National Technical Systems Test Report for Electromagnetic Interference (EMI) Testing of the Verify Controller with 2 Touch Writer Duos

Prepared For
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Performed By
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Revision History

Rev.	Description	Issue Date
0	Initial Release	03/29/2022
1	Table 3.0-1: Corrected test item Part Numbers. Table 5.0-1: Corrected test item Part Numbers.	04/07/2022

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List of Tables

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 Specifications:
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-8
- IEC 61000-4-11
- SLI Compliance Purchase Order(s) 20220207-01
- 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

SLI Compliance 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	Verify Controller	3006085	C2115161506
2	2	Touch Writer Duos	3006070	B1903101010
3				B2013730601

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 ANSI/NCSL Z540-1 and 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 16-4-2:2003 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
Radiated Immunity	V/m	80-2,700 MHz
ESD	kV	N/A
EFT	Voltage	N/A
	Timing	N/A
Surge	Voltage	N/A
RF Common Mode (CDN Method)	Vrms	N/A
RF Common Mode (BCI Method)	Vrms	N/A

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	IEC/EN 61000-4-2	Longmont	03/28/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	
5.2	Radiated RF Immunity	IEC/EN 61000-4-3	Longmont	03/10/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	
5.3	Electrical Fast Transient / Burst	IEC/EN 61000-4-4	Longmont	03/14/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	
5.4	Conducted RF Immunity	IEC/EN 61000-4-6	Longmont	03/11/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	
5.5	Surge Immunity	IEC/EN 61000-4-5	Longmont	03/14/2022 - 03/15/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	
5.6	Voltage Dips and Interruptions	IEC/EN 61000-4-11	Longmont	03/16/2022 - 03/17/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	
5.7	Power Frequency H-Field Immunity	IEC/EN 61000-4-8	Longmont	03/21/2022 - 03/23/2022	Verify Controller: 3006085	C2115161506	No Anomalies
					Touch Writer Duo: 3006070	B1903101010 B2013730601	

5.1 Electrostatic Discharge

5.1.1 Test Procedure

IEC/EN 61000-4-2

5.1.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Electrostatic Discharge.

5.1.3 Test Datasheets

National Technical Systems

Electrostatic Discharge per IEC / EN 61000-4-2

Standard Referenced: VVSG1.0 IEC 61000-4-2 Date: 3/22/2022

Temperature: ˚20.1C Humidity: 35% Pressure: 840 mb

Input Voltage: 120Vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.

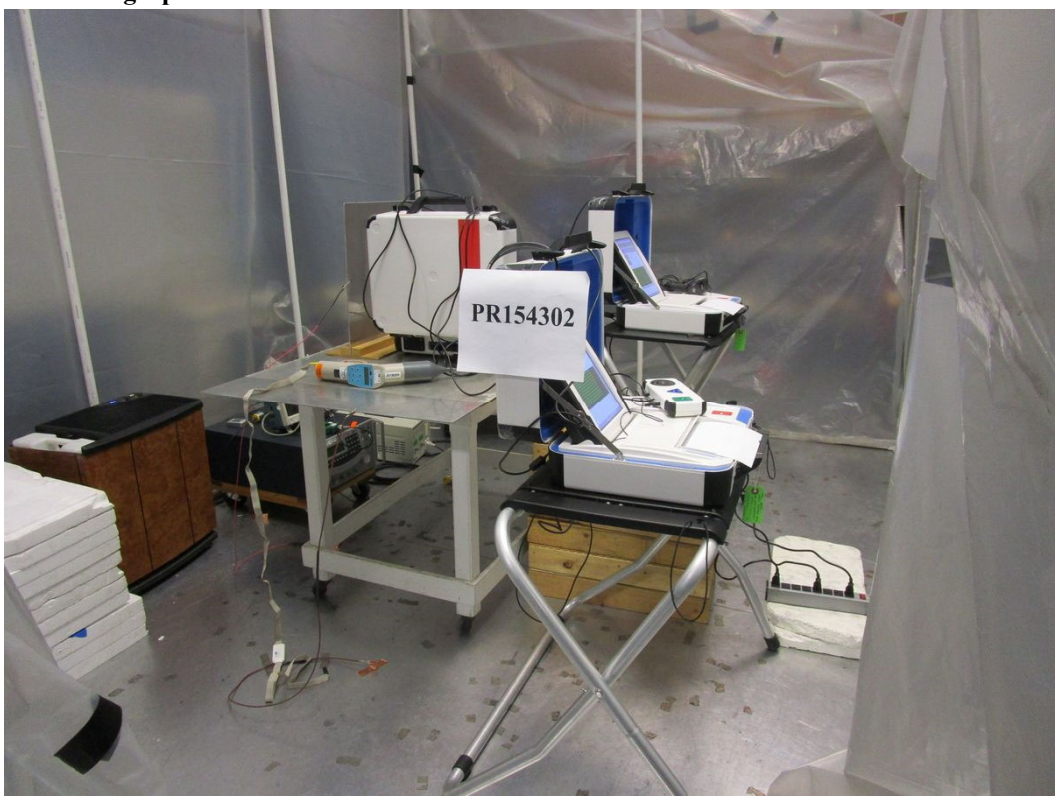
Test Engineer: Casey Lockhart

Date	Time	Log Entries	Initials	Result
3/22/22	0800	Electrostatic Discharge. +/- 8kV Contact, +/-2, 4, 8, 15kV Air. 120 VAC / 60 Hz (4.1.2.8) Cables are .929 & .936 m ohms.	CL	Pass

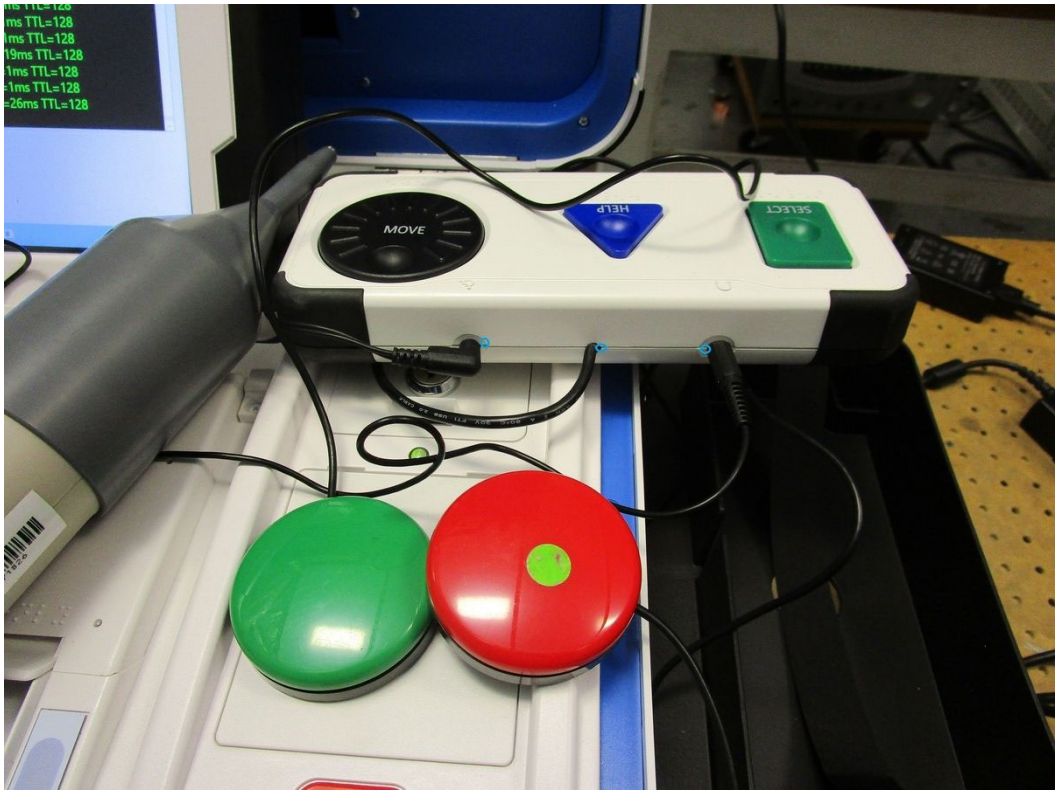
National Technical Systems			
Electrostatic Discharge per IEC / EN 61000-4-2			
Standard Referenced:	VVSG1.0 IEC 61000-4-2	Date:	3/22/2022
Temperature:	˚20.1C Humidity: 35%	Pressure:	840 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.		
Test Engineer:	Casey Lockhart		

Test Location	Voltage Level	Polarity		Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass/ Fail
	(kV)	+	-					
Indirect Discharge Points								
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 a	A	Pass
Contact Discharge Points - **RED** Arrows.								
Figure A2	8	x	x	10	1	Front S/N C21	A	Pass
Figure A3	8	x	x	10	1	Left, no discha	---	---
Figure A4	8	x	x	10	1	Right, no disch	---	---
Figure A5	8	x	x	10	1	Back, no disch	---	---
Figure A6	8	x	x	10	1	Front S/N B20	A	Pass
Figure A7	8	x	x	10	1	Left (On all 4	A	Pass
Figure A8	8	x	x	10	1	Right, no disch	---	---
Figure A9	8	x	x	10	1	Back, no disch	---	---
Figure A10	8	x	x	10	1	Front S/N B19	---	---
Figure A11	8	x	x	10	1	Left	A	Pass
Figure A12	8	x	x	10	1	Right	A	Pass
Figure A13	8	x	x	10	1	Back, no disch		
Figure A14	8	x	x	10	1	ATI on S/N B2	---	---
Air Discharge Points - **BLUE** Arrows.								
Figure A2	2, 4, 8, 15	x	x	10	1	S/N C2115161	15	Pass

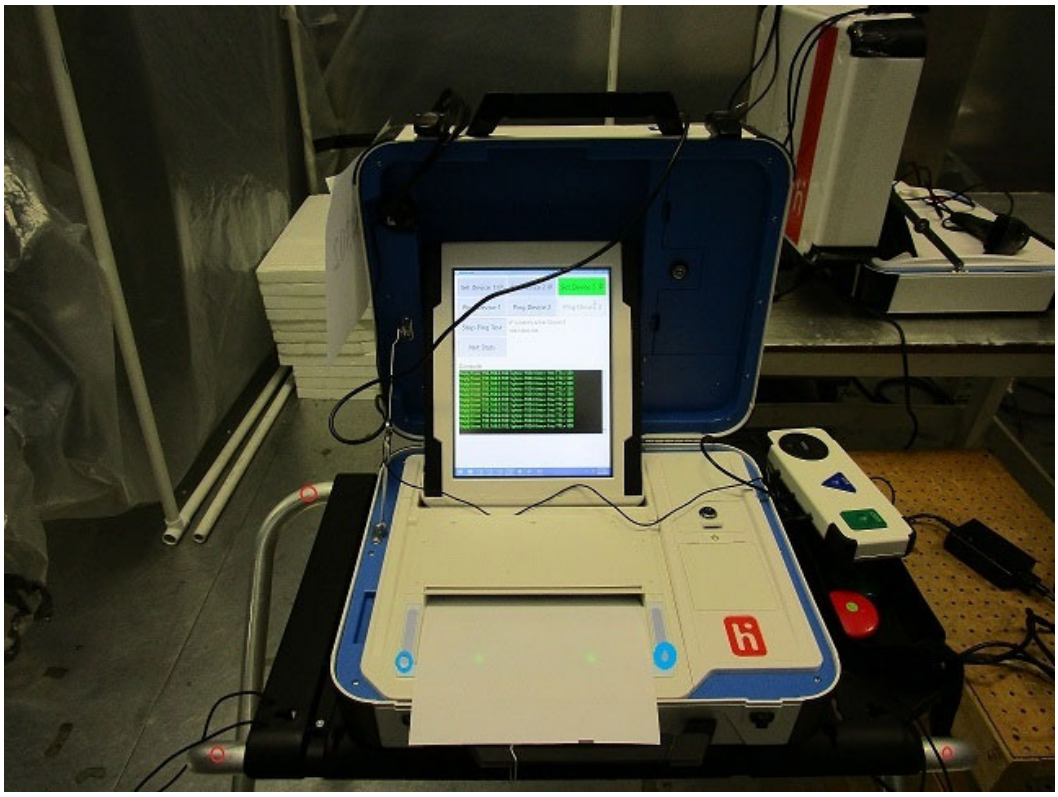
5.1.4 Test Photographs



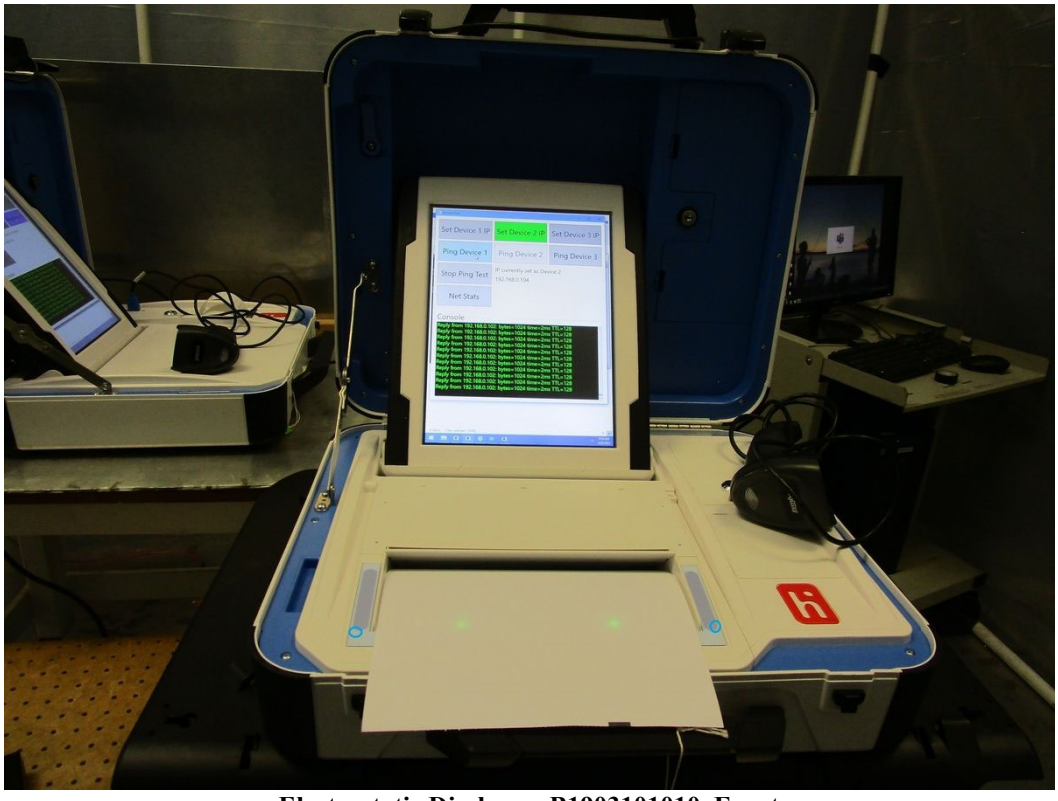
Electrostatic Discharge Setup



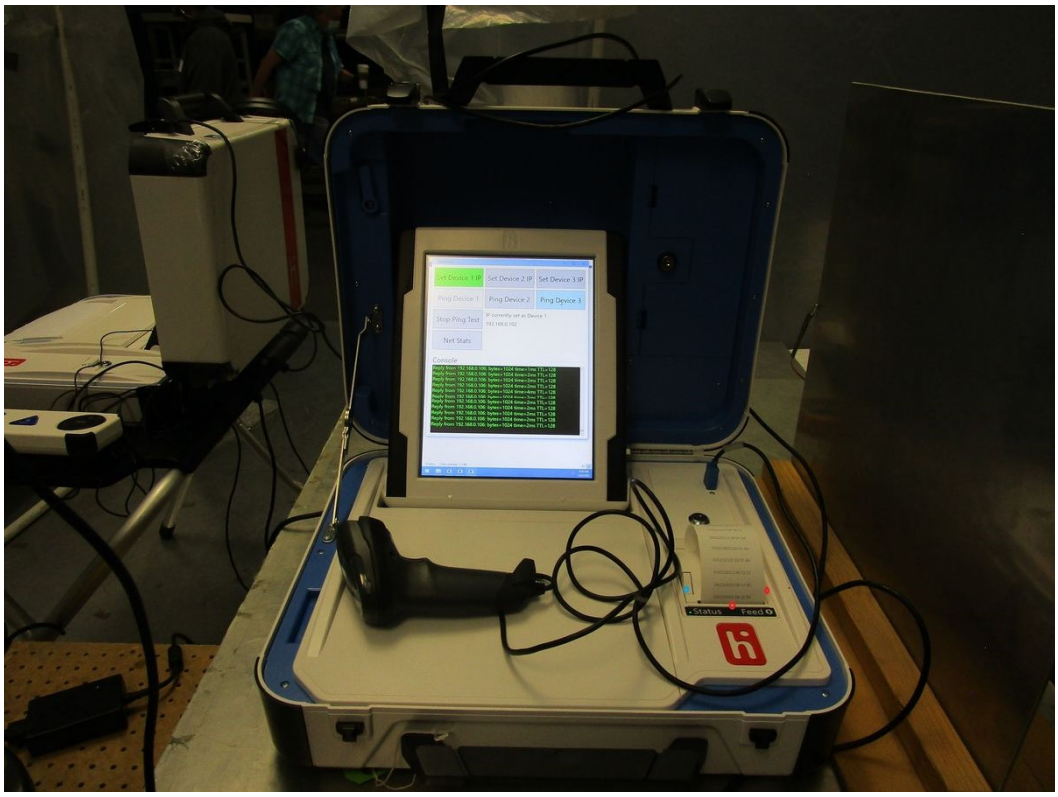
Electrostatic Discharge B2013730601_ATI



Electrostatic Discharge B2013730601_Front



Electrostatic Discharge B1903101010_Front

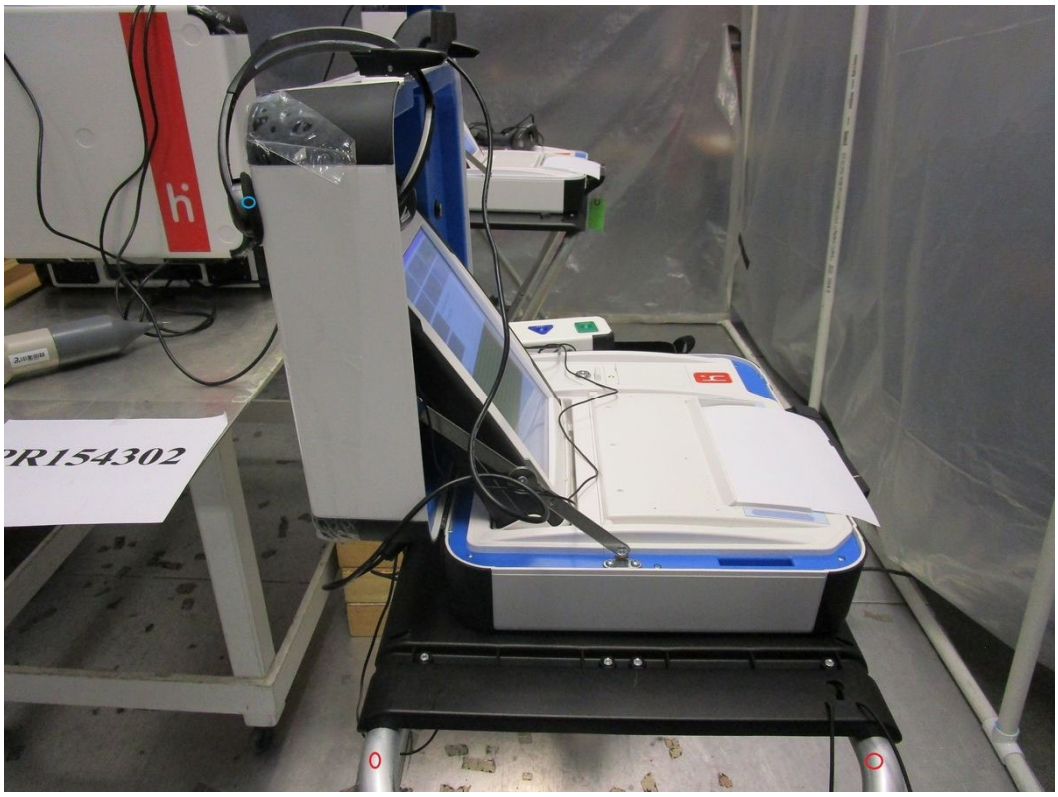


Electrostatic Discharge C2115161506_Front

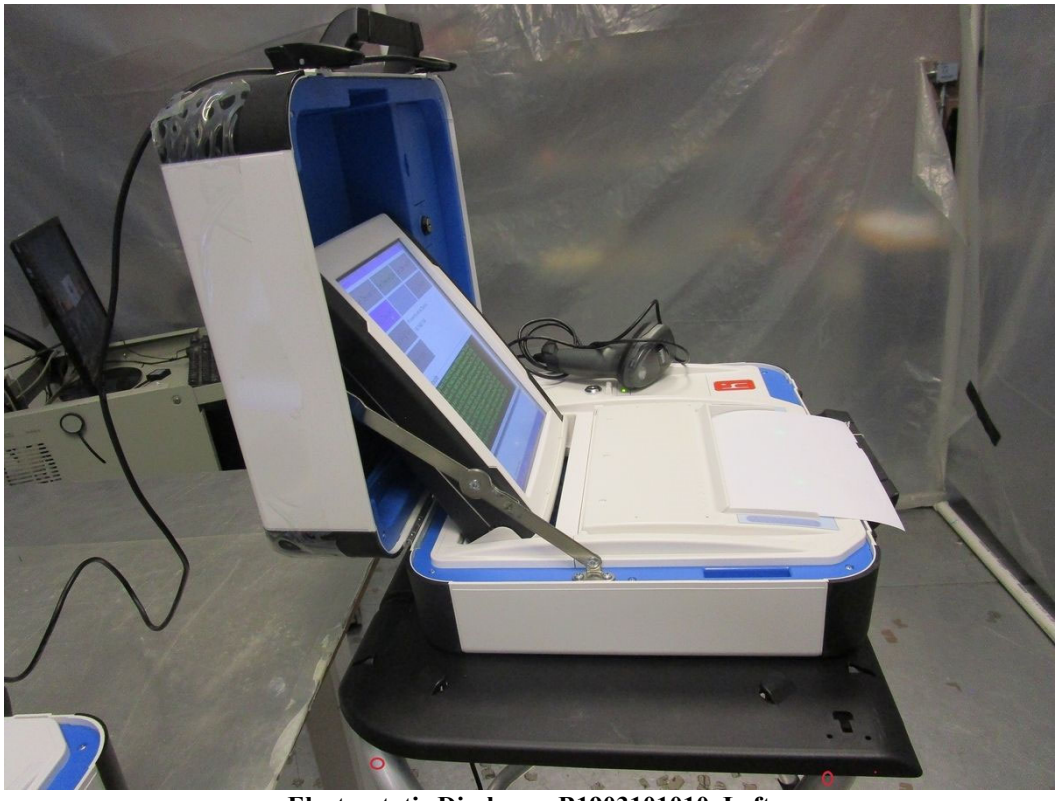
Electrostatic Discharge B2013730601_Back

Electrostatic Discharge B1903101010_Back

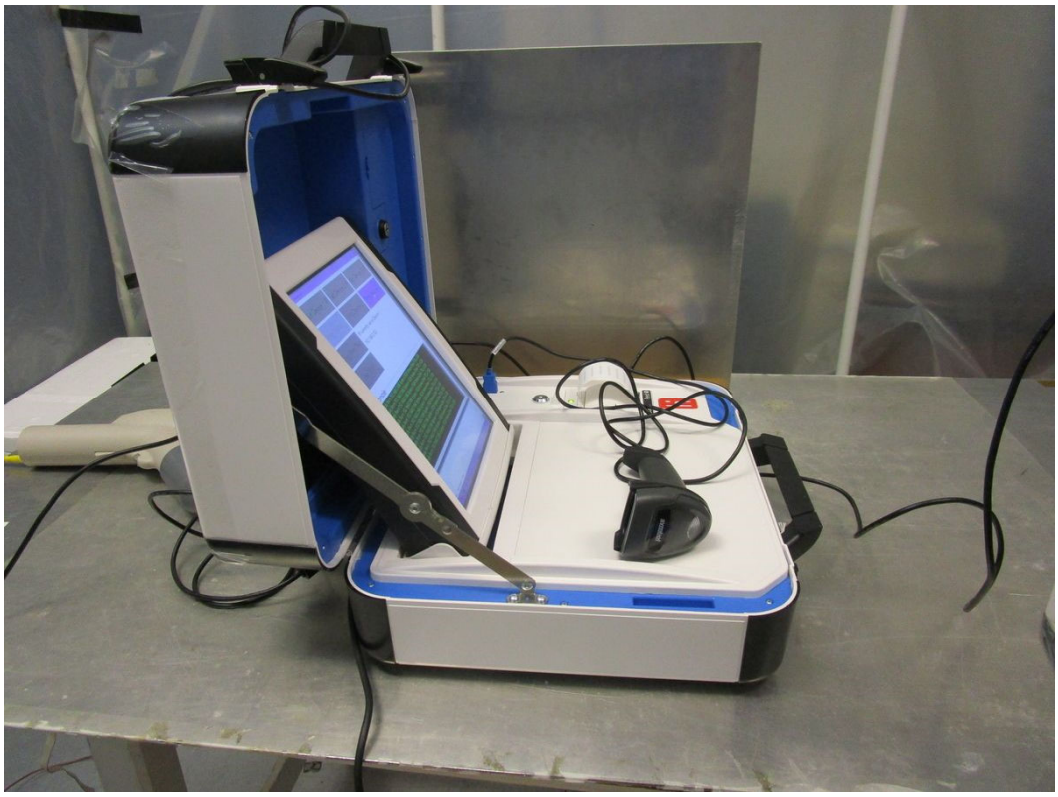
Electrostatic Discharge C2115161506_Back



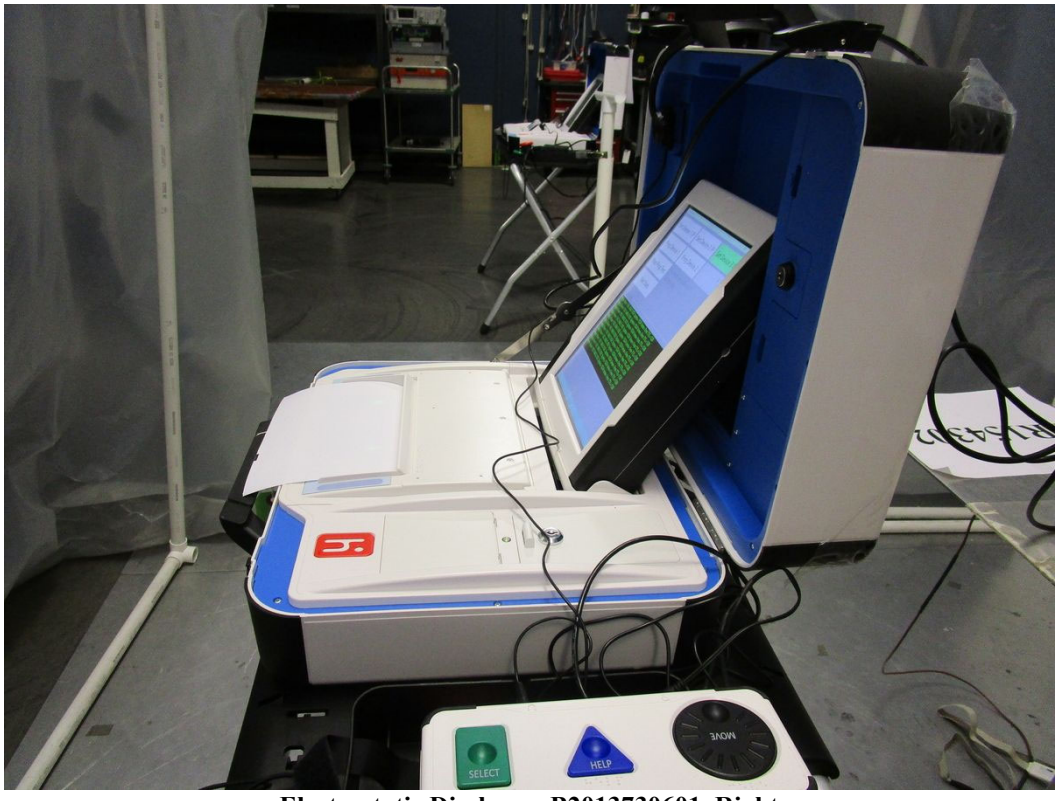
Electrostatic Discharge B2013730601_Left



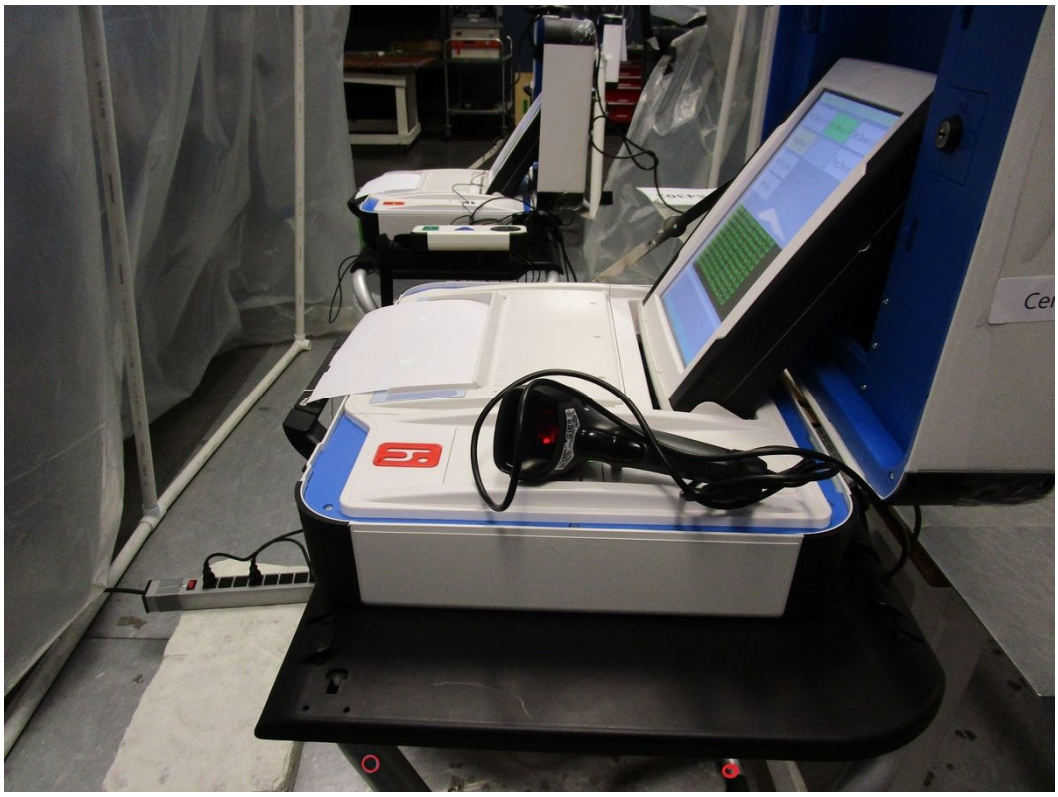
Electrostatic Discharge B1903101010_Left



Electrostatic Discharge C2115161506_Left



Electrostatic Discharge B2013730601_Right



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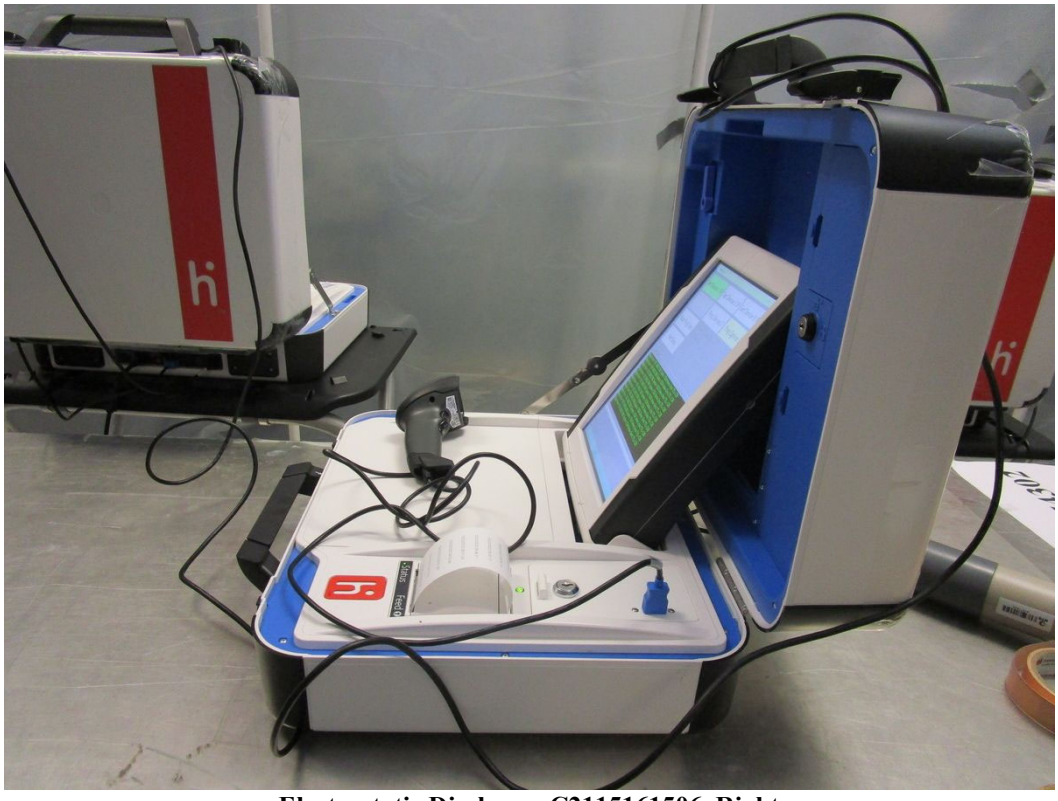


Electrostatic Discharge C2115161506_Right

5.1.5 Test Equipment List

Table 5.1-1: Electrostatic Discharge Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	National Technical Systems	GP #2	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC071826	Gun (ESD Simulator)	EMC-Partner	ESD3000	03/31/2021	03/31/2022
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	06/14/2021	06/14/2022

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.2 Radiated RF Immunity

5.2.1 Test Procedure

IEC/EN 61000-4-3

5.2.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Radiated RF Immunity.

5.2.3 Test Datasheets

National Technical Systems

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

Standard Referenced: VVSG1.0 IEC 61000-4-3 Date: 3/10/2022

Temperature: 19.7°C Humidity: 17% Pressure: 832 mb

Input Voltage: 120Vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.

Test Engineer: Casey Lockhart

Date	Time	Log Entries	Initials	Result
3/9/22	07:30	Client Late	CL	---
	1100	Equipment setup	CL	---
	1230	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell	CL	---
3/10/22	07:30	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM	CL	Pass

National Technical Systems

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

Standard Referenced: VVSG1.0 IEC 61000-4-3 Date: 3/10/2022

Temperature: 19.7°C Humidity: 17% Pressure: 832 mb

Input Voltage: 120Vac/60Hz

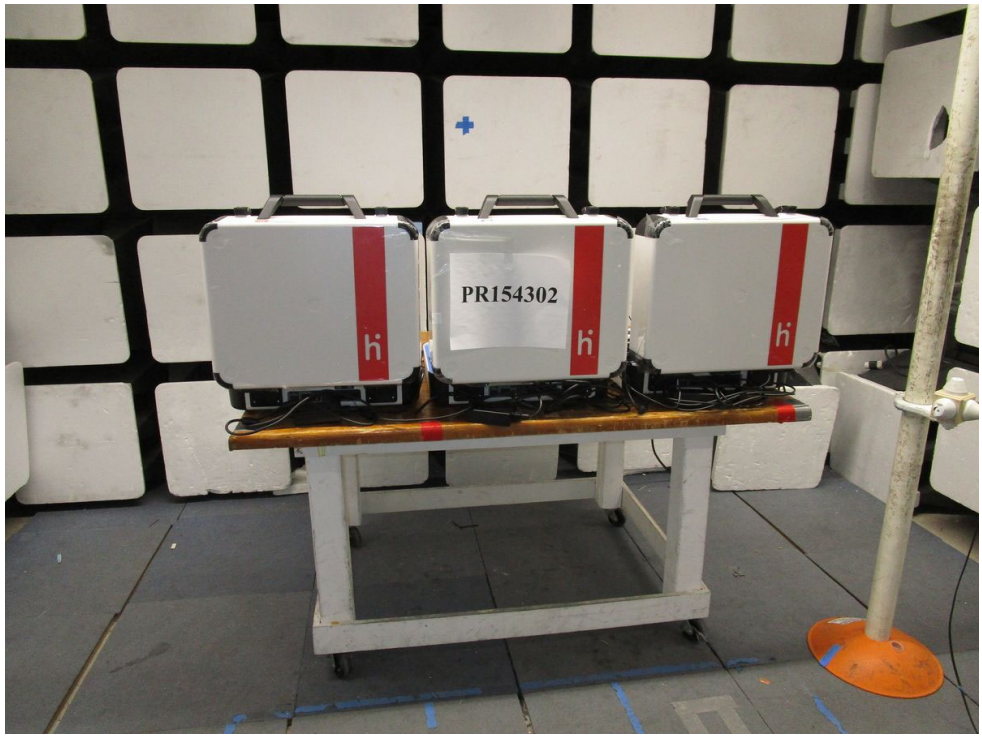
Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.

Test Engineer: Casey Lockhart

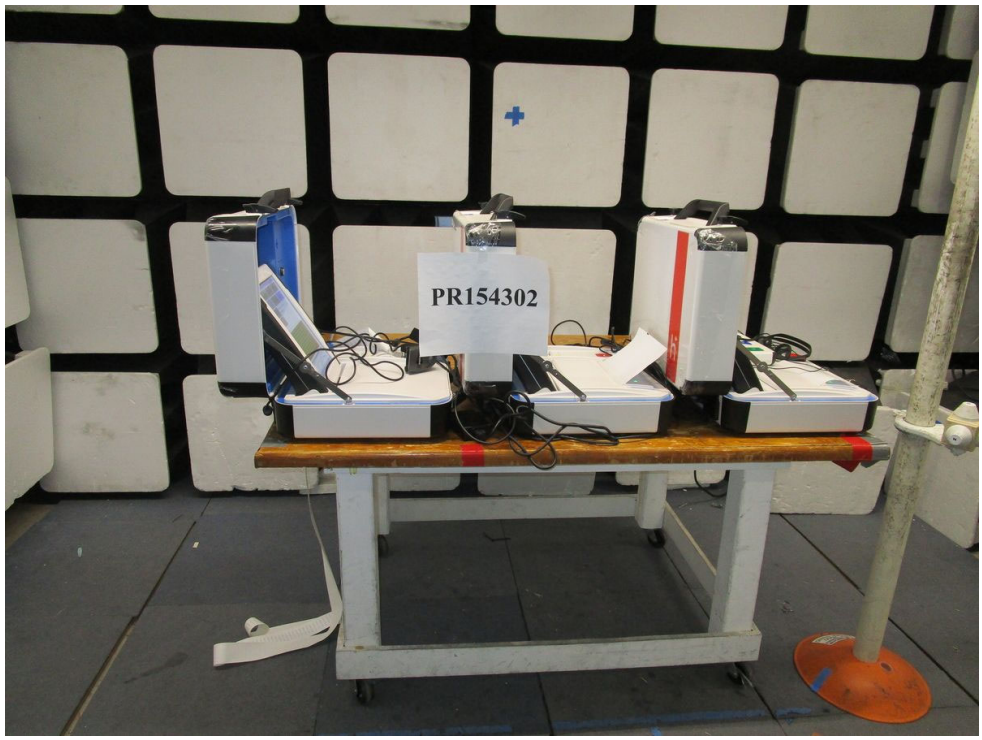
Frequency (MHz)	Modulation				Step Size	Field	Polarity	Dwell	Comments	Criteria Met	Pass/ Fail
	Type	%	Freq	Form	(%)	(V/m)	(V or H)	(sec)			
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	**Front**	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	**Right**	A	Pass
80 - 1000	AM	80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

5.2.4 Test Photographs

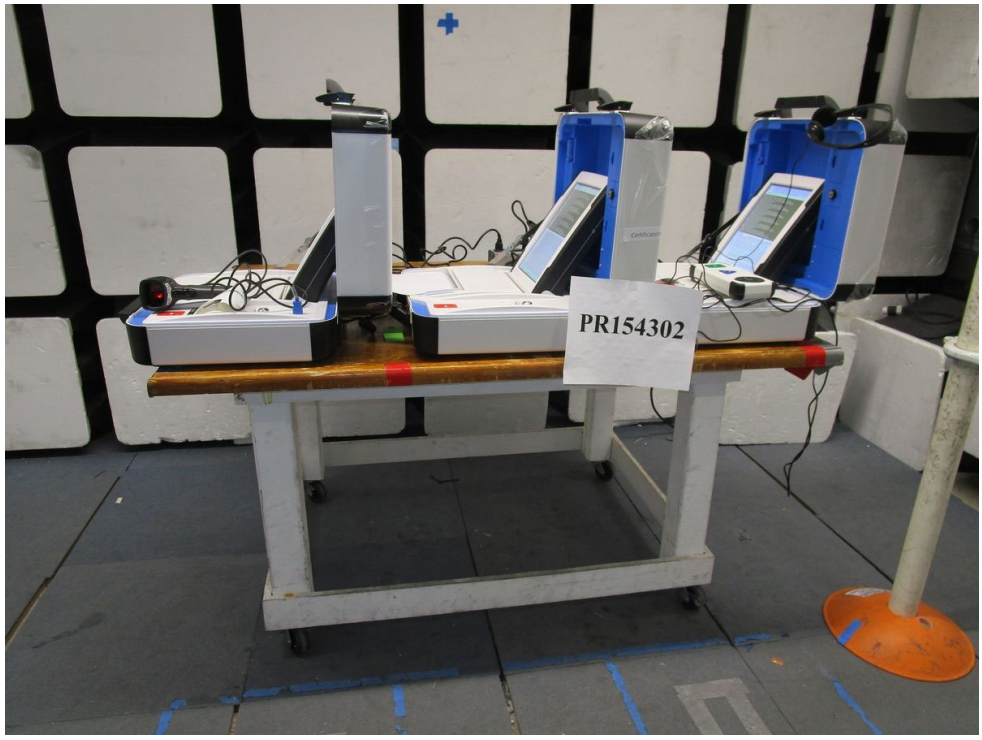
Radiated RF Immunity Front



Radiated RF Immunity Back



Radiated RF Immunity Left



Radiated RF Immunity Right

5.2.5 Test Equipment List

Table 5.2-1: Radiated RF Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059916	Ground Plane (Fixed)	National Technical Systems	GP #0	NCR	NCR
WC059917	Ground Plane (Fixed)	National Technical Systems	GP #1	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC059710	Amplifier (Pre/RF/Low Noise)	Ophir RF	5127F	09/17/2012	NCR
WC059712	Coupler (Bi-Directional)	Werlatone	C3908-10	06/14/2021	06/14/2022
WC059797	Generator (Signal)	Wiltron	68369B	05/17/2021	05/17/2022
WC059805	Antenna (Log Periodic)	ETS-Lindgren	3142B	NCR	NCR
WC070468	Meter (Power)	Giga-Tronics	GT-8888A	07/27/2021	07/27/2022
WC070507	Software	EMC Integrity	RFS	NCR	NCR
WC078463	Probe (E-Field/Near Field)	ETS-Lindgren	FP5000	06/08/2021	06/08/2022
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	06/14/2021	06/14/2022

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.3 Electrical Fast Transient / Burst

5.3.1 Test Procedure

IEC/EN 61000-4-4

5.3.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Electrical Fast Transient/Burst.

5.3.3 Test Datasheets

National Technical Systems

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

Standard Referenced: EN 61000-4-4 Date: 3/11/2022

Temperature: 19.6°C Humidity: 11.20% Pressure: 838 mb

Input Voltage: 120Vac/60Hz

Configuration of Unit: Normal Operation

Test Engineer: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product. Injecting on **C2115161506**

Date	Time	Log Entries	Initials	Result
3/11/22	1330	Electrical Fast Transient / Burst. Mains: +/- 2kV, I/O: +/- 1kV. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.6) Injecting on S/N C2115161506.	CL	Pass
3/11/22	1400	Electrical Fast Transient / Burst. Mains: +/- 2kV, I/O: +/- 1kV. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.6) Injecting on S/N . B1903101010	CL	Pass
3/11/22	1430	Electrical Fast Transient / Burst. Mains: +/- 2kV, I/O: +/- 1kV. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.6) Injecting on S/N B2013730601	CL	Pass

National Technical Systems

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

Standard Referenced: EN 61000-4-4 Date: 3/11/2022

Temperature: 19.6˚C Humidity: 11% Pressure: 838 mb

Input Voltage: 120Vac/60Hz

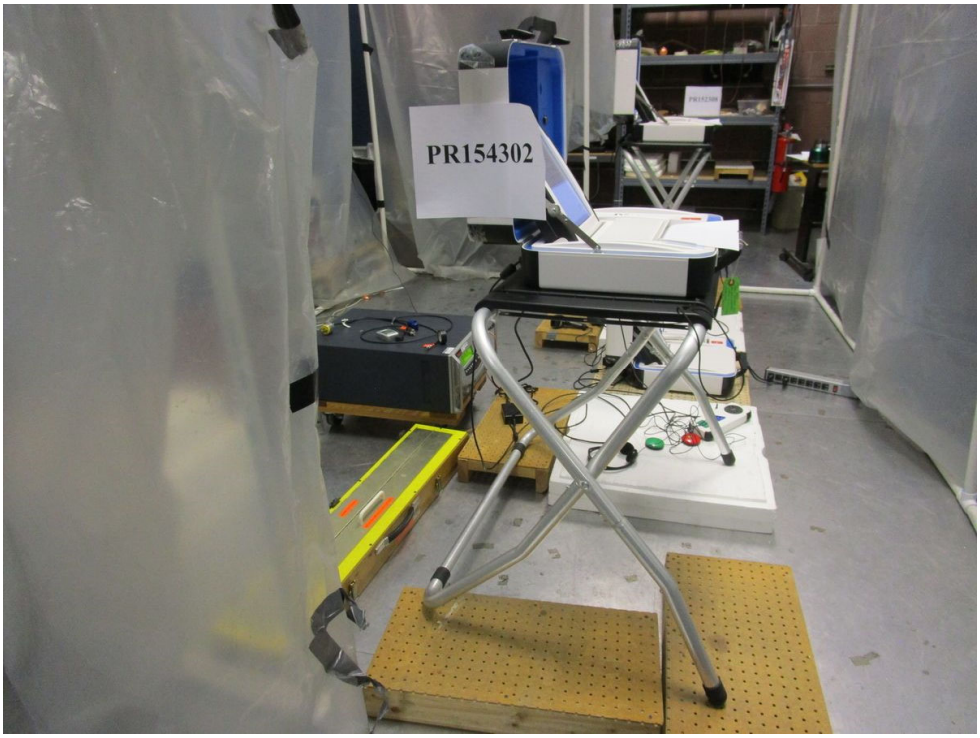
Configuration of Unit: Normal Operation

Test Engineer: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product. Injecting on C2115161506

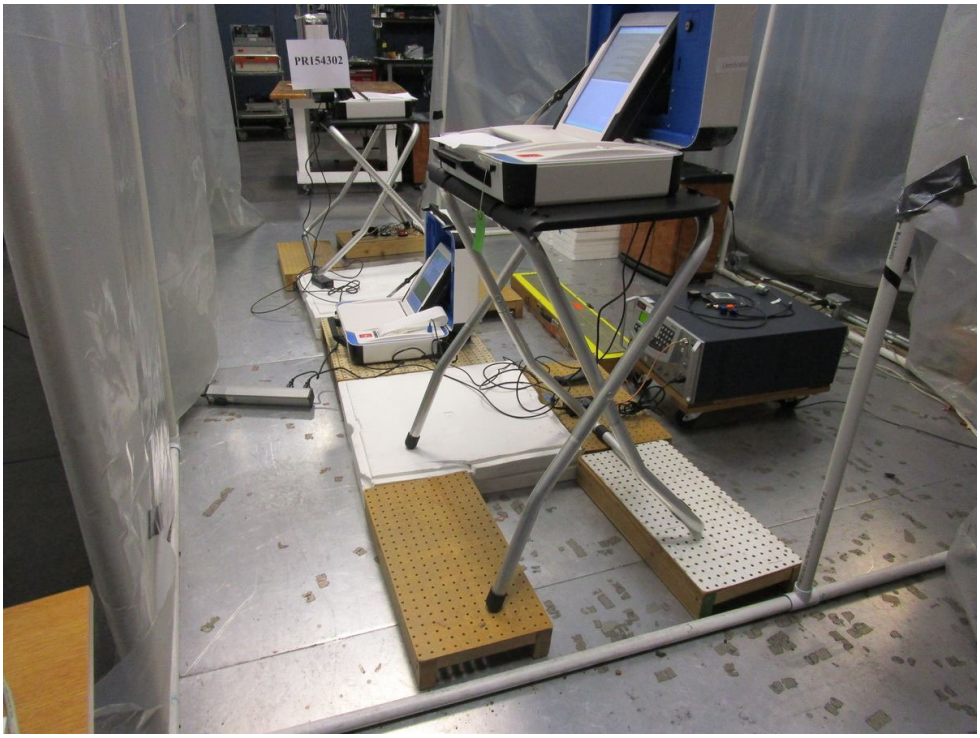
Voltage (kV)	Polarity +/-	Time (sec)	Injection Type	L1	L2	L3	N	PE	Rep Freq.	Comments	Criteria Met	Pass/ Fail
2.0	±	60	CDN	X					5kHz	AC	A	Pass
2.0	±	60	CDN		X				5kHz	AC	A	Pass
2.0	±	60	CDN					X	5kHz	AC	A	Pass
2.0	±	60	CDN		X	X		X	5kHz	AC	A	Pass

Voltage (kV)	Polarity +/-	Time (sec)	Injection Type	Rep Freq.	Comments	Criteria Met	Pass/ Fail
1.0	±	60	Clamp To I/O to B1903101010	5kHz	Cable		Pass
1.0	±	60	Clamp to B2013730601	5kHz	Cable		Pass
			The above tests were performed on B1903101010 and B2013730601UUT's as well				

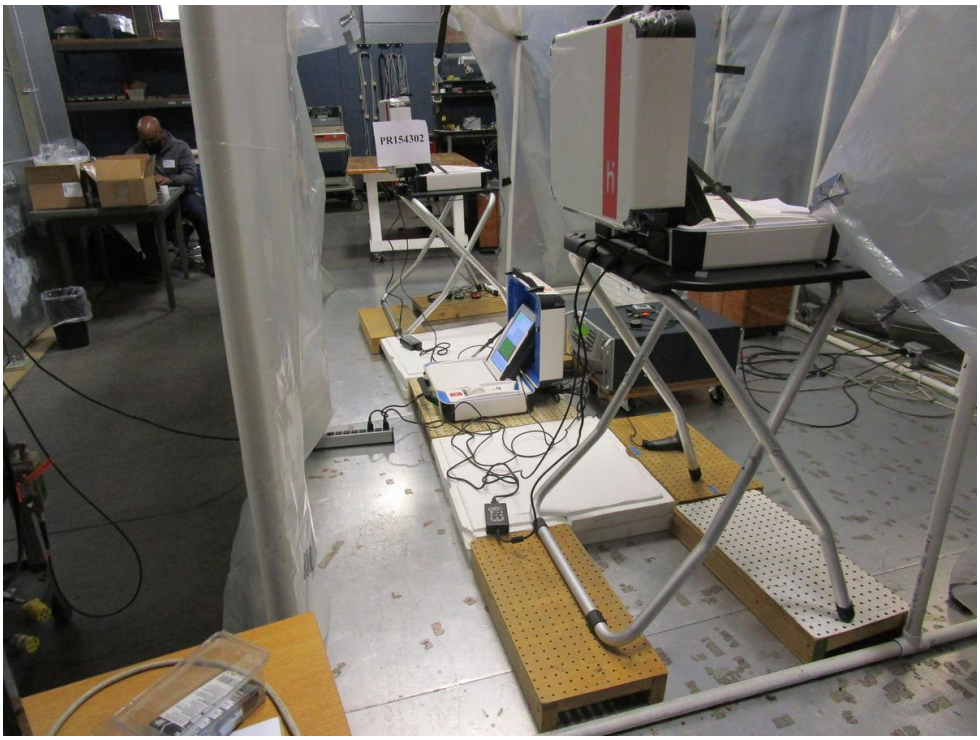
5.3.4 Test Photographs



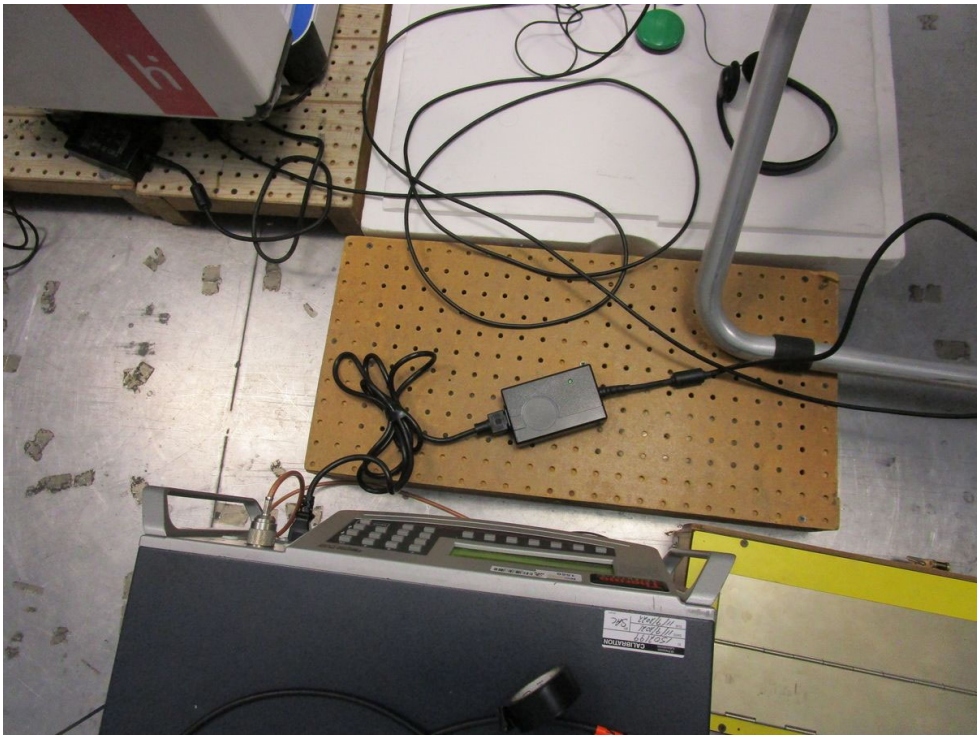
Electrical Fast Transient/Burst Setup_B2013730601



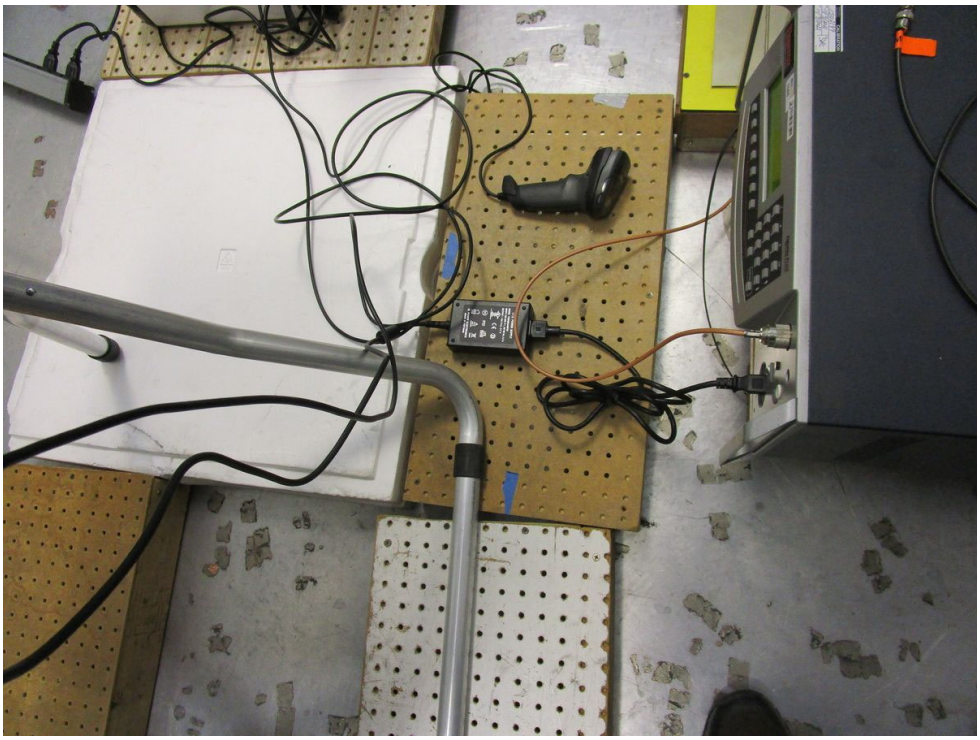
Electrical Fast Transient/Burst Setup_B1903101010



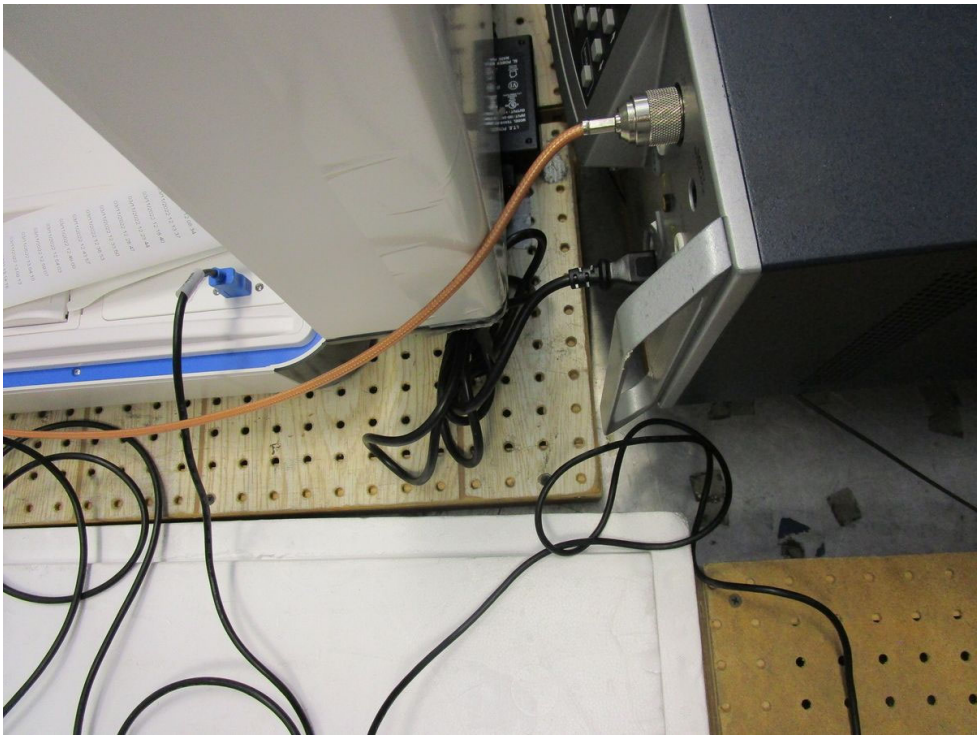
Electrical Fast Transient/Burst Setup _C2115161506



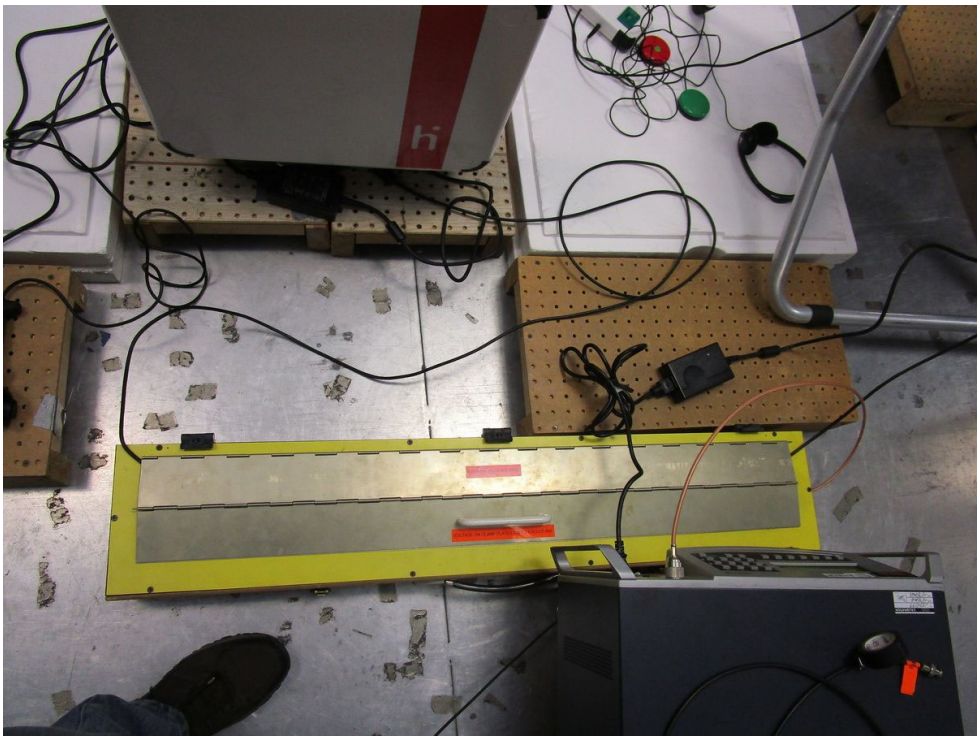
Electrical Fast Transient/Burst Setup AC_B2013730601



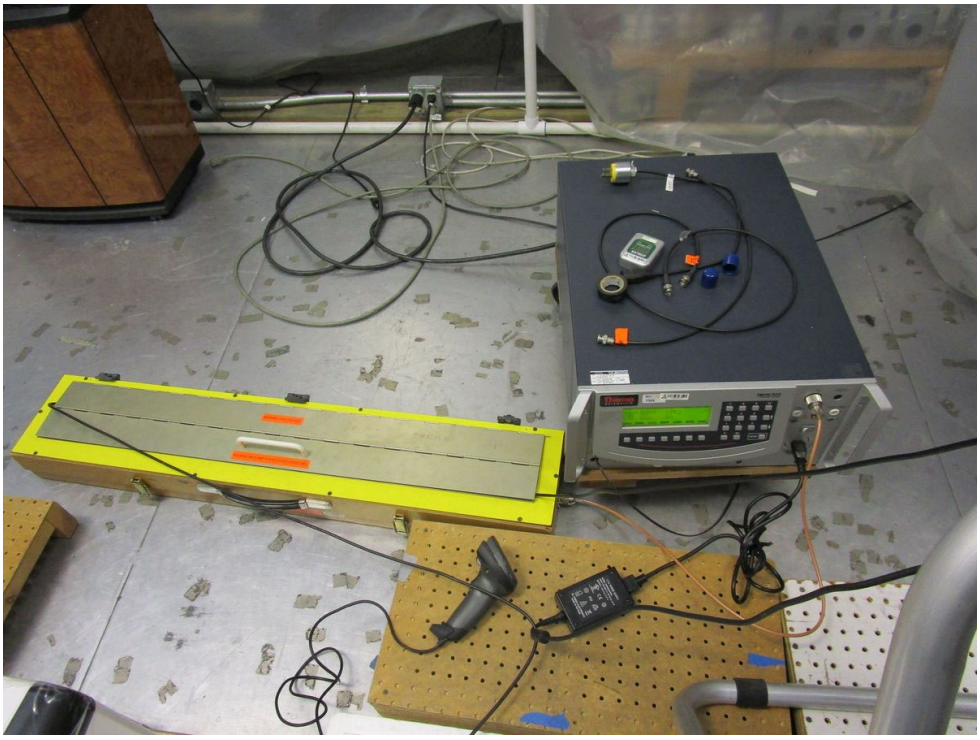
Electrical Fast Transient/Burst Setup AC_B1903101010



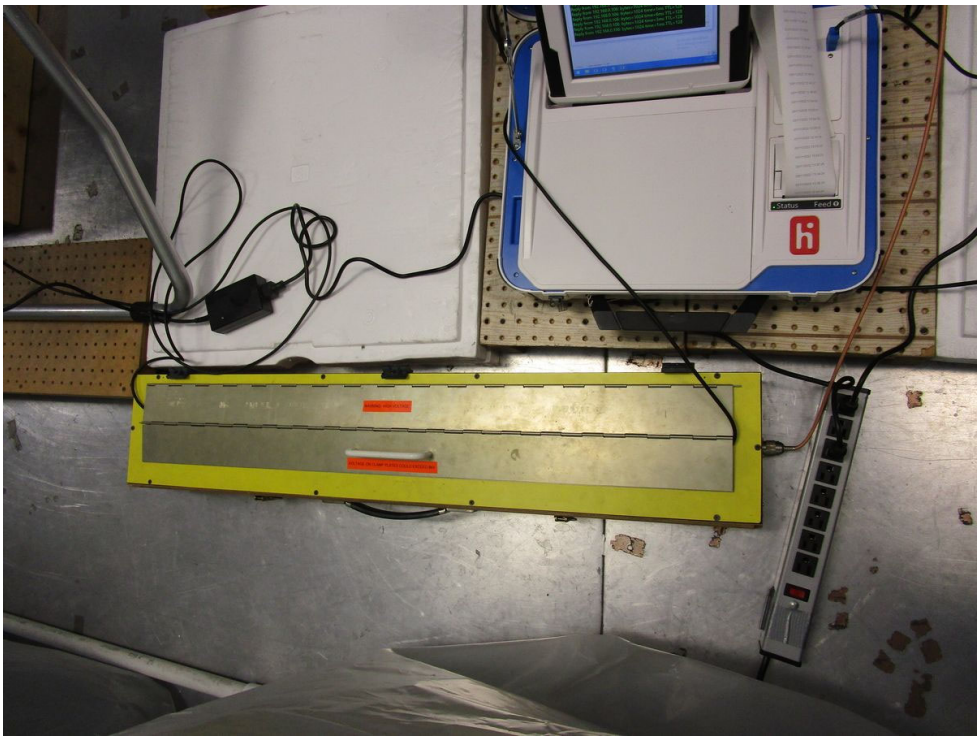
Electrical Fast Transient/Burst Setup AC_C2115161506



Electrical Fast Transient/Burst Setup IO_B2013730601



Electrical Fast Transient/Burst Setup IO_B1903101010



Electrical Fast Transient/Burst Setup IO_C2115161506

5.3.5 Test Equipment List

Table 5.3-1: Electrical Fast Transient / Burst Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059916	Ground Plane (Fixed)	National Technical Systems	GP #0	NCR	NCR
WC059917	Ground Plane (Fixed)	National Technical Systems	GP #1	NCR	NCR

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.4 Conducted RF Immunity

5.4.1 Test Procedure

IEC/EN 61000-4-6

5.4.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Conducted RF Immunity.

5.4.3 Test Datasheets

National Technical Systems

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

Standard Referenced: VVSG1.0 IEC 61000-4-6 Date: 3/10/2022

Temperature: 18.6°C Humidity: 12.30% Pressure: 838 mb

Input Voltage: 120Vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.

Test Engineer: Casey Lockhart

Date	Time	Log Entries	Initials	Result
3/10/22	1130	Conducted RF Immunity. 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.11) Note: Daisy chain Hart Ethernet cable is: 2005312 Rev E.	CL	---
3/11/22	07:30	Conducted RF Immunity. 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.11) Note: Daisy chain Hart Ethernet cable is: 2005312 Rev E.	CL	Pass

National Technical Systems

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

Standard Referenced: VVSG1.0 IEC 61000-4-6 Date: 3/10/2022

Temperature: 18.6°C Humidity: 12% Pressure: 838 mb

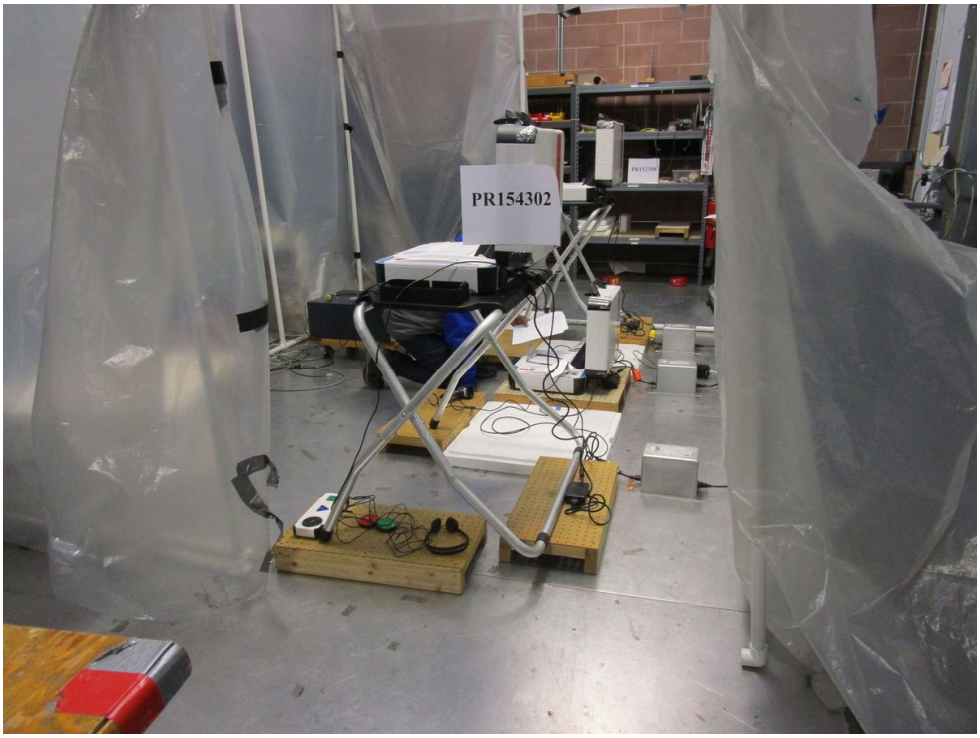
Input Voltage: 120Vac/60Hz

Configuration of Unit: Verify Controller w/2 Touch Writer Duo Fully exercising all features of product

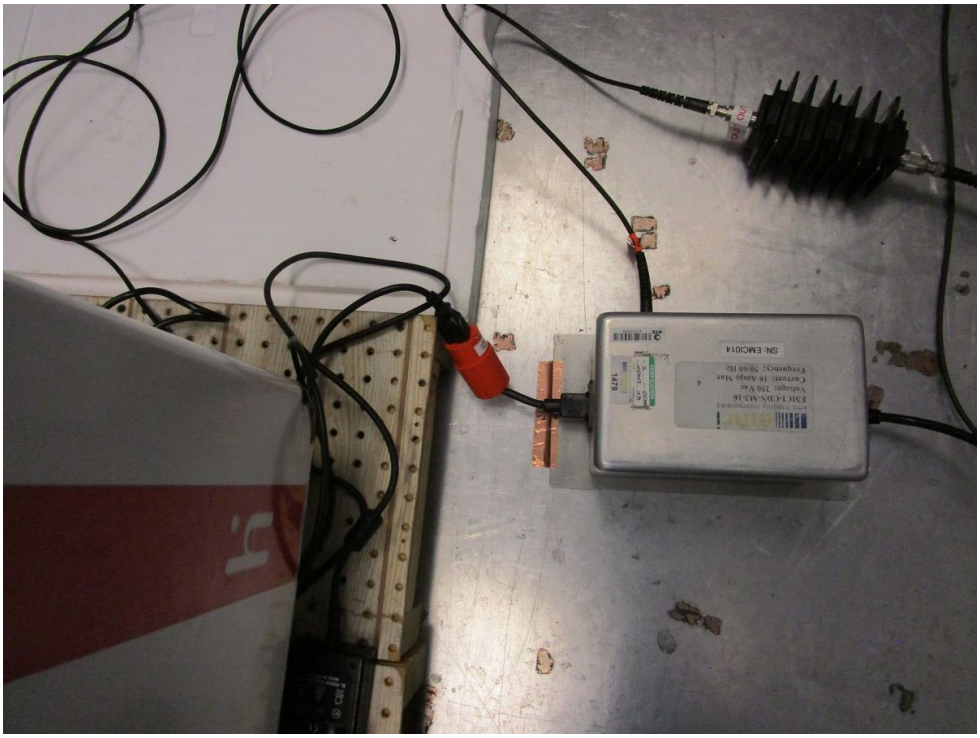
Test Engineer: Casey Lockhart

Frequency (MHz)	Modulation			Level	Dwell	Comments	Criteria Met	Pass/ Fail
	Type	%	Freq	(V/m)	(sec)			
0.150 – 80.0	AM	80	1 kHz	10	3	AC using M3 (	A	Pass
0.150 – 80.0	AM	80	1 kHz	10	3	AC using M3 (	A	Pass
0.150 – 80.0	AM	80	1 kHz	10	3	AC using M3 (	A	Pass
0.150 – 80.0	AM	80	1 kHz	10	3	Daisey chain/F	A	Pass
0.150 – 80.0	AM	80	1 kHz	10	3	Daiseychain/H UUT) Cable using EMClamp	A	Pass
0.150 – 80.0	AM	80	1 kHz	10	3	Daisey chain/F	A	Pass

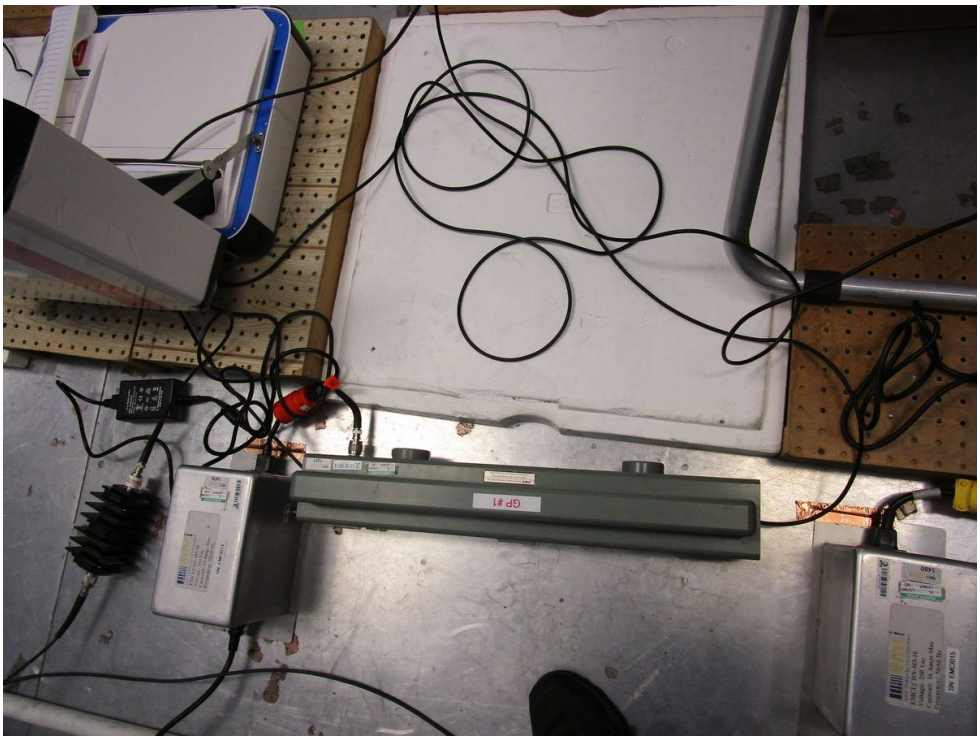
5.4.4 Test Photographs



Conducted RF Immunity Setup



Conducted RF Immunity _AC



Conducted RF Immunity IO

5.4.5 Test Equipment List

Table 5.4-1: Conducted RF Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	National Technical Systems	GP #2	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC059693	Analyzer (Spectrum)	Rigol Technologies	DSA815	10/04/2021	10/04/2022
WC059697	Clamp (Injection)	Fischer Custom Communica-tions	F-2031	02/03/2022	02/03/2023
WC059698	Network (Coupling/Decoupling)	EMC Integrity	EMCI-CDN_M3-16	02/03/2022	02/03/2023
WC059700	Coupler (Bi-Directional)	Werlatone	C9475-13	02/03/2022	02/03/2023
WC059702	Network (Coupling/Decoupling)	EMC Integrity	EMCI-CDN-M3-16	02/03/2022	02/03/2023
WC059703	Network (Coupling/Decoupling)	EMC Integrity	EMCI-CDN-M3-16	02/03/2022	02/03/2023
WC059764	Amplifier (Pre/RF/Low Noise)	Amplifier Research	75A250A	04/22/2014	NCR
WC078470	TBD	ETS-Lindgren	C47213	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	06/14/2021	06/14/2022

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.5 Surge Immunity

5.5.1 Test Procedure

IEC/EN 61000-4-5

5.5.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Surge Immunity.

5.5.3 Test Datasheets

National Technical Systems

Surge Immunity per IEC / EN 61000-4-5

Standard Referenced: VVSG1.0 IEC 61000 4-5 Date: 3/14/2022

Temperature: 19.3°C Humidity: 16.40% Pressure: 838 mb

Input Voltage: 120Vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product. Injecting on S/N C2115161506

Test Engineer: Casey Lockhart

Date	Time	Log Entries	Initials	Result
3/14/22	0730	Surge-Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) Three AC mains (S/N C2115161506) 120 VAC / 60 Hz (4.1.2.7)	CL	Pass

National Technical Systems

Surge Immunity per IEC / EN 61000-4-5

Standard Referenced: VVSG1.0 IEC 61000 4-5 Date: 3/14/2022

Temperature: 19.3°C Humidity: 16% Pressure: 838 mb

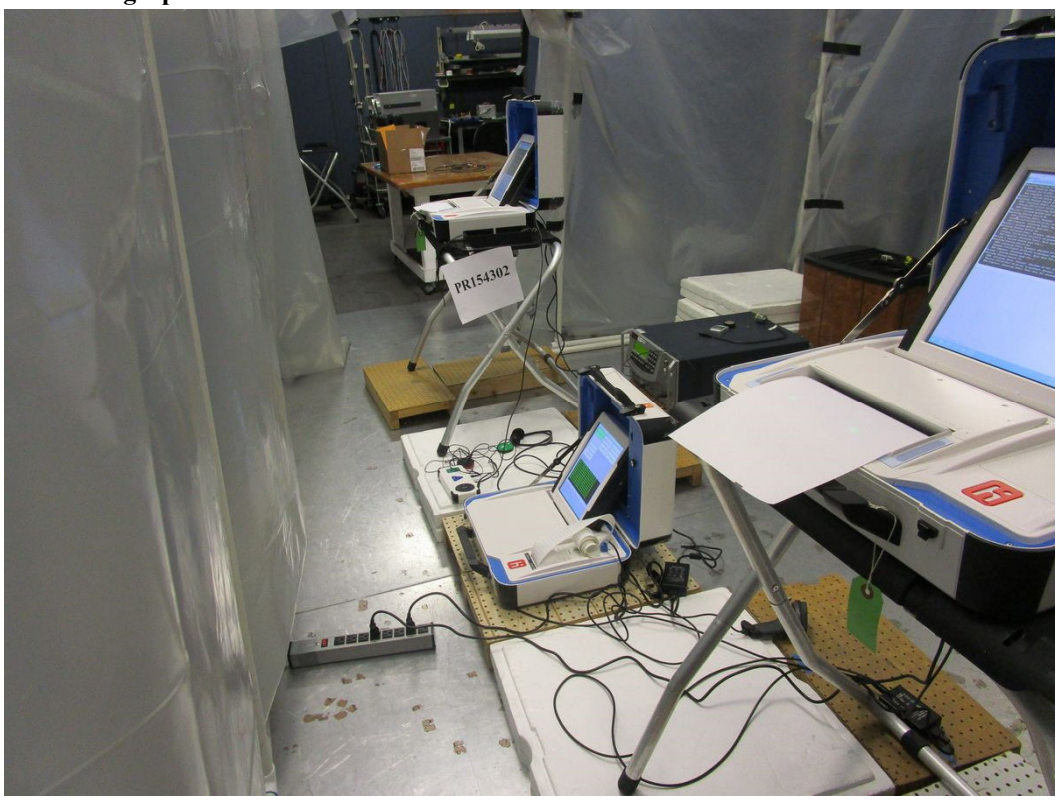
Input Voltage: 120Vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product. Injecting on S/N C2115161506

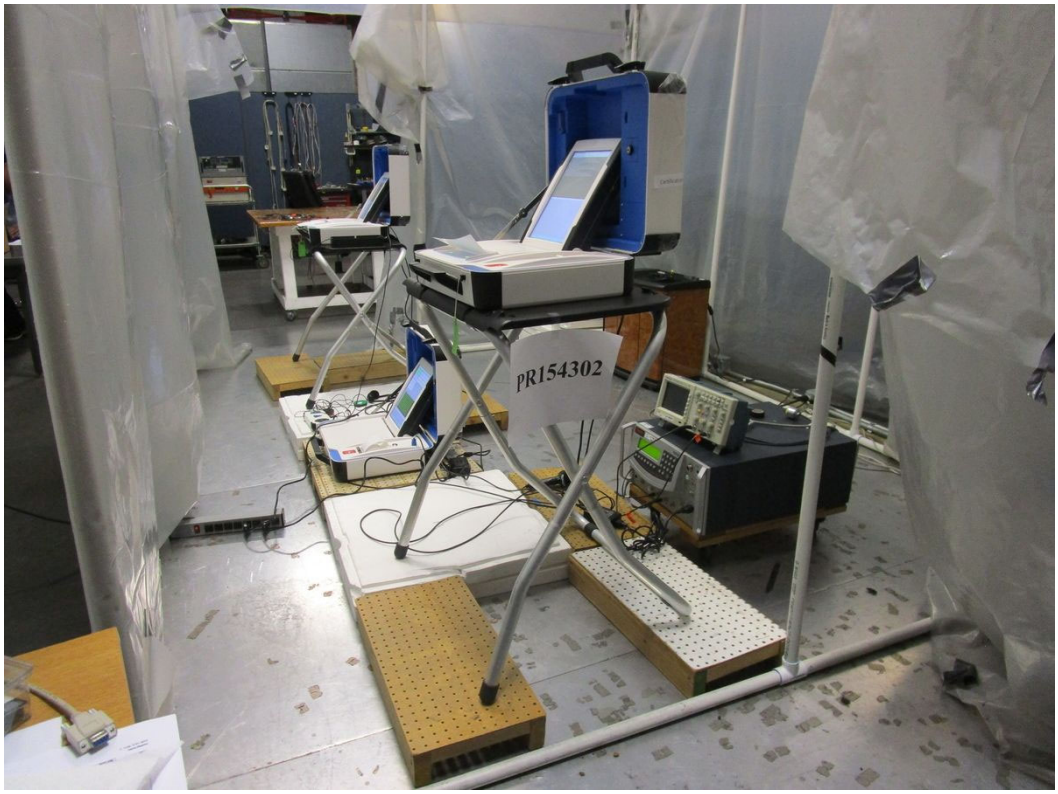
Test Engineer: Casey Lockhart

Voltage (kV)	Polarity +/-	L1	L2	L3	N	PE	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass/ Fail
0.5	±	X			X		0	5	30	Differential Mode	A	Pass
0.5	±	X			X		90	5	30		A	Pass
0.5	±	X			X		180	5	30		A	Pass
0.5	±	X			X		270	5	30		A	Pass
0.5	±	X				X	0	5	30	Common Mode Line	A	Pass
0.5	±	X				X	90	5	30		A	Pass
0.5	±	X				X	180	5	30		A	Pass
0.5	±	X				X	270	5	30		A	Pass
0.5	±				X	X	0	5	45	Common Mode Neutral	A	Pass
0.5	±				X	X	90	5	45		A	Pass
0.5	±				X	X	180	5	45		A	Pass
0.5	±				X	X	270	5	45		A	Pass
1.0	±	X				X	0	5	60	Differential Mode	A	Pass
1.0	±	X				X	90	5	60		A	Pass
1.0	±	X				X	180	5	60		A	Pass
1.0	±	X				X	270	5	60		A	Pass
1.0	±	X				X	0	5	60	Common Mode Line	A	Pass
1.0	±	X				X	90	5	60		A	Pass
1.0	±	X				X	180	5	60		A	Pass
1.0	±	X				X	270	5	60		A	Pass
1.0	±				X	X	0	5	60	Common Mode Neutral	A	Pass
1.0	±				X	X	90	5	60		A	Pass
1.0	±				X	X	180	5	60		A	Pass
1.0	±				X	X	270	5	60		A	Pass
2.0	±				X	X	0	5	60	Differential Mode	A	Pass
2.0	±				X	X	90	5	60		A	Pass
2.0	±				X	X	180	5	60		A	Pass
2.0	±				X	X	270	5	60		A	Pass
2.0	±	X			X		0	5	60	Common Mode Line	A	Pass
2.0	±	X			X		90	5	60		A	Pass
2.0	±	X			X		180	5	60		A	Pass
2.0	±	X			X		270	5	60		A	Pass

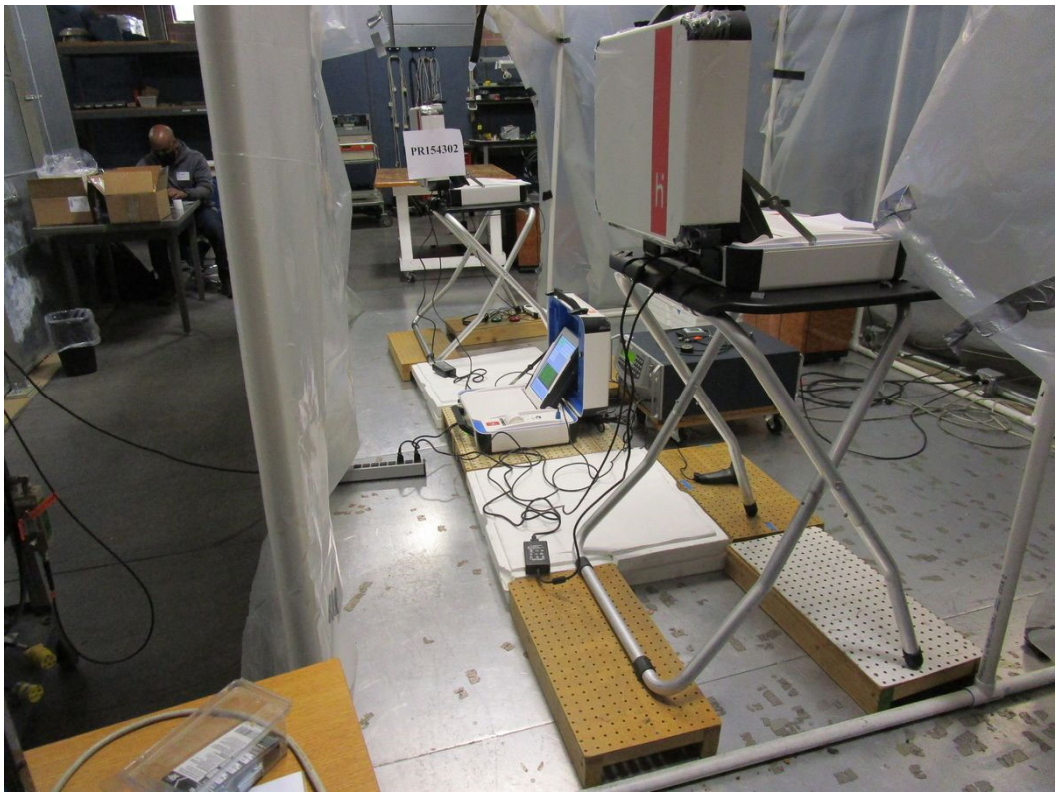
5.5.4 Test Photographs



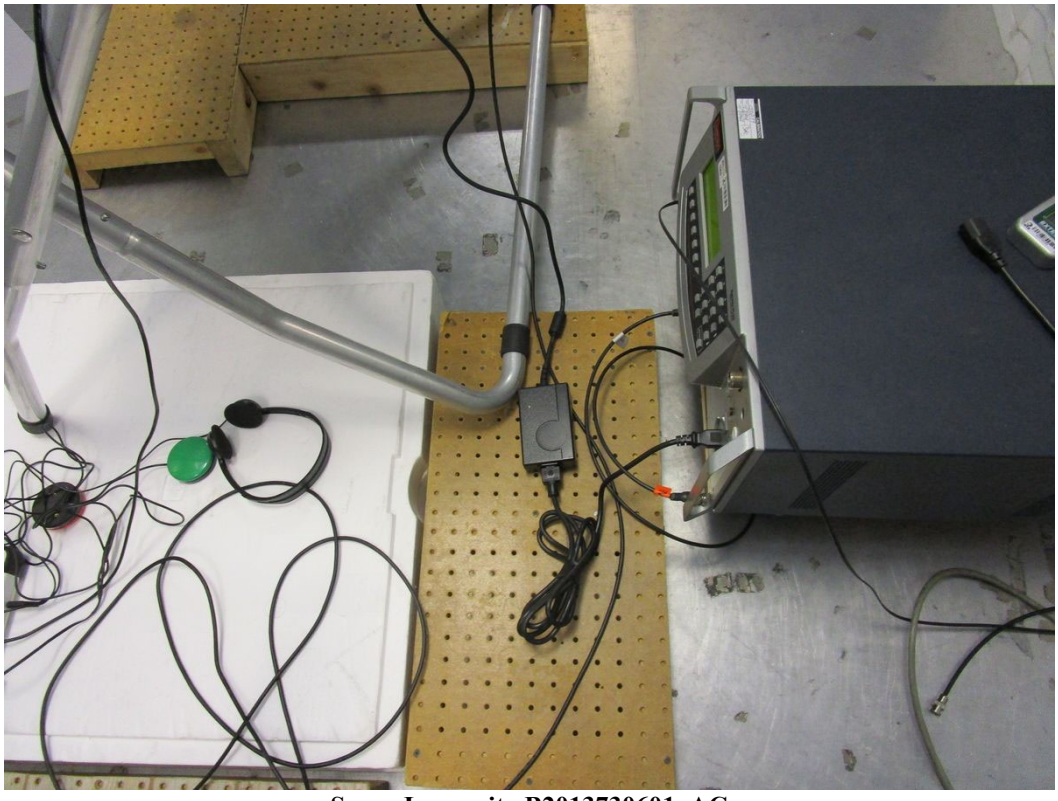
Surge Immunity B2013730601_Setup



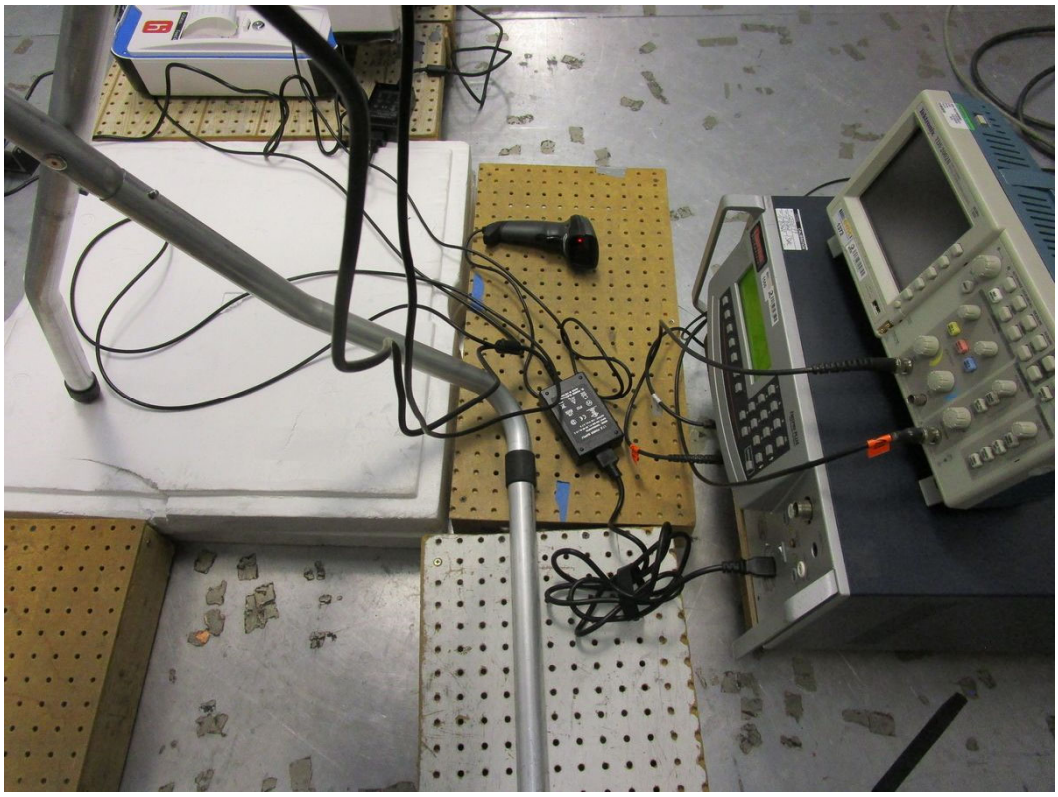
Surge Immunity B1903101010_Setup



Surge Immunity C2115161506_Setup



Surge Immunity B2013730601_AC



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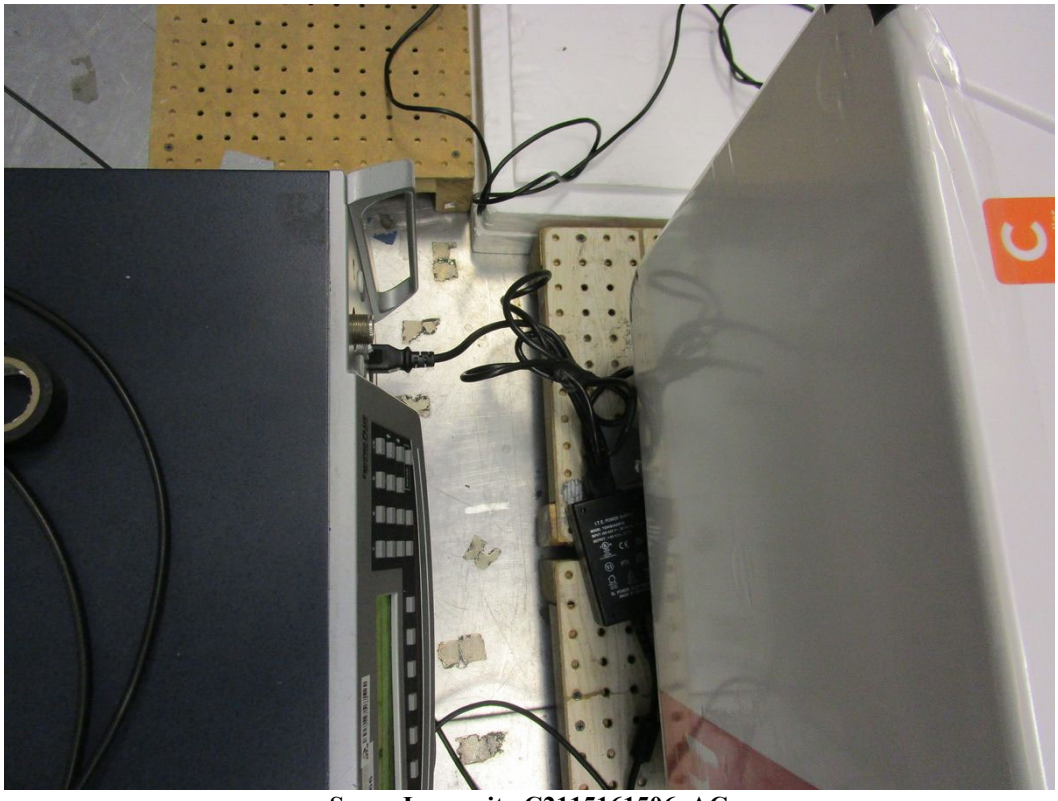


Surge Immunity C2115161506_AC

5.5.5 Test Equipment List

Table 5.5-1: Surge Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	National Technical Systems	GP #2	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC059683	Oscilloscope (Digital)	Tektronix	TDS2002B	07/02/2021	07/02/2022
WC059768	Generator (Spike/Transient)	Thermo Fisher Scientific	EMC Pro Plus	11/09/2021	11/09/2022
WC070508	Software	Keytek	CEWare	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	06/14/2021	06/14/2022

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.6 Voltage Dips and Interruptions

5.6.1 Test Procedure

IEC/EN 61000-4-11

5.6.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Voltage Dips and Interruptions.

5.6.3 Test Datasheets

National Technical Systems

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

Standard Referenced: EN 61000-4-11 Date: 3/14/2022

Temperature: 19.7°C Humidity: 15.20% Pressure: 838 mb

Input Voltage: 120vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product. Injecting on S/N C2115161506, B1903101010 & B2013730601

Test Engineer: Casey Lockhart

Date	Time	Log Entries	Initials	Result
3/14/22	1450	Voltage Dips and Interruptions. 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles. 120 VAC / 60 Hz (4.1.2.5) Ran all three UUT's.	CL	Pass

National Technical Systems

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

Standard Referenced: EN 61000-4-11

Date: 3/14/2022

Temperature: 19.7°C Humidity: 15%

Pressure: 838 mb

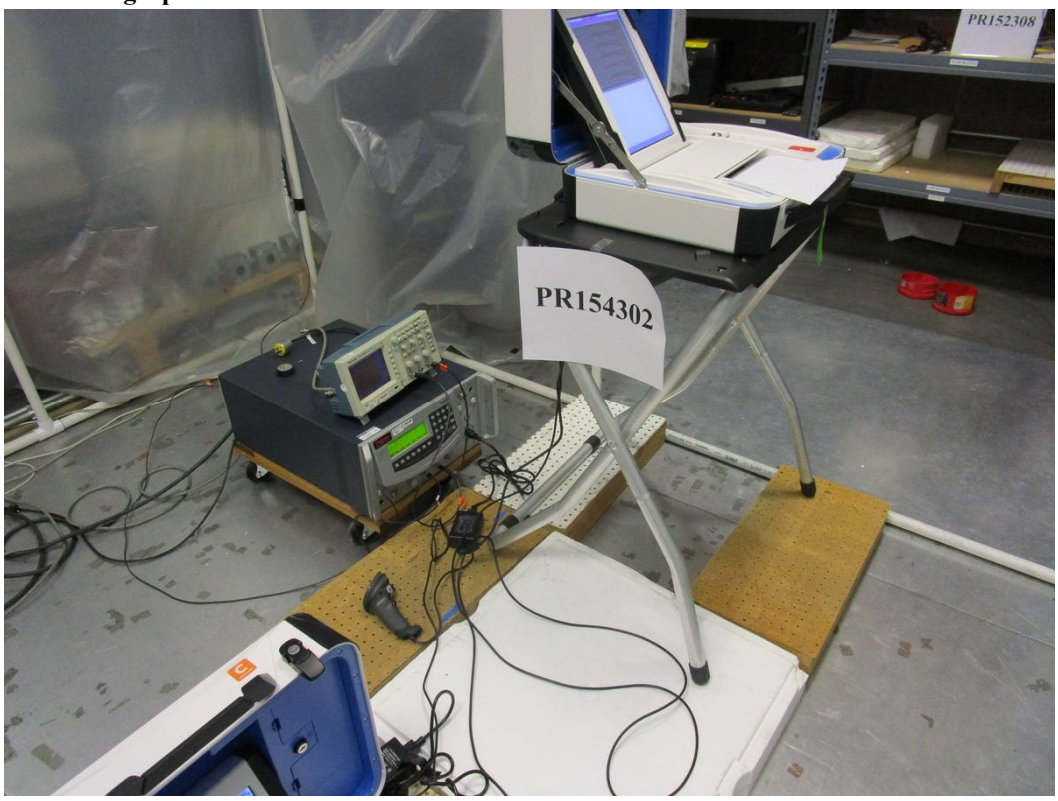
Input Voltage: 120vac/60Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product. Injecting on S/N C2115161506, B1903101010 & B2013730601

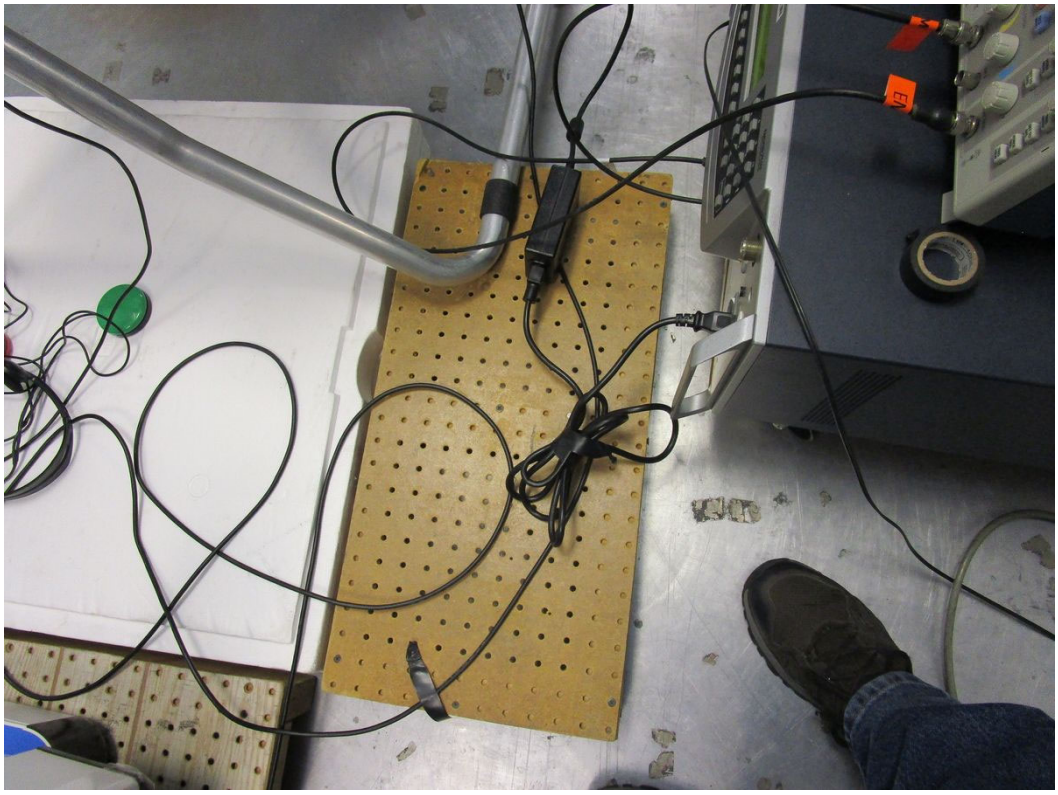
Test Engineer: Casey Lockhart

% 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%	0.6				x	10	3		A	Pass
40%	6	x				10	3		A	Pass
40%	6		x			10	3		A	Pass
40%	6			x		10	3		A	Pass
40%	6				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

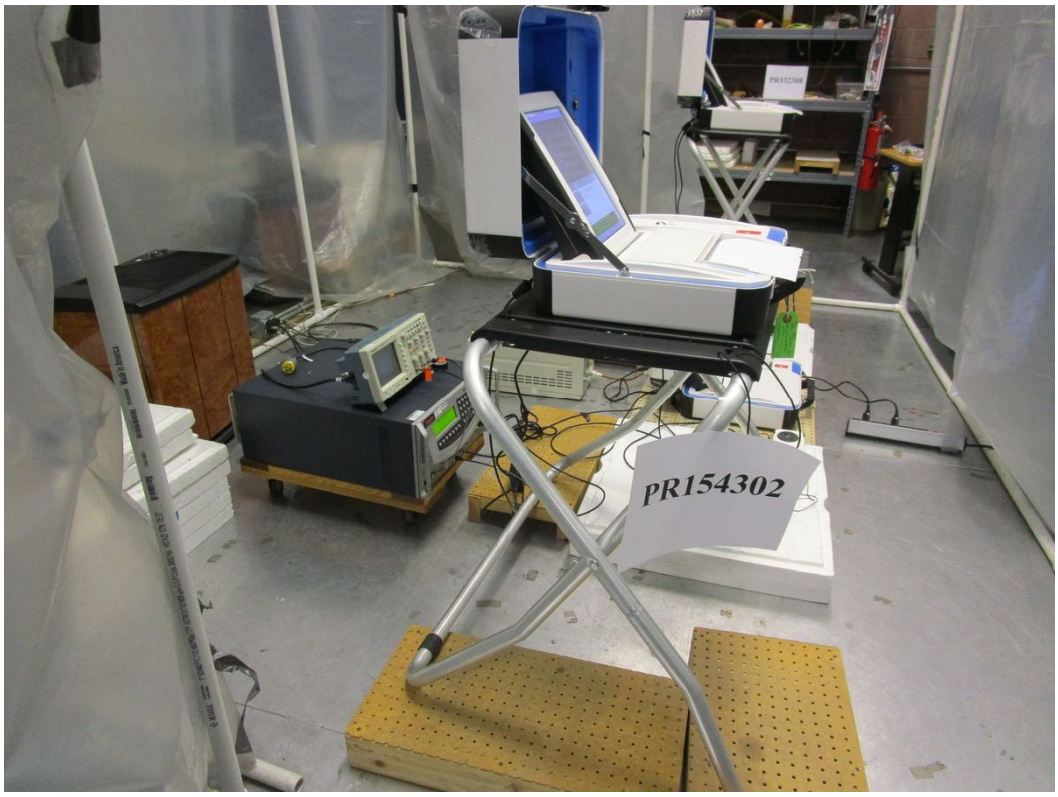
5.6.4 Test Photographs



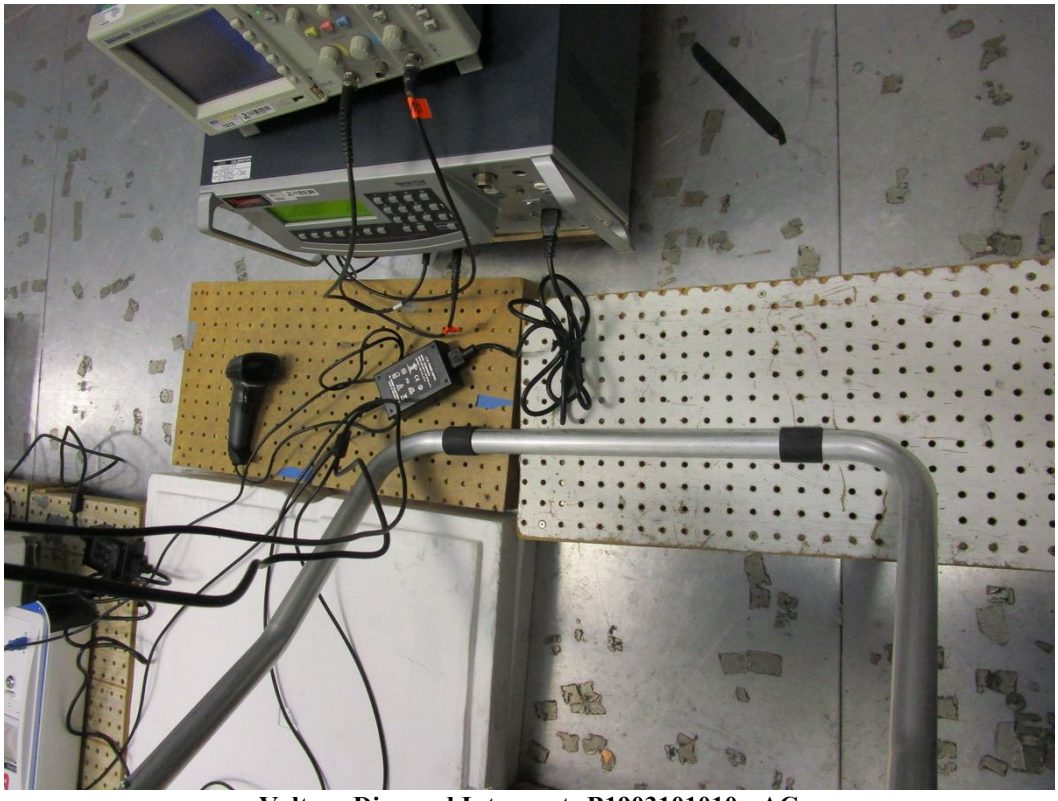
Voltage Dips and Interrupts B1903101010 - Setup



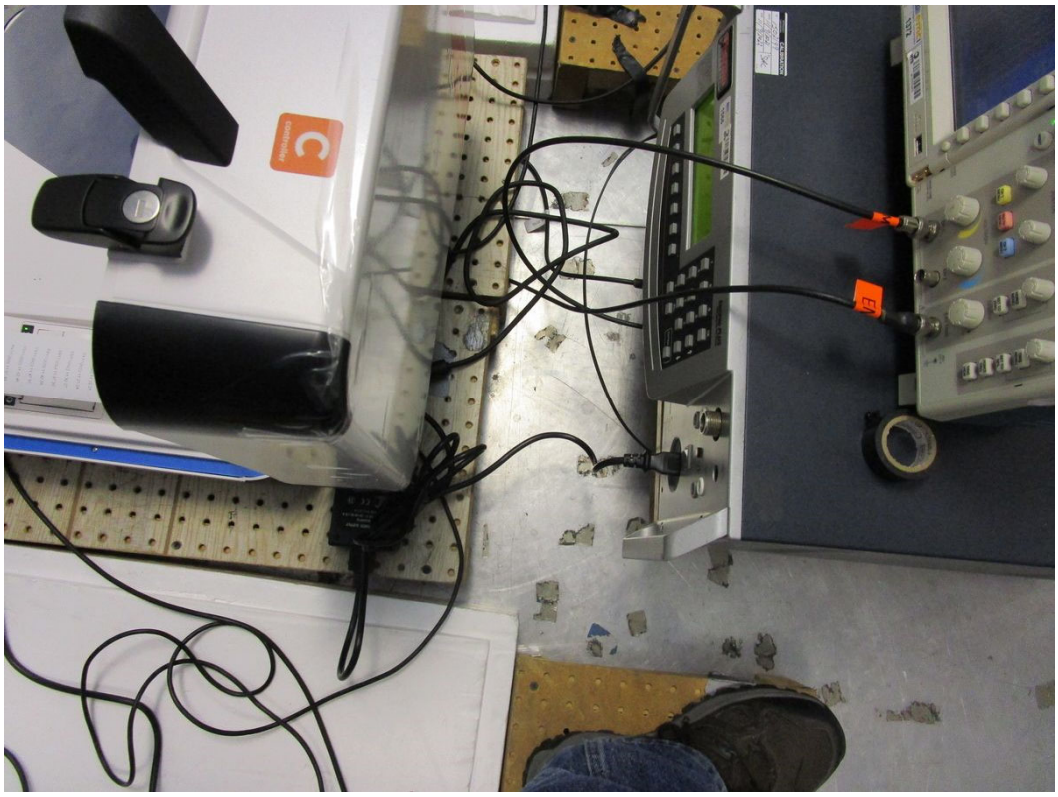
Voltage Dips and Interrupts B2013730601 - AC



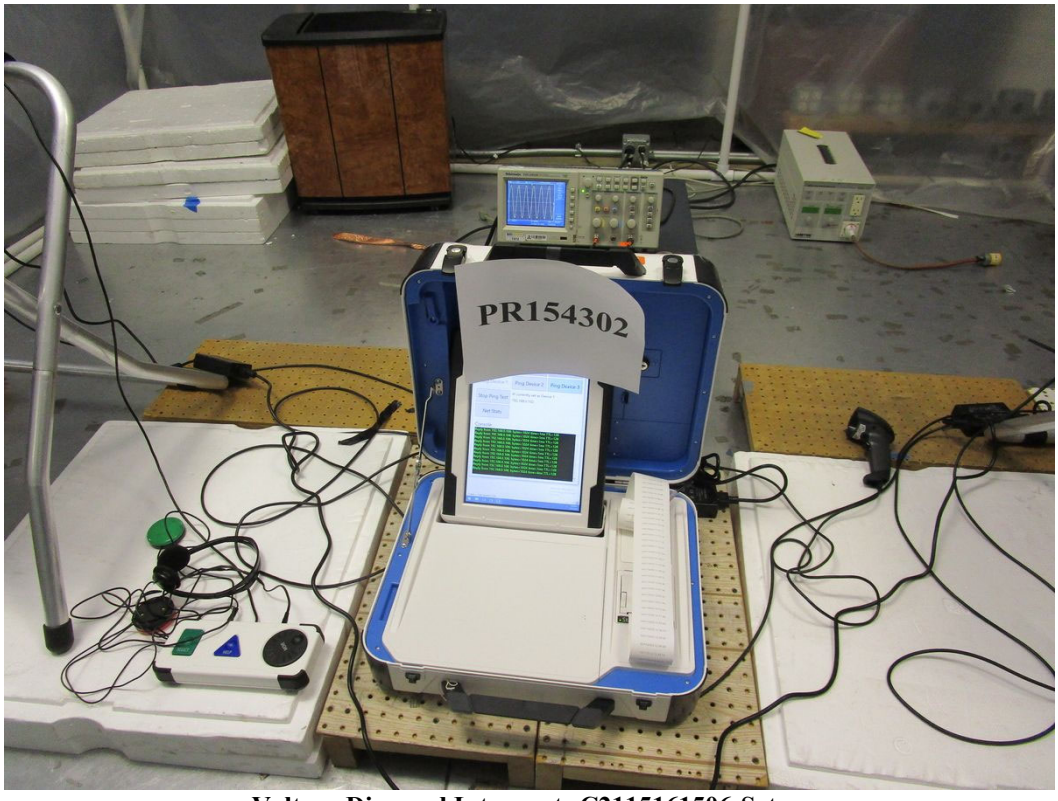
Voltage Dips and Interrupts B2013730601-Setup



Voltage Dips and Interrupts B1903101010 - AC



Voltage Dips and Interrupts C2115161506-AC



Voltage Dips and Interrupts C2115161506-Setup

5.6.5 Test Equipment List

Table 5.6-1: Voltage Dips and Interruptions Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	National Technical Systems	GP #2	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC059683	Oscilloscope (Digital)	Tektronix	TDS2002B	07/02/2021	07/02/2022
WC059768	Generator (Spike/Transient)	Thermo Fisher Scientific	EMC Pro Plus	11/09/2021	11/09/2022
WC070508	Software	Keytek	CEWare	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	06/14/2021	06/14/2022

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.7 Power Frequency H-Field Immunity

5.7.1 Test Procedure

IEC/EN 61000-4-8

5.7.2 Test Result

The Verify Controller with 2 Touch Writer Duos met the specification requirements for Power Frequency H-Field Immunity.

5.7.3 Test Datasheets

National Technical Systems

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

Standard Referenced: VVSG1.0 IEC 61000-4-8 Date: 3/22/2022

Temperature: 21.3˚C Humidity: 19% Pressure: 840 mb

Input Voltage: 230V, 50Hz

Configuration of Unit: Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.

Test Engineer: Casey Lockhart

Date	Time	Log Entries	Initials	Result
3/22/22	7:00	Power Frequency H-Field Immunity. 30A/m, 50 / 60 Hz, 3 axes. 120 VAC / 60 Hz (4.1.2.12)	CL	Pass

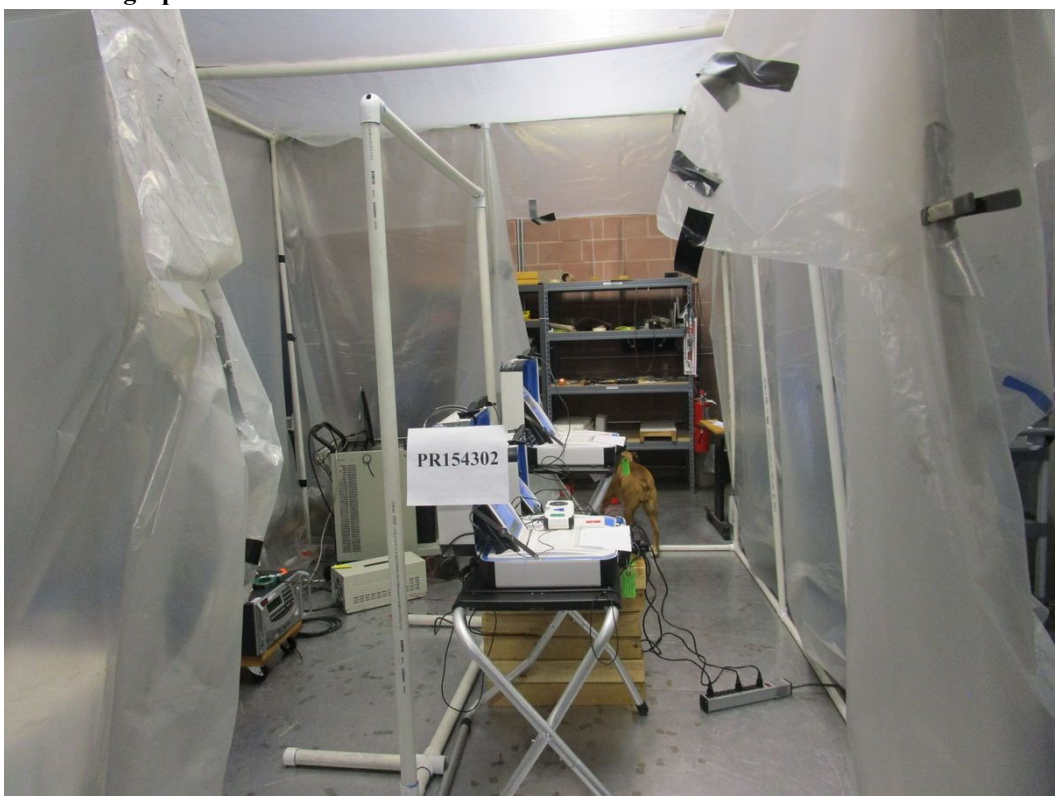
Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	SLI Compliance	Project Number:	PR154302
Customer Representative:	Derrick Forester	Test Area:	GP1
Model:	Verity Controller 3006085 Touch Writer Duo 3006070	S/N:	C2115161506 B1903101010 B2013730601
Standard Referenced:	VVSG1.0 IEC 61000-4-8	Date:	March 22, 2022
Temperature:	21.3˚C Humidity: 19.4%	Pressure:	840 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Verity Controller w/2 Touch Writer Duo Fully exercising all features of product.		
Test Engineer:	Casey Lockhart		

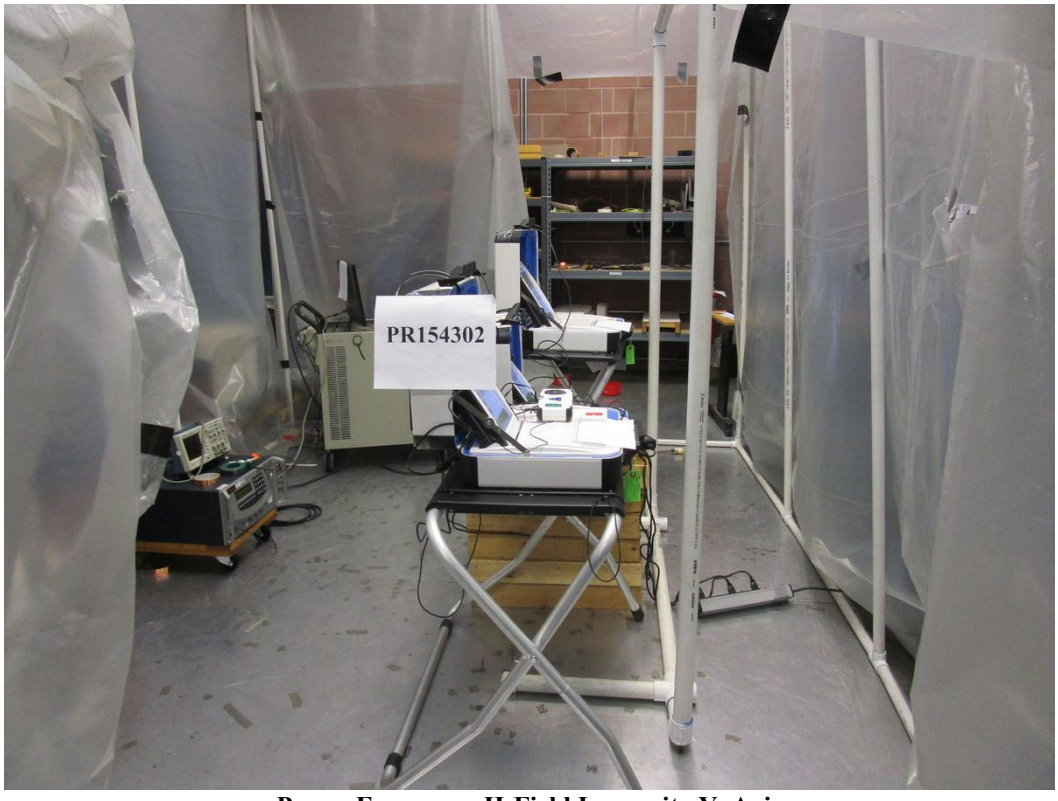
PR154302-4-8.doc FR0100

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

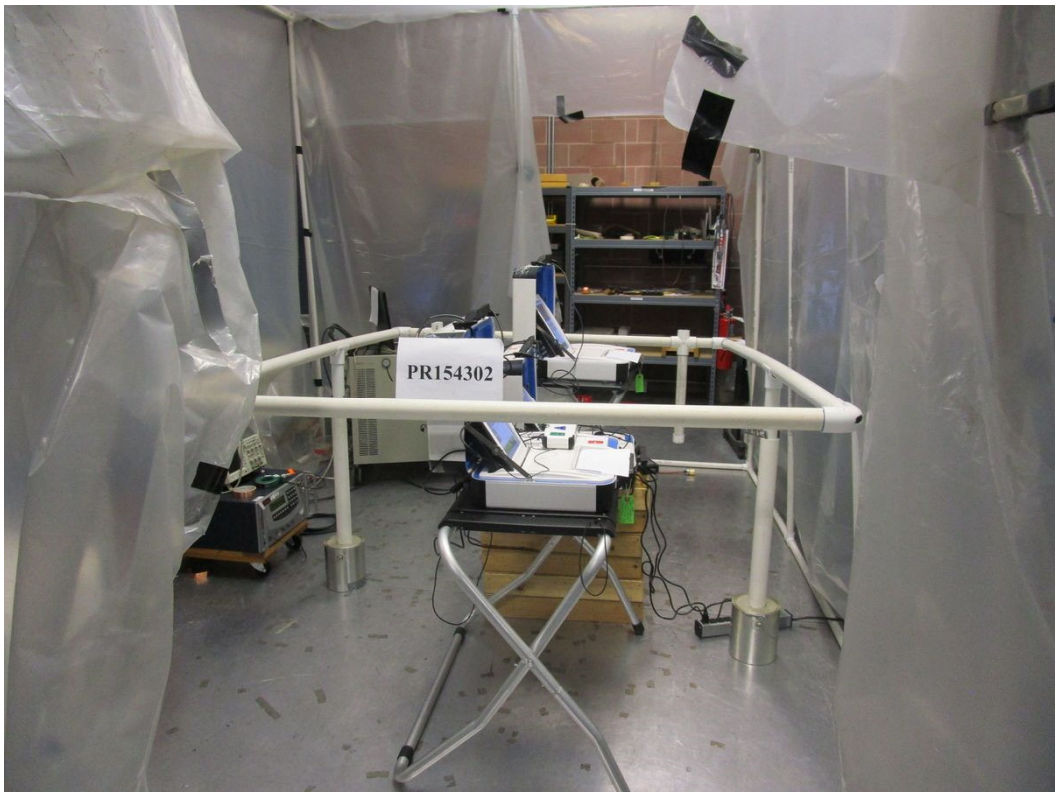
5.7.4 Test Photographs



Power Frequency H-Field Immunity X_Axis



Power Frequency H-Field Immunity Y_Axis



Power Frequency H-Field Immunity Z_Axis

5.7.5 Test Equipment List

Table 5.7-1: Power Frequency H-Field Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	National Technical Systems	GP #2	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC059683	Oscilloscope (Digital)	Tektronix	TDS2002B	07/02/2021	07/02/2022
WC059767	Power Supply (AC)	California Instruments	1251P	NCR	NCR
WC070285	Antenna (Loop)	EMC Integrity	EMCI-4-8-2m-1.5m	09/10/2019	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	06/14/2021	06/14/2022

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

6.0 Test Logs

EMI Test Log

Manufacturer:	SLI Compliance	Project Number:	PR154302
Model:	Verity Controller 3006085 Touch Writer Duo 3006070	S/N:	C2115161506 B1903101010 B2013730601
Customer Representative:	Derrick Forester		
Standard Referenced:	VVSG1.0 IEC 61000		

FR0105

Ground Planes / CALC

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
4-3	---	March 9, 2022 0730 - 1100	Client late.		3.5	---	CL
---	---	1100 - 1230	Equipment setup		1.5	---	CL
---	---	1230 - 1530	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz (4.1.2.10)		3.0	---	CL
---	---	March 10, 2022 0730 - 1000	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz (4.1.2.10)		2.5	Pass	CL
---	---	1000 - 1030	Equipment move from GP0 to GP1		.5	---	CL
4-6	---	1030 - 1130	Equipment setup on GP1		1.0	---	CL
---	---	1130 - 1530	Conducted RF Immunity. 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.11) Note: Daisy chain Hart Ethernet cable is: 2005312 Rev E.		6.5	---	CL
---	---	March 11, 2022 0730 - 1000	Conducted RF Immunity. 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.11) Note: Daisy chain Hart Ethernet cable is: 2005312 Rev E.		2.5	Pass	CL
4-5	---	1000 - 1330	Surge-Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) Three AC mains (S/N C2115161506 120 VAC / 60 Hz (4.1.2.7) Note: Communication cable was kicked out of the back of the computer. Unable to re-start surge at this time as it takes 5+ hours.		3.5	---	CL
4-4	---	1330 - 1400	Electrical Fast Transient / Burst. Mains: +/- 2kV, I/O: +/- 1kV. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.6) Injecting on S/N **C2115161506.**		.5	Pass	CL
4-4	---	1400 - 1430	Electrical Fast Transient / Burst. Mains: +/- 2kV, I/O: +/- 1kV. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.6) Injecting on S/N . **B1903101010**		.5	Pass	CL

EMI Test Log

Manufacturer:	SLI Compliance	Project Number:	PR154302
Model:	Verity Controller 3006085 Touch Writer Duo 3006070	S/N:	C2115161506 B1903101010 B2013730601
Customer Representative:	Derrick Forester		
Standard Referenced:	VVSG1.0 IEC 61000		

FR0105

Ground Planes / CALC

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
4-4	---	1430 - 1500	Electrical Fast Transient / Burst. Mains: +/- 2kV, I/O: +/- 1kV. Three AC mains & three I/O >3m 120 VAC / 60 Hz (4.1.2.6) Injecting on S/N **B2013730601**		.5	Pass	CL
4-4	---	1500 - 1530	.Client Post test verification of UUT.		.5	Pass	CL
4-5	---	March 14, 2022 0730 - 1400	Surge-Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) Three AC mains (S/N C2115161506 120 VAC / 60 Hz (4.1.2.7)		5.5	Pass	CL
---	---	1400 - 1430	Post test check by client.		.5	Pass	CL
4-11	---	1430 - 1530	Voltage Dips and Interruptions. 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles. 120 VAC / 60 Hz (4.1.2.5) Ran all three UUT's.		1.0	Pass	CL
4-5	---	March 15, 2022 0730 - 1400	Surge-Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) Three AC mains (S/N **B1903101010)** 120 VAC / 60 Hz (4.1.2.7)		5.5	Pass	CL
4-11	---	1400 - 1500	Voltage Dips and Interruptions. Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. One hour each +/-, Three AC mains 120 VAC / 60 Hz (Inc./Red. of Nom. Voltage) (4.1.2.5) **129 Vac/60Hz for one hour.**		1.0	Pass	CL
4-11	---	1500 - 1530	Voltage Dips and Interruptions. Surge of +/- 15% line variation of nominal line voltage. Three AC mains 120 VAC / 60 Hz (Surge of +/- 15%) (4.1.2.5) **138 Vac/60Hz for .5 hours**		.5	Pass	CL
4-5		March 16, 2022 0730 - 1400	Surge-Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) Three AC mains S/N **B2013730601 Note: Communications fiber optics cable was kicked out of the socket. Test halted and has to be re-ran. Working on comm port issue with admin so we can get the test to run on the PC and ground plane that's the product is tested on.**		6.5	---	CL

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4-11	---	1400 - 1500	Voltage Dips and Interruptions. Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. One hour each +/-, Three AC mains 120 VAC / 60 Hz (Inc./Red. of Nom. Voltage) (4.1.2.5) **105 Vac/60Hz for one hour.**		1.0	Pass	CL
		March 17, 2022 0730 - 1430	Surge-Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) Three AC mains S/N **B2013730601 (Taped comm line to floor, covered with 10cm risers to protect. Perform post test.**		7.0	Pass	CL
4-11	---	1430 - 1500	Voltage Dips and Interruptions. Surge of +/- 15% line variation of nominal line voltage. Three AC mains 120 VAC / 60 Hz (Surge of +/- 15%) (4.1.2.5) **102 Vac/60Hz for .5 hours**		.5	Pass	CL
4-8	---	March 22, 2022 0700 - 8000	Power Frequency H-Field Immunity. 30A/m, 50 / 60 Hz, 3 axes. 120 VAC / 60 Hz (4.1.2.12)		1.0	Pass	CL
4-2	---	0800 - 1400	Electrostatic Discharge. +/- 8kV Contact, +/-2, 4, 8, 15kV Air. 120 VAC / 60 Hz (4.1.2.8) Cables are .929 & .936 m ohms.		6.0	Pass	CL

End of Test Report