Test Report of

Full Compliance Immunity Testing Performed on the ClearAccess and ClearCast

Issue Date: 08 August 2019

Prepared for: **Pro V&V, Inc.**
700 Boulevard South
Huntsville, AL 35802

Prepared by: **National Technical Systems**
NTS Longmont
1736 Vista View Drive
Longmont, Colorado 80504

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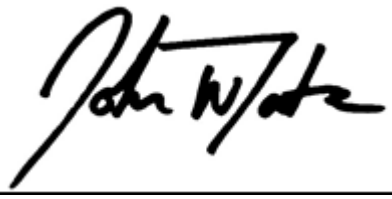
SIGNATURES

Prepared by:  Date: 08 August 2019

Technical Writer, Greg Gagne

Reviewed by:  Date: 08 August 2019

Technical Reviewer, John Tate

REVISIONS

Revision	Reason for Revision	Date
NR	Initial Release	08 August 2019

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1.0 ADMINISTRATIVE DATA

1.1 PURPOSE OF TESTS

This report documents the test efforts performed on the ClearAccess/ClearCast to verify compliance to EAC 2005 VVSG. This was a formal qualification test and was conducted from 16-24 July 2019.

The normative references of this standard define the test methods used for the immunity testing. These standards are contained in Table 1-1.

Table 1-1: Reference Documents and Performance Criteria

Requirement	Specification	Test Method	Performance Criteria
EAC 2005 VVSG	Electrostatic Discharge	EN 61000-4-2: 2009	(B) Self-Recovering
	Radiated RF Immunity	EN 61000-4-3:, 2006 + A1: 2008 + A2: 2010	(A) No Degradation
	Electrical Fast Transient/Burst	EN 61000-4-4: 2004 + A1: 2010	(B) Self-Recovering

1.2 DESCRIPTION OF TEST ITEM

The UUT is a ballot marking device (Configuration 1)/precinct tabulator (Configuration 2) designed for use in “voting during elections” environments.

1.3 MANUFACTURER

Clear Ballot Group
700 Boulevard South, Suite 102
Huntsville, AL 35802

1.4 REFERENCE DOCUMENTS

1. Quotation Number OP0521624 – 1
2. EAC 2005 VVSG
3. ISO 17025:2005

1.5 QUANTITY OF ITEMS TESTED

Quantity	Test Item Description	Part/Model Numbers	Serial Numbers
1	ClearAccess	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	A17C002919, AK76022990A0, PY3JN2000184
1	ClearCast	Model D	041902577

1.6 SECURITY CLASSIFICATION

Unclassified

1.7 TESTS CONDUCTED BY

National Technical Systems
NTS Longmont
1736 Vista View Drive
Longmont, Colorado 80504

1.8 DISPOSITION OF TEST ITEMS

Returned to:

Pro V&V, Inc.
700 Boulevard South
Huntsville, AL 35802

1.9 TEST ENVIRONMENT

1.9.1 Immunity Test Site

The immunity testing was performed at NTS's test facility in Longmont, Colorado. The radiated field immunity testing was performed in a ferrite lined, shielded enclosure. The enclosure is 10' high x 12' wide x 20' long in size and meets the field uniformity requirements of IEC 61000-4-3. The size of the chamber allows 2-meter separation between the antenna and the UUT.

From 80 MHz to 1 GHz, field uniformity deviation for NTS's completely anechoic lined chamber (CALC) is a maximum of 7.4 dB for three frequencies for vertical polarization (1.1% of all test frequencies) and 7.3 dB for two frequencies for horizontal polarization (0.8% of all test frequencies). This is allowed by IEC 61000-4-3, as follows:

"**In the frequency range up to 1 GHz, a tolerance greater than+ 6 dB, up to +10 dB, but not less than -0 dB is allowed for a maximum of 3% of the test frequencies, provided that the actual tolerance is stated in the test report**." (*Ref. IEC 61000-4-3, Ed. 3.2 (2010), Section 6.2*)

All other immunity testing was performed on a ground reference plane measuring 3.05 m by 3.05 m, or 9.3 m^2. The ground plane was made of 90 mil steel and extended beyond the UUT by 0.5 meters and all sides. It was bonded to the protective earth ground of the test facility and complied with all applicable standards.

1.9.2 Measurement Uncertainty

The measurement uncertainty for NTS's immunity test facility complies with the requirements defined in CISPR 16. The complete calculations of measurement uncertainty are contained in a memo, which is available upon request. However, a summary of NTS's measurement uncertainty is given in Table 1-2.

Table 1-2

Test	Measurement Uncertainty	Reference
Electrostatic Discharge	Contact Voltage: 1.9% Risetime: 60 ps Peak Current: 2.8% 30 ns Current: 3.8% 60 ns Current: 9% Indicated Voltage: 1.9%	Accredited Calibration Data Sheet
Radiated RF Immunity	V-pole: 1.2 dB H-pole: 0.7 dB	Worksheets located at H:\Calibration\Measurement Uncertainty
Electrical Fast Transient	Voltage: 0.01 kV Risetime: 0.45 nsec Pulse Width: 1.08 nsec	

1.10 TEST APPARATUS

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 17025:2005. Certification of calibration is on file subject to inspection by authorized personnel.

1.11 SOURCE INSPECTION

NTS QA

1.12 PURCHASE ORDER NUMBER

2019-011

2.0 TEST RESULTS SUMMARY

Table 2-1: Summary of Test Results

Test	Specification	Test Dates	Results
Electrostatic Discharge	EN 61000-4-2	17 July 2019	Complies
Radiated RF Immunity	EN 61000-4-3	16-24 July 2019	Complies
Electrical Fast Transient/Burst	EN 61000-4-4	17 July 2019	Complies

3.0 ELECTROSTATIC DISCHARGE TEST

3.1 REFERENCES

EN 61000-4-2

3.2 SERIAL NUMBERS

Table 3-1: Serial Numbers

041902593

3.3 TEST PROCEDURE

The UUT was subjected to Electrostatic Discharge Testing per IEC 61000-4-2 and in accordance with the referenced documents. Contact discharge testing was performed on selected conductive points of the UUT at a level of ±8 kV using 1 pulse per second (pps) and 10 discharges per level per polarity. Air discharge was performed at non-conductive points on the UUT at levels of ±2 kV, ±4 kV, ±8 kV, and ±15 kV. Indirect discharge testing was performed using a vertical coupling plane (VCP) and a horizontal coupling plane (HCP) at a level of ±8 kV.

3.4 SPECIAL CONFIGURATIONS

N/A

3.5 TEST RESULTS

The UUT maintained essential performance and basic safety and therefore complied with the requirements of this test.

Note: In the event that no discharge occurs when ESD testing is performed on a product, the data sheet will state “no [contact or air] discharge points found”.

Electrostatic Discharge Test Data is presented in Appendix A.

4.0 RADIATED RF IMMUNITY TEST

4.1 REFERENCES

EN 61000-4-3

4.2 SERIAL NUMBERS

Table 4-1: Serial Numbers

A17C002919,AK76022990A0, PY3JN2000184
041902577

4.3 TEST PROCEDURE

Radiated RF immunity testing was performed on the UUT in accordance with the test methods specified in IEC 61000-4-3. The UUT, which was a table-top unit, was placed of a non-conductive table inside the semi-anechoic-lined, ferrite floor chamber. Testing was performed in both horizontal and vertical antenna polarizations over the frequency range from 80 MHz to 1 GHz at 10 V/m. The UUT was rotated on the table so that all four sides were illuminated in the field. The frequency was stepped in 1% increments and a dwell time of three (3) seconds was used at each test frequency. The radiated field was amplitude modulated with a 1 kHz sine wave to a depth of 80%. Performance of the unit was monitored remotely (via Ethernet) with a support PC. Both configurations were tested.

4.4 SPECIAL CONFIGURATIONS

N/A

4.5 TEST RESULTS

The UUT maintained essential performance and basic safety and therefore complied with the requirements of this test.

Radiated RF Immunity Test Data is presented in Appendix B.

5.0 ELECTRICAL FAST TRANSIENT/BURST TEST

5.1 REFERENCES

EN 61000-4-4

5.2 SERIAL NUMBERS

Table 5-1: Serial Numbers

041902593

5.3 TEST PROCEDURE

Electrical fast transient/burst testing was performed on the UUT in accordance with EN 61000-4-4. The UUT's AC power was tested via direct injection at a level of ±2.0 kV. A 100 kHz repetition rate was used for this testing and a minimum of 1 minute was used for each mode of injection.

5.4 SPECIAL CONFIGURATIONS

N/A

5.5 TEST RESULTS

The UUT maintained essential performance and basic safety and therefore complied with the requirements of this test.

Electrical Fast Transient/burst Test Data is presented in Appendix C.

APPENDIX A: Electrostatic Discharge Test Data

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019
Temperature:	26.7˚C Humidity: 52%	Pressure:	835 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Printing ballots		
Test Engineer:	Casey Lockhart		

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Test Location	Voltage Level (kV)	Polarity +	Polarity -	Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass / Fail
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	N/A	N/A
Contact Discharge Points - **RED** Arrows.								
Figure A2	8	x	x	10	1	Slight flicker on screen.	B	Pass
Figure A2	8	x	x	10	1		A	Pass
Figure A2	8	x	x	10	1		A	Pass
Figure A2	8	x	x	10	1		A	Pass
Figure A2	8	x	x	10	1	Slight flicker on screen	B	Pass
Air Discharge Points - **BLUE** Arrows.								
Figure A2	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	--
Figure A2	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	--
Figure A2	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	--
Figure A2	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	--
Figure A2	2, 4, 8, 15	x	x	10	1	No discharge points found.	---	--

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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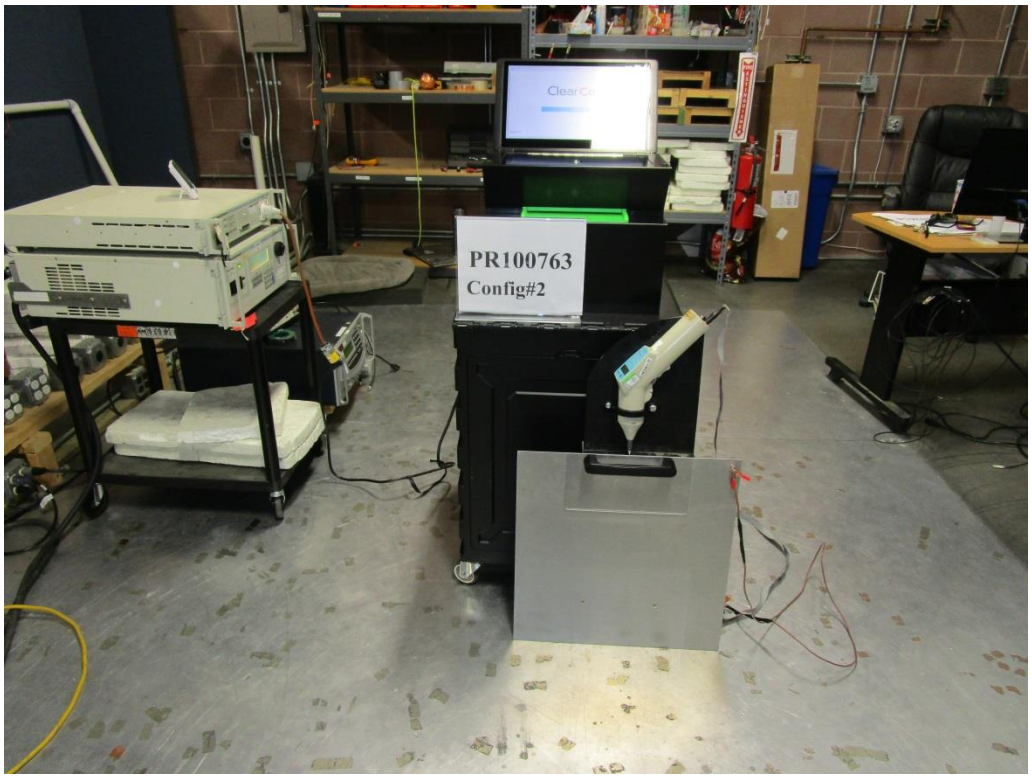

Figure A1. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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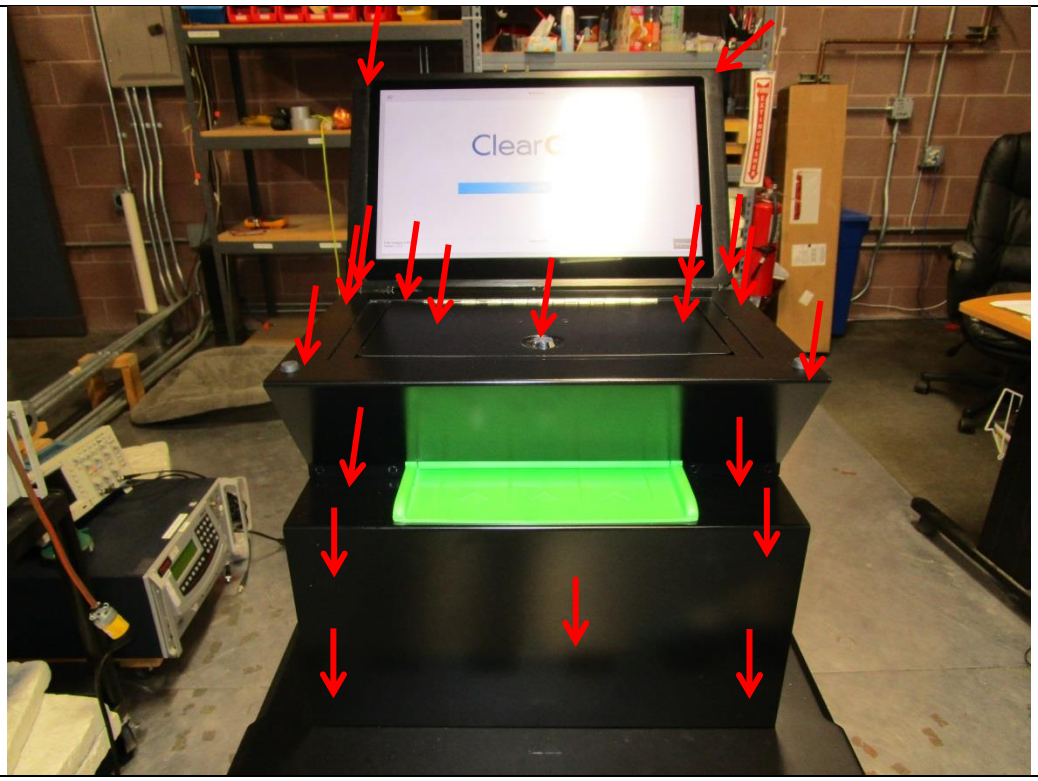

Figure A2. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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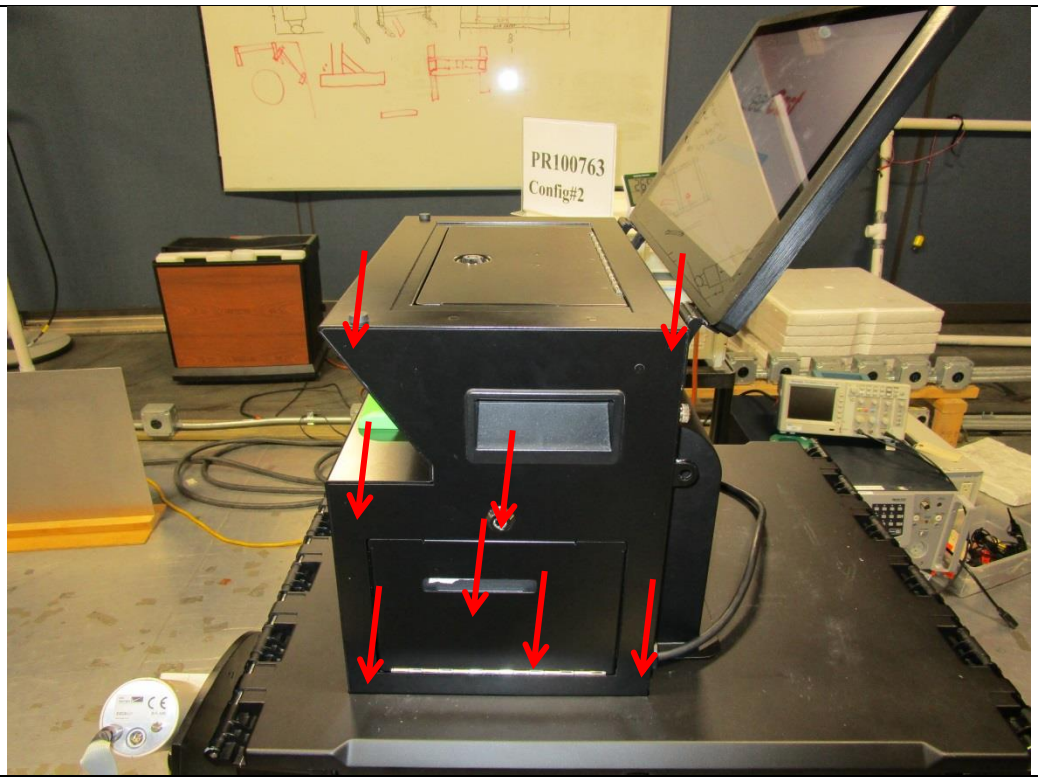

Figure A3. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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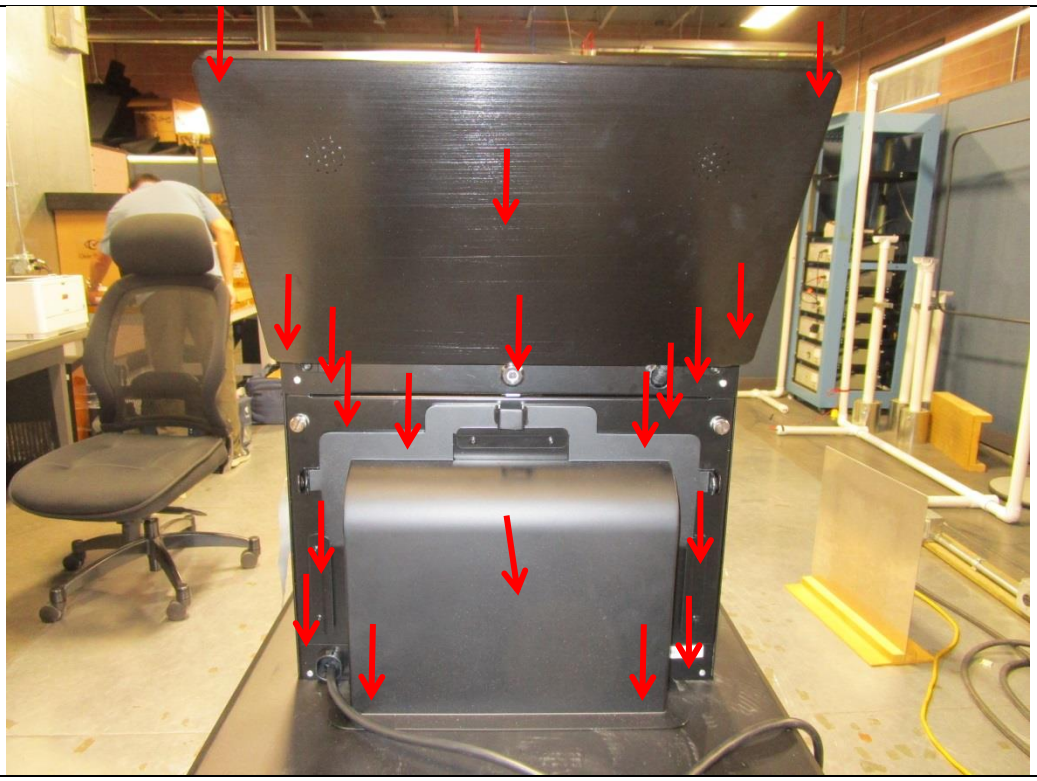

Figure A4. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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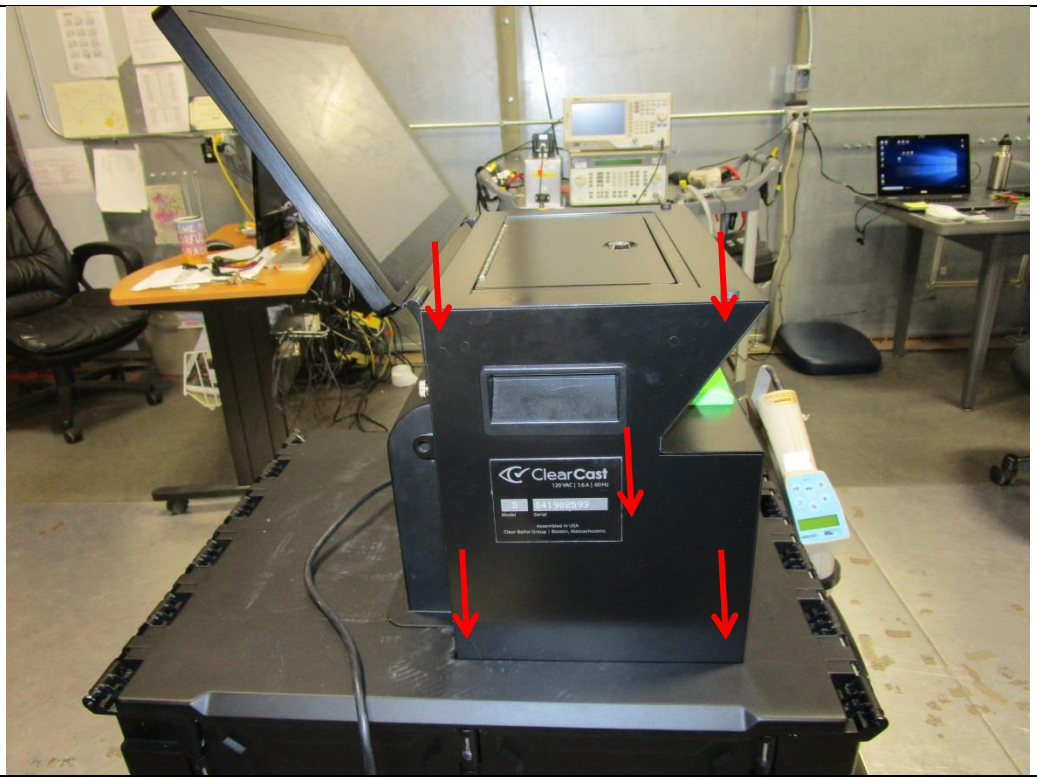

Figure A5. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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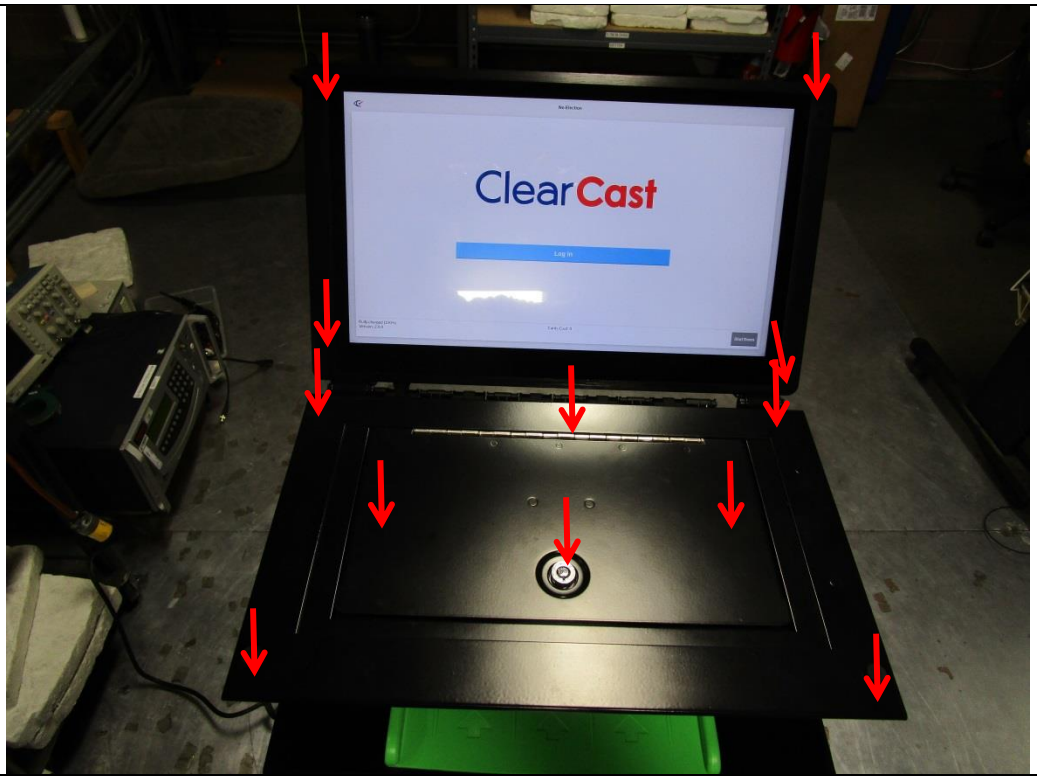

Figure A6. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

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Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1039	Fluke	83-3	69811227	Multimeter/Frequency Meter	02/14/2019	02/14/2020
1281	EMC Partner	ESD3000	284	ESD Test System	01/16/2019	01/16/2020
1296	California Instruments Corporation	5001IX208-150/300	S59159	5k VA AC Power Source	08/01/2018	08/01/2019
1899	EXTECH	445703	1217	Hygrometer-Thermometer	06/10/2019	06/10/2020

APPENDIX B: Radiated RF Immunity Test Data

Configuration 1:

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	S/N:	A17C002919,AK76022990A0, PY3JN2000184
Standard Referenced:	EAC 2005 VVSG	Date:	July 16, 2019
Temperature:	24˚C Humidity: 68%	Pressure:	838mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Printing ballots		
Test Engineer:	Kevin Johnson		

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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 Side**	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 Side**	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 Side**	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 Side**	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	S/N:	A17C002919,AK76022990A0, PY3JN2000184
Standard Referenced:	EAC 2005 VVSG	Date:	July 16, 2019

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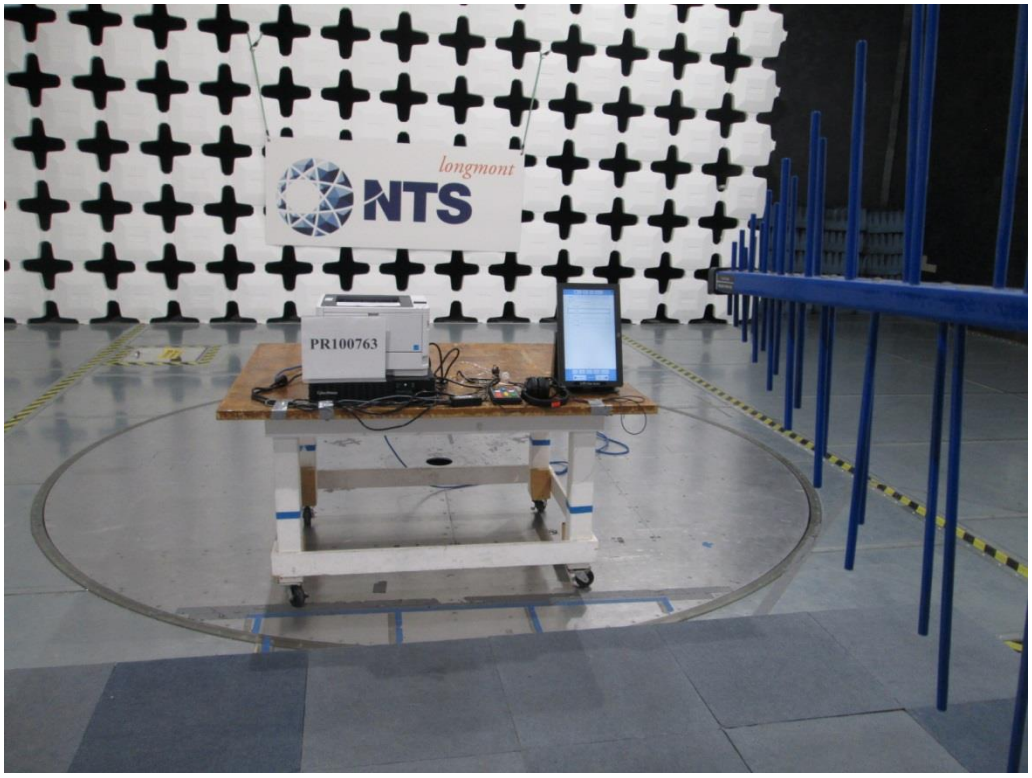

Figure B1. Radiated RF Immunity Test Setup – Front Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	S/N:	A17C002919,AK76022990A0, PY3JN2000184
Standard Referenced:	EAC 2005 VVSG	Date:	July 16, 2019

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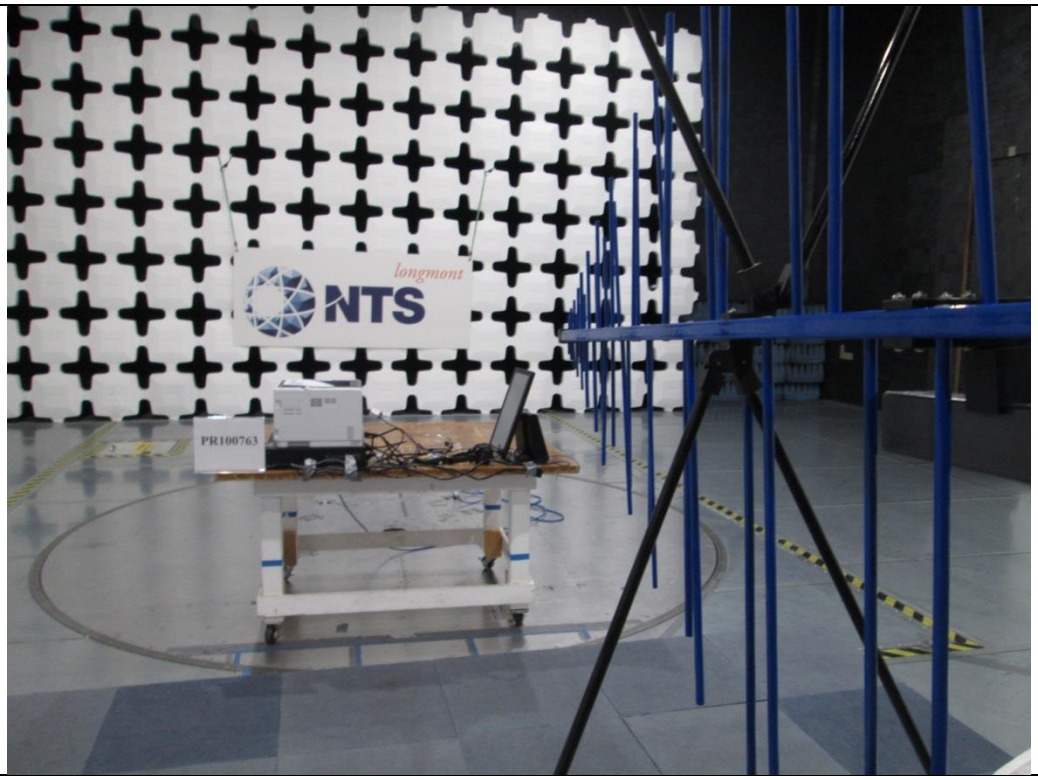

Figure B2. Radiated RF Immunity Test Setup – Right Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	S/N:	A17C002919,AK760 22990A0, PY3JN2000184
Standard Referenced:	EAC 2005 VVSG	Date:	July 16, 2019

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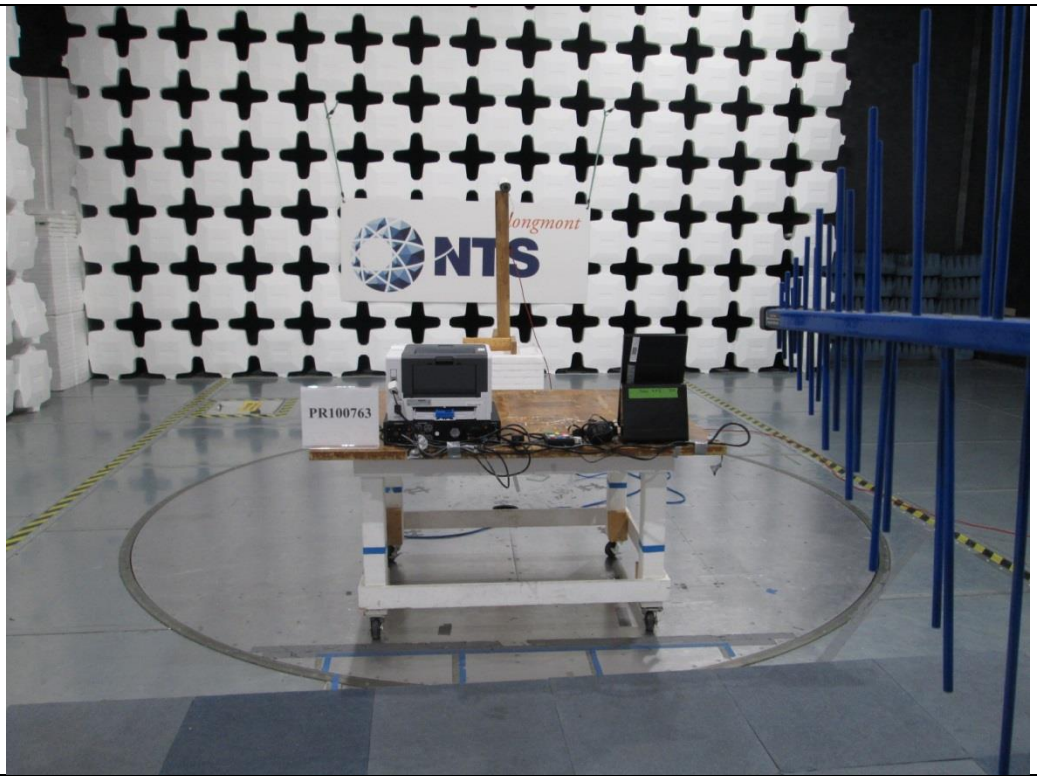

Figure B3. Radiated RF Immunity Test Setup – Back Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	S/N:	A17C002919,AK760 22990A0, PY3JN2000184
Standard Referenced:	EAC 2005 VVSG	Date:	July 16, 2019

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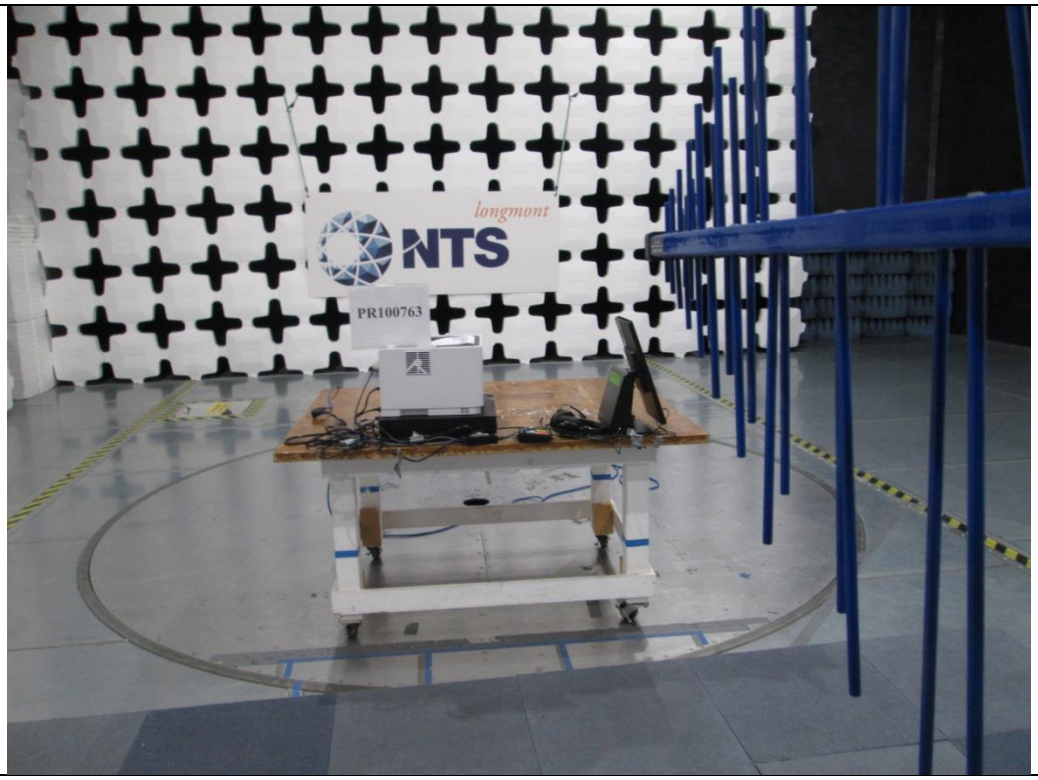

Figure B4. Radiated RF Immunity Test Setup – Left Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ELO E(AIO Desktop), B432(Oki printer), PY3JN2000184 (CyberPower UPS)	S/N:	A17C002919,AK76022990A0, PY3JN2000184
Standard Referenced:	EAC 2005 VVSG	Date:	July 16, 2019

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Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1005	EMCO	3140	1012	Biconilog Antenna	NA	NA
1054	IFR	2023B	202302/817	Signal Generator (9 kHz - 2.05 GHz)	02/07/2019	02/07/2020
1396	CIR Enterprises	10m Chamber #2	002	10m Chamber with 4m turntable	03/29/2018	03/29/2020
1575	Rigol Technologies, Inc	DSA815-TG	DSA8A162150400	9 kHz to 1.5 GHz Spectrum Analyzer w/ tracking gen	11/09/2018	11/09/2019
1455	Giga-tronics	GT-8888A	8888A03337	10 MHz to 8 GHz, +20 dBm, 25 Vdc Power Meter	04/10/2019	04/10/2020
1309	Amplifier Research	150W100BM3	303844	Amplifier 150W, 80-1000MHz	NA	NA
1308	Amplifier Research	500WA100AM3	303874	Amplifier 500W, 10kHz-100MHz	NA	NA
1181	EMCI	RFS	V2.5.8	Initial Release 02 July 2004	NA	NA
1492	Fluke	87/5 Multimeter	23350032	True RMS Multimeter	05/09/2019	05/09/2020

Configuration 2:

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast Model D	S/N:	041902577
Standard Referenced:	EAC 2005 VVSG	Date:	July 24, 2019
Temperature:	27˚C Humidity: 40%	Pressure:	842 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Printing ballots		
Test Engineer:	Mike Tidquist		

PR100763-4-3.doc FR0100

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 Side**	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 Side**	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 Side**	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 Side**	A	Pass
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		A	Pass

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast Model D	S/N:	041902577
Standard Referenced:	EAC 2005 VVSG	Date:	July 24, 2019

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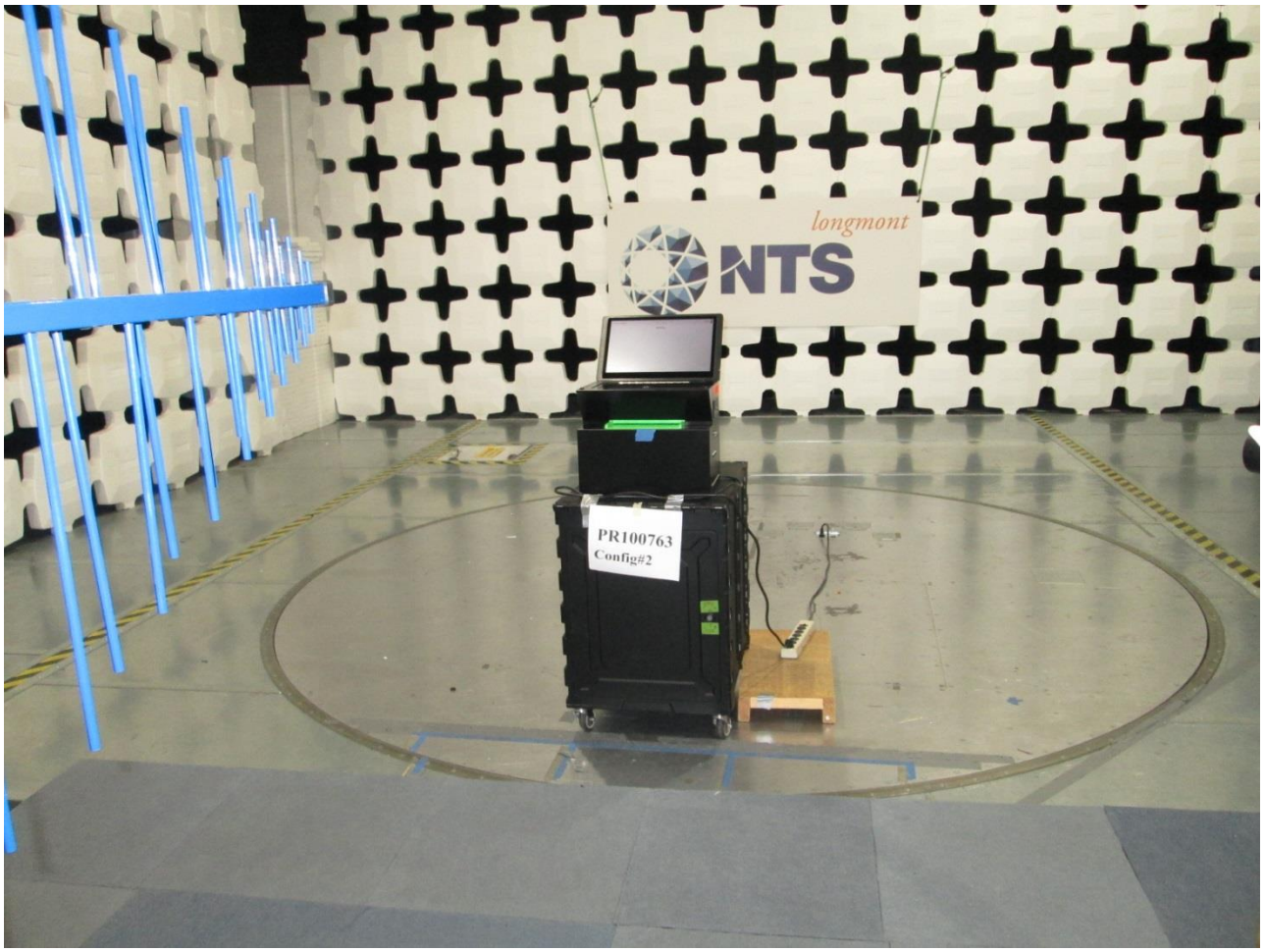


Figure B1. Radiated RF Immunity Test Setup – Front Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast Model D	S/N:	041902577
Standard Referenced:	EAC 2005 VVSG	Date:	July 24, 2019

PR100763-4-3.doc FR0100

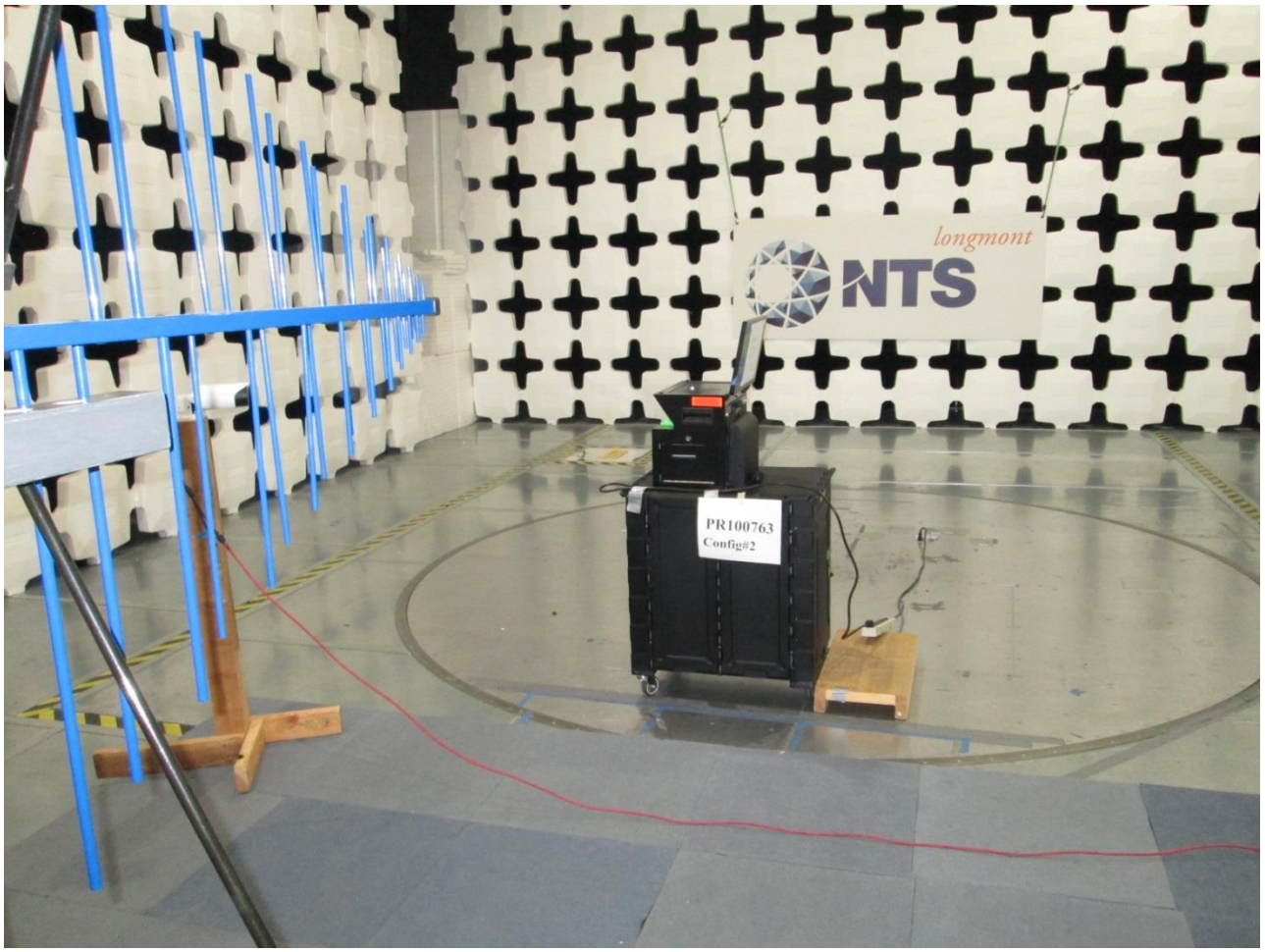


Figure B2. Radiated RF Immunity Test Setup – Right Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast Model D	S/N:	041902577
Standard Referenced:	EAC 2005 VVSG	Date:	July 24, 2019

PR100763-4-3.doc FR0100

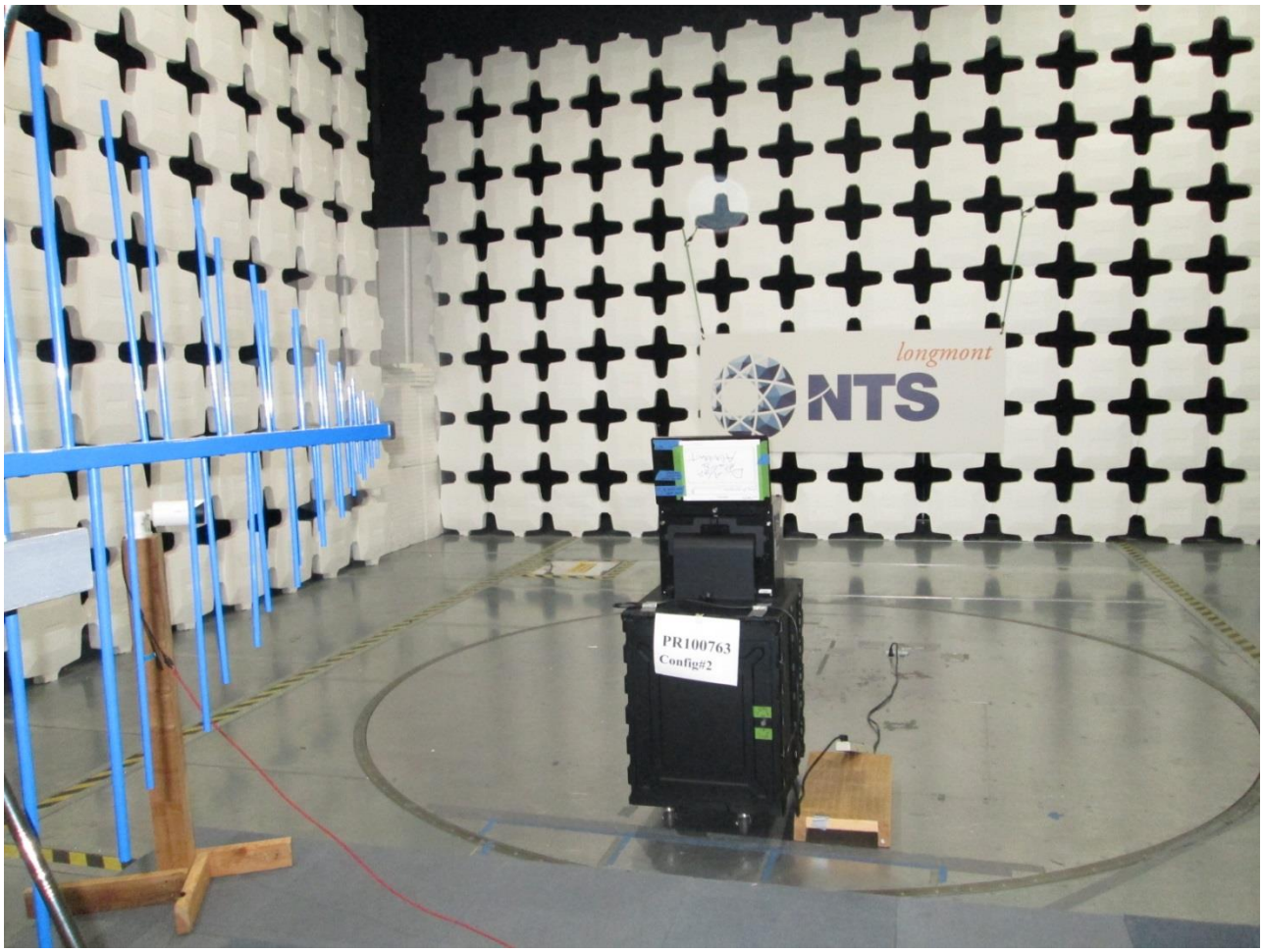


Figure B3. Radiated RF Immunity Test Setup – Back Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast Model D	S/N:	041902577
Standard Referenced:	EAC 2005 VVSG	Date:	July 24, 2019

PR100763-4-3.doc FR0100

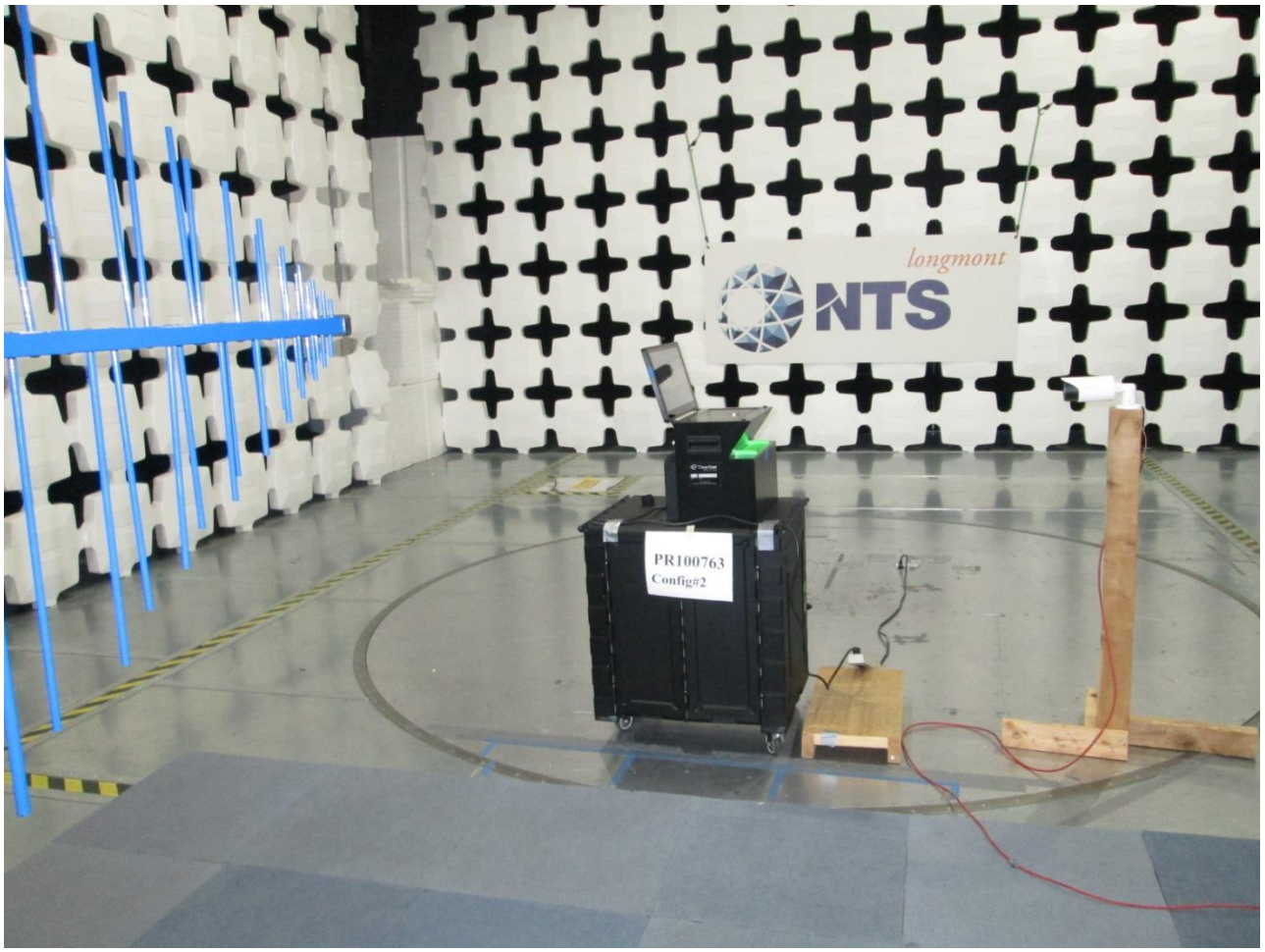


Figure B4. Radiated RF Immunity Test Setup – Left Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast Model D	S/N:	041902577
Standard Referenced:	EAC 2005 VVSG	Date:	July 24, 2019

PR100763-4-3.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1005	EMCO	3140	1012	Biconilog Antenna	NA	NA
1054	IFR	2023B	202302/817	Signal Generator (9 kHz - 2.05 GHz)	02/07/2019	02/07/2020
1396	CIR Enterprises	10m Chamber #2	002	10m Chamber with 4m turntable	03/29/2018	03/29/2020
1575	Rigol Technologies, Inc	DSA815-TG	DSA8A162150400	9 kHz to 1.5 GHz Spectrum Analyzer w/ tracking gen	11/09/2018	11/09/2019
1455	Giga-tronics	GT-8888A	8888A03337	10 MHz to 8 GHz, +20 dBm, 25 Vdc Power Meter	04/10/2019	04/10/2020
1309	Amplifier Research	150W100BM3	303844	Amplifier 150W, 80-1000MHz	NA	NA
1308	Amplifier Research	500WA100AM3	303874	Amplifier 500W, 10kHz-100MHz	NA	NA
1181	EMCI	RFS	V2.5.8	Initial Release 02 July 2004	NA	NA
1492	Fluke	87/5 Multimeter	23350032	True RMS Multimeter	05/09/2019	05/09/2020

APPENDIX C: Electrical Fast Transient/Burst Test Data

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019
Temperature:	24.5˚C Humidity: 60%	Pressure:	835 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Printing ballots		
Test Engineer:	Casey Lockhart		

PR100763-4-4.doc FR0100

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

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

PR100763-4-4.doc FR0100

Figure C1. Electrical Fast Transient Test Setup.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

PR100763-4-4.doc FR0100

Figure C2. Electrical Fast Transient Test Setup – AC Mains.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR100763
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast Model D	S/N:	041902593
Standard Referenced:	EAC 2005 VVSG	Date:	July 17, 2019

PR100763-4-4.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1039	Fluke	83-3	69811227	Multimeter/Frequency Meter	02/14/2019	02/14/2020
1184	KeyTek	CEWare	4.0	KeyTek EMCPro Control Software for EFT, Surge, H-F	NA	NA
1284	ThermoFischer Scientific	EMC Pro Plus - USA	0705276	EFT, Surge, H-field & PQF Immunity Test Generator	07/05/2018	08/05/2019
1296	California Instruments Corporation	5001IX208-150/300	S59159	5k VA AC Power Source	08/01/2018	08/01/2019
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	02/02/2019	02/02/2020
1899	EXTECH	445703	1217	Hygrometer-Thermometer	06/10/2019	06/10/2020

APPENDIX D: Test Log

EMI\ENV Test Log

Manufacturer:	Pro V&V	Project Number:	PR100763
Model:	**Config#1(Clear Vote 2.0)**	S/N:	A17C002919
	E (ELO)		AK76022990A0
	B432 (Oki)		PY3JN2000184
	PR1500RT2U (CyberPower)		Config#2:041902577
	Config#2(ClearCast Model D)		
Customer Representative:	Michael Walker		
Standard Referenced:	FCC		

FR0105

10m Emissions

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
RE	6001	July 15, 2019 1230-1330	Initial Product Set-up & Configuration Engineering / Trouble-Shoot Test#1: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance **AMBIENT SCAN**		1.0	Complete	KJ
RE	1342	1330-1430	Test#2: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz ELO E-Series: A17C002919 B432dn: AK76022990A0 Cyberpower: PY3JN2000184 Config#1 NOTE: Client says unpopulated ports on the UPS are diagnostic only. UUT failed at 666.676MHz by 3.31dB		2.0	Fail	KJ
RE		1430-1630	Test#3: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz ELO E-Series: A17C002919 B432dn: AK8901640960 Cyberpower: PY3JN2000184 Config#1 NOTE: Client says unpopulated ports on the UPS are diagnostic only. **Client changed out the printer to the backup printer** **B432dn: AK8901640960**		2.0	Pass	KJ
CE	2341	July 16, 2019 0800-1000	Test#4: 150kHz – 30MHz Config#1 120Vac/60Hz		2.0	Pass	KJ

10m Emissions

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
4-3	4398	1000	Radiated RF Immunity (10m 2) (4.1.2.10) (Config. #1) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz Printing and script stopped. Field was not on. Printing and script stopped at 167.7689MHz. Right side, H-pole. Printer power off, PC re-booted Printing and script stopped at 101MHz. Rights side, H-pole. Printer power off, PC re-booted PC has the following error message "Warning- logs are not valid" Printing and script stopped at 564MHz. Rights side, H-pole. Printer power off, PC re-booted Battery in the UPS is at 18%. Client believes that the battery is too low to hold the unit up. When the unit prints it does switch to battery power. Client will try to put a new battery in the UPS. Testing resumed after putting a new battery in the UPS. Unit had a paper jam at 710MHz. back side, V-pole Finished everything tested but right side.				KJ
RE	1342	July 24, 2019 0800-1000	Test #5: Radiated Emissions: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz		2.0	Pass	MT
CE	2341	1000-1100	Test #6: Conducted Emissions, 150 kHz - 30 MHz 120 VAC / 60 Hz		1.0	Pass	MT
---	---	1100-1200	Setup For RI		1.0	Complete	MT
---	---	1200-1230	Lunch		---	---	MT
Running Radiated Immunity in 10M #2 Chamber							
4-3	4398	1230-1630	Radiated RF Immunity (10m 2) (Config. #2) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz Front and Right side both polarities complete. Back Side Vertical polarity complete. Still need Back Horizontal and left side both Polarities.		4.0	---	MT
4-3		July 25, 2019 0800-1200	Continue: Radiated RF Immunity (10m 2) (Config. #2) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz		4.0	Pass	MT

Regular hours: 19.0

10m Emissions

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
			Overtime/Prem hours:				
			Total hours:		19.0		

Ground Planes / CALC

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
4-4	4411	July 17, 2019 0800 - 0930	Equipment setup		1.5	---	CL
---	---	0930 - 1030	Waiting on correct paper to be brought over.		1.0	---	CL
---	---	1030 - 1100	Electrical Fast Transient / Burst (4.1.2.6) (Config. #2) Mains: +/- 2kV, I/O: +/- 1kV 120 VAC / 60 Hz		.5	Pass	CL
4-2	4254	1100 - 1330	Electrostatic Discharge (4.1.2.8) (Config. #1) +/- 8kV Contact, +/-2, 4, 8, 15kV Air 120 VAC / 60 Hz		2.5	Pass	CL

Project #: PR100763
B90622

Work Order #: 2019052202A

PO#:
Amount:

Company: Pro V&V
700 Boulevard South
Suite 102
Huntsville, AL 35802
Phone: 256-713-11111
Fax:

Contact: Michael Walker
Email: michael.walker@provandv.com

Model#:
Serial #:

Test Notes: Voting Machine Testing
Formal test reports

Quoted Work

Date	Test Code	Description	Standard	Result	Cost	Billed
July 15, 2019	1342	Radiated Emissions, 30 MHz - 1 GHz (4.1.2.9) (Config. #1) 30 MHz - 1 GHz 120 VAC / 60 Hz	FCC Part 15, Class B	Pass		
July 24, 2019	1342	Radiated Emissions, 30 MHz - 1 GHz (4.1.2.9) (Config. #2) 30 MHz - 1 GHz 120 VAC / 60 Hz	FCC Part 15, Class B	Pass		
July 24, 2019	2341	Conducted Emissions, 150 kHz - 30 MHz (4.1.2.9) (Config. #2) -- 120 VAC / 60 Hz	FCC Part 15, Class B	Pass		
July 16, 2019	2341	Conducted Emissions, 150 kHz - 30 MHz (4.1.2.9) (Config. #1) -- 120 VAC / 60 Hz	FCC Part 15, Class B	Pass		
	4254	Electrostatic Discharge (4.1.2.8) (Config. #1) +/- 8kV Contact, +/-2, 4, 8, 15kV Air 120 VAC / 60 Hz	EN61000-4-2			
July 17, 2019	4254	Electrostatic Discharge (4.1.2.8) (Config. #2) +/- 8kV Contact, +/-2, 4, 8, 15kV Air 120 VAC / 60 Hz	EN61000-4-2	Pass		
July 24, 2019	4398	Radiated RF Immunity (10m 2) (4.1.2.10) (Config. #2) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	EN61000-4-3	Pass		
	4398	Radiated RF Immunity (10m 2) (4.1.2.10) (Config. #1) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	EN61000-4-3			

Quoted Work						
Date	**Test Code**	**Description**	**Standard**	**Result**	**Cost**	**Billed**
	4411	Electrical Fast Transient / Burst (4.1.2.6) (Config. #1) Mains: +/- 2kV, I/O: +/- 1kV 120 VAC / 60 Hz	EN61000-4-4			
July 17, 2019	4411	Electrical Fast Transient / Burst (4.1.2.6) (Config. #2) Mains: +/- 2kV, I/O: +/- 1kV 120 VAC / 60 Hz	EN61000-4-4	Pass		
	4596	Surge Immunity (4.1.2.7) (Config. #1) Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz	EN61000-4-5			
	4596	Surge Immunity (4.1.2.7) (Config. #2) Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz	EN61000-4-5			
	4622	Conducted RF Immunity (4.1.2.11) (Config. #1) 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	EN61000-4-6			
	4622	Conducted RF Immunity (4.1.2.11) (Config. #2) 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	EN61000-4-6			
	4831	Power Frequency H-Field Immunity (4.1.2.12) (Config. #2) 30A/m, 50 / 60 Hz, 3 axes 120 VAC / 60 Hz	EN61000-4-8			
	4831	Power Frequency H-Field Immunity (4.1.2.12) (Config. #1) 30A/m, 50 / 60 Hz, 3 axes 120 VAC / 60 Hz	EN61000-4-8			
	4194	Voltage Dips and Interruptions (Surge of +/- 15%) (4.1.2.5) (Config. #1) Surge of +/- 15% line variation of nominal line voltage 120 VAC / 60 Hz	EN61000-4-11			
	4194	Voltage Dips and Interruptions (Surge of +/- 15%) (4.1.2.5) (Config. #2) Surge of +/- 15% line variation of nominal line voltage 120 VAC / 60 Hz	EN61000-4-11			
	4193	Voltage Dips and Interruptions (4.1.2.5) (Config. #2) 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles 120 VAC / 60 Hz	EN61000-4-11			

Quoted Work						
Date	**Test Code**	**Description**	**Standard**	**Result**	**Cost**	**Billed**
	4193	Voltage Dips and Interruptions (4.1.2.5) (Config. #1) 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles 120 VAC / 60 Hz	EN61000-4-11			
	4196	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage)(4.1.2.5)(Conf # Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. (See Protocol) 120 VAC / 60 Hz	EN61000-4-11			
	4196	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage)(4.1.2.5)(Conf # Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. (See Protocol) 120 VAC / 60 Hz	EN61000-4-11			
July 15, 2019	6001	Initial Product Set-up & Configuration Engineering / Trouble-Shoot ---	--	Complete		
	9040	Emissions Test Report - Soft Copy One Report, Two Configurations --	--			
	9010	Immunity Test Report - Soft Copy One Report, Two Configurations --	--			

Unquoted Work				
Date	**Test Code**	**Description**	**Cost**	**Billed**

Modifications Required For Compliance		
Test	**Description of Modification**	**Client Initials**

APPENDIX E: Product Data Sheet

Configuration 1:

1.0 Client Information

Client Information	
Manufacturer Name	Clear Ballot Group (manufacturer) Pro V&V (client)
Address	700 Boulevard South Suite 102
City	Huntsville
State	AL
Zip Code	35802
Client Representative	Stephen Han
Title	Project Engineer
Phone	256-713-1111
Fax	256-713-1112
Email	stephen.han@provandv.com

2.0 Product Information - General

Product Information	
Product Name (**as it should appear on test report**)	ClearAccess
Model Number (of UUT to be tested)	ClearAccess
Functional description of product (what is it, what does it do, etc.)	ballot marking device
List all modes of operation	Regular and audio
Can modes be operated simultaneously? If so, explain.	Yes
What mode(s) will be used for testing?	Both
Product type (IT, Medical, Scientific, Industrial, etc.)	IT
Is the product an intentional radiator	no
Product Dimensions	Multiple
Product Weight	Multiple
Will fork lift be required	No
Applicable Standards, if known	EAC 2005 VVSG Volumes I and II
Describe all environment(s) where product will be used (residential, commercial, industrial, etc.)	Used for voting during elections
Does product consist of multiple components? (If yes, please describe each system component)	Yes. printers, varies laptops, UPS
Cycle time > 3 seconds? (If yes, how long?)	Yes.
Highest internally generated frequency	
Product Set-up Time	15 minutes
Boot up time in the event of an unintentional power down	2 minutes but UUT will be on UPS

Identify **ALL** I/O connections on the unit(s) under test, as well as **MAXIMUM** associated cable lengths below

Model No.	**Description**	**I/O Type**		**Length (m)**	**Patient Connect? (See Note)**	**QTY**
		UUT-UUT	UUT - SE			
	USB					
	power					

Note: "Patient Connect" column applies only to medical devices.

3.0 Power

Power Requirements	
Does/can product connect to AC mains? (If so, can the UUT function when connected to AC?)	Yes.
Input Voltage Rating as it appears on unit, power supply, or power brick	n/a
Input Current (specify @ 230 Vac/50 Hz)	
Single or Multi-Phase (If multi-phase, specify delta or wye)	single
Is input power connector two-prong (Hot & Neutral) or 3-prong (H, N, Ground)	3 prong
Does UUT have more than 1 power cord? (If yes, explain.)	No

4.0 Unit Under Test (UUT) – Detailed Information

UUT Hardware	
Condition	New
Configuration During Test	Printing Ballots
Input Power	Normal AC power

UUT Components			
Name	**Model No.**	**Serial No.**	**Description**
ELO	E	A17C002919	AIO Desktop
Oki	B432	AK76022990A0	Printer
CyberPower	PR1500RT2U	PY3JN2000184	UPS

I/O Cabling
See Section 2.0 for details

UUT Software/Firmware		
Name	**Version/Revision**	**Functionality**
ClearAccess	2.0.0h	Voting systems software

UUT Operating Conditions	
List all frequencies generated/used by the product.	n/a
How will product be exercised during test?	Printing ballots
How will product be monitored during test?	Visually
What are the product's critical parameters?	Unit keeps printing
Specify tolerance of all critical parameters.	Unit keeps printing

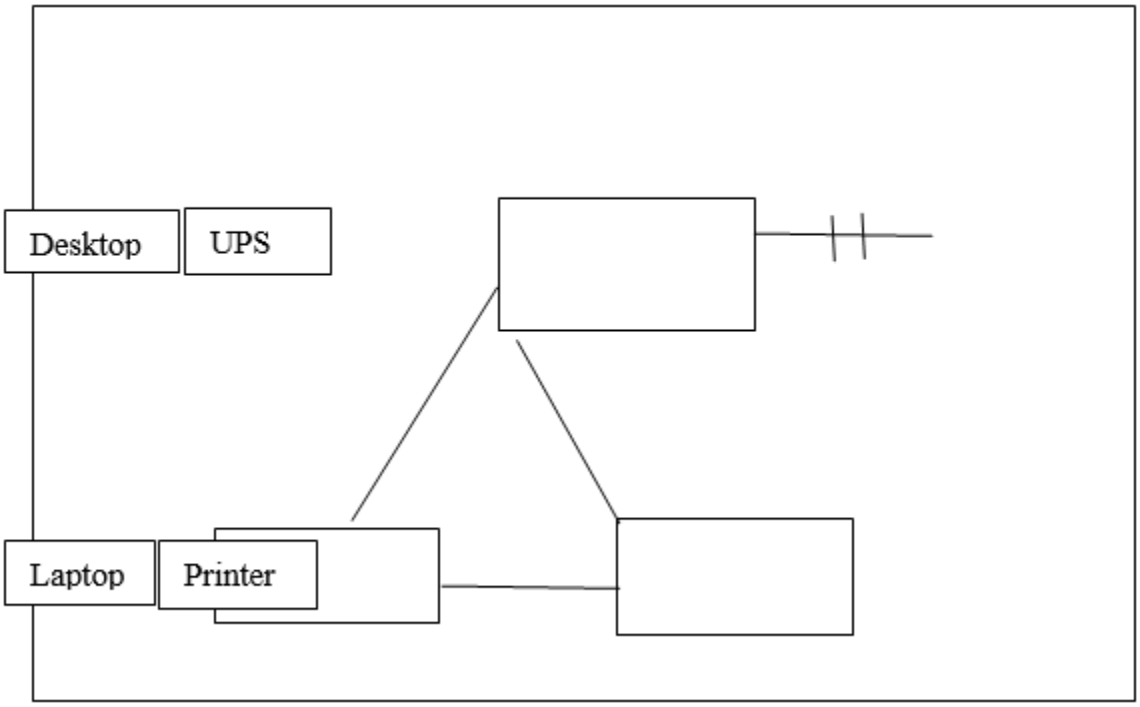
5.0 Support Equipment (SE) – Detailed Information

Support Equipment (SE)			
Name	**Model No.**	**Serial No.**	**Description**
MonoPrice		CBG-HP-02	Headphones
Storm	8button	17020511	ATI
Zebra	DS457	18285000501808	Bar code scanner

SE I/O Cabling				
Model No.	**Description**	**Shielded?**	**Length**	**Quantity**
Generic	USB	N	>3M	1
Generic	3.5mm Headphone jack	N	>3M	1

SE Software/Firmware		
Name	**Version/Revision**	**Functionality**
		n/a

6.0 Block Diagram



Important note: The product data sheet is a critical piece of documentation which is used as the basis for any test reports that NTS will generate; it must be completed *prior* to testing. It should be reviewed carefully by the client. If incorrect information is provided resulting in revisions to test repor

Configuration 2:

1.0 Client Information

Client Information	
Manufacturer Name	Clear Ballot Group (manufacturer) Pro V&V (client)
Address	700 Boulevard South Suite 102
City	Huntsville
State	AL
Zip Code	35802
Client Representative	Stephen Han
Title	Project Engineer
Phone	256-713-1111
Fax	256-713-1112
Email	stephen.han@provandv.com

2.0 Product Information - General

Product Information	
Product Name (**as it should appear on test report**)	ClearCast
Model Number (of UUT to be tested)	ClearCast
Functional description of product (what is it, what does it do, etc.)	Precinct Tabulator
List all modes of operation	Regular
Can modes be operated simultaneously? If so, explain.	Yes
What mode(s) will be used for testing?	Both
Product type (IT, Medical, Scientific, Industrial, etc.)	IT
Is the product an intentional radiator	no
Product Dimensions	
Product Weight	
Will fork lift be required	No
Applicable Standards, if known	EAC 2005 VVSG Volumes I and II
Describe all environment(s) where product will be used (residential, commercial, industrial, etc.)	Used for voting during elections
Does product consist of multiple components? (If yes, please describe each system component)	No
Cycle time > 3 seconds? (If yes, how long?)	Yes. 5 sec
Highest internally generated frequency	
Product Set-up Time	15 minutes
Boot up time in the event of an unintentional power down	0 minutes - internal backup battery

Identify **ALL** I/O connections on the unit(s) under test, as well as **MAXIMUM** associated cable lengths below

Model No.	Description	I/O Type		Length (m)	Patient Connect? (See Note)	QTY
		UUT-UUT	UUT - SE			
	power					

Note: "Patient Connect" column applies only to medical devices.

3.0 Power

Power Requirements	
Does/can product connect to AC mains? (If so, can the UUT function when connected to AC?)	Yes.
Input Voltage Rating as it appears on unit, power supply, or power brick	n/a
Input Current (specify @ 230 Vac/50 Hz)	Normal
Single or Multi-Phase (If multi-phase, specify delta or wye)	single
Is input power connector two-prong (Hot & Neutral) or 3-prong (H, N, Ground)	3 prong
Does UUT have more than 1 power cord? (If yes, explain.)	No

4.0 Unit Under Test (UUT) – Detailed Information

UUT Hardware	
Condition	New
Configuration During Test	Scanning ballots
Input Power	Normal AC power

UUT Components

Name	Model No.	Serial No.	Description
ClearCast	D	041902593	Precinct Tabulator

I/O Cabling

See Section 2.0 for details

UUT Software/Firmware

Name	Version/Revision	Functionality
ClearCast	2.0.0	Voting systems software

UUT Operating Conditions	
List all frequencies generated/used by the product.	n/a
How will product be exercised during test?	Scanning Ballots
How will product be monitored during test?	Visually
What are the product's critical parameters?	Unit keeps scanning
Specify tolerance of all critical parameters.	Unit keeps scanning

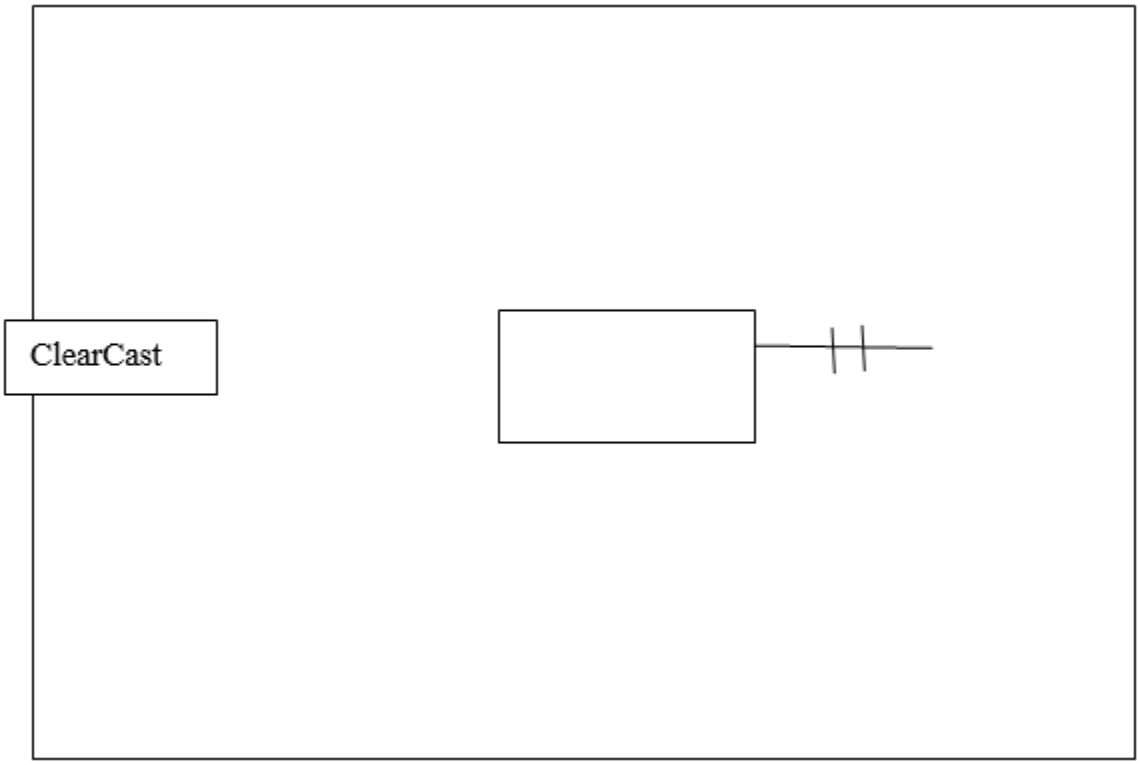
5.0 Support Equipment (SE) – Detailed Information

Support Equipment (SE)			
Name	**Model No.**	**Serial No.**	**Description**
n/a			

SE I/O Cabling				
Model No.	**Description**	**Shielded?**	**Length**	**Quantity**
n/a				

SE Software/Firmware		
Name	**Version/Revision**	**Functionality**
n/a		

6.0 Block Diagram



Important note: The product data sheet is a critical piece of documentation which is used as the basis for any test reports that NTS will generate; it must be completed *prior* to testing. It should be reviewed carefully by the client. If incorrect information is provided resulting in revisions to test reports

APPENDIX F: Laboratory Accreditations

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

NATIONAL TECHNICAL SYSTEMS (NTS) - LONGMONT
1736 Vista View Drive
Longmont, CO 80504-5242
Mr. Eric Loucks Phone: 870 574 0031

ELECTRICAL

Valid To: February 29, 2020 Certificate Number: 0214.43

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following Electromagnetic Compatibility/Interference (EMC/EMI), Lightning, Transient, Surge, and Product Safety tests:

Test Technology:	Test Method(s)[1,2]:
Emissions	
Radiated and Conducted	CFR 47 FCC, Parts 15B (using ANSI C63.4:2014), and 18 (using MP-5:1986); ANSI C63.4:2009; CISPR 32, Ed. 1 (2012-01); EN 55032:2012/AC:2013; AS/NZS CISPR 22 (2002); AS/NZS 3548 (1997); AS/NZS CISPR 14-1 (2003); IEC/CISPR 14-1, Ed. 4 (2003); IEC 61000-3-12, Ed. 2.0 (2011); EN 61000-3-12 (2011); IEC 61000-6-1, Ed. 2 (2005-03); IEC 61000-6-2, Ed. 2.0 (2005-01); IEC 61000-6-3 (1996); EN 61000-6-3 (2001) + A1 (2004); EN 61000-6-4 (2007); KN 32:2015 (Annex 11); KN 22; KN 11
Harmonics	IEC 61000-3-2, Ed. 2.2 (2004-11); IEC 61000-3-2, Ed. 3.0 (2005) + A1 (2008) + A2 (2009); IEC 61000-3-2, Ed. 4.0 (2014-05)
Flicker	IEC 61000-3-3, Ed. 1.1 (2002-03); EN 61000-3-3 + A1 (2001); IEC 61000-3-3, Ed. 1.1 (2003) + A2 (2005); IEC 61000-3-3, Ed. 3.0 (2013-05)
Immunity	
Electrostatic Discharge (ESD)	IEC 61000-4-2 (2001); EN 61000-4-2 (2001) + A2 (2001); EN 61000-4-2 + A1 (1998) + A2 (2001); IEC 61000-4-2, Ed. 2.0 (2008-12); EN 61000-4-2 (2009-05); KN 61000-4-2; KN 61000-4-2 (2008-5); KN 61000-4-2 (Annex 1-1)
Radiated	IEC/EN 61000-4-3, Ed. 2.1 (2002) + A1 (2002); EN 61000-4-3; IEC 61000-4-3 (1995) + A1 (1998) + A2 (2000); EN 61000-4-3 (2002) + A1 (2002); IEC 61000-4-3, Ed. 3.0 (2006-02) + A1 (2007) + A2 (2010); EN 61000-4-3 (2006) + A1 (2008) + A2 (2010); KN 61000-4-3; KN 61000-4-3 (2008-5); KN 61000-4-3 (Annex 1-2)

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Test Technology:	Test Method(s)[1,2]:
Immunity (cont'd)	
Electrical Fast Transient/Burst	IEC 61000-4-4, Ed. 2.0 (2004-07); EN 61000-4-4 (2004); EN 61000-4-4:2012; IEC 61000-4-4 (2012-04); KN 61000-4-4; KN 61000-4-4 (2008-5); KN 61000-4-4 (Annex 1-3)
Surge	IEC 61000-4-5, Ed. 2.0 (2005-11); EN 61000-4-5; IEC 61000-4-5, Ed. 3.0 (May 2014); BS EN 61000-4-5 (2006); EN 61000-4-5: 2014; KN 61000-4-5; KN 61000-4-5 (2008-5); KN 61000-4-5 (Annex 1-4); IEEE C62.41.1 (2002); IEEE C62.41.2 (2002); IEEE C62.45 (2002)
Conducted	IEC 61000-4-6, Ed. 2.1 (2004); EN 61000-4-6; EN 61000-4-6 (1996) + A1 (2001); IEC 61000-4-6, Ed. 2.2 (2006-05); IEC 61000-4-6, Ed. 3.0 (2008); IEC 61000-4-6, Ed. 4.0 (2013); EN 61000-4-6 (2009); EN 61000-4-6 (2014); KN 61000-4-6; KN 61000-4-6 (2008-5); KN 61000-4-6 (Annex 1-5)
Power Frequency Magnetic Field	IEC 61000-4-8 (2001) + A1 (2000); EN 61000-4-8 (2001) + A1 (2000); EN 61000-4-8 (1993) + A1 (2001); IEC 61000-4-8 (2009); EN 61000-4-8:2010; KN 61000-4-8; KN 61000-4-8 (2008-5); KN 61000-4-8 (Annex 1-6)
Voltage Dips, Short Interruptions, and Voltage Variations	IEC 61000-4-11, Ed. 2 (2004-03); EN 61000-4-11; EN 61000-4-11 (1994) + A1 (2001); EN 61000-4-11 (2004); KN 61000-4-11; KN 61000-4-11 (2008-5); KN 61000-4-11 (Annex 1-7)
Product Safety	
Medical Electrical Equipment	IEC 60601-1-2, Ed. 3.0 (2007); KN 60601-1-2 (2008-5); IEC 60601-1-2, Ed. 4, (2014-02); EN 60601-1-2 (2007); EN 60601-1-2 (2015)
Generic/Product Family Standards and Industry Standards	
Generic Standards	EN 61326-1: 2013; KN 35: 2015
Information Technology Equipment	IEC/CISPR 22 (1997); EN 55022 (1998) + A1 (2000); IEC/CISPR 22 (1993); EN 55022 (1994); IEC/CISPR 22 (1993); EN 55022 (1994) + A1 (1995) + A2 (1997); CNS 13438 (1997); IEC/CISPR 22, Ed. 4 (2003-04); EN 55022 (1998); IEC/CISPR 22, Ed. 5 (2005); EN 55022 (1998); IEC/CISPR 22, Ed. 5 (2005) + A1 (2005); EN 55022 (1998) + A1 (2000) + A2 (2003);

Test Technology:	Test Method(s)[1,2]:
Generic/Product Family Standards and Industry Standards (cont'd)	
Information Technology Equipment (cont'd)	CNS 13438 (2006) (up to 6 GHz); IEC/CISPR 22, Edition 5.2 (2006-03); EN 55022 (2006); EN 55022 (2006) + A1 (2007); EN 55022:2010; IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2009); TCVN 7189:2009 (CISPR 22:2006); VCCI V-3 (2009.04, 2011.04, 2013.04, 2014.04, 2015.04) (up to 6 GHz); CISPR 24 Ed 2.0 (2010-08); EN 55024 (2010); KN 24
Industrial, Scientific, and Medical (ISM) Equipment	AS/NZS CISPR 11 (2002); IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004); IEC/CISPR 11, Ed. 4.1 (2004-06) + A1 (2004); EN 55011 (1998) + A1 (1999) + A2 (2002); IEC/CISPR 11 (2003); EN 55011 (1998) + A2(2002); EN 55011 (2009) + A1 (2010); IEC/CISPR 11 Ed. 5 (2009-05); CISPR 11 Ed. 5.1 (2010)
Measure	IEC 61326-1 Ed. 2.0 (2013)
Military/Defense	MIL-STD-461F, G Method CE101 (30 Hz to 10 kHz); MIL-STD-461F, G Method CE102 (10 kHz to 10 MHz); MIL-STD-461F, G Method CE106 (10 kHz to 40 GHz); MIL-STD-461F, G Method CS101 (30 Hz to 150 kHz); MIL-STD-461F, G Method CS106; MIL-STD-461F, G Method CS114 (10 kHz to 200 MHz); MIL-STD-461F, G Method CS115; MIL-STD-461F, G Method CS116 (10 kHz to 100 MHz); MIL-STD-461F, G Method RE101 (30 Hz to 100 kHz); MIL-STD-461F, G Method RE102 (10 kHz to 18 GHz); MIL-STD-461F, G Method RE103 (10 kHz to 40 GHz); MIL-STD-461F, G Method RS101 (30 Hz to 100 kHz); MIL-STD-461F, G Method RS103 (2 MHz to 40 GHz); MIL-STD-704 D, E, F; MIL-HDBK-704-8 Method LDC101; MIL-HDBK-704-8 Method LDC102; MIL-HDBK-704-8 Method LDC103; MIL-HDBK-704-8 Method LDC104; MIL-HDBK-704-8 Method LDC105; MIL-HDBK-704-8 Method LDC201; MIL-HDBK-704-8 Method LDC301; MIL-HDBK-704-8 Method LDC302; MIL-HDBK-704-8 Method LDC401; MIL-HDBK-704-8 Method LDC501; MIL-HDBK-704-8 Method LDC601

[1] When the date, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is expected to be using the current version within one year of the date of publication, per part C., Section 1 of A2LA *R101 - General Requirements- Accreditation of ISO-IEC 17025 Laboratories*. If a specifier/regulator imposes a different transition period, this will supersede the A2LA one-year implementation period.

[2] The laboratory is only accredited for testing activities outlined within the test methods listed above. Reference to any other activity within these standards, such as risk management or risk assessment, does not fall within the laboratory's accredited capabilities.

On the following types of products:

Telecommunication Equipment, Network Equipment, Industrial and Commercial Equipment, Electronic (Digital) Equipment, Medical, Aerospace, Military. Information Technology Equipment, Multimedia Equipment, Scientific Equipment

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[3]

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
Unintentional Radiators Part 15B	ANSI C63.4:2014	18000
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	18000

[3]Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (https://apps.fcc.gov/oetcf/eas/) for a listing of FCC approved laboratories.

Accredited Laboratory

A2LA has accredited

NATIONAL TECHNICAL SYSTEMS (NTS) - LONGMONT

Longmont, CO

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 8th day of October 2018.

President and CEO
For the Accreditation Council
Certificate Number 0214.43
Valid to February 29, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

END OF REPORT