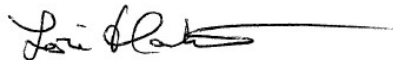


Element Materials Technology Denver-Longmont A.K.A. NTS Labs, LLC

Test Report for Electromagnetic Interference (EMI) Testing of the Vanguard Adapt

Prepared For

SLI Compliance | 4720 Independence Street | Wheat Ridge, CO 80033

Prepared ByElement Materials Technology Denver-Longmont | 1736 Vista View Drive | Longmont, CO 80504-5242 | 303-776-7249 | www.element.comLori Hartman
PreparerEugene DeVito
Program Manager

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Revision History

Rev.	Description	Issue Date
0	Initial Release	02/28/2025
1	Customer gave us a PN & SN correction	03/28/2025

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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 at Element Materials Technology Denver-Longmont (hereafter referred to as “Element”). The test program was conducted to assess the ability of the specified Equipment Under Test (EUT) to successfully satisfy the requirements defined in the test specification.

2.0 References

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

- Test Specification: See Table 5.0-1
- SLI Compliance Purchase Order 20240603-01 dated 06/03/2024.
- Element Quotation OP0647346 dated 09/26/2023.
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/2017.

3.0 Product Selection and Description

SLI Compliance 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	1	Vanguard Adapt	2007040 VV-700	A2520009001

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 16-4-2:2003 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 (Immunity)

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Radiated Immunity	V/m	80MHz - 10GHz	.-26.3% to 29.97%
ESD	KV	NA	./+/- 8.6%
Fast Transients	Voltage	NA	./+/- 5.98%
	Time	NA	./+/- 8.6%
Surge	Voltage	NA	./+/- 4.9%
Conducted Immunity (CDN)	Voltage	NA	.-12.6% to 13.3%
Conducted Immunity (BCI)	Voltage	NA	.-13.5% to 15.3%
Voltage Dips / Interrupts	Voltage	NA	./+/- 2.3%
	Time	NA	./+/- 0.08 ms
Magnetic Immunity	Amps	NA	./+/- 0.8%
Pulsed Magnetic Immunity	Amps	NA	./+/- 9.9%

5.0 Test Description and Results

Table 5.0-1: Summary of Test Information & Results

Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Test Result
5.1	Radiated RF Immunity	IEC 61000-4-3	Longmont	02/24/2025 - 02/25/2025	2007040 VV-700	A2520009001	Passed
5.2	Surge Immunity	IEC 61000-4-5	Longmont	02/26/2025	2007040 VV-700	A2520009001	Passed
5.3	Voltage Dips and Interruptions	IEC 61000-4-11	Longmont	02/27/2025	2007040 VV-700	A2520009001	Passed
5.4	Voltage Dips and Interruptions (Surge of +/- 15%)	IEC 61000-4-11	Longmont	02/26/2025	2007040 VV-700	A2520009001	Passed
5.5	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage)	IEC 61000-4-11	Longmont	02/25/2025	2007040 VV-700	A2520009001	Passed
5.6	Electrical Fast Transient / Burst	IEC 61000-4-4	Longmont	02/26/2025	2007040 VV-700	A2520009001	Passed
5.7	Conducted RF Immunity	IEC 61000-4-6	Longmont	02/27/2025	2007040 VV-700	A2520009001	Passed
5.8	Electrostatic Discharge	IEC 61000-4-2	Longmont	02/27/2025-02/28/2025	2007040 VV-700	A2520009001	Passed

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

5.1 Radiated RF Immunity

5.1.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-3.

5.1.2 Test Result

The EUT passed the defined requirements.

5.1.3 Test Datasheets

Element Materials Technology				
Radiated RF Immunity per: IEC 61000-4-3				
Standard Referenced: IEC 61000-4-3			Date: 2/24/2025	
Temperature: 26°C		Humidity: 31%	Pressure: 835 mb	
Input Voltage: 120Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/24/25	1400-1430	10V/m Verification test performed. OK to test	MT	Complete
	1430-1530	Radiated RF Immunity: IEC 61000-4-3, Per Latest Version and test protocol. 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz Finished Front side V Pole	MT	Continue
2/25/25	0730-1200	Continue: Radiated RF Immunity: IEC 61000-4-3, Per Latest Version and test protocol. 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	MT	Pass

Element Materials Technology											
Radiated RF Immunity per: IEC 61000-4-3											
Standard											
Referenced: IEC 61000-4-3					Date: 2/24/2025						
Temperature: 26°C					Humidity: 31%		Pressure: 835 mb				
Input Voltage: 120Vac/60Hz											
Configuration of											
Unit: Fully exercising all features of product											
Test Engineer: Mike Tidquist											

Frequency	Modulation				Step Size	Field	Polarity	Dwell	Comments	Criteria Met	Pass / Fail
(MHz)	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

5.1.4 Test Photographs



Radiated Immunity Front



Radiated Immunity Right



Radiated Immunity Back



Radiated Immunity Left

5.1.5 Test Equipment List

Table 5.1-1: Radiated RF Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059457	Coupler (Bi-Directional)	Werlatone	C3908-10	08/21/2020	NCR
WC059710	Amplifier (Pre/RF/Low Noise)	Ophir RF	5127F	09/17/2012	NCR
WC059797	Generator (Signal)	Wiltron	68369B	07/25/2024	07/31/2025
WC059805	Antenna (Log Periodic)	ETS-Lindgren	3142B	NCR	NCR
WC070467	Meter (Power)	Agilent Technologies	E4418B	07/30/2024	07/30/2025
WC070506	Sensor (Power)	Hewlett Packard	E4421A	07/30/2024	07/31/2025
WC076935	Cable (Test)	Teledyne-taber	RF Coax Cable	NCR	NCR
WC078459	Cable (Test)	National Technical Systems	TrueBlue	NCR	NCR
WC078470	Software	ETS-Lindgren	C47213	NCR	NCR
WC078488	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	02/19/2024	02/28/2025
WC084405	Cable (Test)	Fairview Microwave	GP0 RF N-Type	NCR	NCR

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.2 Surge Immunity

5.2.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-5.

5.2.2 Test Result

The EUT passed the defined requirements.

5.2.3 Test Datasheets

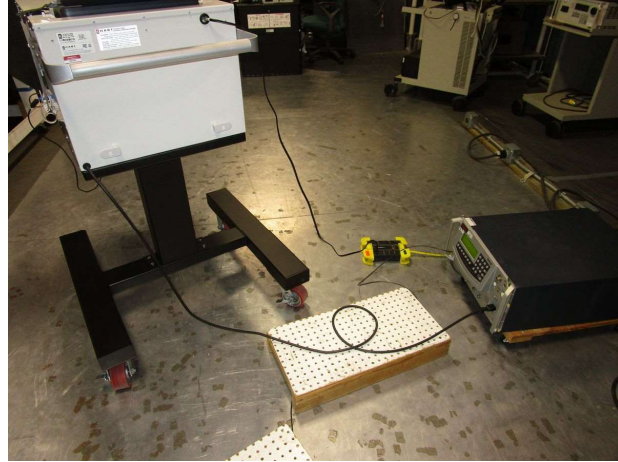
Element Materials Technology				
Surge Immunity per IEC / EN 61000-4-5				
Standard Referenced: EN 61000-4-5		Date: 2/26/2025		
Temperature: 22°C	Humidity: 27%	Pressure: 839 mb		
Input Voltage: 120Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/26/25	0830-0900	Surge pretest performed. OK to test	MT	Complete
	0900-1430	Surge Immunity: IEC 61000-4-5, Per Latest Version and test protocol.. Mains: +/-2kV CM, +/-2kV DM, (0, 90, 180, 270) One AC main 120 VAC / 60 Hz	MT	Pass

Element Materials Technology												
Surge Immunity per IEC / EN 61000-4-5												
Standard Referenced: EN 61000-4-5 Date: 2/26/2025												
Temperature: 22°C Humidity: 27% Pressure: 839 mb												
Input Voltage: 120Vac/60Hz												
Configuration of Unit: Fully exercising all features of product												
Test Engineer: Mike Tidquist												
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	45	Differential Mode	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
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	30	Common Mode Neutral	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
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	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
2.0	±				X	X	0	5	60	Common Mode Neutral	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	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

5.2.4 Test Photographs



Surge Setup



Surge AC Mains

5.2.5 Test Equipment List

Table 5.2-1: Surge Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059668	Oscilloscope (Digital)	Tektronix	TDS2002B	06/28/2024	06/28/2025
WC059684	Generator (Spike/Transient)	Thermo Fisher Scientific	EMC Pro Plus	12/04/2024	12/04/2025
WC070508	Software	Keytek	CEWare	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.3 Voltage Dips and Interruptions

5.3.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-11.

5.3.2 Test Result

The EUT passed the defined requirements.

5.3.3 Test Datasheets

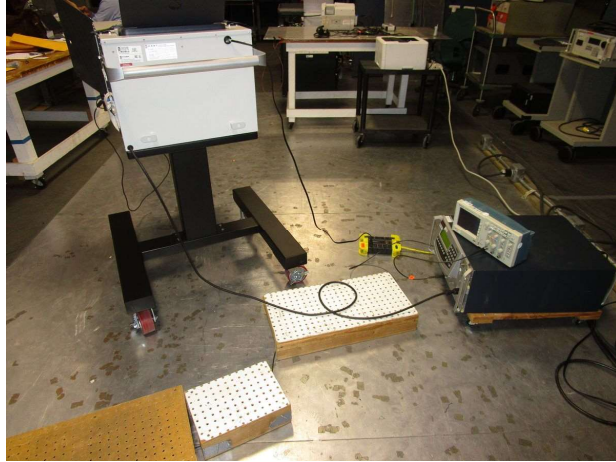
Element Materials Technology				
Voltage Dips and Interrupts per IEC / EN 61000-4-11				
Standard Referenced: EN 61000-4-11		Date: 2/27/2025		
Temperature: 16°C		Humidity: 27%	Pressure: 845 mb	
Input Voltage: 120Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/27/25	0730-0800	PQF Pretest performed. OK to test	MT	Complete
	0800-0900	Voltage Dips and Interruptions: IEC 61000-4-11, Per Latest Version and test protocol. 30% nom @10ms / 60% nom @100ms & 1 sec. / >95% interrupt @5 sec. One AC main 120 VAC / 60 Hz	MT	Pass

Element Materials Technology										
Voltage Dips and Interrupts per IEC / EN 61000-4-11										
Standard Referenced: EN 61000-4-11 Temperature: 16°C Humidity: 27% Input Voltage: 120Vac/60Hz Configuration of Unit: Fully exercising all features of product Test Engineer: Mike Tidquist										
% Nominal	No. of Cycles	Phase Angle (deg)				Time between dropouts (sec)	Number of tests	Comments	Criteria Met	Pass/Fail
		0	90	180	270					
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
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
0%	300	X				10	3		A	Pass
0%	300			X		10	3		A	Pass

5.3.4 Test Photographs



PQF Setup



PQF AC Mains

5.3.5 Test Equipment List

Table 5.3-1: Voltage Dips and Interruptions Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059668	Oscilloscope (Digital)	Tektronix	TDS2002B	06/28/2024	06/28/2025
WC059684	Generator (Spike/Transient)	Thermo Fisher Scientific	EMC Pro Plus	12/04/2024	12/04/2025
WC070508	Software	Keytek	CEWare	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.4 Voltage Dips and Interruptions (Surge of +/- 15%)

5.4.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-11.

5.4.2 Test Result

The EUT passed the defined requirements.

5.4.3 Test Datasheets

Element Materials Technology				
Voltage Dips and Interrupts per IEC / EN 61000-4-11				
Standard Referenced: EN 61000-4-11		Date: 2/26/2025		
Temperature: 22°C		Humidity: 22%		Pressure: 839 mb
Input Voltage: 138Vac/60Hz, 102Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/26/25	0730-0830	Voltage Dips and Interruptions: IEC 61000-4-11, Per Latest test protocol. Surge of +/-15% line variation of nominal line voltage. One AC main 120 VAC / 60 Hz, 138Vac, 102Vac (Surge of +/-15%)	MT	Pass

Element Materials Technology		
Voltage Dips and Interrupts per IEC / EN 61000-4-11		
Standard Referenced: EN 61000-4-11		
Date: 2/26/2025		
Temperature: 22°C		Humidity: 22%
Input Voltage: 138Vac/60Hz, 102Vac/60Hz		Pressure: 839 mb
Configuration of Unit: Fully exercising all features of product		
Test Engineer: Mike Tidquist		
Voltage Dips and Interruptions (Surge of +/- 15% of Nominal 120V)		
	Criteria Met	Pass/Fail
138 Line Voltage Sure (+15% of nominal 120V) 30 minutes	A	Pass
102 Line Voltage Sure (-15% of nominal 120V) 30 minutes	A	Pass

5.4.4 Test Photographs



Voltage Variations Setup



Voltage Variations AC Input

5.4.5 Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059675	Power Supply (AC)	California Instruments	5001IX208-150/300	09/07/2023	09/07/2025
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.5 Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage)

5.5.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-11.

5.5.2 Test Result

The EUT passed the defined requirements.

5.5.3 Test Datasheets

Element Materials Technology				
Voltage Dips and Interrupts per IEC / EN 61000-4-11				
Standard Referenced: EN 61000-4-11		Date: 2/25/2025		
Temperature: 25°C		Humidity: 14%		Pressure: 834 mb
Input Voltage: 129Vac/60Hz, 105Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/25/25	1300-1500	Voltage Dips and Interruptions: IEC 61000-4-11, Per Latest test protocol. Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. One AC main 120 VAC / 60 Hz (129Vac, 105Vac) (Inc./Red. of Nom. Voltage)	MT	Pass

Element Materials Technology		
Voltage Dips and Interrupts per IEC / EN 61000-4-11		
Standard Referenced: EN 61000-4-11		Date: 2/25/2025
Temperature: 25°C		Humidity: 14%
Input Voltage: 129Vac/60Hz, 105Vac/60Hz		Pressure: 834 mb
Configuration of Unit: Fully exercising all features of product		
Test Engineer: Mike Tidquist		
Voltage Dips and Interruptions (Inc./Red. Of Nominal Voltage)		
	Criteria Met	Pass/Fail
129Vac Line Voltage Variation (+7.5% of nominal 120V) 1 hrs.	A	Pass
105Vac Line Voltage Variation (-12.5% of nominal 120V) 1 hrs.	A	Pass

5.5.4 Test Photographs



Voltage Variations Setup



Voltage Variations AC Input

5.5.5 Test Equipment List

Table 5.5-1: Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage) Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059675	Power Supply (AC)	California Instruments	5001IX208-150/300	09/07/2023	09/07/2025
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.6 Electrical Fast Transient / Burst

5.6.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-4.

5.6.2 Test Result

The EUT passed the defined requirements.

5.6.3 Test Datasheets

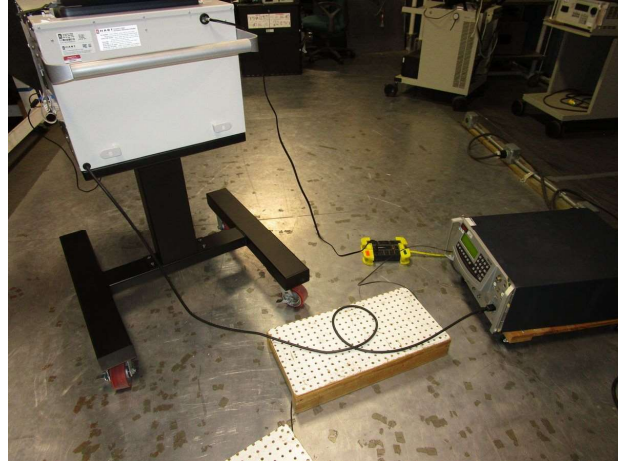
Element Materials Technology				
Electrical Fast Transient/Burst per IEC / EN 61000-4-4				
Standard Referenced: <u>EN 61000-4-4</u>		Date: <u>2/26/2025</u>		
Temperature: <u>24°C</u>		Humidity: <u>34%</u>		Pressure: <u>839 mb</u>
Input Voltage: <u>120Vac/60Hz</u>				
Configuration of Unit: <u>Fully exercising all features of product</u>				
Test Engineer: <u>Mike Tidquist</u>				
Date	Time	Log Entries	Initials	Result
2/26/25	1430-1500	EFT pretest completed. OK to test	MT	Complete
	1500-1530	Electrical Fast Transient / Burst IEC 61000-4-4, Per Latest Version and test protocol. Mains: +/-2kV, I/O: +/-1kV. One AC main, Four I/O < 3M 120 VAC / 60 Hz	MT	Pass

Element Materials Technology												
Electrical Fast Transient/Burst per IEC / EN 61000-4-4												
Standard Referenced: <u>EN 61000-4-4</u>												

5.6.4 Test Photographs



EFT Setup



EFT AC Mains

5.6.5 Test Equipment List

Table 5.6-1: Electrical Fast Transient / Burst Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059668	Oscilloscope (Digital)	Tektronix	TDS2002B	06/28/2024	06/28/2025
WC059684	Generator (Spike/Transient)	Thermo Fisher Scientific	EMC Pro Plus	12/04/2024	12/04/2025
WC070497	Probe (High Voltage)	Tektronix	P5100	NCR	NCR
WC070508	Software	Keytek	CEWare	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.7 Conducted RF Immunity

5.7.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-6.

5.7.2 Test Result

The EUT passed the defined requirements.

5.7.3 Test Datasheets

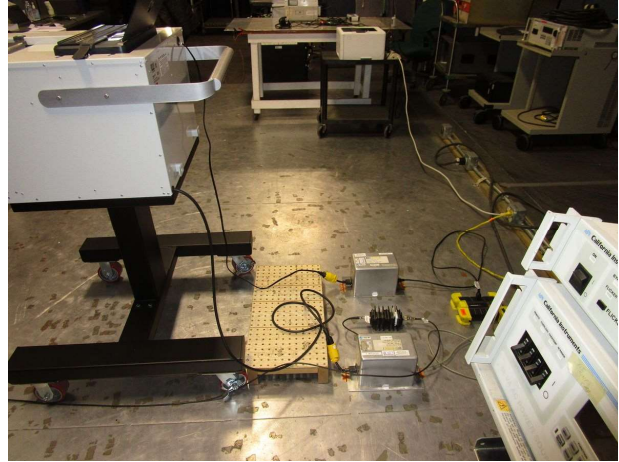
Element Materials Technology				
Conducted RF Immunity per IEC / EN 61000-4-6				
Standard Referenced: EN 61000-4-6		Date: 2/27/2025		
Temperature: 17°C	Humidity: 32%	Pressure: 845 mb		
Input Voltage: 120Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/27/25	0900-1000	Conducted RF Immunity: IEC 61000-4-6, Per Latest Version and test protocol. 10Vrms, 0.15 – 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. One AC main, Four I/O < 3M 120 VAC / 60 Hz	MT	Pass

Element Materials Technology								
Conducted RF Immunity per IEC / EN 61000-4-6								
Standard Referenced: EN 61000-4-6				Date: 2/27/2025				
Temperature: 17°C		Humidity: 32%		Pressure: 845 mb				
Input Voltage: 120Vac/60Hz								
Configuration of Unit: Fully exercising all features of product								
Test Engineer: Mike Tidquist								
Frequency (MHz)	Modulation			Level	Dwell	Comments	Criteria Met	Pass/Fail
	Type	%	Freq	(V/m)	(sec)			
0.150 - 80.0	AM	80	1KHz	10	3	AC Mains	A	Pass

5.7.4 Test Photographs



Conducted Immunity Setup



Conducted Immunity AC Mains

5.7.5 Test Equipment List

Table 5.7-1: Conducted RF Immunity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059528	Sensor (Loop)	Solar Electronics	9229-1	10/04/2023	10/04/2025
WC059657	Amplifier (Pre/RF/Low Noise)	Instruments For Industry	M100	NCR	NCR
WC059661	Network (Coupling/Decoupling)	EMC Integrity	EMCI-CDN-M3-16	12/09/2024	01/30/2026
WC059663	Clamp (Injection)	Fischer Custom Communications	F2031-23mm	01/16/2025	01/30/2026
WC059695	Attenuator (Coaxial)	Aeroflex/Weinschel	40-6-34	01/09/2025	01/30/2026
WC059700	Coupler (Bi-Directional)	Werlatone	C9475-13	01/09/2025	01/30/2026
WC059771	Generator (Signal)	Hewlett Packard	8648C	06/22/2023	04/22/2025
WC059778	Network (Coupling/Decoupling)	EMC Integrity	EMCI-CDN-M3-16	12/09/2024	01/30/2026
WC078470	Software	ETS-Lindgren	C47213	NCR	NCR
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.8 Electrostatic Discharge

5.8.1 Test Procedure

The EUT was tested in accordance with IEC 61000-4-2.

5.8.2 Test Result

The EUT passed the defined requirements.

5.8.3 Test Datasheets

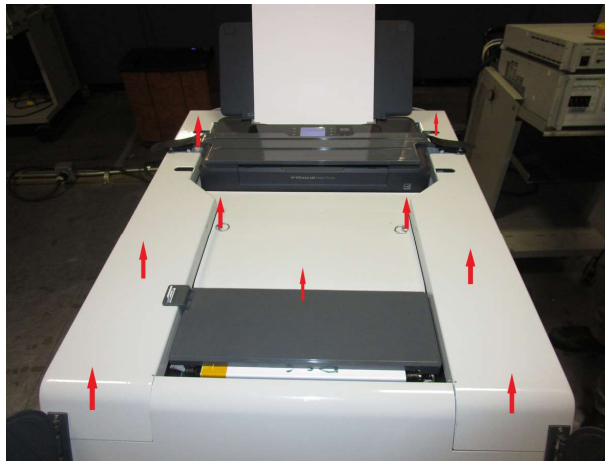
Element Materials Technology				
Electrostatic Discharge per IEC / EN 61000-4-2				
Standard Referenced: EN 61000-4-2		Date: 2/27/2025		
Temperature: 23°C	Humidity: 31%	Pressure: 845 mb		
Input Voltage: 120Vac/60Hz				
Configuration of Unit: Fully exercising all features of product				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
2/27/25	1400-1430	ESD Pretest performed. OK to test. ESD discharge cable measured .94Ohm	MT	Complete
	1430-1530	Electrostatic Discharge: IEC 61000-4-2, Per Latest Version and test protocol. +8kV Contact, +/- 2, 4, 8, 15kV Air. 120 VAC / 60 Hz Finished VCP all sides, Contact top surface, Contact front face. Contact Left side	MT	Continue
2/28/25	0800-1130	Continue: Electrostatic Discharge: IEC 61000-4-2, Per Latest Version and test protocol. +8kV Contact, +/- 2, 4, 8, 15kV Air. 120 VAC / 60 Hz At -15kV air to Bar code reader USB, EUT went into blue screen. Client is trouble shooting. Added CU tape to Memory board cover failure did not repeat. Start ESD from beginning. ESD Passed	MT	Pass

Element Materials Technology								
Electrostatic Discharge per IEC / EN 61000-4-2								
Standard Referenced: EN 61000-4-2				Date: 2/27/2025				
Temperature: 23°C		Humidity: 31%		Pressure: 845 mb				
Input Voltage: 120Vac/60Hz								
Configuration of Unit: Fully exercising all features of product								
Test Engineer: Mike Tidquist								
Test Location	Voltage Level	Polarity		Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass/Fail
	(kV)	+	-					
Indirect Discharge Points								
VCP	8	X	X	10	1	Front Side	A	Pass
VCP	8	X	X	10	1	Left Side 2 positions	A	Pass
VCP	8	X	X	10	1	Right Side 2 positions	A	Pass
VCP	8	X	X	10	1	Back Side	A	Pass
Contact Discharge Points - RED Arrows.								
ESD Setup Photo								
ESD Photo 1	8	X	X	10	1		A	Pass
ESD Photo 2	8	X	X	10	1		A	Pass
ESD Photo 3	8	X	X	10	1		A	Pass
ESD Photo 4	8	X	X	10	1		A	Pass
ESD Photo 5	8	X	X	10	1		A	Pass
ESD Photo 6	8	X	X	10	1		A	Pass
ESD Photo 7	8	X	X	10	1		A	Pass
ESD Photo 8	8	X	X	10	1		A	Pass
Air Discharge Points - BLUE Arrows.								
ESD Setup Photo								
ESD Photo 1	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Photo 2	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Photo 3	2, 4, 8, 15	X	X	10	1		A	Pass
ESD Photo 4	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Photo 5	2, 4, 8, 15	X	X	10	1		A	Pass
ESD Photo 6	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Photo 7	2, 4, 8, 15	X	X	10	1		A	Pass
ESD Photo 8	2, 4, 8, 15	X	X	10	1	ND	-	-
ND: No Discharge points found								

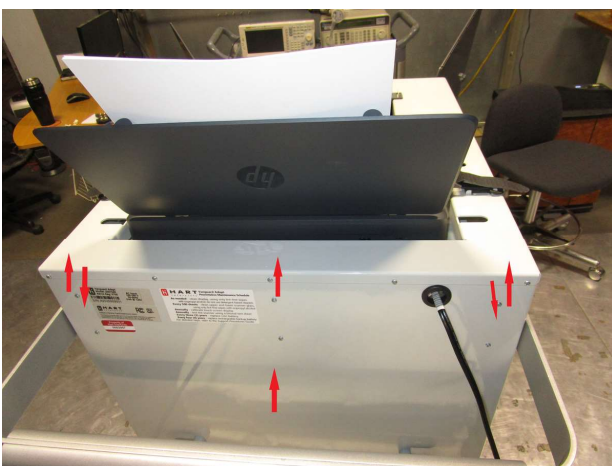
5.8.4 Test Photographs



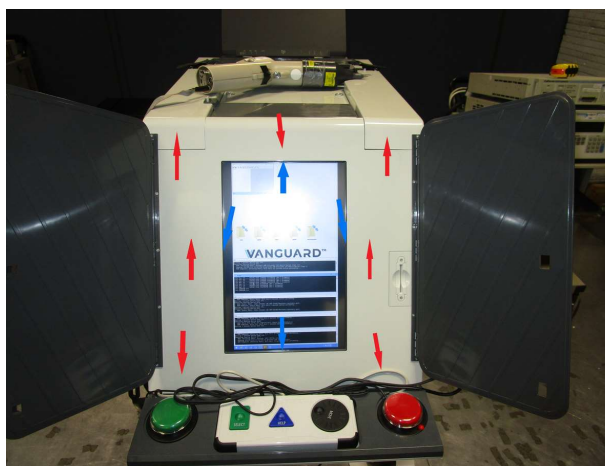
ESD Setup Photo



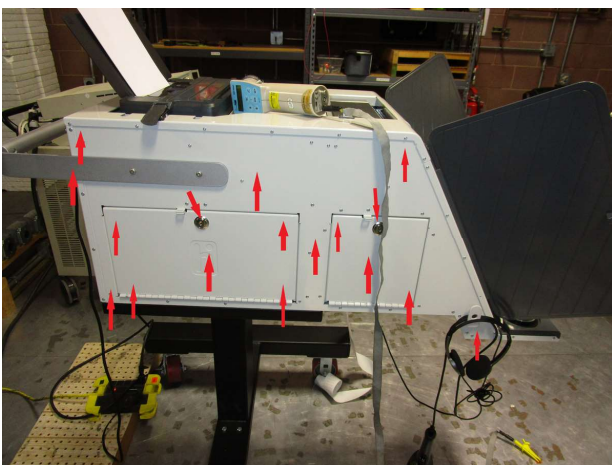
ESD Photo 1



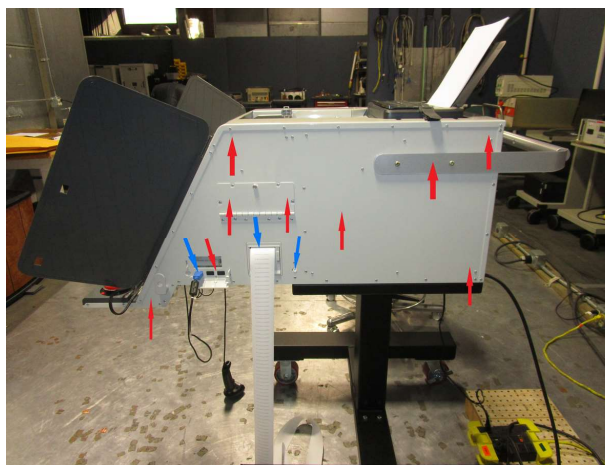
ESD Photo 2



ESD Photo 3



ESD Photo 4



ESD Photo 5



ESD Photo 6



ESD Photo 7



ESD Photo 8

5.8.5 Test Equipment List**Table 5.8-1: Electrostatic Discharge Test Equipment List**

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059439	Meter (Digital Multimeter)	Fluke	85	08/16/2024	08/16/2025
WC059688	Gun (ESD Simulator)	EMC-Partner	ESD3000DN1	07/09/2024	07/31/2025
WC078486	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	08/12/2024	08/31/2025

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

End of Test Report