

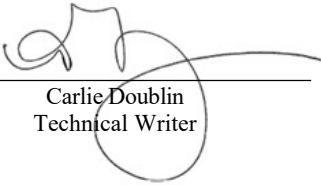
# National Technical Systems Test Report for Electromagnetic Interference (EMI) Testing of the Verity Touch Writer with Brother HL - L6400DWVS Printer Attached


**Prepared For**

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### Revision History

Rev.	Description	Issue Date
0	Initial Release	05/03/2022
1	Added ESD testing to the test log.	05/24/2022

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**4.0 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 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) 20220207-02, dated 02/07/2022
- National Technical Systems (NTS) Quote(s) OP0607046, dated 02/02/2022
- ISO/IEC 17025:2017I *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	Model Number	Serial Number
1	1	Verity Touch Writer	3005852	W2014374311
2	1	Brother L6400 Laser Printer	HL-L6400DWVS	U64185J1N427136

**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 61000-4-2	Longmont	04/19/2022 – 04/25/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms
5.2	Radiated RF Immunity	IEC 61000-4-3	Longmont	03/25/2022 – 04/04/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms
5.3	Electrical Fast Transient / Burst	IEC 61000-4-4	Longmont	03/21/2022 – 03/22/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms
5.4	Surge Immunity	IEC 61000-4-5	Longmont	03/21/2022 – 03/22/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms
5.5	Conducted RF Immunity	IEC 61000-4-6	Longmont	03/21/2022 – 03/22/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms
5.6	Power Frequency H-Field Immunity	IEC 61000-4-8	Longmont	03/21/2022 – 03/22/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms
5.7	Voltage Dips and Interruptions	IEC 61000-4-11	Longmont	03/21/2022 – 03/22/2022	3005852 HL-L6400DWVS	W2014374311 U64185J1N427136	Conforms



**5.1 Electrostatic Discharge**

**5.1.1 Test Procedure**

IEC 61000-4-2

**5.1.2 Test Result**

The Verity Touch Writer with Brother L6400 Printer met the specification requirements for Electrostatic Discharge.

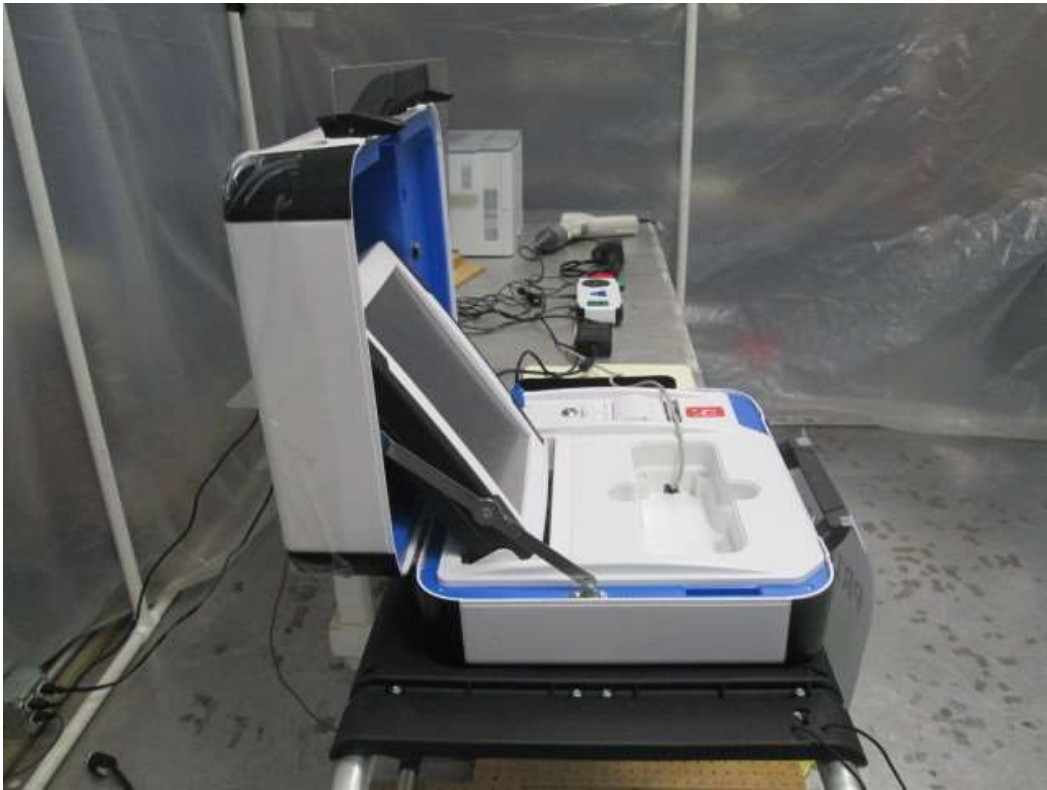
**5.1.3 Test Datasheets**

National Technical Systems				
Electrostatic Discharge per IEC / EN 61000-4-2				
Standard Referenced: VVSG 2005		Date: 4/19/2022		
Temperature: 22°C	Humidity: 43%	Pressure: 829 mb		
Input Voltage: 120V/60Hz				
Configuration of Unit: Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.				
Test Engineer: W Koenig				
Date	Time	Log Entries	Initials	Result
4/19/22	0800 - 0830	Setup for ESD testing. performed ESD pre-test verification prior to testing, bleed-off cables 938k ohms and 940k ohms	WK	---
	0830 - 1230	Electrostatic Discharge (4.1.2.8) Electrostatic Discharge. +/- 8kV Contact, +/-2, 4, 8, 15kV Air. 120 VAC / 60 Hz	WK	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	20/20	1	Front Side	A	Pass
VCP	8	X	X	20/20	1	Left Side	A	Pass
VCP	8	X	X	20/20	1	Right Side	A	Pass
VCP	8	X	X	20/20	1	Back Side	A	Pass
HCP	8	X	X	10	1	Edge of HCP at Front of UUT's	A	Pass
Contact Discharge Points - <b>RED</b> Arrows.								
Figure 1.	8	X	X	10	1	ND	-	-
Figure 2.	8	X	X	10	1	ND	-	-
Figure 3.	8	X	X	10	1	ND	-	-
Figure 4.	8	X	X	10	1	ND	-	-
Figure 5.	8	X	X	10	1	ND	-	-
Figure 6.	8	X	X	10	1	ND	-	-
Air Discharge Points - <b>BLUE</b> Arrows.								
Figure 1.	2, 4, 8, 15	X	X	10	1	Front Side	A	Pass
Figure 2.	2, 4, 8, 15	X	X	10	1	ND	-	-
Figure 3.	2, 4, 8, 15	X	X	10	1	ND	-	-
Figure 4.	2, 4, 8, 15	X	X	10	1	ND	-	-
Figure 5.	2, 4, 8, 15	X	X	10	1		A	Pass
Figure 6.	2, 4, 8, 15	X	X	10	1	ND	-	-
ND: No Discharge points found								



**5.1.4 Test Photographs****ESD Test Setup****ESD Figure 1**



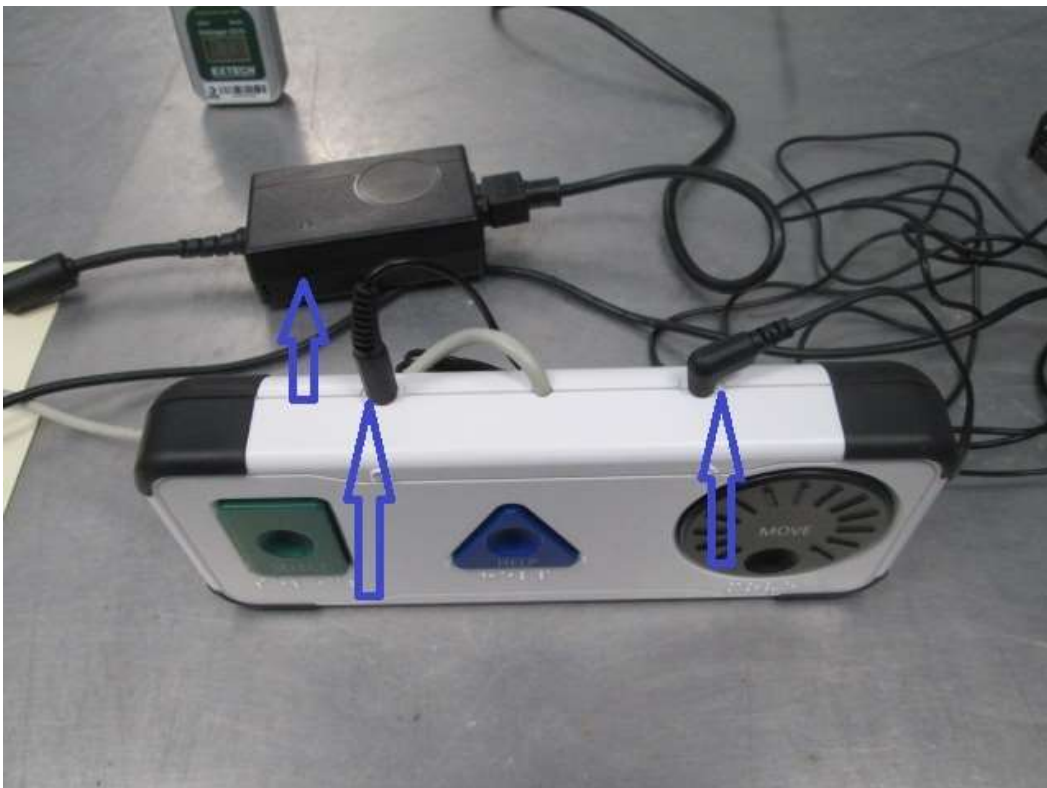
**ESD Figure 2**



**ESD Figure 3**



ESD Figure 4



ESD Figure 5



**ESD Figure 6**



### 5.1.5 Test Equipment List

**Table 5.1-1: Electrostatic Discharge Test Equipment List**

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059917	Ground Plane (Fixed)	National Technical Systems	GP #1	NCR	NCR
WC059669	Meter (Digital Multimeter)	Fluke	83-3	09/23/2021	09/23/2022
WC059688	Gun (ESD Simulator)	EMC-Partner	ESD3000DN1	04/06/2022	04/06/2023
WC078488	TBD	Extech Instruments	Datalogger 42270	06/14/2021	01/19/2023

**Calibration Abbreviations**

CAL: Calibration

NCR: No Calibration Required

**5.2 Radiated RF Immunity**

**5.2.1 Test Procedure**

IEC 61000-4-3

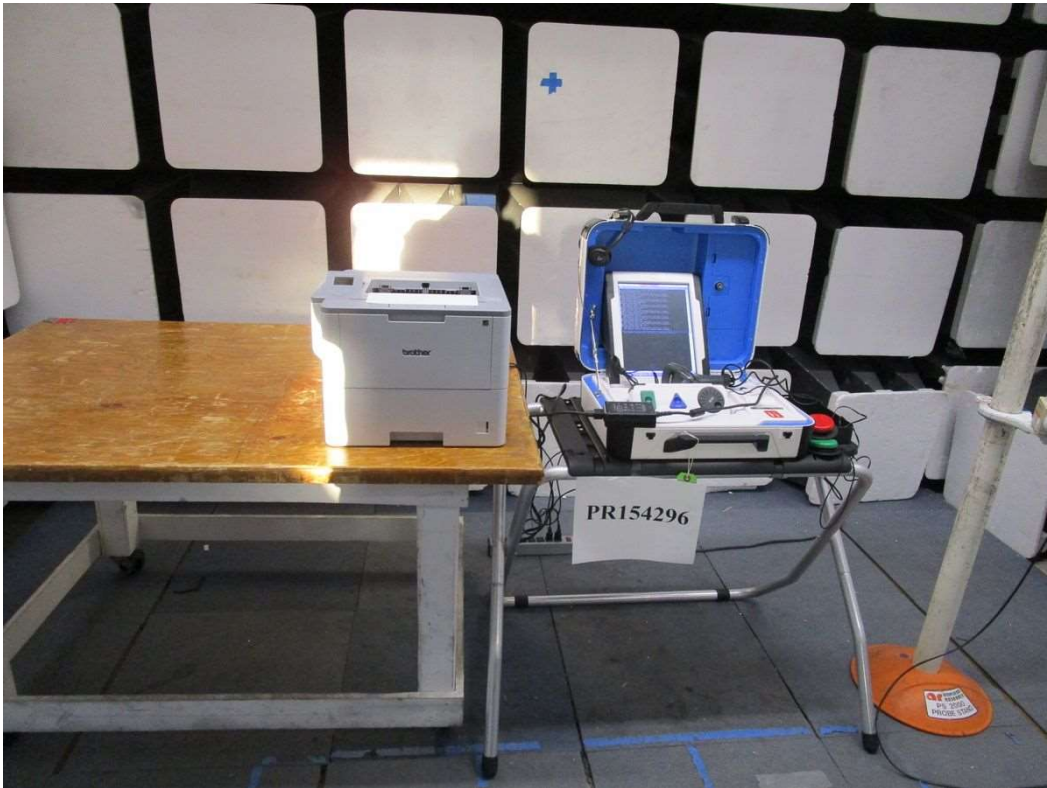
**5.2.2 Test Result**

The Verity Touch Writer with Brother L6400 Printer met the specification requirements for Radiated RF Immunity.

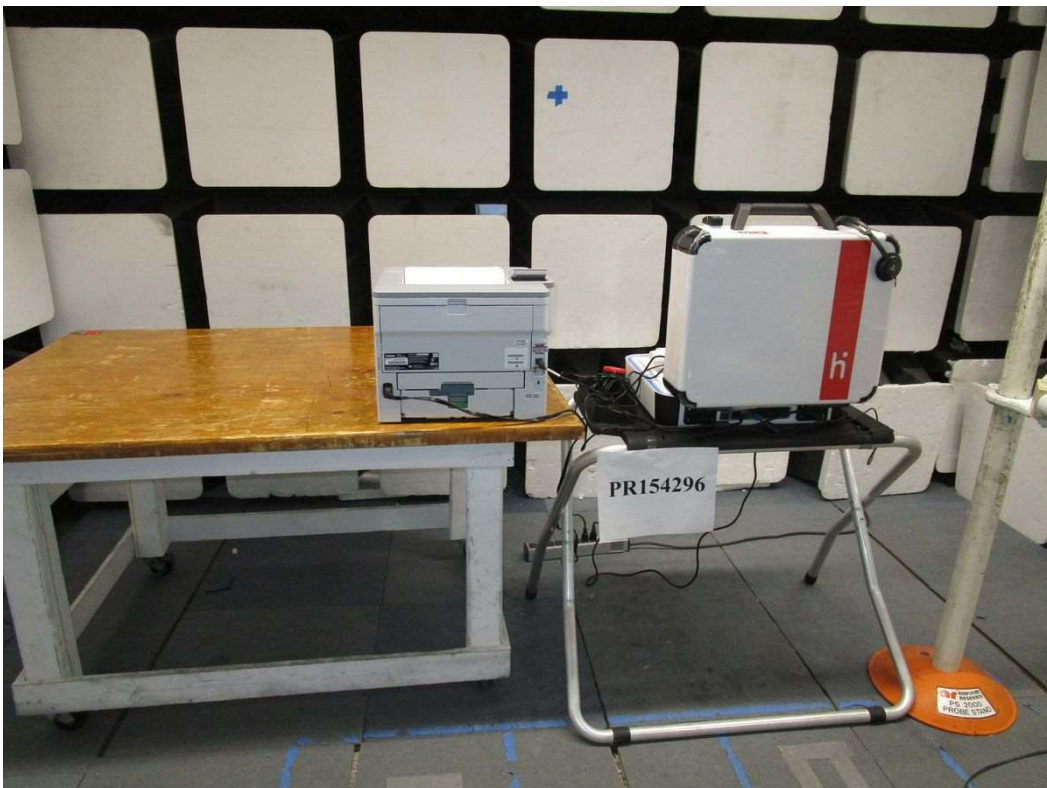
**5.2.3 Test Datasheets**

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

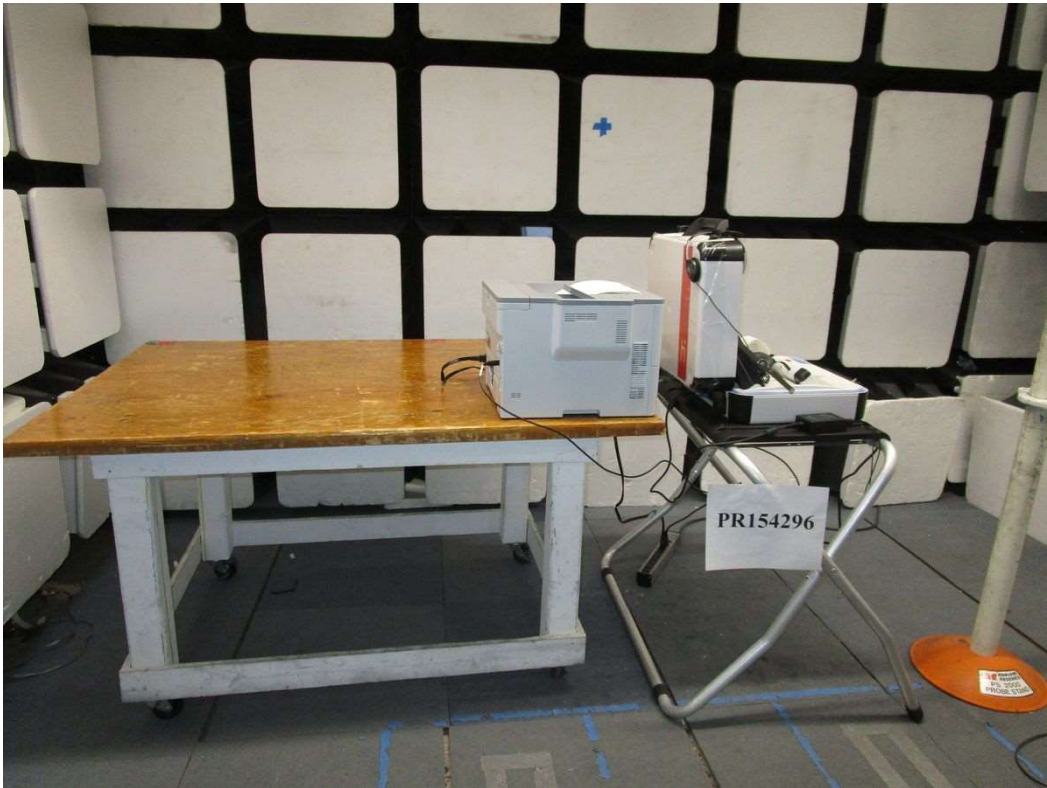
5.2.4 Test Photographs



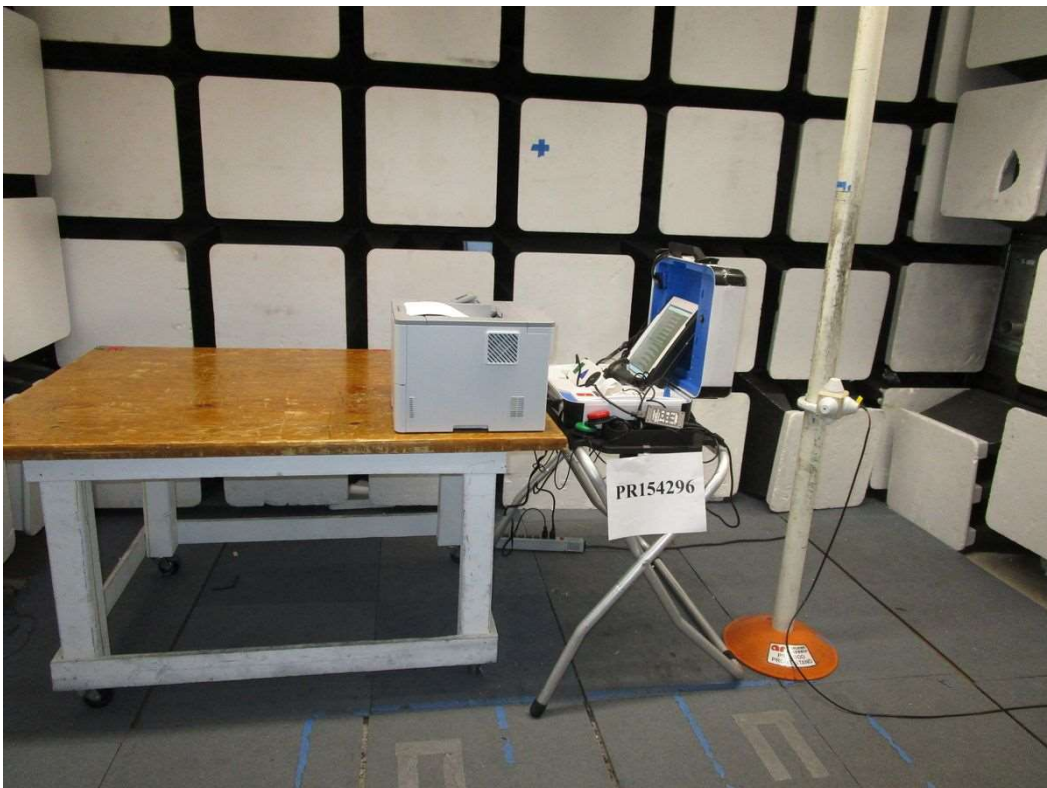
Radiated RF Immunity Front



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
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
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 61000-4-4

**5.3.2 Test Result**

The Verity Touch Writer with Brother L6400 Printer 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: VVSG1.0 IEC 61000-4-4		Date: 3/18/2022		
Temperature: 20.1°C	Humidity: 22.40%	Pressure: 837 mb		
Input Voltage: 120vac/60Hz				
Configuration of Unit: Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.				
Test Engineer: Casey Lockhart				
Date	Time	Log Entries	Initials	Result
3/18/22	10:30	Electrical Fast Transient / Burst. Mains: 1/ 2kV / 10: 1/ 1kV	CL	Pass



National Technical Systems	
<b>Electrical Fast Transient/Burst per IEC / EN 61000-4-4</b>	
Standard Referenced: VVSG1.0 IEC 61000-4-4	Date: #####
Temperature: 20.1°C Humidity: 22%	Pre ssu re: 837 mb
Input Voltage: 120vac/60Hz	
Configuration of Unit: Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.	
Test Engineer: Casey Lockhart	

Voltage (kV)	Polarity +/-	Time (sec)	Injection Type	L1	L2	L3	N	PE	Rep Freq.	Comments	Criteria Met	Pass/Fail
2.0	±	60	CDN	X					100kHz	AC	A	Pass
2.0	±	60	CDN		X				100kHz	AC	A	Pass
2.0	±	60	CDN					X	100kHz	AC	A	Pass
2.0	±	60	CDN		X	X		X	100kHz	AC	A	Pass

5.3.4 Test Photographs



Electrical Fast Transient/Burst – AC



Electrical Fast Transient/Burst – Test Setup



### 5.3.5 Test Equipment List

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

<b>Asset Number</b>	<b>Asset Type</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Calibrated</b>	<b>Due</b>
WC059917	Ground Plane (Fixed)	National Technical Systems	GP #1	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



**5.4 Surge Immunity**

**5.4.1 Test Procedure**  
IEC 61000-4-5

**5.4.2 Test Result**

The Verity Touch Writer with Brother L6400 Printer met the specification requirements for Surge Immunity.

**5.4.3 Test Datasheets**

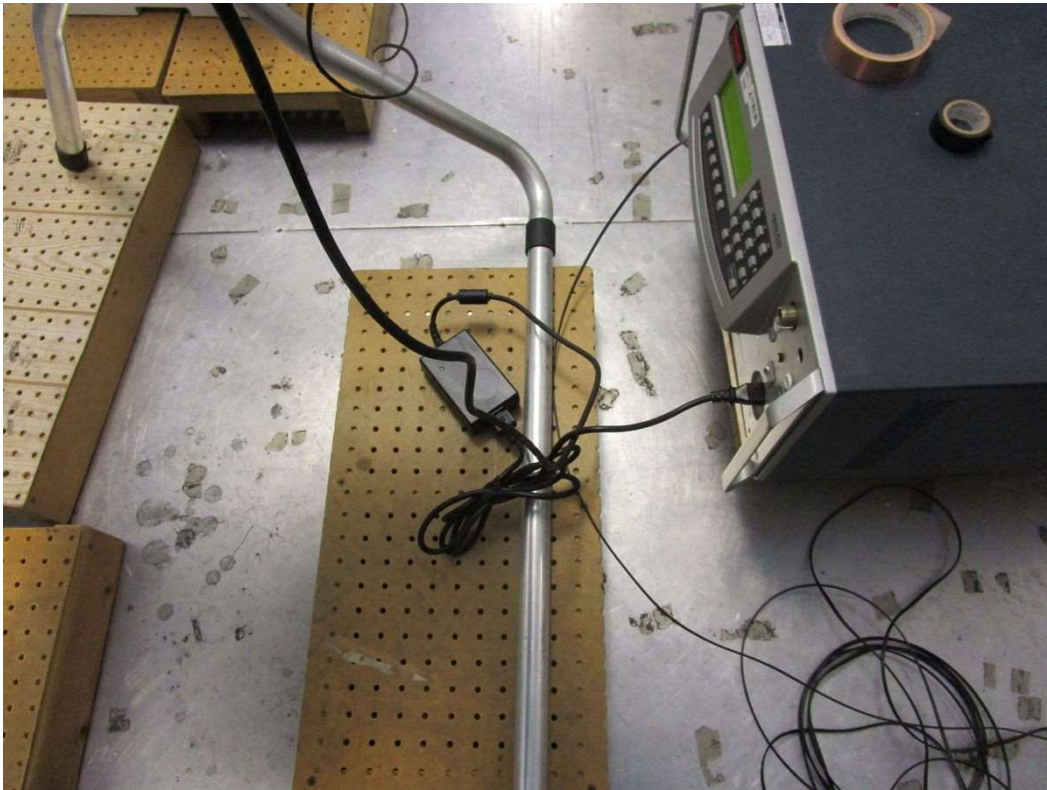
National Technical Systems				
Surge Immunity per IEC / EN 61000-4-5				
Standard Referenced: VVSG1.0 IEC 61000-4-5		Date: 3/21/2022		
Temperature: 19.3°C	Humidity: 26.70%	Pressure: 835 mb		
Input Voltage: 120vac/60Hz				
Configuration of Unit: Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.				
Test Engineer: Casey Lockhart				
Date	Time	Log Entries	Initials	Result
3/21/22	0730	Surge Immunity. Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz (4.1.2.7)	CL	Pass



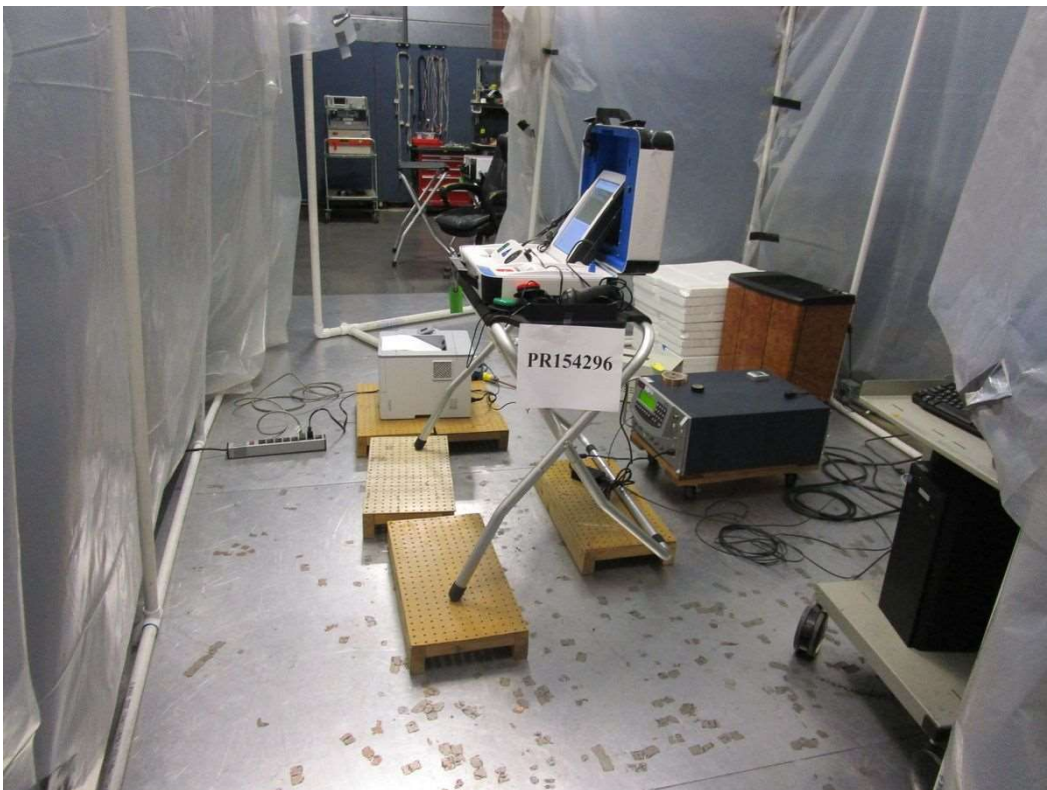
National Technical Systems	
<b>Surge Immunity per IEC / EN 61000-4-5</b>	
Standard Referenced: <u>VVSG1.0 IEC 61000-4-5</u>	Date: <u>3/21/2022</u>
Temperature: <u>19.3°C</u> Humidity: <u>27%</u>	Pressure: <u>835 mb</u>
Input Voltage: <u>120vac/60Hz</u>	
Configuration of Unit: <u>Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.</u>	
Test Engineer: <u>Casey Lockhart</u>	

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
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

#### 5.4.4 Test Photographs



Surge Immunity-AC



Surge Immunity – Test Setup





### 5.4.5 Test Equipment List

**Table 5.4-1: Surge Immunity Test Equipment List**

<b>Asset Number</b>	<b>Asset Type</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Calibrated</b>	<b>Due</b>
WC059917	Ground Plane (Fixed)	National Technical Systems	GP #1	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

**5.5 Conducted RF Immunity**

**5.5.1 Test Procedure**

IEC 61000-4-6

**5.5.2 Test Result**

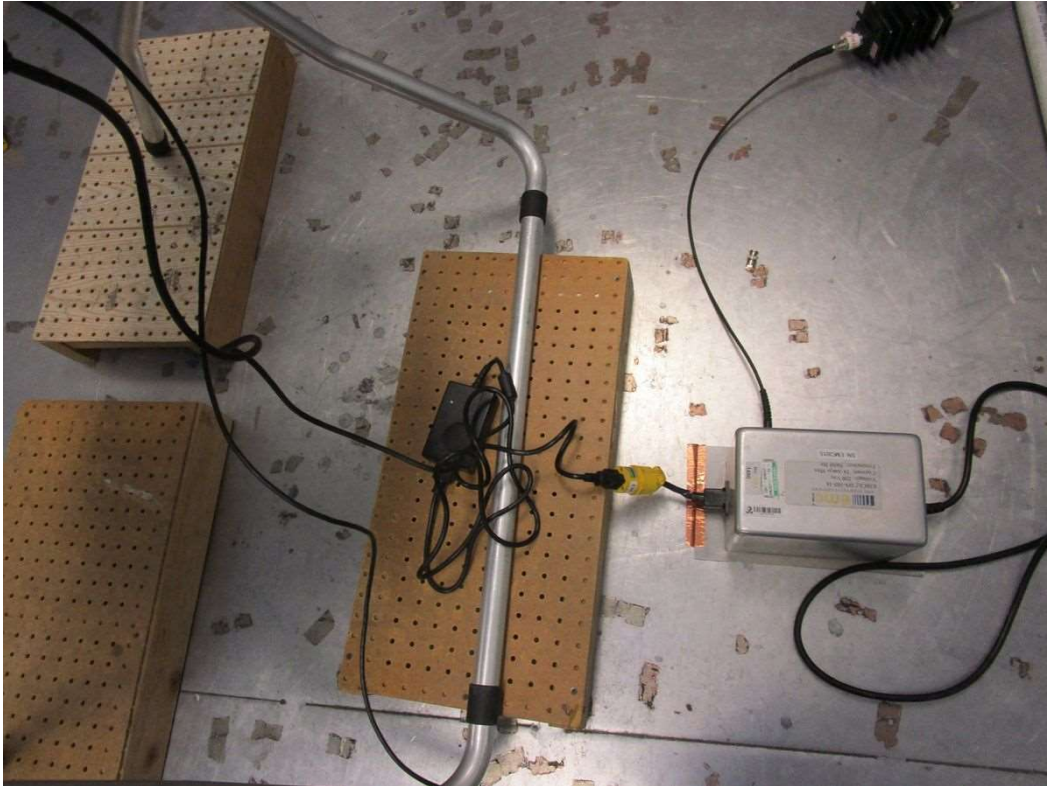
The Verity Touch Writer with Brother L6400 Printer met the specification requirements for Conducted RF Immunity.

**5.5.3 Test Datasheets**

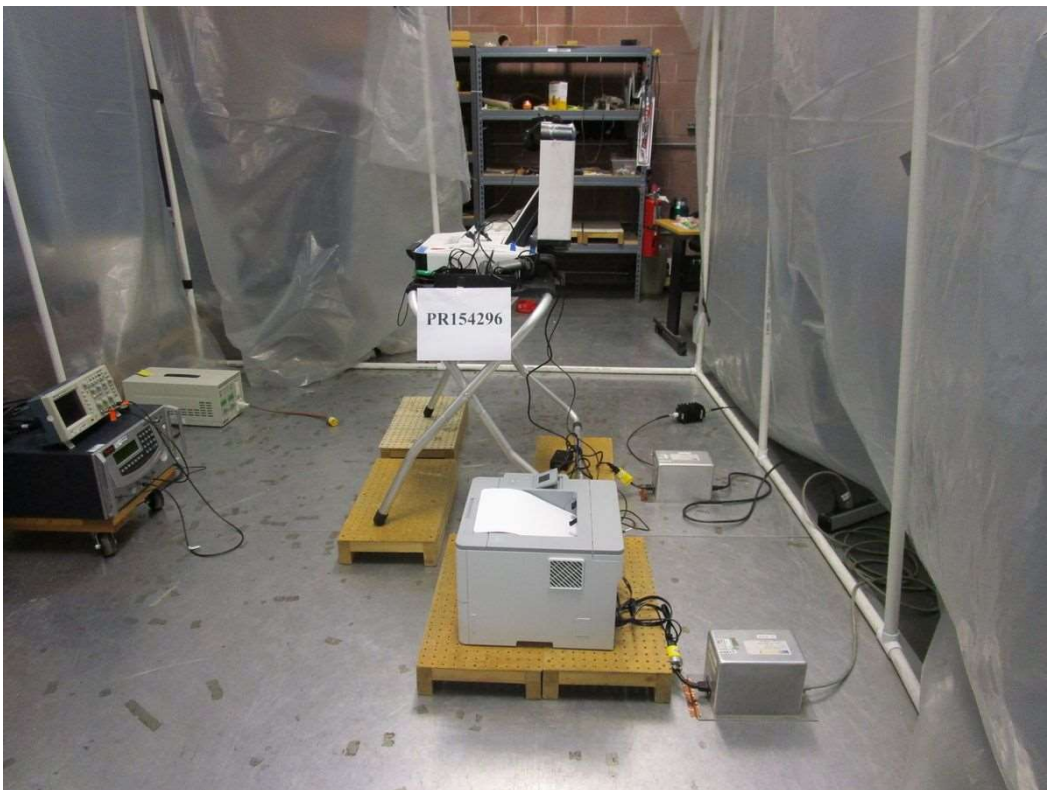
National Technical Systems				
Conducted RF Immunity per IEC / EN 61000-4-6				
Standard Referenced: <u>EN 61000-4-6</u>		Date: <u>3/18/2022</u>		
Temperature: <u>20.6°C</u>	Humidity: <u>22.90%</u>	Pressure: <u>837 mb</u>		
Input Voltage: <u>120Vac/60Hz</u>				
Configuration of Unit: <u>Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.</u>				
Test Engineer: <u>Casey Lockhart</u>				
Date	Time	Log Entries	Initials	Result
3/18/22	0915	Conducted RF Immunity. 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. One AC main, No I/O >3m 120 VAC / 60 Hz (4.1.2.11)	CL	Pass



5.5.4 Test Photographs



Conducted RF Immunity-AC



Conducted RF Immunity – Test Setup



### 5.5.5 Test Equipment List

**Table 5.5-1: Conducted RF Immunity Test Equipment List**

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC059917	Ground Plane (Fixed)	National Technical Systems	GP #1	NCR	NCR
WC059591	Generator (Signal)	IFR	2023A	05/06/2021	05/06/2022
WC059656	Analyzer (Spectrum)	Rigol Technologies	DSA815	07/02/2021	07/02/2022
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
WC059775	Coupler (Bi-Directional)	Werlatone	C9475-13	02/01/2022	02/01/2023
WC078470	Software	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



**5.6 Power Frequency H-Field Immunity**

**5.6.1 Test Procedure**

IEC 61000-4-8

**5.6.2 Test Result**

The Verity Touch Writer with Brother L6400 Printer met the specification requirements for Power Frequency H-Field Immunity.

**5.6.3 Test Datasheets**

National Technical Systems				
Power Frequency H-field Immunity per IEC / EN 61000-4-8				
Standard Referenced: <u>VVSG1.0 IEC 61000-4-8</u>		Date: <u>3/21/2022</u>		
Temperature: <u>20.2C</u>	Humidity: <u>22%</u>	Pressure: <u>835 mb</u>		
Input Voltage: <u>120Vac/60Hz</u>				
Configuration of Unit: <u>Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.</u>				
Test Engineer: <u>Casey Lockhart</u>				
Date	Time	Log Entries	Initials	Result
3/21/22	1400	Power Frequency H-Field Immunity. 30A/m, 50 / 60 Hz, 3 axes. 120 VAC / 60 Hz (4.1.2.12)	CL	Pass



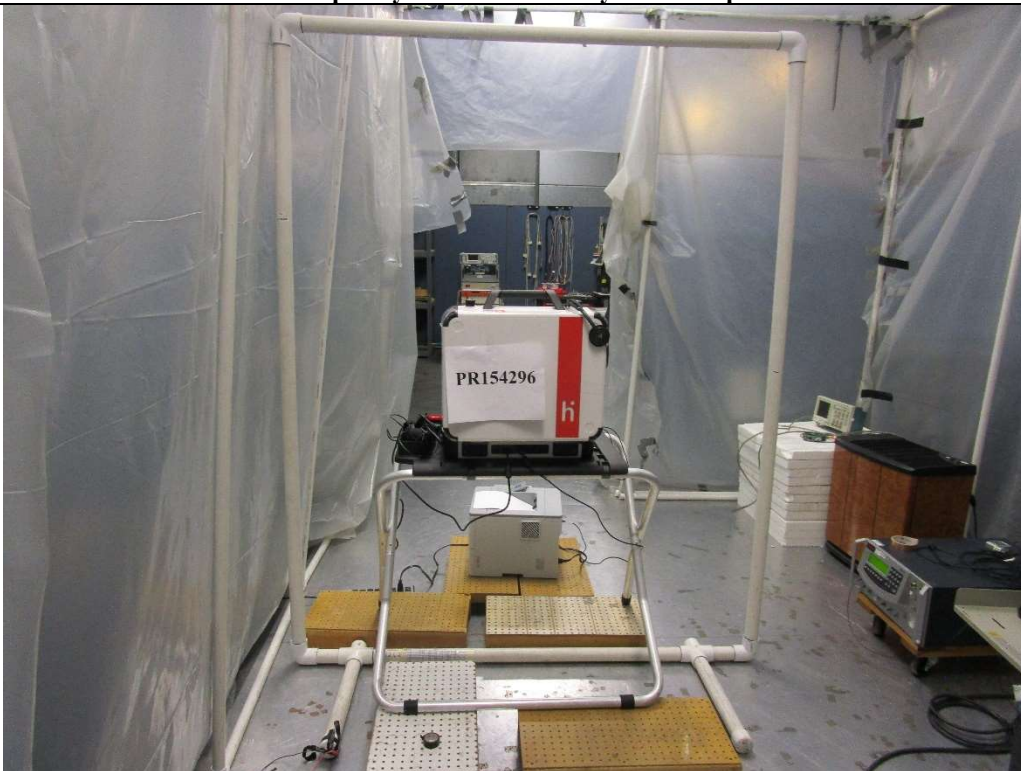
<b>National Technical Systems</b>	
<b>Power Frequency H-field Immunity per IEC / EN 61000-4-8</b>	
Standard Referenced: VVSG1.0 IEC 61000-4-8	Date: 3/21/2022
Temperature: <u>20.2C</u> Humidity: <u>22%</u>	Pressure: <u>835 mb</u>
Input Voltage: <u>120Vac/60Hz</u>	
Configuration of Unit: <u>Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.</u>	
Test Engineer: <u>Casey Lockhart</u>	

Frequency (Hz)		Field Strength	EUT Location	Dwell Time	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

5.6.4 Test Photographs

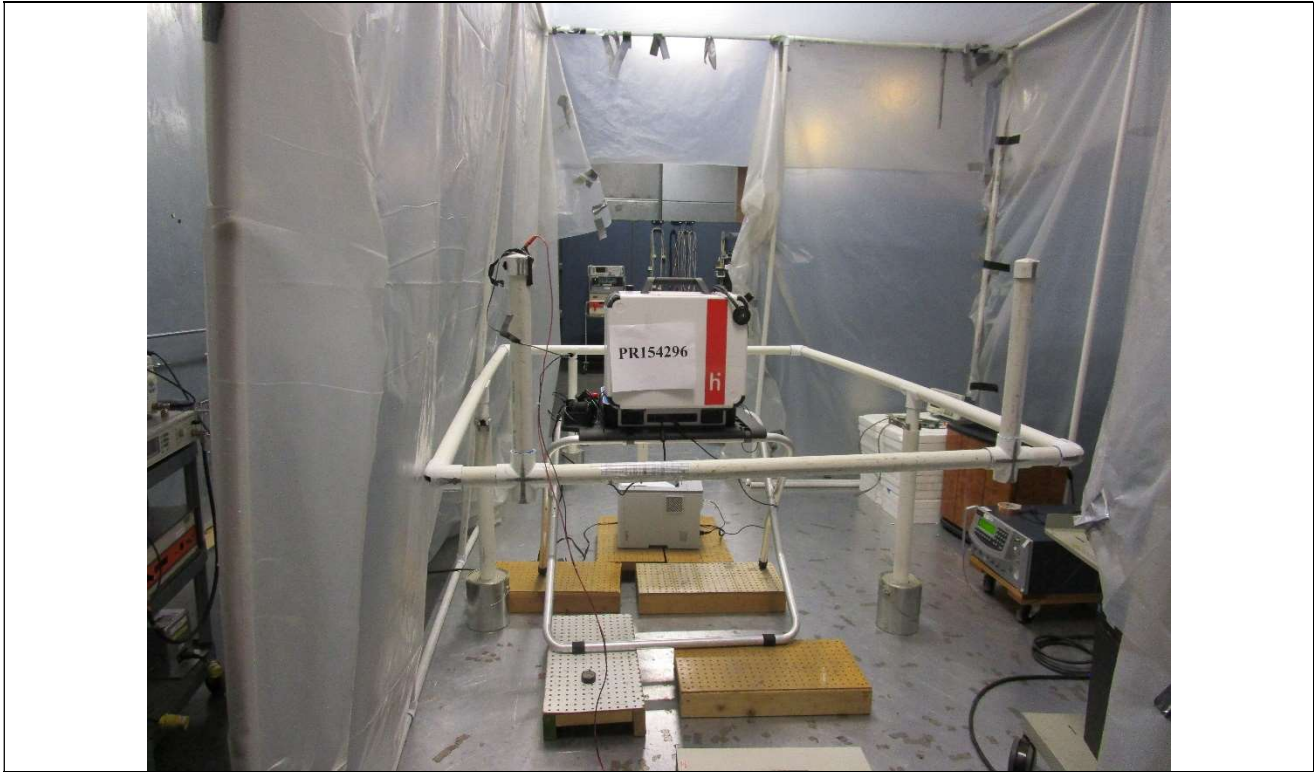


Power Frequency H-field Immunity Test Setup X Axis



Power Frequency H-field Immunity Test Setup Y Axis





**Power Frequency H-field Immunity Test Setup Z Axis**



### 5.6.5 Test Equipment List

**Table 5.6-1: Power Frequency H-Field Immunity Test Equipment List**

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



**5.7 Voltage Dips and Interruptions**

**5.7.1 Test Procedure**

IEC 61000-4-11

**5.7.2 Test Result**

The Verity Touch Writer with Brother L6400 Printer met the specification requirements for Voltage Dips and Interruptions.

**5.7.3 Test Datasheets**

National Technical Systems				
Voltage Dips and Interrupts per IEC / EN 61000-4-11				
Standard Referenced: EN 61000-4-11		Date: 3/18/2022		
Temperature: 20.3°C	Humidity: 20.00%	Pressure: 837 mb		
Input Voltage: 120Vac/60Hz				
Configuration of Unit:	Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.			
Test Engineer:	Casey Lockhart			
Date	Time	Log Entries	Initials	Result
3/18/22	1130	Voltage Dips and Interruptions. 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles. One AC main 120 VAC / 60 Hz (4.1.2.5)	CL	Pass



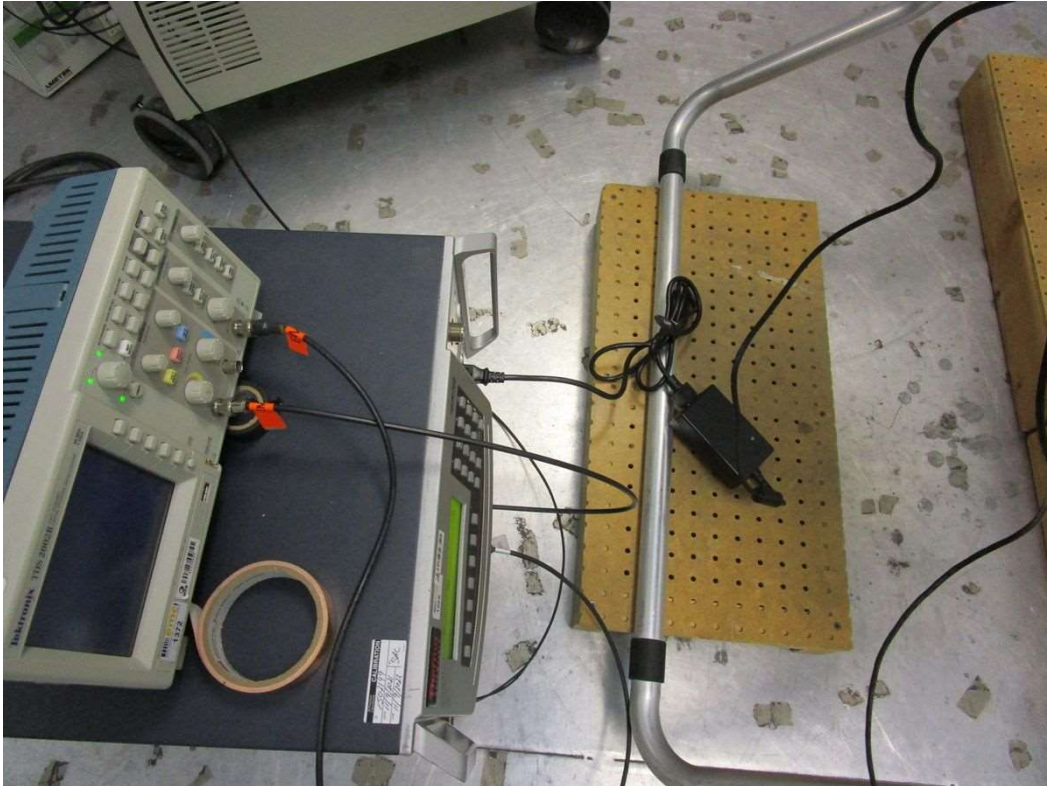
National Technical Systems	
<b>Voltage Dips and Interrupts per IEC / EN 61000-4-11</b>	
Standard Referenced: <u>EN 61000-4-11</u>	Date: <u>3/18/2022</u>
Temperature: <u>20.3°C</u> Humidity: <u>20%</u>	Pressure: <u>837 mb</u>
Input Voltage: <u>120Vac/60Hz</u>	
Configuration of Unit: <u>Verity Touch Writer w/Brother L6400 printer fully exercising all features of product.</u>	
Test Engineer: <u>Casey Lockhart</u>	

% 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

National Technical Systems	
<b>Voltage Dips and Interrupts per IEC / EN 61000-4-11</b>	
Standard Referenced: <u>VVSG1.0 IEC 61000-4-11</u>	Date: <u>3/18/2022</u>
Temperature: <u>20.3°C</u> Humidity: <u>20%</u>	Pressure: <u>mb</u>
Input Voltage: <u>129vac/60Hz and 105Vac/60Hz</u>	
Configuration of Unit: <u>Verity Touch Writer w/Brother L6400 Laser printer (support Equipment)</u>	
Test Engineer: <u>Casey Lockhart</u>	

129Vac Line Voltage Variations (+7.5% of nominal 120V) 1 hrs.	A	Pass
105Vac Line Voltage Variations (-12.5% of nominal 120V) 1 Hrs.	A	Pass

5.7.4 Test Photographs



Voltage Dips and Interrupts-AC



Voltage Dips and Interrupts-Test Setup



5.7.5 Test Equipment List

Table 5.7-1: Voltage Dips and Interruptions Test Equipment List

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



6.0 Test Logs

**EMI Test Log**

Manufacturer:	<u>SLI Compliance</u>	Project Number:	<u>PR154296</u>
Model:	<u>Darrick Forester</u>	S/N:	<u>W2014374311, U64185J1N427136</u>
Customer Representative:	<u>Verity Touch Writer w/Brother L6400 Laser printer (support Equipment)</u>		
Standard Referenced:	<u>VVSG1.0 IEC 61000-4-6</u>		

FR0105

**Ground Planes / CALC**

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
4-6	---	March 18, 2022 0915 – 1015	Conducted RF Immunity. 10Vrms, 0.15 – 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell. One AC main, No I/O >3m 120 VAC / 60 Hz (4.1.2.11)		1.0	Pass	CL
---	---	1015 – 1030	Post test verification of UUT.		.25	Pass	CL
4-4	---	1030 – 1130	Electrical Fast Transient / Burst. Mains: +/- 2Kv, I/O: +/- 1Kv. One AC main, No I/O >3m 120 VAC / 60 Hz (4.1.2.6)		1.0	Pass	CL
4-11		1130 – 1200	Voltage Dips and Interruptions. 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles. One AC main 120 VAC / 60 Hz (4.1.2.5)		.5	Pass	CL
4-11	---	1200 – 1300	Voltage Dips and Interruptions. Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. One hour each +/-, One AC main 120 VAC / 60 Hz (Inc./Red. Of Nom. Voltage) <b>(4.1.2.5) 129Vac/60Hz</b>		1.0	Pass	CL
---	---	1300 – 1400	Voltage Dips and Interruptions. Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. One hour each +/-, One AC main 120 VAC / 60 Hz (Inc./Red. Of Nom. Voltage) <b>(4.1.2.5) 105Vac/60Hz</b>		1.0	Pass	CL
---	---	1400 – 1430	Voltage Dips and Interruptions. Surge of +/- 15% line variation of nominal line voltage. 120 VAC / 60 Hz (Surge of +/- 15%) One AC main <b>(4.1.2.5) 138Vac/60Hz</b>		.5	Pass	CL
---	---	1430 – 1500	Voltage Dips and Interruptions. Surge of +/- 15% line variation of nominal line voltage. 120 VAC / 60 Hz (Surge of +/- 15%) One AC main <b>(4.1.2.5) 102Vac/60Hz</b>		.5	Pass	CL
---	---	1500 – 1530	Post test check of the UUT.		.5	Pass	CL

## EMI Test Log

Manufacturer:	SLI Compliance	Project Number:	PR154296
Model:	Darrick Forester	S/N:	W2014374311, U64185J1N427136
Customer Representative:	Verity Touch Writer w/Brother L6400 Laser printer (support Equipment)		
Standard Referenced:	VVSG1.0 IEC 61000-4-6		

FR0105

### Ground Planes / CALC

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
4-5	---	March 21, 2022 0730 – 1330	Surge Immunity. Mains: +/- 2Kv CM, +/- 2Kv DM, (0, 90, 180, 270) 120 VAC / 60 Hz (4.1.2.7)		6.0	Pass	CL
---	---	1330 – 1400	Post Test of UUT		.5	Pass	CL
4-8	---	1400 – 1500	Power Frequency H-Field Immunity. 30A/m, 50 / 60 Hz, 3 axes. 120 VAC / 60 Hz (4.1.2.12)		1.0	Pass	CL
---	---	1500 – 1530	Post Test of UUT		.5	Pass	CL
4-3	---	March 23, 2022 0700 – 1200	Radiated RF Immunity 10V/m, 80 – 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz (4.1.2.10) Note: On the back side, printer got a drum error. Repeat back side testing. Printer shut down and did not accept print jobs generated by UUT. Client wishes to move on to the next project. They will ship a new printer, same model, and re-test later.			Pending	CL
4-3		March 24, 2022 1200	Re-setup for Radiated RF Immunity Retest 10V/m, 80 – 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz (4.1.2.10) Back Side		---	---	TW
4-3			Client swapped out support printer, had the same issue, stopped printing		---	---	TW
4-3			*Client went back to the original printer and continued testing on the back side, the printer is support equipment, therefore, it's ok to reset printer after each issue has occurred		---	---	TW
4-3			Resume 4-3 testing on remaining side		---	---	TW
4-3		1530	Completed 4-3 testing		---	Pass	TW
4-2		April 19, 2022 0800-0830	Setup for ESD. Pretest complete and passed. Resistance check for bleed resistors: 938kOhms & 940kOhms.		0.5	---	WK/ TW
4-2		0830-1230	ESD (4.1.2.8) +/- 8kV Contact, +/-2, 4, 8, 15 kV Air @ 120VAC/60Hz		4.0	Pass	WK/ TW





**End of Test Report**