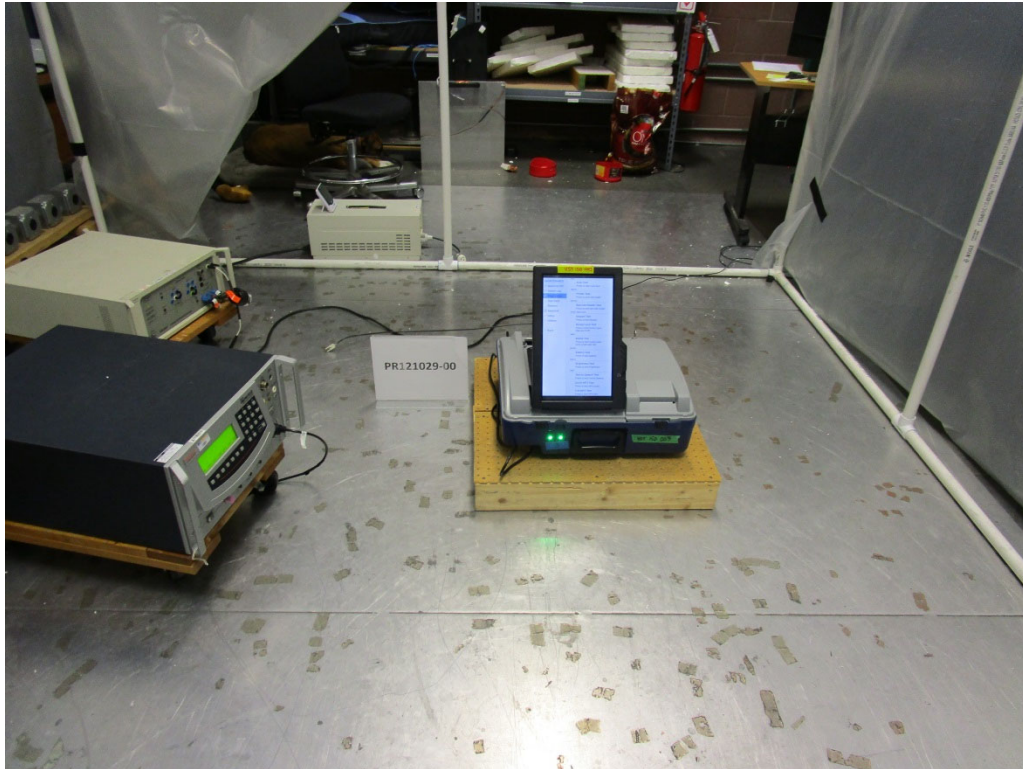


Figure E1. Conducted RF Immunity Test Setup.



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### Conducted RF Immunity per IEC / EN 61000-4-6

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Manufacturer: Unisyn  
Customer Representative: Michael Walker  
Model: FVT  
Standard Referenced: EAC 2005 VVSG

Project Number: PR121029-00  
Test Area: GP #1  
S/N: VST 150 003  
Date: September 16, 2020

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Figure E2. Conducted RF Immunity Test Setup – AC Mains.



### Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Unisyn	Project Number:	PR121029-00
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021

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### Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1226	EMCI	EMCI-CDN-M3-16	EMCI011	M3 CDN, 16A, 250 VAC	10/24/2019	10/24/2021
1274	IFI	M100	L594-0108	100W Power Amplifier, 0.01 MHz to 220 MHz	NA	NA
1353	Fischer Custom Communications	F2031-23mm	329	EM Injection Clamp	10/24/2019	10/24/2021
1477	Hewlett Packard	8648A	3636A02899	Signal Generator, 100 kHz to 1 GHz	05/27/2020	05/27/2022
1526	Aeroflex/Wein schel	40-6-34	RX850	Hi power attenuator 6dB	02/11/2020	02/11/2022
1533	Werlatone	C9475	102544	100 Watt Dual Directional Coupler, 10 kHz to 250 M	10/24/2019	10/24/2021
1547	Rigol Technologies, Inc	DSA815	DSA8A160300184	9 kHz to 1.5 GHz Spectrum Analyzer (WC059656)	05/09/2020	05/09/2022
1902	EXTECH	445703	1218-1	Hygrometer-Thermometer (WC059900)	06/29/2020	06/29/2021





**5.6 Power Frequency H-Field Immunity**

**Power Frequency H-field Immunity per IEC / EN 61000-4-8**

Manufacturer:	Unisyn	Project Number:	PR121029-00 B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021
Temperature:	23.5°C	Humidity:	25%
Input Voltage:	120Vac/60Hz	Pressure:	834 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Casey Lockhart		

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Frequency (Hz)		Field Strength (A/m)	EUT Axis Location	Dwell Time (sec)	Comments	Criteria Met	Pass / Fail
50	60						
x		30	X	60		A	Pass
	x	30	X	60		A	Pass
x		30	Y	60		A	Pass
	x	30	Y	60		A	Pass
x		30	Z	60		A	Pass
	x	30	Z	60		A	Pass

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## Power Frequency H-field Immunity per IEC / EN 61000-4-8

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Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021
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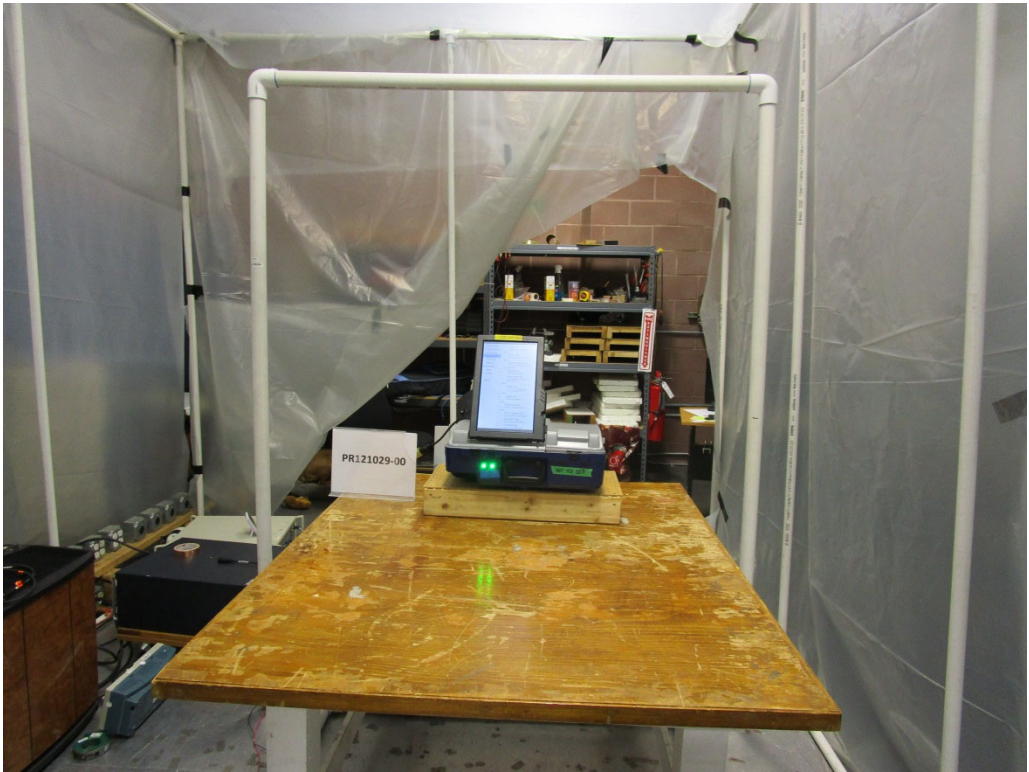


Figure F1. Power Frequency H-field Immunity Test Setup.

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## Power Frequency H-field Immunity per IEC / EN 61000-4-8

---

Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021

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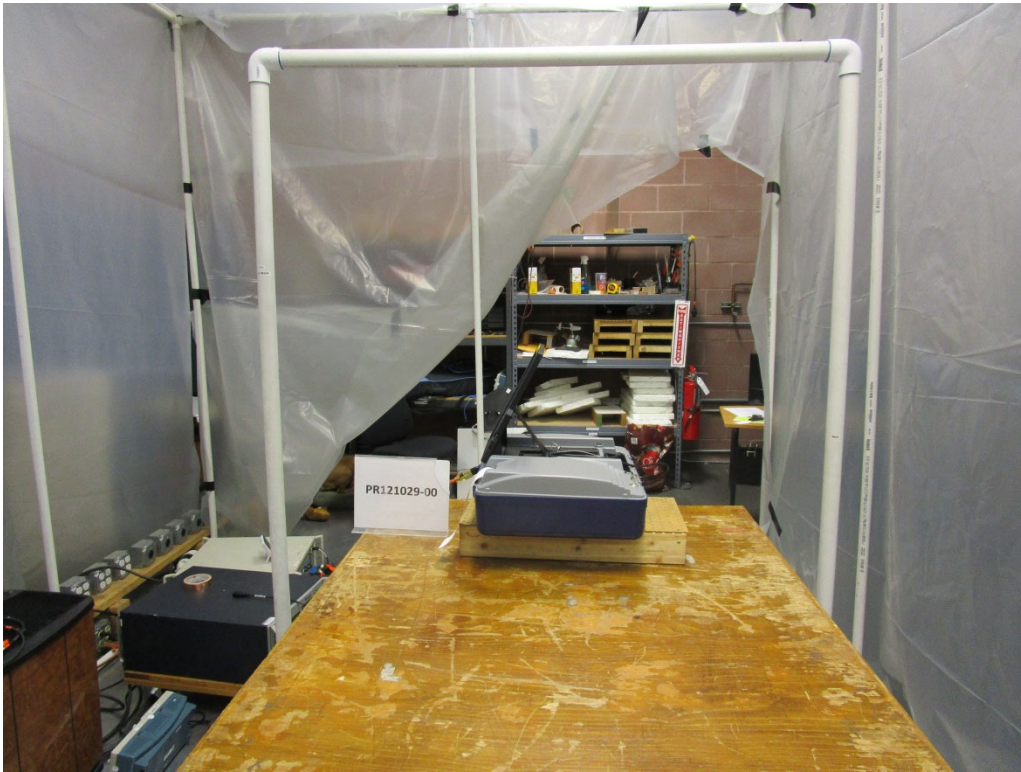


Figure F2. Power Frequency H-field Immunity Test Setup.

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### Power Frequency H-field Immunity per IEC / EN 61000-4-8

---

Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021

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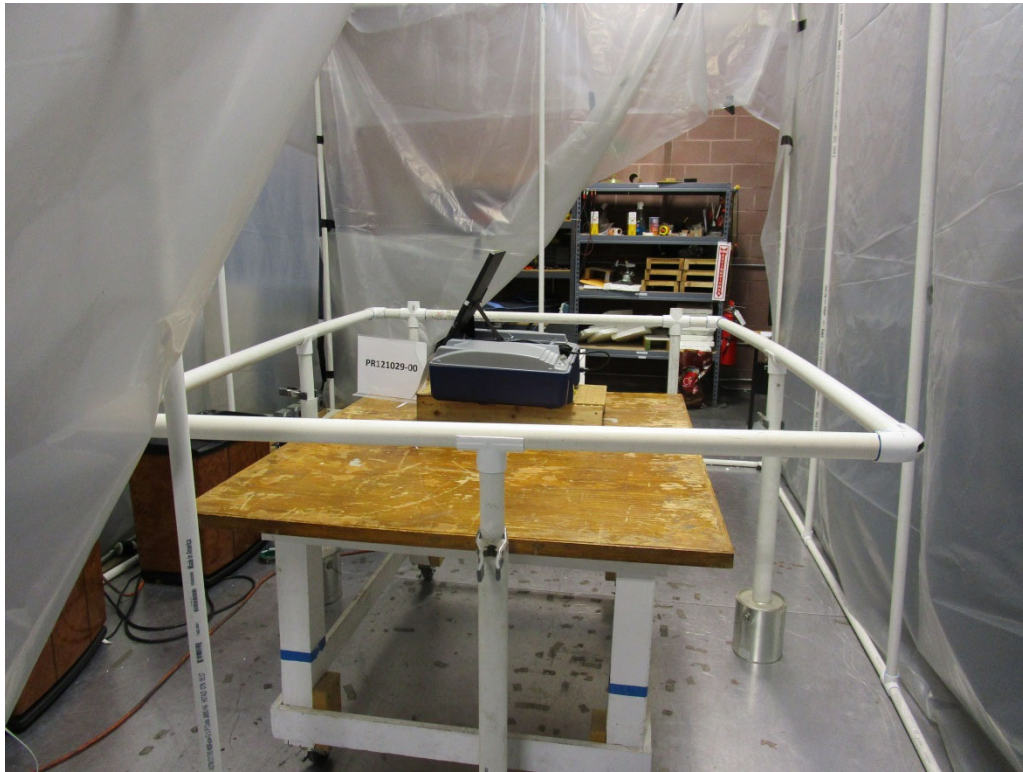


Figure F3. Power Frequency H-field Immunity Test Setup.



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**Power Frequency H-field Immunity per IEC / EN 61000-4-8**

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Manufacturer:	Unisyn	Project Number:	PR121029-00
			B80802
Customer Representative:	Michael Walker	Test Area:	GP #1
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 13, 2021

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**Test Equipment List**

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1262	EMCI	EMCI-4-8-2m-1.5m	0001	HField Loop, 2m x 1.5m	NA	NA
1372	Tektronix	TDS2002B	C103489	Oscilloscope, 60 MHz, 2-channel (WC059683)	06/29/2020	06/29/2021
1484	Pearson Electronics	110A	88593	Current Monitor, 1 Hz to 20 MHz (WC070471)	07/12/2020	07/12/2021
1548	California Instruments/Ametek	1251P	1423A06347	AC Power supply	NA	NA



**5.7 Voltage Dips and Interruptions**

**Voltage Dips and Interrupts per IEC / EN 61000-4-11**

Manufacturer:	Unisyn	Project Number:	PR121029-00
Customer Representative:	Michael Walker	Test Area:	GP #2
Model:	FVT	S/N:	VST 150 003
Standard Referenced:	EAC 2005 VVSG	Date:	January 11, 2021
Temperature:	25°C	Humidity:	26%
Input Voltage:	120Vac/60Hz	Pressure:	842 mb
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	T. Wittig		

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% Nominal	No. of Cycles	Phase Angle (deg)				Time between dropouts (sec)	Number of tests	Comments	Criteria Met	Pass / Fail
		0	90	180	270					
70%	0.6	x				10	3		A	Pass
70%	0.6		x			10	3		A	Pass
70%	0.6			x		10	3		A	Pass
70%	0.5				x	10	3		A	Pass
40%	6.0	x				10	3		A	Pass
40%	6.0		x			10	3		A	Pass
40%	6.0			x		10	3		A	Pass
40%	6.0				x	10	3		A	Pass
40%	60	x				10	3		A	Pass
40%	60		x			10	3		A	Pass
40%	60			x		10	3		A	Pass
40%	60				x	10	3		A	Pass
0%	300	x				10	3		A	Pass
0%	300			x		10	3		A	Pass
Line Voltage Variation tests										
129Vac Line Voltage Variations (+7.5% of nominal 120V) 2hrs.									A	Pass
105Vac Line Voltage Variations (-12.5% of nominal 120V) 2 Hrs.									A	Pass
Surges of +15% line variations of nominal voltage (138V) 2 Hrs.									A	Pass
Surges of -15% line variations of nominal voltage (102V) 2 Hrs.									A	Pass



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### Voltage Dips and Interrupts per IEC / EN 61000-4-11

---

Manufacturer: Unisyn  
Customer Representative: Michael Walker  
Model: FVT  
Standard Referenced: EAC 2005 VVSG

Project Number: PR121029-00  
Test Area: GP #2  
S/N: VST 150 003  
Date: January 11, 2021

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Figure G1. Voltage Dips and Interrupts Test Setup



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## Voltage Dips and Interrupts per IEC / EN 61000-4-11

---

Manufacturer: Unisyn  
Customer Representative: Michael Walker  
Model: FVT  
Standard Referenced: EAC 2005 VVSG

Project Number: PR121029-00  
Test Area: GP #2  
S/N: VST 150 003  
Date: January 11, 2021

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### Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1013	KeyTek	EMC Pro	0008347	Advanced EMC Immunity Tester	10/22/2020	10/22/2021
1038	Fluke	85	66180455	Multimeter/Frequency Meter	05/26/2020	05/26/2021
1184	KeyTek	CE Ware	4.0	KeyTek EMC Pro Control Software for EFT, Surge, H-F	NA	NA
1295	California Instruments Corporation	CTS-115-230	S72726	PACS-1 Power Analyzer Compliance Test System (WC05	08/20/2020	08/20/2021
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	02/24/2020	02/24/2021
1901	EXTECH	445703	0617	Hygrometer-Thermometer (WC059899)	06/29/2020	06/29/2021
1902	EXTECH	445703	1218-1	Hygrometer-Thermometer (WC059900)	06/29/2020	06/29/2021



**6.0 Test Log**

**EMI Test Log**

Manufacturer: Unisyn	Project Number: PR121029-00
	B80802
Model: FVT	S/N: FVT-BBU-001
	FVT-BBU-002
Customer Representative: Michael Walker	
Standard Referenced: FCC	

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**Ground Planes / CALC**

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
4-3	---	September 14, 2020 0800 - 1630	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell, 120/60 VAC 120Vac/60Hz		8.0	Pass	KJ
4-11		September 16, 2020 1330-1400	Voltage Dips and Interruptions 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles 120Vac/60Hz		0.5	Pass	MT
4-11		1400-1600	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage) Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. 120/60 VAC Line Voltage Variations (+7.5% of nominal 120V) 2hrs. 129Vac/60Hz		2.0	Pass	MT
4-11		September 17, 2020 0830-1030	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage) Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. 120/60 VAC Line Voltage Variations (-12.5% of nominal 120V) 2hrs. 105Vac/60Hz		2.0	Pass	MT
4-11		1030-1230	Voltage Dips and Interruptions (Surge of +/- 15%) Surge of +/- 15% line variation of nominal line voltage 120/60 VAC Surges of +15% line variations of nominal voltage 2 Hrs. 138Vac/60Hz		2.0	Pass	MT

### Ground Planes / CALC

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
4-11		1230-1430	Voltage Dips and Interruptions (Surge of +/- 15%) Surge of +/- 15% line variation of nominal line voltage 120/60 VAC Surges of -15% line variations of nominal voltage 2 Hrs. 102Vac/60Hz		2.0	Pass	MT
4-5		September 18, 2020 0800-1400	Surge Immunity Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120/60 VAC		6.5	Pass	MT
<b>Per Client and NTS management EUT was swapped with a EUT that does not have a USB extender cable attached</b>							
4-4	---	September 21, 2020 0900 - 1000	Electrical Fast Transient / Burst Mains: +/- 2kV, I/O: +/- 1kV, 120/60 VAC		1.0	Pass	CL
4-6	---	1000 - 1100	Conducted RF Immunity 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell, 120/60 VAC		1.0	Pass	CL
4-8	---	1100 - 1200	Power Frequency H-Field Immunity 30A/m, 50 / 60 Hz, 3 axes, 120/60 VAC		1.0	Pass	CL
4-2	---	1200 - 1600	Electrostatic Discharge +/- 8kV Contact, +/-2, 4, 8, 15kV Air, 120/60 VAC		4.0	Pass	CL
Re-Test							
4-11		January 11, 2021 0800	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage) Electric power increases of 7.5% and reductions of 12.5% of nominal specified power., 120Vac/60 VAC		---	Pass	TW
			Voltage Dips and Interruptions (Surge of +/- 15%) Surge of +/- 15% line variation of nominal line voltage 120Vac/60 VAC		---	---	TW
		1600	Done for the day		---	---	TW
4-11		January 12, 2021 0800	Resumed Voltage Dips and Interruptions		---	---	TW
		1030	Completed 4-11 testing		---	---	TW
			Setup for Surge Immunity Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120/60 VAC				
4-5		1045	Begin Surge testing				
4-5			Setup for Surge Immunity Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120/60 VAC		---	---	TW
4-5		1045	Begin Surge testing		---	---	TW
		1630	Completed Surge Immunity		---	---	TW



**Ground Planes / CALC**

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
4-6	---	January 13, 2021 0800 - 100	Conducted RF Immunity (PR121029-00) 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell, 120/60 VAC		2.0	Pass	CL
4-4	---	1000 - 1030	Electrical Fast Transient / Burst Mains: +/- 2kV, I/O: +/- 1kV, 120/60 VAC		.5	Pass	CL
4-8	---	1030 - 1100	Power Frequency H-Field Immunity 30A/m, 50 / 60 Hz, 3 axes, 120/60 VAC		.5	Pass	CL
4-2	---	1100 - 1200	Electrostatic Discharge +/- 8kV Contact, +/-2, 4, 8, 15kV Air, 120/60 VAC		1.0	---	CL
---	---	1200 - 1230	Lunch		---	---	CL
4-2	---	1230 - 1330	Electrostatic Discharge +/- 8kV Contact, +/-2, 4, 8, 15kV Air, 120/60 VAC		1.0	Pass	CL
4-6	---	1330 - 1430	Conducted RF Immunity ( <b>PR121029</b> ) 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell, 120/60 VAC		1.0	Pass	CL
4-4	---	1430 - 1530	Electrical Fast Transient / Burst ( <b>PR121029</b> ) Mains: +/- 2kV, I/O: +/- 1kV, 120/60 VAC		1.0	Pass	CL
4-8	---	1530 - 1600	Power Frequency H-Field Immunity ( <b>PR121029</b> ) 30A/m, 50 / 60 Hz, 3 axes, 120/60 VAC		.5	Pass	CL



**End of Report**