



Hellbender Inc

26082642G8-EMC

New Castle, PA

Durham, NC



EMI Test Report 26082642G8-EMC Rev. N/C

Test Standards: IEC 61000-4-2

For

Hellbender Inc

620 William Pitt Way

Pittsburgh, Pennsylvania 15238-1332, United States of America

On

Vine Camera System

Model Number: N/A; Part Number: N/A; Serial Number: N/A

Performed By: **Applus+ Keystone**
131 Columbus Innerbelt
New Castle, PA 16101

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Document History				
Revision	Issue Date	Description of Modifications	Revised By	Approved By
N/C	9/10/2026	Initial release	N/A	MG

EMI TEST REPORT FOR HELLBENDER INC

Client Information

Purchase Order	1279
Quote Number	26082642G8-EMC
EUT Arrival Date	9/2/2026 – Received in good condition
Company Name	Hellbender Inc
Address	620 William Pitt Way
City, State Zip	Pittsburgh, Pennsylvania 15238-1332, United States of America
Contact Name	
Email	

Test Facility Information

Test Laboratory	Applus+ Keystone
Address	131 Columbus Innerbelt
City, State, Zip Code	New Castle, PA 16101
Phone	(724) 657-9940
Web Site	www.keystonecompliance.com
Contact Name	Mike Gennaro
Title	EMC Lab Manager
E-Mail Address	

Test Program Information

Test Personnel	Ethan Gonzalez – EMC Test Technician
Test Title & Test Dates	Electrostatic Discharge Immunity – September 2, 2026

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Introduction

This report documents the results of the EMC tests performed on the Vine Camera System, Model Number: N/A; Part Number: N/A; Serial Number: N/A, submitted by Hellbender Inc.

The EMC test programs described herein were performed in accordance with the applicable requirements of IEC 61000-4-2.

Statements of compliance are made in this report without taking measurement uncertainty into account, except for when specifically requested by the customer. Where statements of compliance are made in this report, the following decision rules are applied:

Compliant/Met the criteria of the specification – Results are within the limits.

Noncompliant/Did not meet the criteria of the specification – Results exceed the limits.

All test data is included in Section 3 of this document.

All tests were performed at Applus+ Keystone's New Castle, PA 16101 EMC test facility. All tests were performed using the test setups of the relevant standard for tests performed in laboratory conditions.

Acronyms and Abbreviations

EMC – Electromagnetic Compatibility	EMI – Electromagnetic Interference
EUT – Equipment Under Test	M/N – Model Number
P/N – Part Number	S/N – Serial Number
VAC – Voltage Alternating Current	VDC – Voltage Direct Current
AM – Amplitude Modulation	dB – Decibel
deg – Degree	H/V – Horizontal or Vertical Polarity
m – Meters	cm – Centimeter
V/m – Volts per meter	dBμV/m – Decibel microvolts per meter
kV – Kilovolt	Hz – Hertz
kHz – Kiloherztz	MHz – Megahertz
GHz – Gigahertz	pF – Pico farad
Ω – Ohm	QP – Quasi-Peak
N/A – Not Applicable	

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Configuration

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations, and settings used to complete the evaluation. The actual test parameters are specified in the test data; this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation, are indicated in the test data.

EUT		
Description		Manufacturer
Vine Camera System		Hellbender Inc
Model Number	Part Number	Serial Number
N/A	N/A	N/A

EUT	
	
Vine Camera System	

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Summary of Tests Performed & Results

Table 1 Test Performed & Results

Report Paragraph	Test Description	Specification	Test Parameters	Results
IEC 61000-4-2				
3.1	Electrostatic Discharge Immunity	EN 61000-4-2:2008	Contact Discharge: $\pm 4\text{kV}$ Air Discharge: $\pm 8\text{kV}$	To Be Determined By Customer

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Section 1 - Test Conditions and Equipment**1.1 Instrumentation and Equipment**

Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with ISO/IEC 17025:2017, by Applus+ Keystone or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data when such information is essential to achieve the accuracy control required by the procedure.

Applus+ Keystone attests that the commercial sources providing calibration services on the above-referenced equipment, other than the NIST Standards are in fact capable of performing the required services to the satisfaction of Applus+ Keystone Quality Assurance. Certifications of all calibrations performed are retained on file in the Applus+ Keystone Quality Assurance Department and are available for inspection upon request by customer representatives.

The test equipment utilized during this test program is listed on individual Test Equipment Logs located in Section 3 of this document.

1.2 Measurement Uncertainty

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its “true” or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests, our test equipment has been demonstrated by calibration to provide at least 95% confidence that it complies with the test specifications.

1.3 Tolerances

All test conditions were maintained within all applicable specified tolerances.

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Section 2 - References

Reference
Specification Title

EN 61000-4-2:2008

Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test

Calibration
Information

ISO/IEC 17025:2017

General Requirements for the Competence of Testing and Calibration Laboratories

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The general principles for the evaluation of the immunity test results are the following

Performance Criterion A

During testing, normal performance within the specification limits.

Example 1

If electronic equipment is required to work with high reliability, the EUT shall operate without any apparent degradation from the manufacturer's specification.

Performance Criterion B

During testing, temporary degradation, or loss of function or performance which is self-recovering.

Example 1

A data transfer is controlled/checked by parity check or by other means. In the case of malfunction, such as caused by a lightning strike, the data transfer will be repeated automatically. The reduced data transfer rate at this time is acceptable.

Example 2

During testing, an analog function value may deviate. After the test, the deviation vanishes.

Example 3

In the case of a monitor used only for man-machine monitoring, it is acceptable that some degradation takes place for a short time, such as flashes during the burst application.

Performance Criterion C

During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

Example 1

In the case of an interruption in the mains longer than the specified buffer time, the power supply unit of the equipment is switched off. The switch-on may be automatic or carried out by the operator.

Example 2

After a program interruption caused by a disturbance, the processor functions of the equipment stops at a defined position and is not left in a "crashed state". The operator's decision prompts may be necessary.

Example 3

The test results in an opening of an over-current protection device that is replaced or restored by the operator.

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Section 3 - Test Description, Test Equipment, Test Data, & Test Photographs

3.1 Electrostatic Discharge Immunity Test

- a) The Electrostatic Discharge Immunity requirements for the Vine Camera System are specified in EN 61000-4-2:2008.
- b) The Electrostatic Discharge Immunity Test Description for the Vine Camera System is located in Paragraph 3.1.1 of this document.
- c) The Electrostatic Discharge Immunity test equipment used to test the Vine Camera System is located in Paragraph 3.1.2 of this document.
- d) All recorded test data for the Electrostatic Discharge Immunity test on the Vine Camera System is located in Paragraph 3.1.3 of this document.
- e) The Electrostatic Discharge Immunity test photographs for the Vine Camera System are located in Paragraph 3.1.4 of this document.

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3.1.1 Electrostatic Discharge Immunity Test Description

Test Description

Using the mode of operation and configuration noted within this report, an Electrostatic Discharge Immunity test was performed to EN 61000-4-2:2008. The EUT was tested using air and contact discharges. The specified number of air discharges was applied to each of the non-conductive surfaces of the EUT as listed in the datasheet. The specified number of contact discharges was applied to each of the conductive surfaces of the EUT as listed in the datasheet. If a response is detected after the discharge, the type of response, discharge level, and location are noted. Testing was conducted with the EUT fully cabled. Discharges were made to the connector shells, not to the individual conductors.

During the performance of the Electrostatic Discharge Immunity test, the Vine Camera System unit was in the Normal mode and powered with PoE/15VDC.

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3.1.2 Electrostatic Discharge Immunity Test Equipment Log

Equipment Log	
Customer:	Hellbender Inc
Date:	9/2/26
Test Engineer:	E. Gonzalez

Test Equipment					
Asset No.	Description	Manufacturer	Model	Serial No.	Cal. Due
EF030	Vertical Coupling Plane	Keytech	VCP-1	N/A	(UWCE)
EF104	Horizontal Coupling Plane	Keystone Compliance	N/A	N/A	(UWCE)
EF145	ESD Simulator	Teseq	NSG 438A	335	12/19/2026
EF146	Contact Discharge Tip	Teseq	1004551	438A335	12/19/2026
EF147	Air Discharge Tip	Teseq	1004552	438A335	12/19/2026
EF148	ESD Discharge Network (150pF/330ohm)	Teseq	INA 4380	3929	12/19/2026
EJ006	Injection Clamp	FCC Inc.	F-203I	56	(UWCE)
NM117	Temperature/Humidity Meter	Traceable	4096 98766-84	240743642	10/3/2026
OA100	Laptop (EMC)	Acer	ASPIRE 3	NXAT0AA006 141ADAA834 00	(UWCE)

UWCE: Used with Calibrated Equipment

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3.1.3 Electrostatic Discharge Immunity Test Data

Electrostatic Discharge Immunity Data Sheet			
Customer:	Hellbender Inc	Date:	9/2/26
Attendees:	None	Test Engineer:	E. Gonzalez
Temperature:	71°F	Humidity:	55%
Configuration #:	1	Power:	PoE/15VDC
Test Specifications			
Test Spec:	EN 61000-4-2:2008	Test Limit:	Listed Below

Test Parameters			
Energy Storage Capacitor:	150pF	Discharge Resistance:	330Ω
Polarity Voltage:	Positive & Negative	Time Between Successive Discharges:	>=1sec
EUT Operating Modes			
Normal			

Air Discharge Data											
Minimum Criterion:	A										
Number of Discharges:	10	10	10	10	10	10	10	10	Phenomena Observed/Comments	Performance Criterion	
ESD Test Level (kV):	2	-2	4	-4	8	-8	15	-15			
Test Location											
Camera Lense Cover	0	0	0	0	0	0	x	x	None	A	
Camera bottom Leds	1	1	1	1	1	1	x	x	None	A	
Camera top Leds	0	0	0	0	0	0	x	x	None	A	
Camera seam	1	1	1	1	2	2	x	x	8kV Zapped to Chassis. Cameras froze. Hub needed a power cycle to return to normal operation. all 4 cameras affected.	C	
Power supply Led	0	0	0	0	0	0	x	x	None	A	
Power supply seam	0	0	0	0	0	0	x	x	None	A	
Hub Power Button	1	1	1	1	1	1	x	x	None	A	
Hub Led	1	1	1	1	1	1	x	x	None	A	
Hub power connector	0	0	0	0	0	0	x	x	None	A	
Hub seam	1	1	1	1	1	1	x	x	None	A	
Key: X = Not Tested 0 = Tested, No Discharge 1 = Tested, No EUT response observed 2 = Tested, EUT response observed											

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Contact Discharge Data

Minimum Criterion:	A									
Number of Discharges:	10	10	10	10	10	10	10	10	Phenomena Observed/Comments	Performance Criterion
ESD Test Level (kV):	2	-2	4	-4	6	-6	8	-8		
Test Location										
Camera Screws	1	1	2	2	x	x	x	x	On cameras 1, 2, and 3 the discharge made the underside leds flash with cameras frozen. The hub needed a power cycle to return to normal operation.	C
Camera Heat Sinks	1	1	1	1	x	x	x	x	None	A
Camera thumb screws	0	0	0	0	x	x	x	x	None	A
Camera top chassis	0	0	0	0	x	x	x	x	None	A
Hub RJ45 Shell	1	1	1	1	x	x	x	x	None	A
Hub heat sink	1	1	1	1	x	x	x	x	None	A
Hub screws	1	1	1	1	x	x	x	x	None	A
Hub thumb screws	0	0	0	0	x	x	x	x	None	A
Key:	X = Not Tested		0 = Tested, No Discharge				1 = Tested, No EUT response observed		2 = Tested, EUT response observed	

Indirect Discharge Data

Minimum Criterion:	A										
Number of Discharges:	10	10	10	10	10	10	10	10	Phenomena Observed/Comments		Performance Criterion
ESD Test Level (kV):	2	-2	4	-4	6	-6	8	-8			
Test Location											
Horizontal Coupling Plane	1	1	1	1	x	x	x	x	None		A
Vertical Coupling Plane	1	1	1	1	x	x	x	x	None		A
Key: X = Not Tested 0 = Tested, No Discharge 1 = Tested, No EUT response observed 2 = Tested, EUT response observed											

Comments

None

Deviations From Test Standard

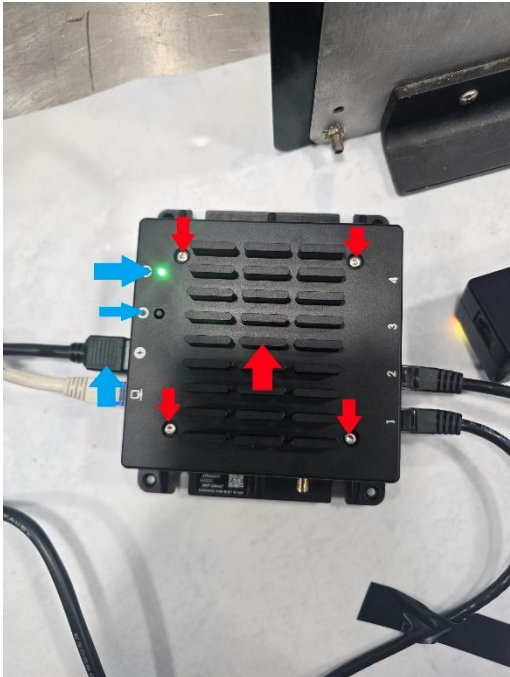
None

Results

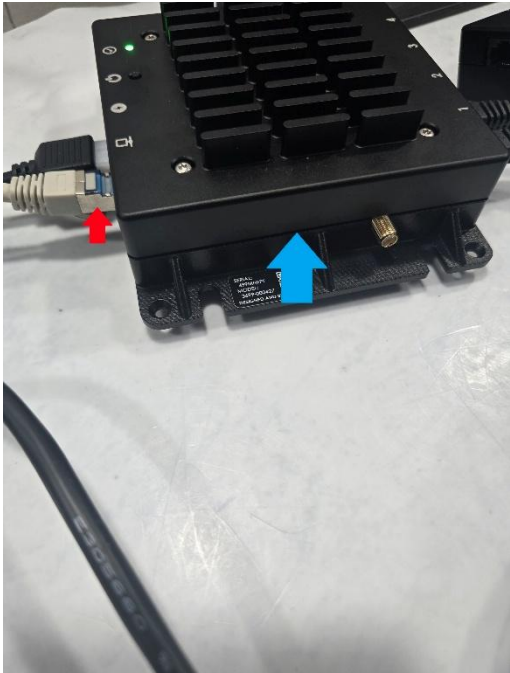
To Be Determined By Customer

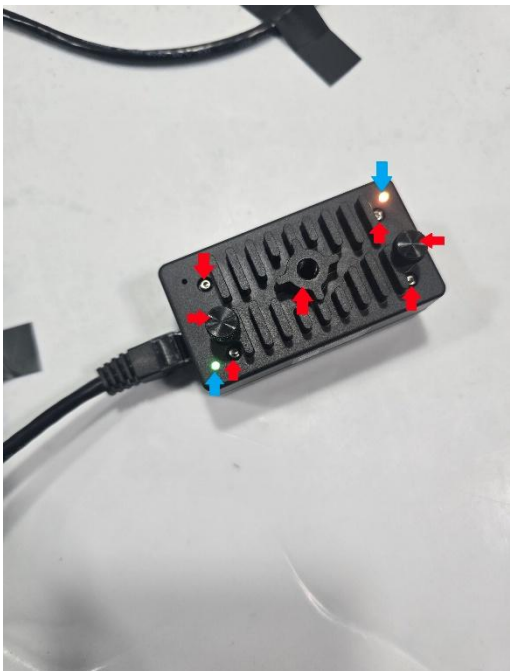
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3.1.4 Electrostatic Discharge Immunity Test Photographs

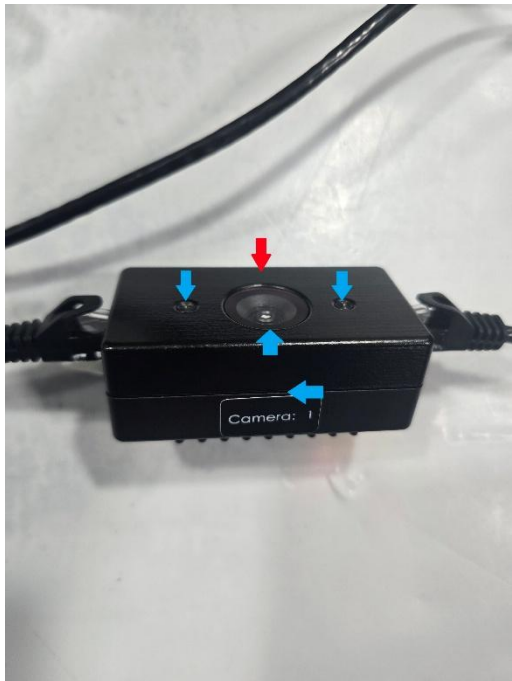
	Electrostatic Discharge Immunity Test Setup
	Electrostatic Discharge Immunity Test Location

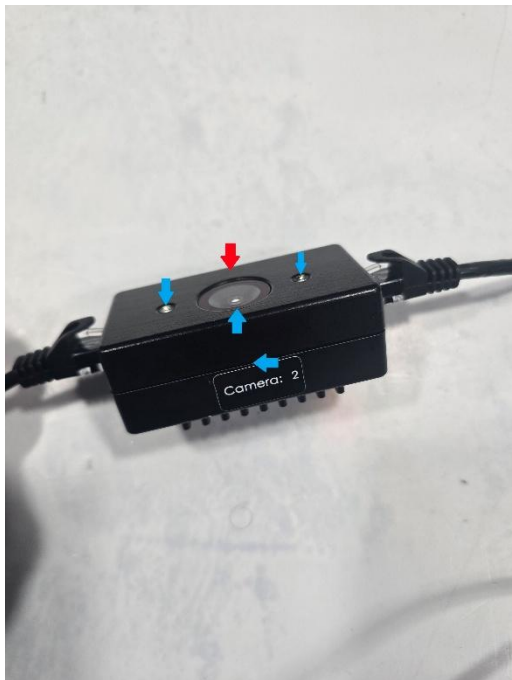
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	Electrostatic Discharge Immunity Test Location
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	Electrostatic Discharge Immunity Test Location
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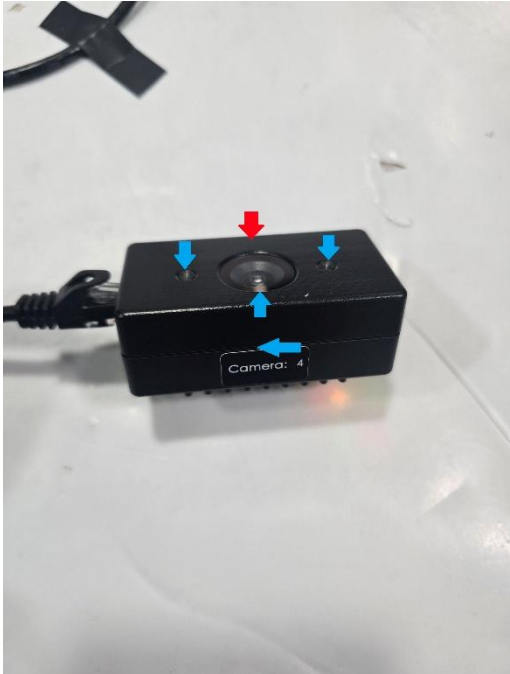
EMI TEST REPORT FOR HELLBENDER INC

	Electrostatic Discharge Immunity Test Location
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	Electrostatic Discharge Immunity Test Location
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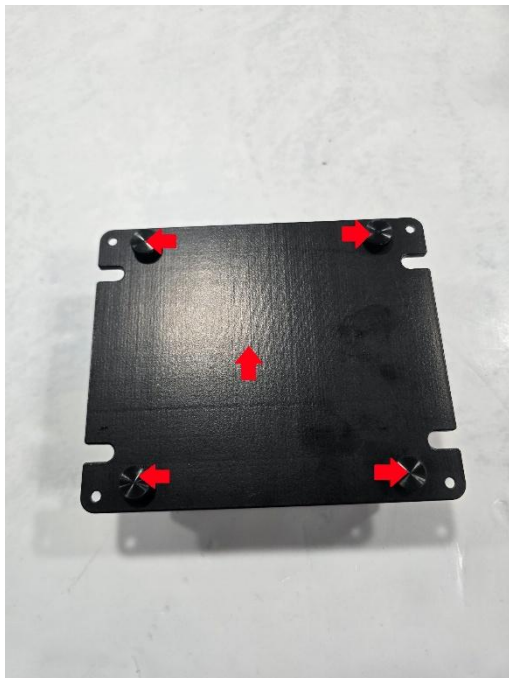
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Electrostatic Discharge Immunity	
	Test Location

Electrostatic Discharge Immunity	
	Test Location

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Electrostatic Discharge Immunity	
	Test Location

Electrostatic Discharge Immunity	
	Test Location

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Section 4 - Conclusion

- a) The Vine Camera System, Model Number: N/A; Part Number: N/A; Serial Number: N/A was subjected to the following EMC Tests in accordance with IEC 61000-4-2 and the specifications as shown in Table 2:

Table 2 Tests Performed & Results

Test Description	Specification	Results
IEC 61000-4-2		
Electrostatic Discharge Immunity	EN 61000-4-2:2008	To Be Determined By Customer

- b) The Vine Camera System was returned to Hellbender Inc after completion of the EMI Testing.