Test Report of

Full Compliance Immunity Testing Performed on the ClearCast Precinct Tabulator

Issue Date: 24 September 2018

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SIGNATURES

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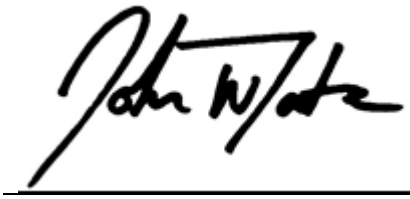
Reviewed by:  Date: 25 September 2018

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1.0 ADMINISTRATIVE DATA

1.1 PURPOSE OF TESTS

This report documents the test efforts performed on the ClearCast Precinct Tabulator to verify compliance to IEC 60601-1-2: 4th Ed., 2014-02 Medical Electrical Equipment - Part 1-2: General Requirements for Basic Safety and Essential Performance - Collateral Standard: Electromagnetic Disturbances - Requirements and Tests. This was a formal qualification test and was conducted from 06-12 September 2018.

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

1.2 DESCRIPTION OF TEST ITEM

The Unit Under Test (UUT) is a precinct tabulator, designed for use in voting during elections.

1.3 MANUFACTURER

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

1.4 REFERENCE DOCUMENTS

1. Pro V&V SOW
2. ISO 17025:2005

The standards applied to this product were IEC 60601-1-2: 4th Ed., 2014-02. This is the collateral for Medical Electrical Equipment. The dated references outlined in Table 1 defines the test methods used for the immunity testing. Performance criteria for all immunity testing were derived from IEC 60601-1-2, 4th Ed., 2014-02, Table 3.

Table 1-1: (IEC Standards)

Requirement	Specification	Test Method
IEC 60601-1- 2, 4th Ed. (2014-02), Medical Electrical Equipment - Part 1-2: General Requirements For Basic Safety and Essential Performance - Collateral Standard: Electromagnetic disturbances - Requirements and Tests	Electrostatic Discharge	IEC 61000-4-2: 2008
	Radiated RF Immunity	IEC 61000-4-3: 2006 + A1: 2007 +A2: 2010
	Electrical Fast Transient/Burst	IEC 61000-4-4: 2012
	Surge Immunity	IEC 61000-4-5: 2005
	Conducted RF Immunity	IEC 61000-4-6: 2013
	Power Frequency H-field	IEC 61000-4-8: 2009
	Voltage Dips, Interrupts	IEC 61000-4-11: 2004

1.5 TEST RESULTS COMPLIANCE LEVELS

Compliance levels to the immunity levels specified in these standards are summarized in Table 1-2.

Table 1-2 (Professional Healthcare Environment)

Immunity Test	IEC 60601, 4th Edition Test Level	Compliance Level
Electrostatic Discharge	± 8 kV Contact, HCP & VCP ±2 kV, ±4 kV, ±8 kV, ± 15 kV Air	± 8 kV Contact, HCP & VCP ±2 kV, ±4 kV, ±8 kV, ± 15 kV Air
Radiated RF Immunity	80 MHz - 2.7 GHz, 3 V/m, 80% 1 kHz AM	80 MHz - 2.7 GHz, 3 V/m, 80% 1 kHz AM
Prox. Fields from RF Wireless	Reference IEC 60601-1-2, 4th Edition, Section 8.10, Table 9	Reference IEC 60601-1-2, 4th Edition, Section 8.10, Table 9
EFT/Burst	± 2 kV (100 kHz rep rate) AC mains ± 1 kV (100 kHz rep rate) I/O > 3 m	± 2 kV (100 kHz rep rate) AC mains ± 1 kV (100 kHz rep rate) I/O > 3 m
Surge Immunity	±0.5 kV & ± 1 kV line-line, AC mains ±0.5 kV, ± 1 kV, ± 2 kV line-ground, AC mains	±0.5 kV & ± 1 kV line-line, AC mains ±0.5 kV, ± 1 kV, ± 2 kV line-ground, AC mains
Conducted RF Immunity	150 kHz to 80 MHz, 3 Vrms, 80% 1 kHz AM, power and I/O 6 Vrms (+modulation) for ISM frequencies	150 kHz to 80 MHz, 3 Vrms, 80% 1 kHz AM, power and I/O 6 Vrms (+modulation) for ISM frequencies
Power Frequency H-field Immunity	50 and 60 Hz, 30 A/m, x-, y-, and z-axes	50 and 60 Hz, 30 A/m, x-, y-, and z-axes
Voltage Dips and Interrupts	100% reduction for 0.5 cycles (at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) 100% reduction for 1.0 cycle (at 0°) 30% reduction for 25/30 cycles (at 0°) 100% reduction for 250/300 cycles (at 0°)	100% reduction for 0.5 cycles (at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) 100% reduction for 1.0 cycle (at 0°) 30% reduction for 25/30 cycles (at 0°) 100% reduction for 250/300 cycles (at 0°)

1.6 QUANTITY OF ITEMS TESTED

Quantity	Test Item Description	Model Number	Serial Number
1	ClearCast Precinct Tabulator	Model 2, Version A	Unit 1

1.7 SECURITY CLASSIFICATION

Unclassified

1.8 TESTS CONDUCTED BY

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

1.9 DISPOSITION OF TEST ITEMS

Returned to:

Pro V&V
700 Boulevard South
Suite 102
Huntsville, AL 35802

1.10 TEST ENVIRONMENT

1.10.1 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.

1.10.2 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 is contained in a memo, which is available upon request. However, a summary of NTS's measurement uncertainty is given in Table 1-3.

Table 1-3

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	
Surge Immunity	O.C. Voltage: 0.01 kV Risetime: 0.1 usec Pulse Width: 1.76 usec S. C. Current: 0.91 A Risetime: 0.08 usec Pulse Width: 0.15 usec	
Conducted RF Immunity	0.24 dB	
Power Frequency H-field Immunity	0.87 dB	
Voltage Dips & Interruptions	Voltage: 10.38 Volts Duration: 0.23 msec	

1.11 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.

1.12 SOURCE INSPECTION

NTS QA

1.13 PURCHASE ORDER NUMBER

2018-010

2.0 TEST RESULTS SUMMARY

Table 2-1: Summary of Test Results

Test	Specification	Test Dates	Results
Electrostatic Discharge	IEC 61000-4-2	12 September 2018	Complies
Radiated RF Immunity	IEC 61000-4-3	06 September 2018	Complies
Electrical Fast Transient/Burst	IEC 61000-4-4	10 September 2018	Complies
Surge Immunity	IEC 61000-4-5	11 September 2018	Complies
Conducted RF Immunity	IEC 61000-4-6	10 September 2018	Complies
Power H-Field Immunity	IEC 61000-4-8	11 September 2018	Complies
Voltage Dips and Interrupts	IEC 61000-4-11	10 September 2018	Complies

3.0 ELECTROSTATIC DISCHARGE TEST

3.1 REFERENCES

IEC 61000-4-2: 4th Ed. (2014-02)

3.2 SERIAL NUMBERS

Table 3-1: Serial Numbers

Unit 1

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 was performed at levels of ±8 kV at applicable (conductive) test points. Air discharge was performed for non-conductive surfaces of the product at levels of ±2 kV, ±4 kV, ±8 kV and ±15 kV. Indirect discharge to the horizontal coupling plane (HCP) and the vertical coupling plane (VCP) were also performed at levels of ±8 kV. ESD testing was also performed on applicable patient coupling ports as well as signal input/output ports. If this testing was applicable, it will be documented on the test data sheet.

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

IEC 61000-4-3: 4th Ed. (2014-02)

4.2 SERIAL NUMBERS

Table 4-1: Serial Numbers

Unit 1

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 on a non-conductive table inside the completely anechoic-lined chamber. The frequency range for this testing was 80 MHz – 1.0 GHz and the UUT was placed 2 meters from the radiating antenna, which was 1.5 meters above the floor of the chamber. Testing was performed in both horizontal and vertical antenna polarizations. The frequency was incremented in 1% steps, with a 3 second dwell time for each test frequency. The UUT was rotated so that all four sides were illuminated in the 10 V/m field. The field was amplitude modulated with a 1 kHz sine wave to a depth of 80%.

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

IEC 61000-4-4: 4th Ed. (2014-02)

5.2 SERIAL NUMBERS

Table 5-1: Serial Numbers

Unit 1

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 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.

6.0 SURGE IMMUNITY TEST

6.1 REFERENCES

IEC 61000-4-5: 4th Ed. (2014-02)

6.2 SERIAL NUMBERS

Table 6-1: Serial Numbers

Unit 1

6.3 TEST PROCEDURE

Surge immunity testing was performed on the UUT in accordance with the test methods specified in IEC 61000-4-5. The UUT's AC power was tested via direct injection at levels of +0.5 kV, +1.0 kV and +2.0 kV for differential and common modes. Surges were injected at 0 degrees, 90 degrees, 180 degrees and 270 degrees of the input AC waveform. Five pulses were injected for each test configuration and a maximum injection rate of once every 30 seconds was used.

6.4 SPECIAL CONFIGURATIONS

N/A

6.5 TEST RESULTS

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

Surge Immunity Test Data is presented in Appendix D.

7.0 CONDUCTED RF IMMUNITY TEST

7.1 REFERENCES

IEC 61000-4-6: 4th Ed. (2014-02)

7.2 SERIAL NUMBERS

Table 7-1: Serial Numbers

Unit 1

7.3 TEST PROCEDURE

Conducted RF immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-6. The UUT was subjected to injected RF signals on its input AC power cable. Injection on the AC leads was performed via a coupling/decoupling network (CDN). The frequency range for this testing was 150 kHz to 80 MHz. The test frequency was stepped in 1% increments with a three (3) second dwell time for each injection frequency. The injection level used for all testing was 10 Vrms and the carrier was amplitude modulated with 1 kHz sine wave to a depth of 80%.

7.4 SPECIAL CONFIGURATIONS

N/A

7.5 TEST RESULTS

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

Conducted RF Immunity Test Data is presented in Appendix E.

8.0 POWER FREQUNCY H-FIELD IMMUNITY TEST

8.1 REFERENCES

IEC 61000-4-8: 4th Ed. (2014-02)

8.2 SERIAL NUMBERS

Table 8-1: Serial Numbers

Unit 1

8.3 TEST PROCEDURE

Power frequency H-field immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-8. The UUT was exposed to a 30 A/m field at both 50 and 60 Hz. The immersion method was used for this testing and a 1.5 m x 2.0 m coil was utilized. All three axes (x, y, and z) of the various components were subjected to a field of 30 A/m for a period of 60 seconds per location

8.4 SPECIAL CONFIGURATIONS

N/A

8.5 TEST RESULTS

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

Power Frequency H-Filed Immunity Test Data is presented in Appendix F.

9.0 VOLTAGE DIPS AND INTERRUPTS TEST

9.1 REFERENCES

IEC 61000-4-11: 4th Ed. (2014-02)

9.2 SERIAL NUMBERS

Table 9-1: Serial Numbers

Unit 1

9.3 TEST PROCEDURE

Voltage dip and interrupt testing was performed on the UUT, in accordance with EN 61000-4-11. The UUT was subjected to the following voltage fluctuations on its AC power input:

- 30% reduction for 0.6 cycles at 0°, 90°, 180°, and 270°
- 60% reduction for 6 cycles at 0°, 90°, 180°, and 270°
- 60% reduction for 60 cycles at 0°, 90°, 180°, and 270°
- 100% reduction for 300 cycles at 0° and 180°

9.4 SPECIAL CONFIGURATIONS

N/A

9.5 TEST RESULTS

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

Voltage Dips and Interrupts Test Data is presented in Appendix G.

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:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018
Temperature:	25.4˚C Humidity: 34%	Pressure:	834 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

PR085361-4-2.doc FR0100

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	A	Pass
Contact Discharge Points - **RED** Arrows.								
Figure A2	8	x	x	10	1		A	Pass
Figure A3	8	x	x	10	1		A	Pass
Figure A4	8	x	x	10	1		A	Pass
Figure A5	8	x	x	10	1		B	Pass
Air Discharge Points - **BLUE** Arrows.								
Figure A2	2, 4, 8, 15	x	x	---	---	No discharge points found.	---	---
Figure A3	2, 4, 8, 15	x	x	---	---	No discharge points found.	---	---
Figure A4	2, 4, 8, 15	x	x	10	1		B	Pass
Figure A5	2, 4, 8, 15	x	x	---	---	No discharge points found.	---	---

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018

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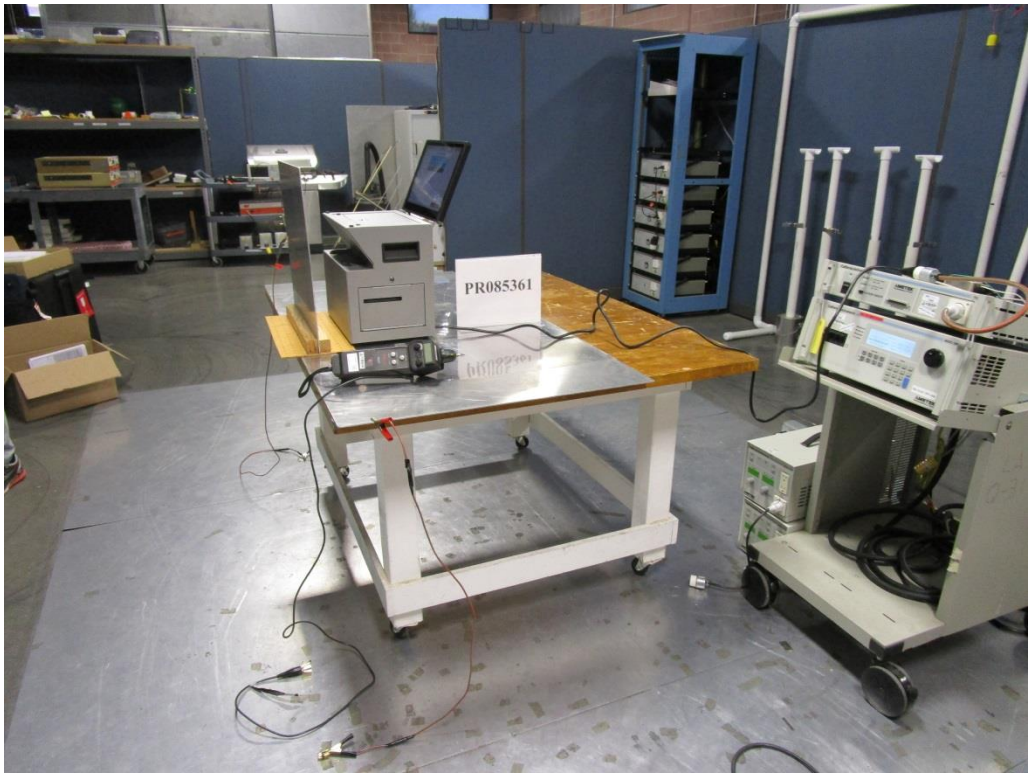

Figure A1. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018

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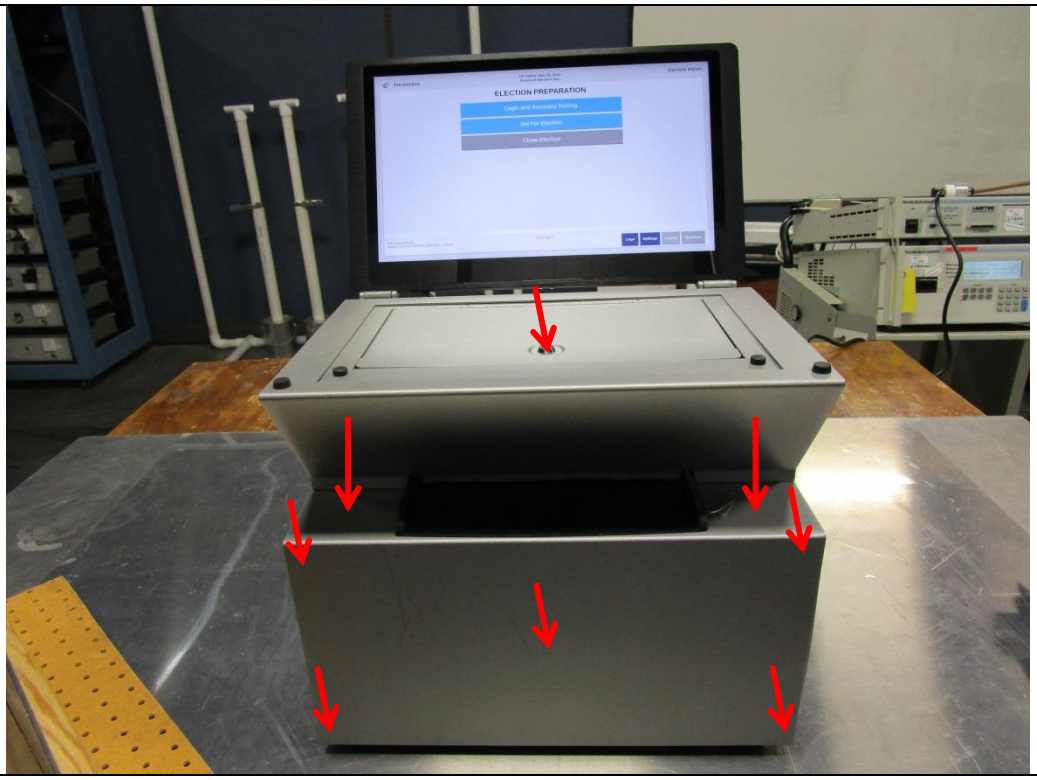

Figure A2. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018

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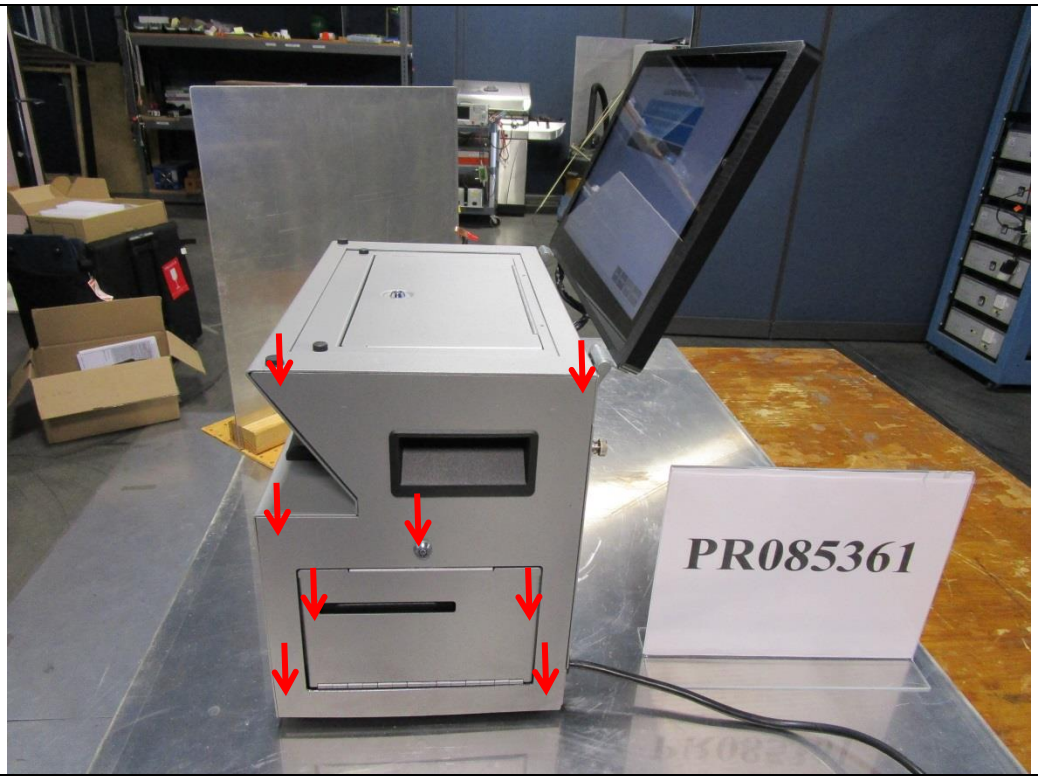

Figure A3. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018

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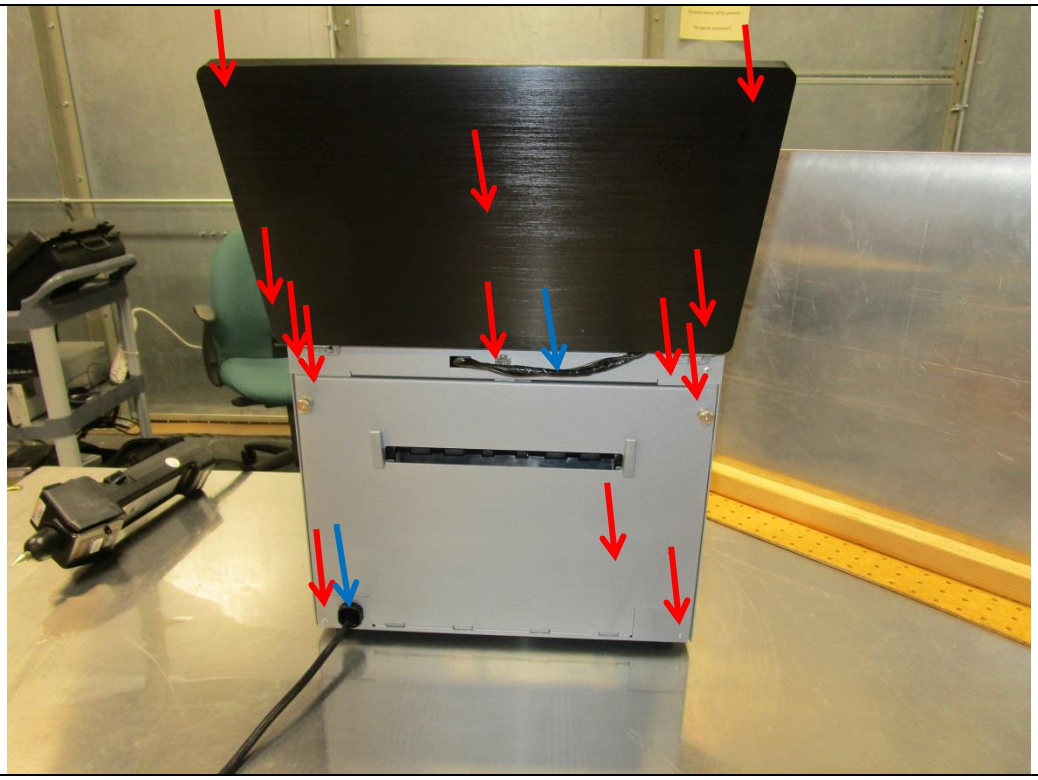

Figure A4. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018

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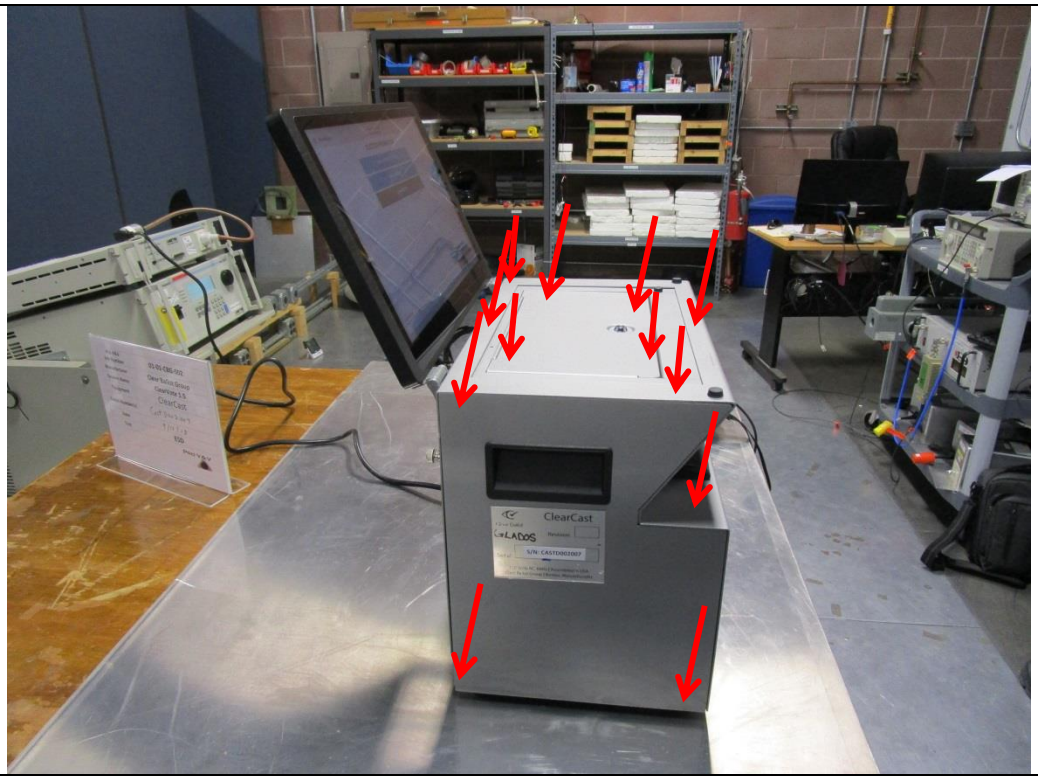

Figure A5. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 12, 2018

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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	10/24/2017	10/24/2018
1249	KeyTek	MZ-15/EC	0609258	ESD Gun with TPC-2A SN:0609259	07/13/2018	07/13/2019
1281	EMC Partner	ESD3000	284	ESD Test System	12/20/2017	12/20/2018
1569	California Instruments by Ametek	5001IX-208-CTS, Series II	1514A02227	5kV Progammable Power Supply	NA	NA
1587	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019

APPENDIX B: Radiated RF Immunity Test Data

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast (Model 2, Version A)	S/N:	Unit 1
Standard Referenced:	EAC 2005 VVSG	Date:	September 6, 2018
Temperature:	24˚C Humidity: 47%	Pressure:	845mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning 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:	PR085361
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast (Model 2, Version A)	S/N:	Unit 1
Standard Referenced:	EAC 2005 VVSG	Date:	September 6, 2018

PR085361-4-3.doc FR0100

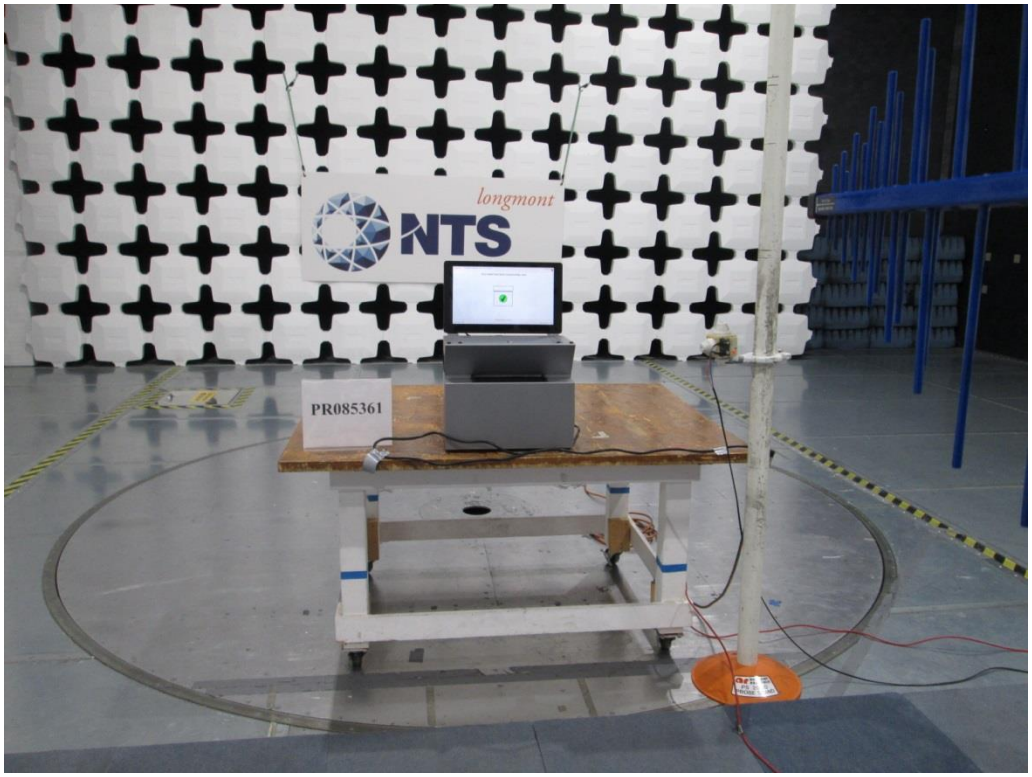

Figure B1. Radiated RF Immunity Test Setup – Front Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast (Model 2, Version A)	S/N:	Unit 1
Standard Referenced:	EAC 2005 VVSG	Date:	September 6, 2018

PR085361-4-3.doc FR0100

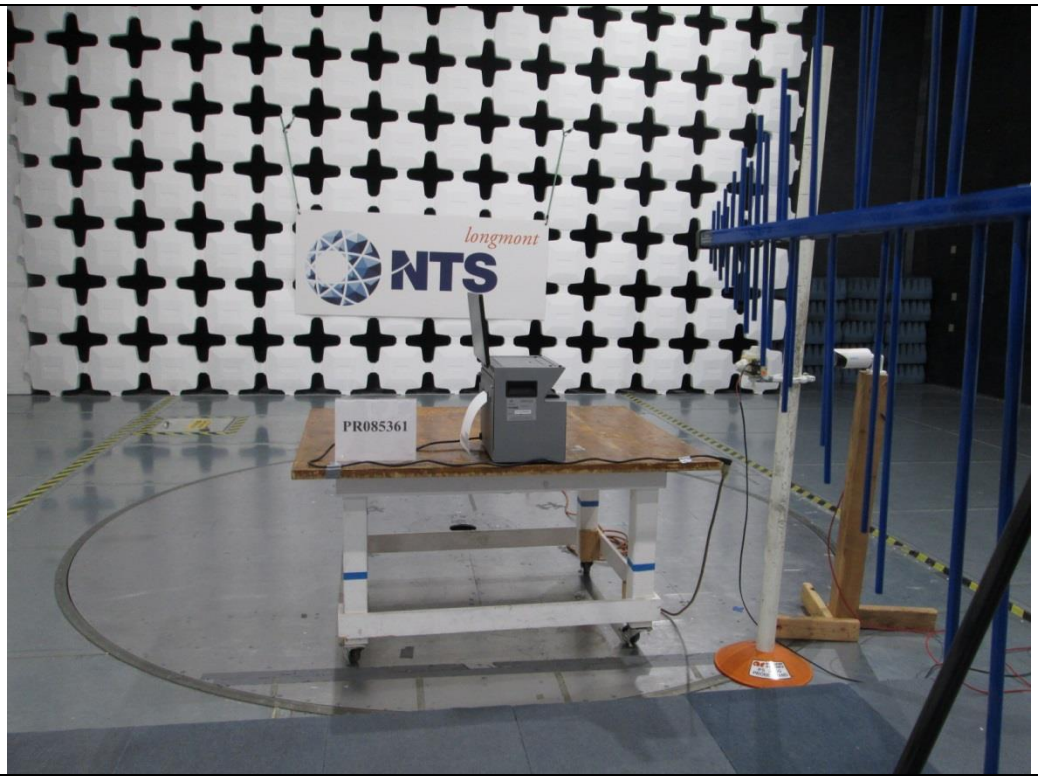

Figure B2. Radiated RF Immunity Test Setup – Right Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast (Model 2, Version A)	S/N:	Unit 1
Standard Referenced:	EAC 2005 VVSG	Date:	September 6, 2018

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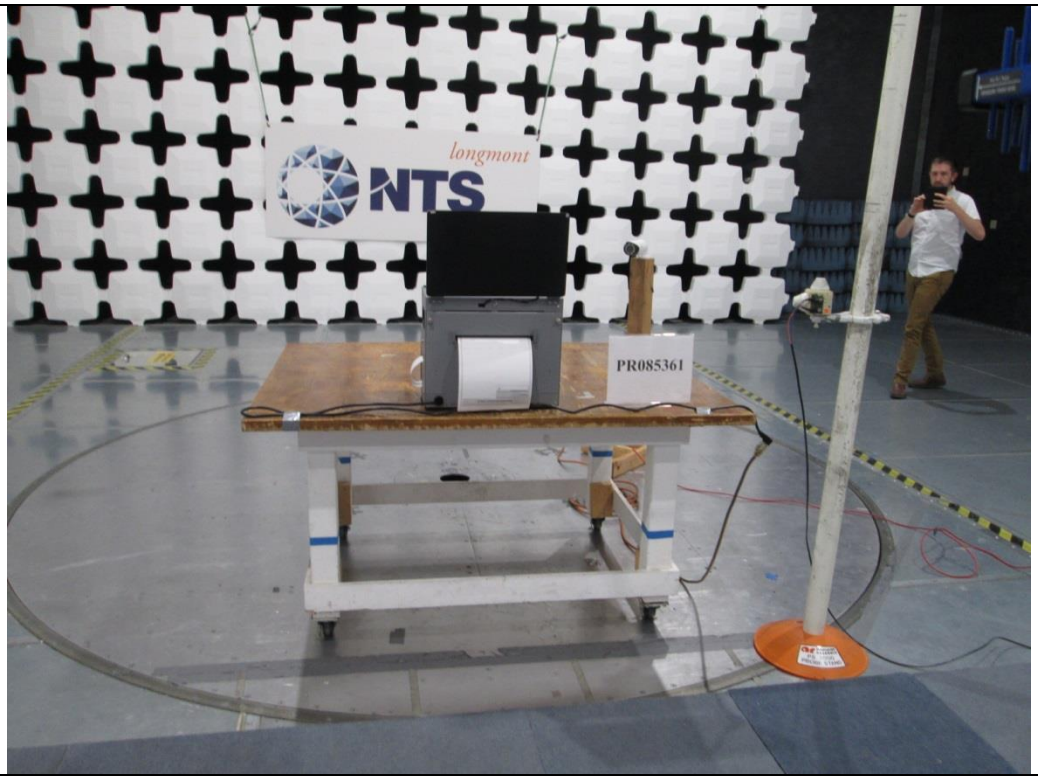

Figure B3. Radiated RF Immunity Test Setup – Back Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast (Model 2, Version A)	S/N:	Unit 1
Standard Referenced:	EAC 2005 VVSG	Date:	September 6, 2018

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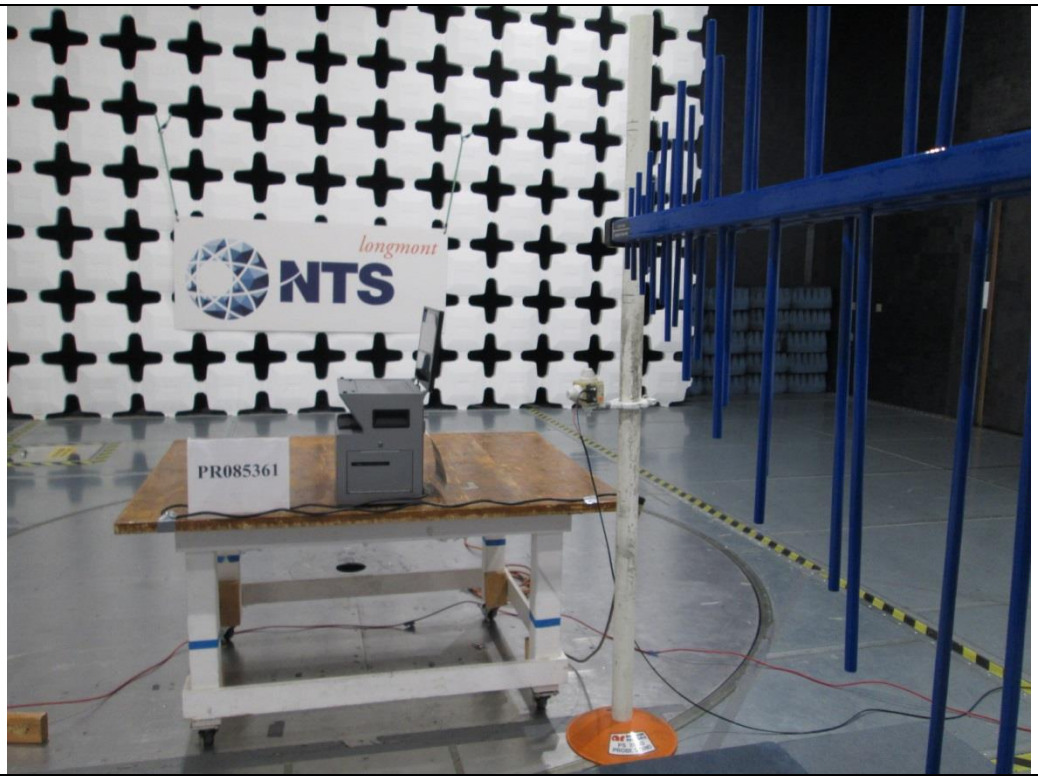

Figure B4. Radiated RF Immunity Test Setup – Left Side.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	10m2
Model:	ClearCast (Model 2, Version A)	S/N:	Unit 1
Standard Referenced:	EAC 2005 VVSG	Date:	September 6, 2018

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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
1024	Amplifier Research	FP4000	18358	Isotropic Field Probe (10 kHz - 1 GHz)	10/04/2017	10/04/2018
1055	Marconi	2024	112113/027	Signal Generator (10 kHz - 2.4 GHz)	05/31/2018	05/31/2019
1181	EMCI	RFS	V2.5.8	Initial Release 02 July 2004	NA	NA
1250	OPHIR	5127F	1034	RF Power Amplifier 20-1000MHz, 200 Watts	NA	NA
1396	CIR Enterprises	10m Chamber #2	002	10m Chamber with 4m turntable	03/29/2018	03/29/2020
1453	Giga-tronics	GT-8888A	8888A0336	10 MHz to 8 GHz, +20 dBm, 25 Vdc Power Meter	03/29/2018	03/29/2019
1492	Fluke	87/5 Multimeter	23350032	True RMS Multimeter	05/08/2018	05/08/2019
1578	Werlatone	C3908-10	107952	1500 Watts, 50 dB Dual Directional Coupler (80MHz	06/25/2018	06/25/2019
1586	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019

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:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018
Temperature:	23.6˚C Humidity: 34%	Pressure:	836 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

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Voltage (kV)	Polarity +	Polarity -	Time (sec)	Injection Type	L 1	L 2	L 3	N	P E	Rep Freq.	Comments	Criteria Met	Pass / Fail
2.0	x		60	CDN	x					100 kHz	AC	A	Pass
2.0		x	60	CDN	x					100 kHz		A	Pass
2.0	x		60	CDN		x				100 kHz		A	Pass
2.0		x	60	CDN		x				100 kHz		A	Pass
2.0	x		60	CDN					x	100 kHz		A	Pass
2.0		x	60	CDN					x	100 kHz		A	Pass
2.0	x		60	CDN	x	x			x	100 kHz		A	Pass
2.0		x	60	CDN	x	x			x	100 kHz		A	Pass

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

PR085361-4-4.doc FR0100

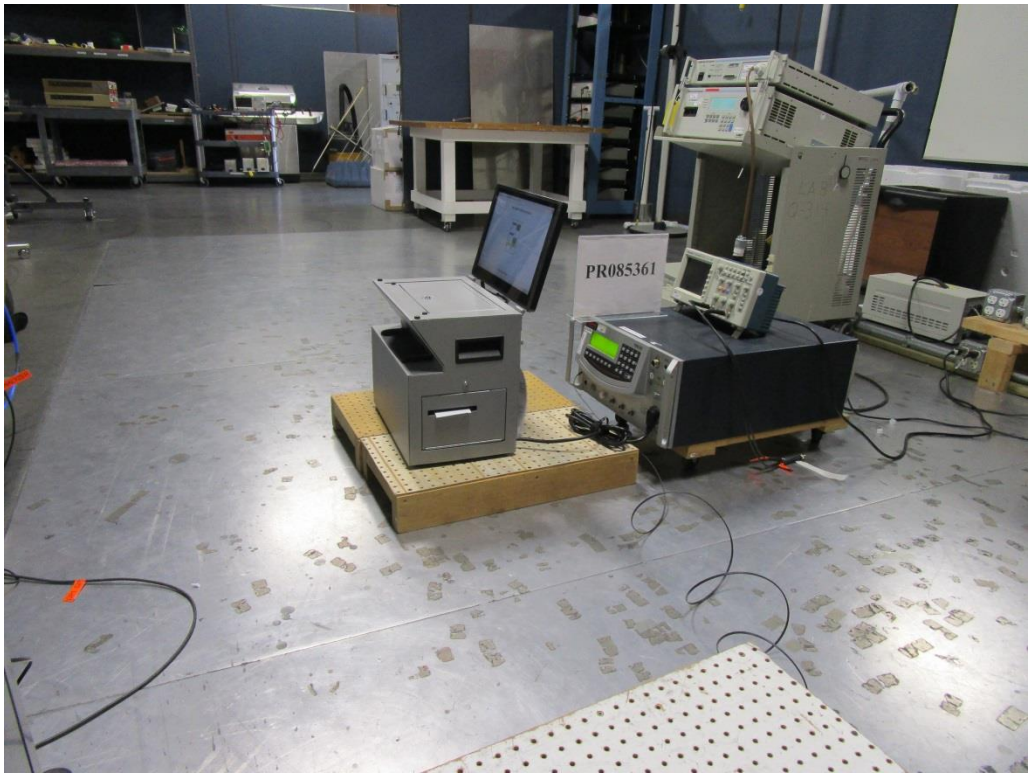

Figure C1. Electrical Fast Transient Test Setup.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

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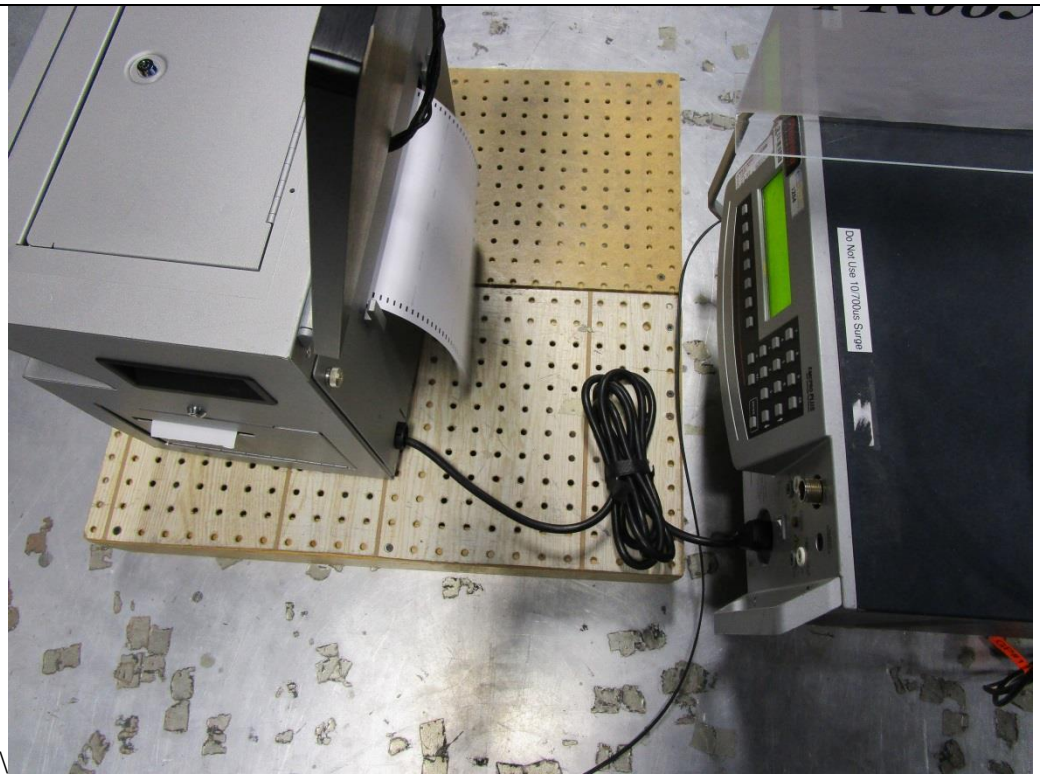

Figure C2. Electrical Fast Transient Test Setup – AC Mains.

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

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	FCC Part 15, EAC 2005 VVSG	Date:	September 10, 2018

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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	10/24/2017	10/24/2018
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	07/05/2019
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	01/26/2018	01/26/2019
1587	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019

APPENDIX D: Surge Immunity Test Data

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018
Temperature:	26.2˚C Humidity: 30%	Pressure:	835 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

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Voltage (kV)	Polarity +	Polarity -	L1	L2	L3	N	PE	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
0.5	x		x			x		0	5	30	Differential Mode	A	Pass
0.5		x	x			x		0	5	30		A	Pass
0.5	x		x			x		90	5	30		A	Pass
0.5		x	x			x		90	5	30		A	Pass
0.5	x		x			x		180	5	30		A	Pass
0.5		x	x			x		180	5	30		A	Pass
0.5	x		x			x		270	5	30		A	Pass
0.5		x	x			x		270	5	30		A	Pass
0.5	x		x				x	0	5	30	Common Mode Line	A	Pass
0.5		x	x				x	0	5	30		A	Pass
0.5	x		x				x	90	5	30		A	Pass
0.5		x	x				x	90	5	30		A	Pass
0.5	x		x				x	180	5	30		A	Pass
0.5		x	x				x	180	5	30		A	Pass
0.5	x		x				x	270	5	30		A	Pass
0.5		x	x				x	270	5	30		A	Pass
0.5	x					x	x	0	5	30	Common Mode Neutral	A	Pass
0.5		x				x	x	0	5	30		A	Pass
0.5	x					x	x	90	5	30		A	Pass
0.5		x				x	x	90	5	30		A	Pass
0.5	x					x	x	180	5	30		A	Pass
0.5		x				x	x	180	5	30		A	Pass
0.5	x					x	x	270	5	30		A	Pass
0.5		x				x	x	270	5	30		A	Pass

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018
Temperature:	26.2˚C Humidity: 30%	Pressure:	835 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

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Voltage (kV)	Polarity +	Polarity -	L1	L2	L3	N	PE	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
1.0	x		x			x		0	5	45	Differential Mode	A	Pass
1.0		x	x			x		0	5	45		A	Pass
1.0	x		x			x		90	5	45		A	Pass
1.0		x	x			x		90	5	45		A	Pass
1.0	x		x			x		180	5	45		A	Pass
1.0		x	x			x		180	5	45		A	Pass
1.0	x		x			x		270	5	45		A	Pass
1.0		x	x			x		270	5	45		A	Pass
1.0	x		x				x	0	5	45	Common Mode Line	A	Pass
1.0		x	x				x	0	5	45		A	Pass
1.0	x		x				x	90	5	45		A	Pass
1.0		x	x				x	90	5	45		A	Pass
1.0	x		x				x	180	5	45		A	Pass
1.0		x	x				x	180	5	45		A	Pass
1.0	x		x				x	270	5	45		A	Pass
1.0		x	x				x	270	5	45		A	Pass
1.0	x					x	x	0	5	45	Common Mode Neutral	A	Pass
1.0		x				x	x	0	5	45		A	Pass
1.0	x					x	x	90	5	45		A	Pass
1.0		x				x	x	90	5	45		A	Pass
1.0	x					x	x	180	5	45		A	Pass
1.0		x				x	x	180	5	45		A	Pass
1.0	x					x	x	270	5	45		A	Pass
1.0		x				x	x	270	5	45		A	Pass
2.0	x		x			x		0	5	60	Differential Mode	A	Pass

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018
Temperature:	26.2˚C Humidity: 30%	Pressure:	835 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

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Voltage (kV)	Polarity +	Polarity -	L1	L2	L3	N	PE	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
2.0		x	x			x		0	5	60		A	Pass
2.0	x		x			x		90	5	60		A	Pass
2.0		x	x			x		90	5	60		A	Pass
2.0	x		x			x		180	5	60		A	Pass
2.0		x	x			x		180	5	60		A	Pass
2.0	x		x			x		270	5	60		A	Pass
2.0		x	x			x		270	5	60		A	Pass
2.0	x		x				x	0	5	60	Common Mode Line	A	Pass
2.0		x	x				x	0	5	60		A	Pass
2.0	x		x				x	90	5	60		A	Pass
2.0		x	x				x	90	5	60		A	Pass
2.0	x		x				x	180	5	60		A	Pass
2.0		x	x				x	180	5	60		A	Pass
2.0	x		x				x	270	5	60		A	Pass
2.0		x	x				x	270	5	60		A	Pass
2.0	x					x	x	0	5	60	Common Mode Neutral	A	Pass
2.0		x				x	x	0	5	60		A	Pass
2.0	x					x	x	90	5	60		A	Pass
2.0		x				x	x	90	5	60		A	Pass
2.0	x					x	x	180	5	60		A	Pass
2.0		x				x	x	180	5	60		A	Pass
2.0	x					x	x	270	5	60		A	Pass
2.0		x				x	x	270	5	60		A	Pass

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

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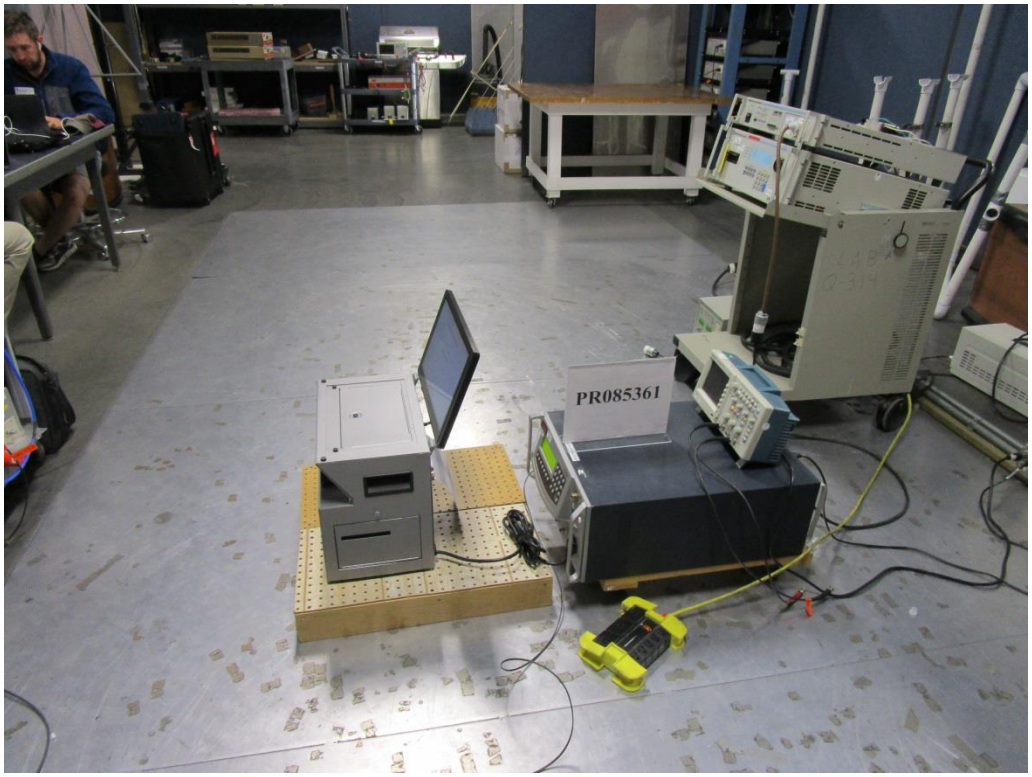

Figure D1. Surge Immunity Test Setup.

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

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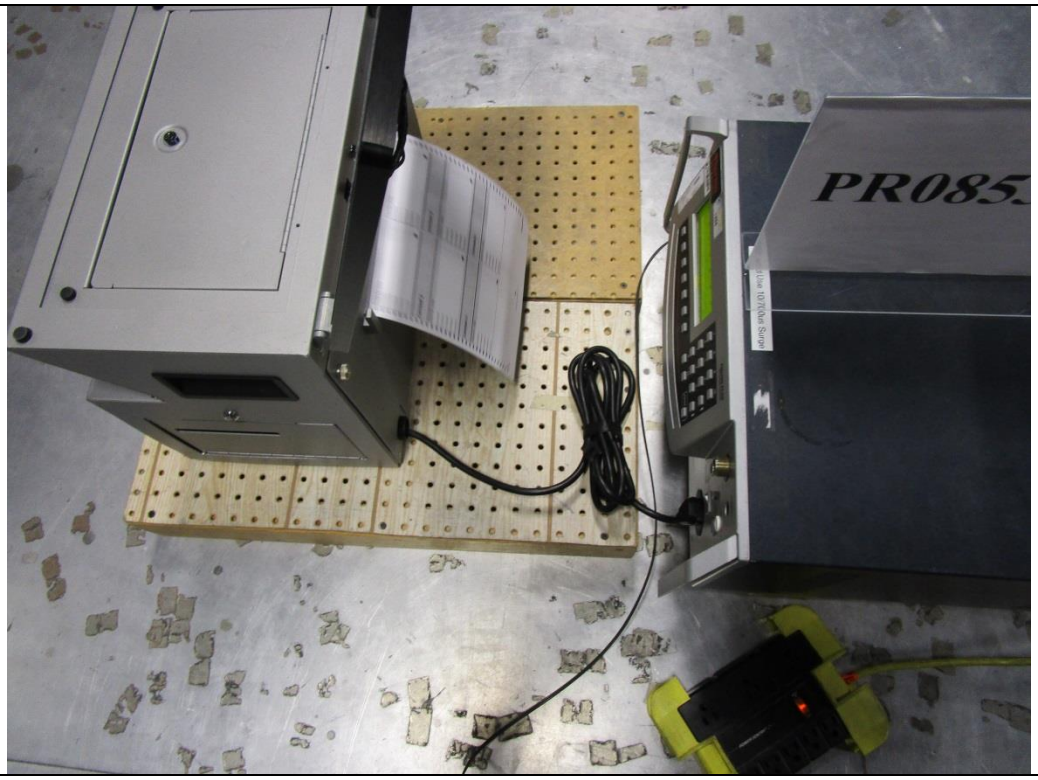

Figure D2. Surge Immunity Test Setup – AC Mains.

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

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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	10/24/2017	10/24/2018
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	07/05/2019
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	01/26/2018	01/26/2019
1587	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019
1596	California Instruments & AMETEK	iXGui	V3.0.0	AC Source Control and Scripting Software	NA	NA

APPENDIX E: Conducted RF Immunity Test Data

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018
Temperature:	22.8˚C Humidity: 32%	Pressure:	836 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

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Frequency (MHz)	Modulation			Level (Vrms)	Dwell (sec)	Comments	Criteria Met	Pass / Fail
	Type	%	Freq					
0.150 – 80.0	AM	80	1 kHz	10	3	AC using M3 CDN	A	Pass

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

PR085361-4-6.doc FR0100

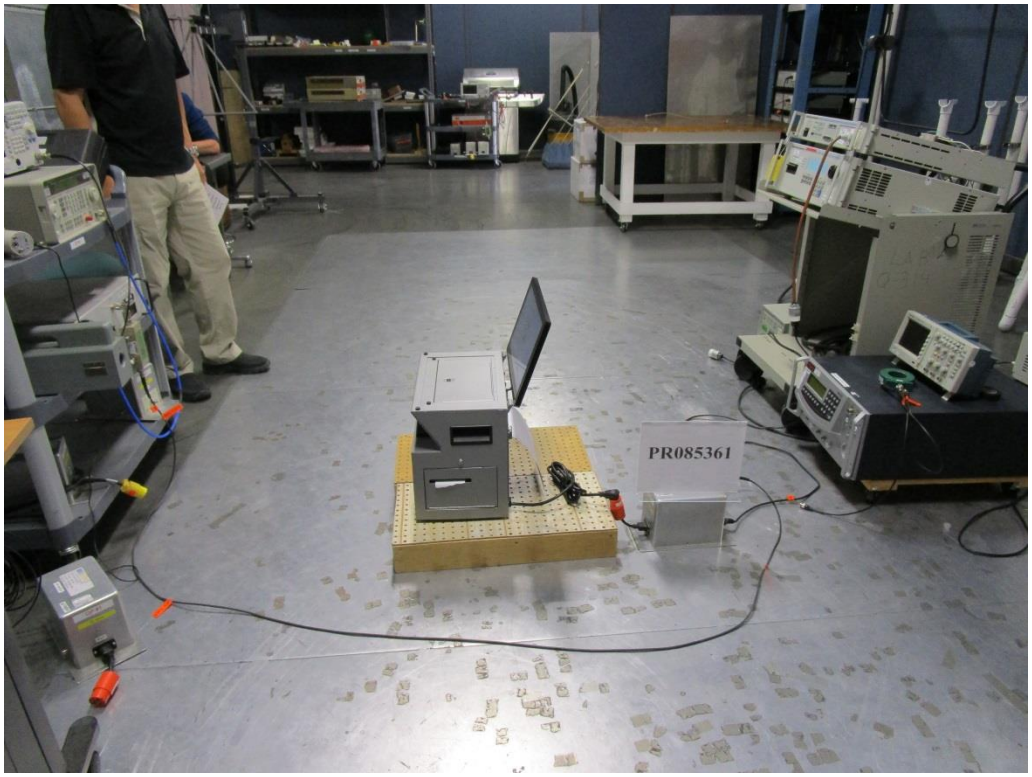

Figure E1. Conducted RF Immunity Test Setup.

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

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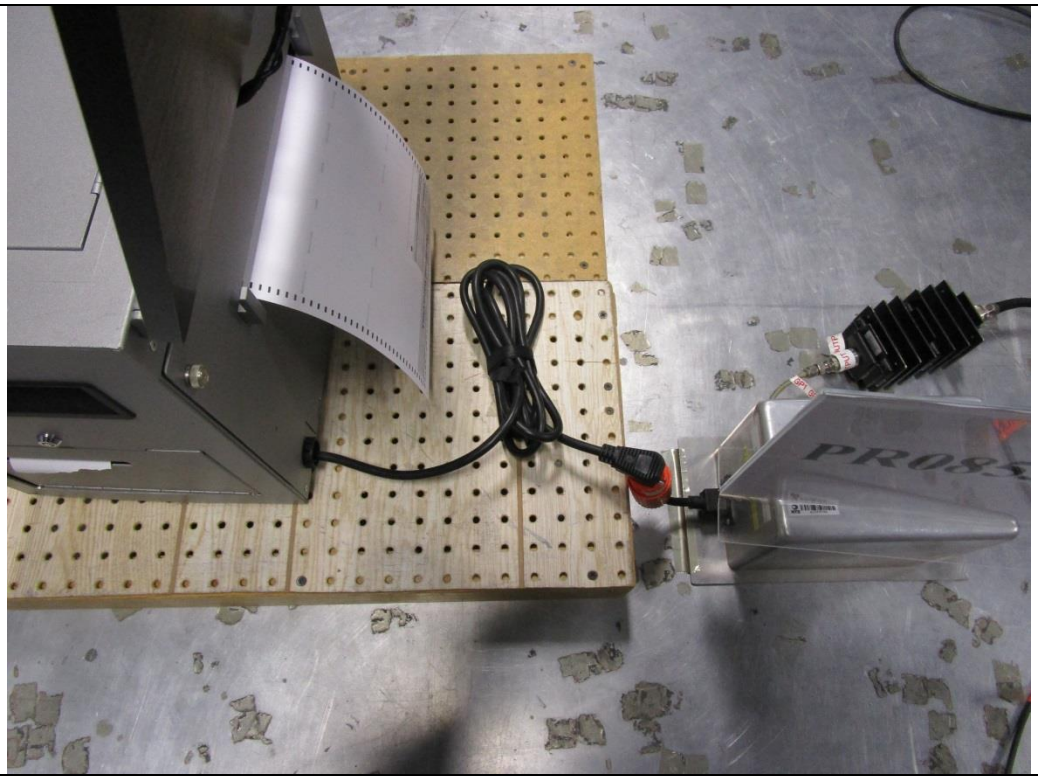

Figure E2. Conducted RF Immunity Test Setup – AC Mains.

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

PR085361-4-6.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1039	Fluke	83-3	69811227	Multimeter/Frequency Meter	10/24/2017	10/24/2018
1261	Hewlett Packard	8648C	3619U00779	Signal Generator, 100kHz to 3.2GHz	10/24/2017	10/24/2018
1379	IFI	M100	O1200-0111	100W Power Amplifier, 0.01 MHz to 220 MHz	NA	NA
1480	EMCI	EMCI-CDN-M3-16	EMCI015	M3 CDN, 16A, 250 VAC	11/13/2017	11/13/2018
1496	Rigol Technologies, Inc.	DSA815	DSA8B150500096	9 kHz to 1.5 GHz Spectrum Analyzer	03/26/2018	03/26/2019
1528	Aeroflex/Weinschel	40-6-34	SB031	Hi power atten 6 dB	10/12/2017	10/12/2018
1532	Werlatone	C9475-13	102545	100 Watt Dual Directional Coupler, 10 kHz to 250 M	10/12/2017	10/12/2018
1569	California Instruments by Ametek	5001IX-208-CTS, Series II	1514A02227	5kV Progammable Power Supply	NA	NA
1587	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019
1594	EMCI	CI	V2.5.0	Conducted Immunity Software	NA	NA

APPENDIX F: Power Frequency H-Field Test Data

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018
Temperature:	24.0˚C Humidity: 42%	Pressure:	835 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

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Frequency (Hz) 50	Frequency (Hz) 60	Field Strength (A/m)	EUT Axis Location	Dwell Time (sec)	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
x		30	Z	60	Extra axis to cover monitor.	A	Pass
	x	30	Z	60	Extra axis to cover monitor.	A	Pass

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

PR085361-4-8.doc FR0100

Figure F1. Power Frequency H-field Immunity Test Setup X axis.

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

PR085361-4-8.doc FR0100

Figure F2. Power Frequency H-field Immunity Test Setup Y axis.

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

PR085361-4-8.doc FR0100

Figure F3. Power Frequency H-field Immunity Test Setup Z axis.

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

PR085361-4-8.doc FR0100

Figure F4. Power Frequency H-field Immunity Test Setup extra Z axis.

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 11, 2018

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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	10/24/2017	10/24/2018
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	01/26/2018	01/26/2019
1587	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019
1505	EMCI	EMCI-4-8-2m-1.5m	0002	HField Loop, 2m x 1.5m	08/28/2017	09/28/2018
1549	California Instruments/Ametek	1251P	1423A05348	AC power supply	NA	NA
1485	Pearson Electronics	110A	90561	Current Monitor, 1 Hz to 20 MHz	11/28/2017	11/28/2018

APPENDIX G: Voltage Dips and Interrupts Test Data

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018
Temperature:	23.6˚C Humidity: 32%	Pressure:	836 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Scanning ballots		
Test Engineer:	Casey Lockhart		

PR085361-4-11.doc FR0100

% Nominal	No. of Cycles	Phase Angle (deg) 0	90	180	270	Time between dropouts (sec)	Number of tests	Comments	Criteria Met	Pass / Fail
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
40%	60			x		10	3		A	Pass
40%	60				x	10	3		A	Pass
0%	300	x				10	3		A	Pass
0%	300			x		10	3		A	Pass
Line Voltage Variation tests										
129Vac Line Voltage Variations (+7.5% of nominal 120V) 3hrs.									A	Pass
105Vac Line Voltage Variations (-12.5% of nominal 120V) 3 Hrs.									A	Pass
Surges of -15% line variations of nominal voltage (102V) 1 Hrs									A	Pass
Surges of -15% line variations of nominal voltage (138V) 1 Hrs									A	Pass

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

PR085361-4-11.doc FR0100

Figure G1. Voltage Dips and Interruptions Test Setup.

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

PR085361-4-11.doc FR0100

Figure G2. Voltage Dips and Interruptions Test Setup.

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Clear Ballot Group (manufacturer) Pro V&V (client)	Project Number:	PR085361
Customer Representative:	Stephen Han	Test Area:	GP1
Model:	ClearCast (Model 2, Version A)	S/N:	CASTD002007
Standard Referenced:	EAC 2005 VVSG	Date:	September 10, 2018

PR085361-4-11.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1039	Fluke	83-3	69811227	Multimeter/Frequency Meter	10/24/2017	10/24/2018
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	07/05/2019
1371	Tektronix	TDS2002B	C103483	Oscilloscope, 60 MHz, 2-channel	01/26/2018	01/26/2019
1569	California Instruments by Ametek	5001IX-208-CTS, Series II	1514A02227	5kV Progammable Power Supply	NA	NA
1587	EXTECH Instruments	445715	NA	Hygro-Thermometer	01/25/2018	01/25/2019

APPENDIX H: Product Data Sheet

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	Sr. 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	Normal
Can modes be operated simultaneously? If so, explain.	No
What mode(s) will be used for testing?	Normal
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	115 VAC ; 230 VAC
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	Model 2, Version A	Unit 1	Precinct Tabulator

I/O Cabling
See Section 2.0 for details

UUT Software/Firmware		
Name	**Version/Revision**	**Functionality**
ClearCast	N/A	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

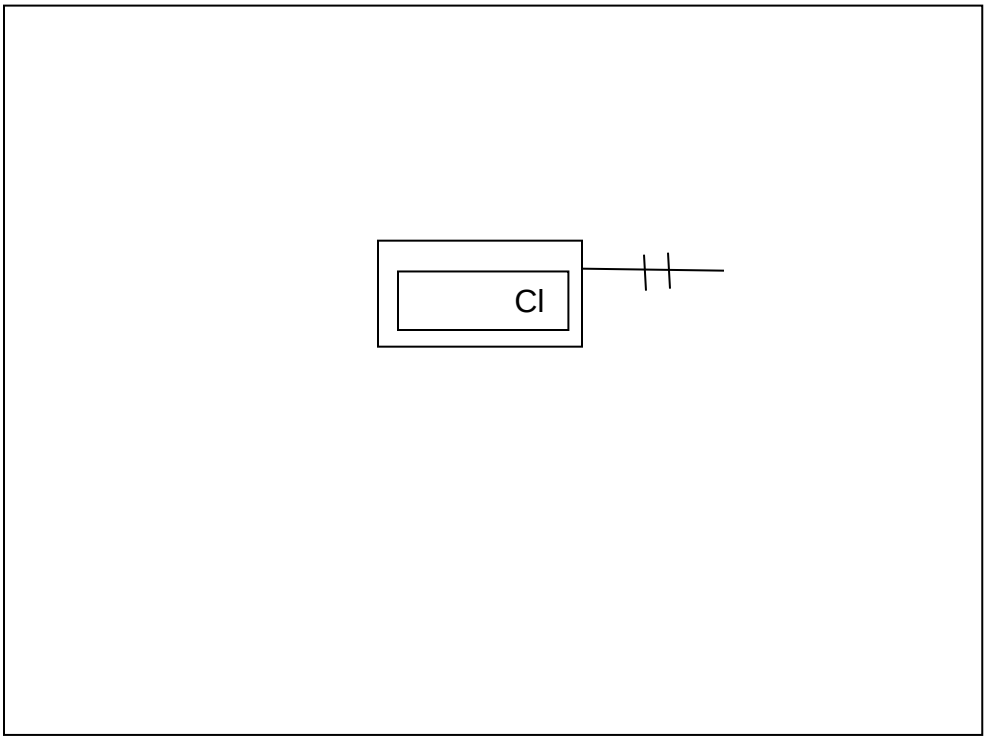
5.0 Support Equipment (SE) – Detailed Information

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, the client will be subject to report revision fees.

APPENDIX I: Test Log

EMI\ENV Test Log

Manufacturer:	Pro V&V	Project Number:	PR085361
Model:	Clear Ballot Group (manufacturer) Pro V&V (client)	S/N:	Unit 1
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Part 15, EAC 2005 VVSG		

FR0105

10m Emissions

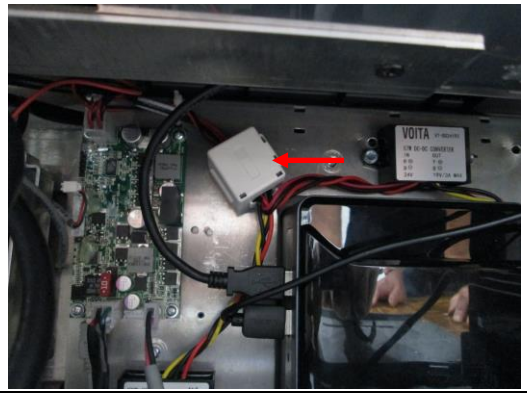
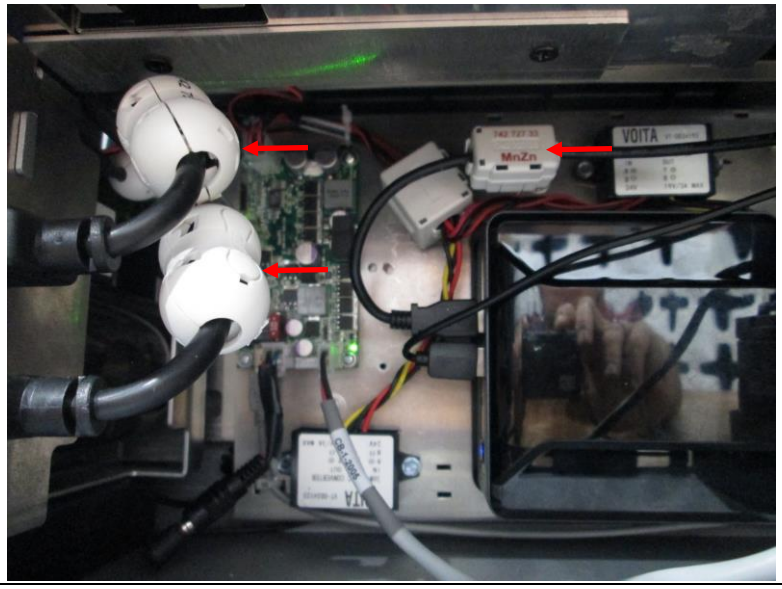
Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
RE	6001	September 6, 2018 0800-0900	Setup for RE		1.0	Complete	KJ
RE	1342	0900-1000	Test#1: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter test distance. 120Vac/60Hz FCC Class B Unit failing multiple frequencies		1.0	Fail	KJ
		1000-1100	Test#2: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter test distance. 120Vac/60Hz FCC Class B RE Troubleshooting **Ferrite on the HDMI cable and internal power cable.**		1.0	Fail	KJ

EMI\ENV Test Log

Manufacturer:	Pro V&V	Project Number:	PR085361
Model:	Clear Ballot Group (manufacturer) Pro V&V (client)	S/N:	Unit 1
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Part 15, EAC 2005 VVSG		

FR0105

10m Emissions

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
							
		1100-1200	Test#3: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter test distance. 120Vac/60Hz FCC Class B RE Troubleshooting Ferrite on the HDMI cable and internal power cable. **Ferrite on 3 USB cables**		1.0	Fail	KJ
							

EMI\ENV Test Log

Manufacturer:	Pro V&V	Project Number:	PR085361
Model:	Clear Ballot Group (manufacturer) Pro V&V (client)	S/N:	Unit 1
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Part 15, EAC 2005 VVSG		

FR0105

10m Emissions

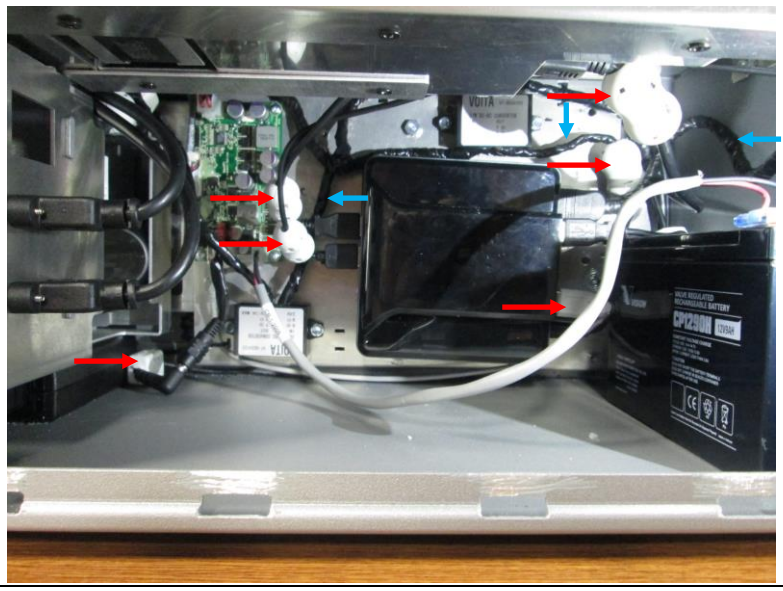
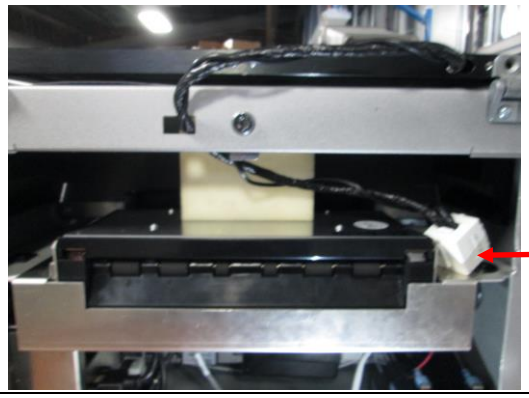
Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
RE	1351	1230-1330	Test#4: 1GHz – 18GHz, 16 rads, 2 heights, 3 second dwell, ref level = 107dB, 3 meter test distance. 120Vac/60Hz FCC Class B Client does not want to measure any signals.		1.0	Complete	KJ
CE	2341	1330-1430	Test#5: 150KHz – 30MHz 120Vac/60Hz FCC Class B		1.0	Pass	KJ
RI	4398	1430-1630	Radiated RF Immunity (4.1.2.10) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz EAC 2005 VVSG Did the back side V-pole		2.0	Complete	KJ
RI		September 7, 2018 0800-1200	Finishing Radiated RF Immunity Unit stopped at 239MHz, V-pole, left side. Did not repeat.		4.0	Pass	KJ
RE		1230-1300	Test#6: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter test distance. 120Vac/60Hz Cable re-positioning, cable management and ferrites Unit failed at 668MHz by .5dB		0.5	Fail	KJ
RE		1330-1430	Test#7: 30MHz – 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter test distance. 120Vac/60Hz HDMI cable shielded with foil with ferrites Output power cable shielded		1.0	Pass	KJ

EMI\ENV Test Log

Manufacturer:	Pro V&V	Project Number:	PR085361
Model:	Clear Ballot Group (manufacturer) Pro V&V (client)	S/N:	Unit 1
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Part 15, EAC 2005 VVSG		

FR0105

10m Emissions

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
							
							
			NOTE: Client says that they do not need to finish 1GHz to 18GHz Radiated emissions.				

Regular hours:	13.5
Overtime/Prem hours:	
Total hours:	13.5

Ground Planes / CALC

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
4-6	4622	September 10, 2018 0800 - 0900	Conducted RF Immunity (4.1.2.11) 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz		1.0	Pass	CL
4-4	4411	0900 - 0930	Electrical Fast Transient / Burst (4.1.2.6) Mains: +/- 2kV, I/O: +/- 1kV 120 VAC / 60 Hz @ 100kHz rep rate. Also ran at 5kHz rep rate.		0.5	Pass	CL
4-11	4196	0930 - 1000	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage) (4.1.2.5) Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. (See Protocol) 120 VAC / 60 Hz		0.5	Pass	CL
---	---	1000 - 1300	129Vac Line Voltage Variations (+7.5% of nominal 120V) 3hrs.		3.0	Pass	CL
---	---	1300 - 1600	105Vac Line Voltage Variations (-12.5% of nominal 120V) 3 Hrs.		3.0	Pass	CL
---	---	September 11, 2018 0800 - -9000	Surges of -15% line variations of nominal voltage (102V) 1 Hrs		1.0	Pass	CL
---	---	0900 - 1000	Surges of + 15% of line variations of nominal (138Vac) 1 Hrs.		1.0	Pass	CL
4-5	4596	1000 - 1530	Surge Immunity (4.1.2.7) Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz **Note: Post-test verification found touch screen not responding. Will replace screen and re-test tomorrow.**		5.5	---	CL
4-8	4831	1530 - 1630	Power Frequency H-Field Immunity (4.1.2.12) 30A/m, 50 / 60 Hz, 3 axes 120 VAC / 60 Hz		1.0	Pass	CL
4-5	---	September 12, 2018 0800 - 1300	Re-test Surge Immunity (4.1.2.7) Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz		5.0	Pass	CL
4-2	4254	1300 - 1500	Electrostatic Discharge Note: Pre-test performed, cables are .931 and .947 (4.1.2.8) +/- 8kV Contact, +/-2, 4, 8, 15kV Air 120 VAC / 60 Hz		2.0	Pass	CL

Regular hours:	23.5
Overtime/Prem hours:	
Total hours:	23.5

Project #:PR085361 Work Order #: 2018080601 PO#:
B80857 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
Three (5) units for test
PQF: Increase/decrease = 3 hrs each -/+, 6 hrs total per unit
PQF: Surge = 4 hrs each
Data sheet folder for each unit
Formal test reports

Quoted Work

Date	Test Code	Description	Standard	Result		Billed
September 6, 2018	1342	Radiated Emissions, 30 MHz - 1 GHz (4.1.2.9) 30 MHz - 1 GHz 120 VAC / 60 Hz	FCC Part 15, Class B	Pass		
September 6, 2018	1351	Radiated Emissions, 1 GHz - 18 GHz (4.1.2.9) 1 GHz - 18 GHz 120 VAC / 60 Hz	FCC Part 15, Class B	Fail		
September 6, 2018	2341	Conducted Emissions, 150 kHz - 30 MHz (4.1.2.9) -- 120 VAC / 60 Hz	FCC Part 15, Class B	Pass		
September 12, 2018	4254	Electrostatic Discharge (4.1.2.8) +/- 8kV Contact, +/-2, 4, 8, 15kV Air 120 VAC / 60 Hz	EN61000-4-2	Pass		
September 6, 2018	4398	Radiated RF Immunity (4.1.2.10) 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	--	Pass		
September 10, 2018	4411	Electrical Fast Transient / Burst (4.1.2.6) Mains: +/- 2kV, I/O: +/- 1kV 120 VAC / 60 Hz	EN61000-4-4	Pass		
September 11, 2018	4596	Surge Immunity (4.1.2.7) Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz	EN61000-4-5	Pass		

September 10, 2018	4622	Conducted RF Immunity (4.1.2.11) 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	EN61000-4-6	Pass		
September 11, 2018	4831	Power Frequency H-Field Immunity (4.1.2.12) 30A/m, 50 / 60 Hz, 3 axes 120 VAC / 60 Hz	EN61000-4-8	Pass		
September 10, 2018	4196	Voltage Dips and Interruptions (Inc./Red. of Nom. Voltage) (4.1.2.5) Electric power increases of 7.5% and reductions of 12.5% of nominal specified power. (See Protocol) 120 VAC / 60 Hz	EN61000-4-11	Pass		
September 11, 2018	4194	Voltage Dips and Interruptions (Surge of +/- 15%) (4.1.2.5) Surge of +/- 15% line variation of nominal line voltage 120 VAC / 60 Hz	EN61000-4-11	Pass		
September 10, 2018	4193	Voltage Dips and Interruptions (4.1.2.5) 70% nom, 0.6 cycles / 40% nom, 6 cycles & 1 sec. / 0% nom, 300 cycles 120 VAC / 60 Hz	EN61000-4-11	Pass		
September 6, 2018	6001	Initial Product Set-up & Configuration Engineering / Trouble-Shoot ---	--			
	9010	Immunity Test Report - Soft Copy -- --	--			
	9040	Emissions Test Report - Soft Copy -- --	--			

Unquoted Work

Date	Test Code	Description	Cost	Billed

Modifications Required For Compliance

Test	Description of Modification	Client Initials
RE	(1) 742 717 22 Wurth ferrite (1) 742 711 42 Wurth ferrite (1) 742 711 32 Wurth ferrite (2) 742 758 13 Wurth ferrites (2) 742 758 12 Wurth ferrites Shielded HDMI and output power cable See photo in test log. Red arrows for ferrites and blue arrows for shielded cable	

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

Shipping Instructions:		**Client Initials**

Supervisor: _____ Date: _____

Test Engineer: _____ Date: _____

I, the client, verify that all the information provided concerning the unit which was tested, support equipment, etc., was accurate. This includes, but is not limited to, information provided via EMC Test Plan and/or EMC Test Protocol, information provided to complete NTS's Product Data Sheet, etc.

Furthermore, I understand that my company may be assessed report revision fees for any report revisions resulting from inaccurate or incomplete information provided.

Client: _____ Date: _____

☐ Invoice Complete Invoice #: _____

APPENDIX J: 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: 303 776 7249

ELECTRICAL

Valid To: September 30, 2018 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), 15C (using ANSI C63.10:2013), and 18 (using MP-5:1986); 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 C62.25 (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 6GHz); 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); VCCI-CISPR 32:2016; 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 (2012)
Military/Defense	MIL-STD-461F Method CE101 (30 Hz to 10 kHz); MIL-STD-461F Method CE102 (10 kHz to 10 MHz); MIL-STD-461F Method CE106 (10 kHz to 40 GHz); MIL-STD-461F Method CS101 (30 Hz to 150 kHz); MIL-STD-461F Method CS106; MIL-STD-461F Method CS114 (10 kHz to 200 MHz); MIL-STD-461F Method CS116 (10 kHz to 100 MHz); MIL-STD-461F Method RE101 (30 Hz to 100 kHz); MIL-STD-461F Method RE102 (10 kHz to 18 GHz); MIL-STD-461F Method RE103 (10 kHz to 40 GHz); MIL-STD-461F Method RS101 (30 Hz to 100 kHz); MIL-STD-461F Method RS103 (2 MHz to 40 GHz)

[1] When the date, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is required 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	40000
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	40000
Intentional Radiators Part 15C	ANSI C63.10:2013	40000

[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 8 January 2009*).

Presented this 28th day of October 2016.

President and CEO
For the Accreditation Council
Certificate Number 0214.43
Valid to September 30, 2018
Revised August 30, 2018

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

END OF REPORT