



NTS Labs, LLC Test Report for EMI Immunity Testing of the ClearMark

Prepared For

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Performed By

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Andrew Garcia
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Eugene DeVito
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Revision History

Rev.	Description	Issue Date
0	Initial Release	07/21/2023

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1.0 Introduction

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

2.0 References

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

- Test Specification: IEC/EN 61000-4-2: 2008
- Pro V&V, Inc Purchase Order(s) 2023-013, dated 05/23/2023
- NTS Labs, LLC (NTS) Quote(s) OP0639511, dated 05/15/2023
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/1/2017

3.0 Product Selection and Description

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

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

Configuration	Qty.	Description	Part Number	Serial Number
1	4	ClearMark	ClearMark AIO	4610001013 (ClearMark AIO), 460012141VWM3 (Laser Pronter), 4630001050 (BV Scanner), P1FMS2000077 (Cyberpower UPS)
2	3	ClearMark	ClearMark AIO	4610001013 (ClearMark AIO), 4620001404 (Thermal Printer), 4630001050 (BV Scanner)

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

Measurement Type	Measurement Units	Frequency Range	Expanded Uncertainty
ESD	KV	NA	+/- 8.6%



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 - Config. #1	IEC/EN 61000-4-2: 2008	Longmont	07/13/2023	ClearMark AIO	4610001013 (ClearMark AIO), 460012141VWM3 (Laser Pronter), 4630001050 (BV Scanner), P1FMS2000077 (Cyberpower UPS)	Passed
5.2	Electrostatic Discharge - Config. #2	IEC/EN 61000-4-2: 2008	Longmont	07/13/2023	ClearMark AIO	4610001013 (ClearMark AIO), 4620001404 (Thermal Printer), 4630001050 (BV Scanner)	Passed

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



5.1 Electrostatic Discharge - Config. #1

5.1.1 Test Procedure

IEC/EN 61000-4-2: 2008

5.1.2 Test Result

Passed

5.1.3 Test Datasheets

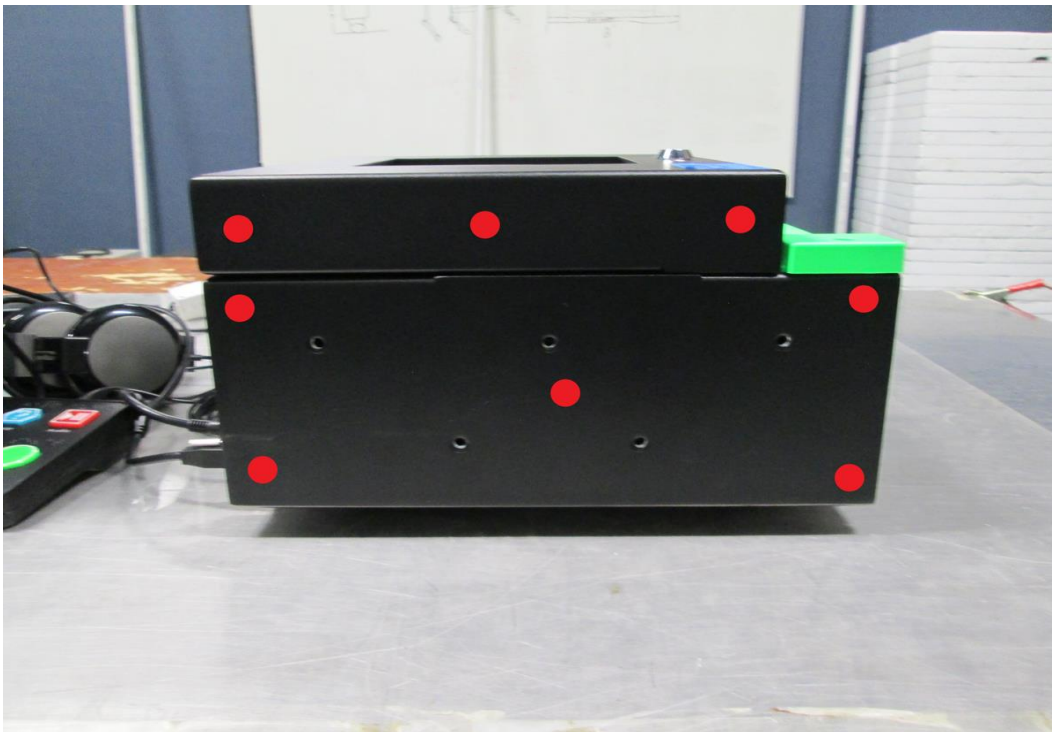
National Technical Systems				
Electrostatic Discharge per IEC / EN 61000-4-2				
Standard Referenced: EN 61000-4-2		Date: 7/13/2023		
Temperature: 25°C		Humidity: 52%	Pressure: 838 mb	
Input Voltage: 120Vac/60Hz				
Configuration of Unit: Normal Operation				
Test Engineer: Mike Tidquist				
Date	Time	Log Entries	Initials	Result
7/13/23	0800-0900	ESD Pretest performed, OK to continue. Bleed off cables measure .928 and .935Ohm ESD Testing is being performed to Client test plan	MT	Complete
7/13/23	0900-1130	Electrostatic Discharge. +/8kV Contact, +/-2, 4, 8, 15kV Air. 120 VAC / 60 Hz (4.1.2.8) Configuration 1	MT	Pass

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	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 - RED Dots.								
ESD Config. 1 Setup								
ESD Config. 1 01	8	X	X	10	1		A	Pass
ESD Config. 1 02	8	X	X	10	1		A	Pass
ESD Config. 1 03	8	X	X	10	1		A	Pass
ESD Config. 1 04	8	X	X	10	1		A	Pass
ESD Config. 1 05	8	X	X	10	1		A	Pass
ESD Config. 1 06	8	X	X	10	1		A	Pass
ESD Config. 1 07	8	X	X	10	1		A	Pass
ESD Config. 1 08	8	X	X	10	1		A	Pass
ESD Config. 1 09	8	X	X	10	1		A	Pass
ESD Config. 1 10	8	X	X	10	1		A	Pass
Air Discharge Points - BLUE Dots.								
ESD Config. 1 Setup								
ESD Config. 1 01	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Config. 1 02	2, 4, 8, 15	X	X	10	1	+/-15kV Discharges occurred, No disruption in operation	A	Pass
ESD Config. 1 03	2, 4, 8, 15	X	X	10	1	+/-15kV Discharges occurred, No disruption in operation	A	Pass
ESD Config. 1 04	2, 4, 8, 15	X	X	10	1	+/-8,15kV Discharges occurred, No disruption in operation	A	Pass
ESD Config. 1 05	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Config. 1 06	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Config. 1 07	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Config. 1 08	2, 4, 8, 15	X	X	10	1	ND	-	-
ESD Config. 1 09	2, 4, 8, 15	X	X	10	1	+/-8,15kV Discharges occurred, No disruption in operation	-	Pass
ESD Config. 1 10	2, 4, 8, 15	X	X	10	1	ND	-	-
ND: No Discharge points found								

5.1.4 Test Photographs



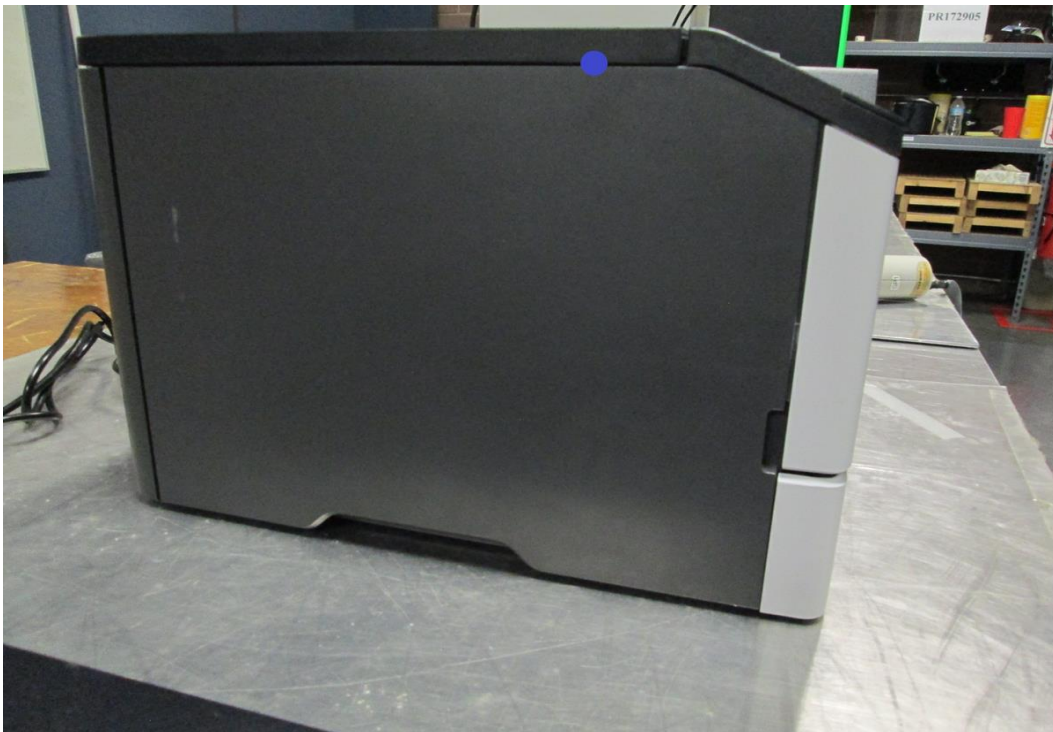
ESD Config 1 Setup



ESD Config 1 View 1



ESD Config 1 View 2



ESD Config 1 View 3



ESD Config 1 View 4



ESD Config 1 View 5



ESD Config 1 View 6



ESD Config 1 View 7



ESD Config 1 View 8



ESD Config 1 View 9



ESD Config 1 View 10



5.1.5 Test Equipment List

Table 5.1-1: Electrostatic Discharge - Config. #1 Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	NTS Labs, LLC	GP2	NCR	NCR
WC059439	Meter (Digital Multimeter)	Fluke	85	08/15/2022	08/15/2023
WC059675	Power Supply (AC)	California Instruments	5001IX208-150/300	07/28/2022	07/28/2023
WC059688	Gun (ESD Simulator)	EMC-Partner	ESD3000DN1	05/17/2023	05/17/2024
WC078490	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	02/15/2023	02/15/2024

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

A black rectangular device, likely a portable electronic instrument, is shown on a grey workbench. The device has a silver handle in the center and a circular dial on the left side. The dial has a white arrow pointing to the 'Lock for transport' position. Red dots are placed on the device to identify features: one on the top edge, one on the bottom edge, one on the left side near the dial, one on the right side near the handle, and one on the right side near the latch. The background shows a workshop environment with shelves and equipment.

ESD Config 2 View 2



ESD Config 2 View 3



ESD Config 2 View 4



ESD Config 2 View 5



5.2.5 Test Equipment List

Table 5.2-1: Electrostatic Discharge - Config. #2 Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059918	Ground Plane (Fixed)	NTS Labs, LLC	GP2	NCR	NCR
WC059439	Meter (Digital Multimeter)	Fluke	85	08/15/2022	08/15/2023
WC059675	Power Supply (AC)	California Instruments	5001IX208-150/300	07/28/2022	07/28/2023
WC059688	Gun (ESD Simulator)	EMC-Partner	ESD3000DN1	05/17/2023	05/17/2024
WC078490	Meter (Hydrometer)	Extech Instruments	Datalogger 42270	02/15/2023	02/15/2024

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



End of Test Report