Report Number: **ERB11210, Rev. A**

Report Type: **Engineering-level**

Reference Standard: **FCC Part 15, Class B**
                             IEC 61000-4-2 Ed. 2.0 2008-12
                             IEC 61000-4-3:, Ed. 3.1, 2008-04

Date of Report: **26 January 2012**

Product Name: **AccuVote-OS Memory Card**

Model Number: **181-001004**

Serial Number: **N/A**

Manufacturer: **Dominion Voting Systems, Inc.**

Representative: **Ian Piper**

Approved By: *Vincent W. Erst*

Prepared for:

Dominion Voting Systems, Inc.
1201 18th Street, Suite 210
Denver, Colorado 80202
Phone: 720-257-5209 x9221
Email: ian.piper@dominionvoting.com

Customer Representative:

Ian Piper
Director, Certification

Tested at:

EMC Integrity, Inc.
1736 Vista View Drive
Longmont, Colorado 80504

Revision	Description of Revision	Date:
Rev. -	Initial Release	19 January 2012
Rev. A	Changes to report per client email request of 1-20-2012	26 January 2012

TABLE OF CONTENTS

LIST OF APPENDICES

1.0   SCOPE

This report outlines the engineering-level emissions and immunity testing that was performed on a piece of information technology equipment (ITE).   Testing was performed to the levels specified by the client's EMC test plan.   The purpose of this test was to give a level of confidence that this product complied with the Class B emission limits for FCC Part 15, as well as the immunity requirements of IEC 61000-4-2 and IEC 61000-4-3.

2.0   PRODUCT DESCRIPTION

The product name was the AccuVote-OS Memory Card manufactured by Dominion Voting Systems, Inc..   The model number of the unit tested was 181-001004.   No serial number information was available.   This product is a 128Kb data storage card using MRAM based memory and specifically designed for use with the Dominion's AccuVote-OS optical scan unit with its 40-pin card edge connector interface.   It should be noted that 120 Vac/60 Hz input power was used for all testing.   Additional product information may be found in Appendices D and E of this report.

3.0   TEST DESCRIPTION

One emission and two immunity tests were performed on this product, and these are defined as follows:

3.1 Radiated E-field Emissions.   Radiated emissions testing was performed at a distance of 10-meters in a semi-anechoic 10-meter chamber.   This chamber is calibrated annually and meets the volumetric site attenuation requirements of ANSI C63.4: 2003 at a distance of 10 meters.   For measurements from 30 MHz to 1 GHz, a biconilog antenna is used in conjunction with a high-gain, low-noise preamplifier.   This is connected to an HP 8566B spectrum analyzer with an HP 85650A Quasi-Peak (QP) Adapter, via an HP 85685 RF Preselector.

Radiated emissions testing is broken into two parts: pre-scan and QP/maximization.   Pre-scanning a product from 30 MHz to 1 GHz consists of measuring peak emissions from eight radials (every 45 degrees), at four antenna heights (1 m, 2 m, 3 m and 4 m) for both antenna polarities.   Data is recorded in a graph showing amplitude vs. frequency of the emissions, and frequencies for QP/maximization are chosen based on this graph.   The procedure for maximizing emissions is as follows:

1. The analyzer is tuned to the frequency associated with the emissions having the least margin.
2. The turntable and antenna mast are moved to the location where the maximum emission was measured during the pre-scan.
3. Both are then oriented such that the maximum emission is obtained.
4. Cables on the UUT are manually manipulated to achieve the maximum emission.
5. The turntable and antenna mast are then re-adjusted to ensure a maximum reading.

6. If the signal in question is less than 1 GHz, quasi-peak detection is performed on the signal for a minimum of 10 seconds. For signals greater than 1 GHz, video averaging is performed.
7. Turntable/antenna mast maximization and QP detection are performed on all other signals within 6 dB of the limit. In the event that there are not six signals within 6 dB of the limit, the highest six signals are maximized. This ensures that a minimum of six signals are maximized and appear in the final data table.

3.2 Electrostatic Discharge. Direct and indirect discharge testing was performed on the UUT. Contact discharge testing was performed on selected conductive points of the UUT at levels of $\pm$2 kV, $\pm$ 4 kV, $\pm$ 6 kV and $\pm$8 kV using 1 pulse per second (pps) and 10 discharges per level per polarity. Air discharge was also performed at non-conductive points on the UUT at levels of $\pm$2 kV, $\pm$ 4 kV, $\pm$ 8 kV and $\pm$ 15 kV. Indirect discharge testing was also performed using a vertical coupling plane (VCP) and a horizontal coupling plane (HCP). Discharge levels were $\pm$2 kV, $\pm$ 4 kV, $\pm$ 6 kV and $\pm$ 8 kV.

3.3 Radiated RF Immunity. Radiated RF immunity testing was performed on the UUT over the frequency range from 80 MHz to 2.5 GHz in 1% frequency increments. The UUT consisted of both table-top and floor-standing components. The floor-standing component was placed on the floor of the chamber and the table-top components were placed on a non-conductive table, 80 cm above the floor of the chamber. The magnitude of the impinged field was 3 V/m and this field was amplitude modulated with a 1 kHz sine wave to a depth of 80%. The UUT was oriented such that all four sides were illuminated over the entire frequency range. Testing was performed for both vertical and horizontal polarities.

4.0 TEST RESULTS

The UUT complied with all testing. Top-level summaries are shown in Tables 4-1 and 4-2. Data sheets, test setup photographs and test equipment lists are all contained in their respective appendices.

Test	Frequency (MHz)	Margin (dB)	Result	Appendix
Radiated E-field Emissions	240.031 MHz	3.19	Pass	A

Table 4-1. Emissions Test Summary.

Test	Description	Result	Appendix
Electrostatic Discharge	Contact: $\pm$2 kV, $\pm$ 4 kV, $\pm$ 6 kV and $\pm$8 kV Air: $\pm$2 kV, $\pm$ 4 kV, $\pm$ 8 kV and $\pm$15 kV HCP & VCP: $\pm$2 kV, $\pm$ 4 kV, $\pm$ 6 kV and $\pm$8 kV	Pass	B
Radiated RF Immunity	10 V/m from 80 to 1000 MHz (four sides); fields amplitude modulated with a 1 kHz sine wave to a depth of 80%	Pass	C

Table 4-2. Immunity Test Summary.

APPENDIX A

Radiated E-field Emissions Test Data

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	12/15/11
Temperature:	23˚C Humidity: 17%	Pressure:	840mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Kevin Johnson		

B11210-11-RE.doc   FR0100

Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B QP (dB)
QP	292.573	37.3	13.2	-28.1	22.4	247/V-Pole/1.24	13.13
QP	308.381	45.5	13.5	-28.1	30.9	15/V-Pole/1.24	4.61
QP	337.584	39.0	13.9	-28.1	24.9	287/V-Pole/1.36	10.64
QP	352.597	45.7	14.7	-28.0	32.4	4/V-Pole/1.00	3.19
QP	374.343	41.6	15.1	-28.0	28.7	185/V-Pole/1.00	6.85
QP	396.389	39.5	15.5	-28.0	26.9	341/V-Pole/1.00	8.60
QP	462.492	38.6	16.8	-27.8	27.6	133/V-Pole/1.00	7.98
QP	638.591	40.3	19.0	-27.1	32.2	102/V-Pole/2.77	3.31

The highest emission measured was at **240.031 MHz,** which was **3.19 dB** below the limit

> ➤ "Type" refers to the type of measurement performed. The type of measurement made is based on the requirements of the particular standard:
>
>   ▪ PK = Peak Measurement: RBW is 120kHz, VBW is 3 MHz
>
>   ▪ QP = Quasi-Peak Measurement: RBW is 120kHz, VBW is 3 MHz, and QP Detection is ENABLED
>
>   ▪ AV = Video Average Measurement: RBW is 1 MHz, VBW is 10 Hz
>
> ➤ The "Final" emissions level is attained by taking the "Level" and adding the "Transducer" factor and the "Gain/Loss" factor. Final measurements are made with the Azimuth, Polarity, Height, and EUT Cables positioned for maximum radiation. If applicable, cables positions are noted in the test log. (Sample Calculation: 49.6 dBuV + 11.4 dB/m – 28.8 dB = 32.2 dBuV/m. **Important Note**: This is a sample calculation only for the purpose of demonstration, and does not reflect data in this report.)
>
> ➤ The "Azm/Pol/Hgt" indicates the turn-table *azimuth*, the antenna *polarity*, and the antenna *height* where the maximum emissions level was measured.
>
> ➤ The "Margin" is with reference to the emissions limit. A positive number indicates that the emission measurement is below the limit. A negative number indicates that the emission measurement exceeds the limit.
>
> ➤ The PRESCAN is a peak measurement and is performed with the RBW set to 120 kHz, VBW set to 3 MHz (30 MHz to 1 GHz), and the RBW set to 1 MHz, VBW set to 100 kHz (> 1 GHz)

emci
emc integrity incorporated

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	December 15, 2011
B11210-11-RE.doc			FR0100

Project: B11210   Test Number: 18   Date: 12-15-2011
SLI Global Solutions, Model#: AccuVote-OS Memory Card
Serial#: 30799
Power: 120Vac/60Hz
Notes: Proto5-RA005 .Pins 39 and 40 shorted together

Figure A1: Radiated Emissions Prescan, 30MHz to 1000MHz, Peak Measurements at 10m Distance

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	December 15, 2011

B11210-11-RE.doc   FR0100

Figure A2: Radiated Emissions Test Setup - Front

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	December 15, 2011

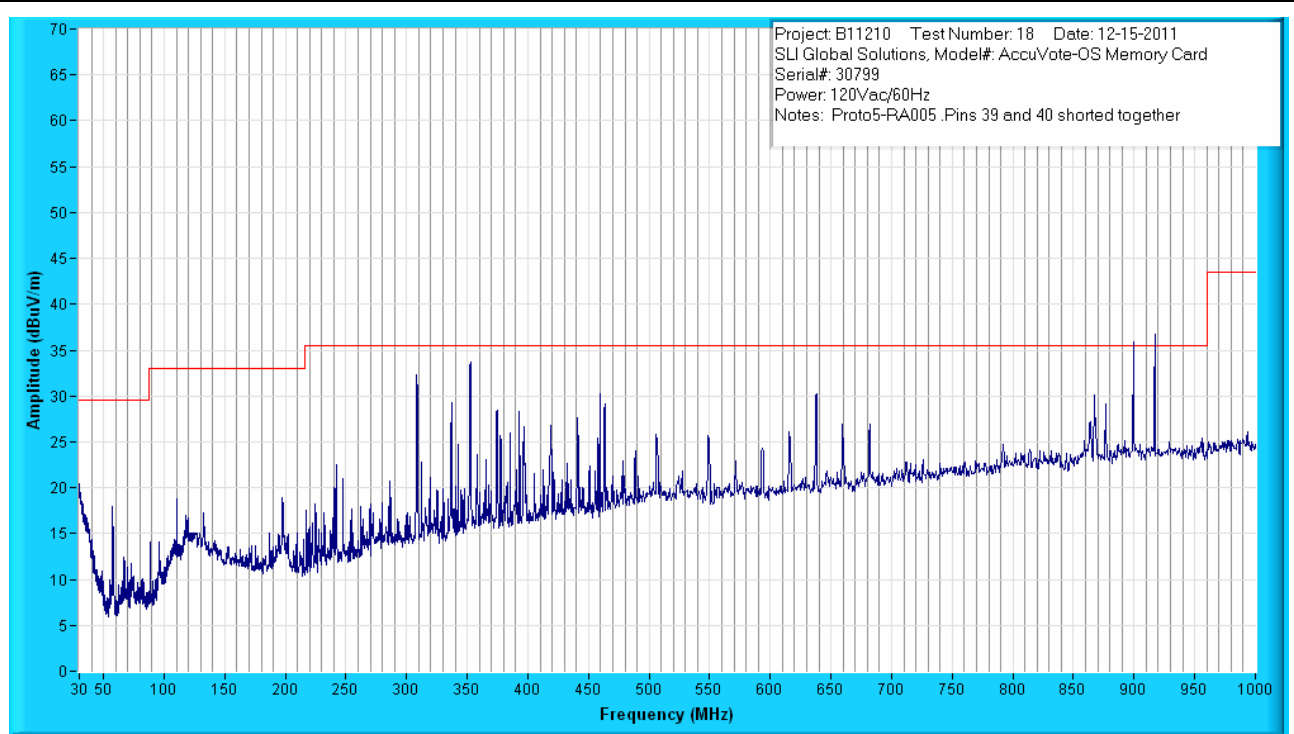B11210-11-RE.doc   FR0100

Figure A3: Radiated Emissions Test Setup - Right

![emc — emc integrity incorporated logo]

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	December 15, 2011

B11210-11-RE.doc   FR0100

Figure A4: Radiated Emissions Test Setup – Back

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	December 15, 2011

B11210-11-RE.doc   FR0100

Figure A5: Radiated Emissions Test Setup – Left

Radiated Emissions, FCC Part 15

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	10m1
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)	S/N:	N/A
Standard Referenced:	FCC Part 15	Date:	December 15, 2011

B11210-11-RE.doc

FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1219	Mini-Circuits	ZKL-2	062905	Preamp, 10 - 2000 MHz, 30 dB	03/06/2011	03/06/2012
1232	Sunol Sciences	JB1	A071605-2	Bilog Antenna, 30 MHz to 2.0 GHz	09/01/2011	09/01/2012
1233	Sunol Sciences	SC104V	110305-1	Positioning Controller	NA	NA
1234	CIR Enterprises	10m Chamber	001	10m Chamber with 2.5m turntable	04/03/2011	04/03/2012
1238	Sunol Sciences	TWR95-4	110305-3	Antenna Mast	NA	NA
1239	Sunol Sciences	FM2522VS	110305-2	Turn Table, 2.5m Diameter	NA	NA
1266	California Instruments	MX15-1	57961	AC Power Source, 0 - 300 VAC / 16 - 819 Hz / 15kVA	NA	NA
1338	Hewlett Packard	85685A	3506A01551	RF Preselector	01/28/2011	01/28/2012
1339	Hewlett Packard	8566B	2937A06103	Spectrum Analyzer with 2542A11546	01/28/2011	01/28/2012
1340	Hewlett Packard	8566B	2542A11546	Spectrum Analyzer Display	01/28/2011	01/28/2012
1341	Hewlett Packard	85650A	2811A01351	Quasi-Peak Adapter	01/28/2011	01/28/2012

APPENDIX B

Electrostatic Discharge Test Data

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011
Temperature:	21°C Humidity: 50%	Pressure:	837 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Mike Tidquist		

B11210-4-2.doc   FR0100

Test Location	Voltage Level (kV)	Polarity +	Polarity -	Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass / Fail
						Indirect Discharge Points		
VCP	2, 4, 6, 8	x	x	10	1	Front Side	---	Complete
VCP	2, 4, 6, 8	x	x	10	1	Left Side	---	Complete
VCP	2, 4, 6, 8	x	x	10	1	Right Side	---	Complete
VCP	2, 4, 6, 8	x	x	10	1	Back Side	---	Complete
HCP	2, 4, 6, 8	x	x	10	1	Edge of HCP at Front of UUT	---	Complete
						Contact Discharge Points - **RED** Arrows.		
Figure A3	2, 4, 6, 8	x	x	---	---	No Contact Points Found	---	---
Figure A4	2, 4, 6, 8	x	x	---	---	No Contact Points Found	---	---
Figure A5	2, 4, 6, 8	x	x	10	1	At -6kV to lock mem card removed system halted message appeared. Operator reset was required and testing continued. At +/- 8 kV to lock Scanner quit working, error messages appeared ISR7:0256 D666 call for service, ISR1:14e0:2f91 call for service.	---	Complete
Figure A6	2, 4, 6, 8	x	x	10	1	AT -8kV to back plate by serial connector scanner stopped functioning properly operator reset was required ans testing continued	---	Complete
Figure A7	2, 4, 6, 8	x	x	10	1		---	Complete
						Air Discharge Points - **BLUE** Arrows.		
Figure A3	2, 4, 8, 15	x	x	10	1	At +/-6, 8, 15kV discharges occurred at seam(all along seam) no disruption in service	---	Complete

IIIII‖ **emci**
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011
Temperature:	21°C Humidity: 50%	Pressure:	837 mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Normal Operating Mode		
Test Engineer:	Mike Tidquist		

B11210-4-2.doc   FR0100

Test Location	Voltage Level (kV)	Polarity +	Polarity -	Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass / Fail
Figure A4	2, 4, 8, 15	x	x	10	1	At +/-6, 8, 15kV discharges occurred at seam(all along seam) no disruption in service	---	Complete
Figure A5	2, 4, 8, 15	x	x	10	1	At +/-6, 8, 15kV discharges occurred around lock cover, display, and scanner opening no disruption in service	---	Complete
Figure A6	2, 4, 8, 15	x	x	10	1	At +/-4, 6, 8, 15kV to back area discharges occurred around seam and scanner opening no disruption in service.	---	Complete
Figure A7	2, 4, 8, 15	x	x	10	1	At +/-4, 6, 8, 15kV to buttons in front discharges occurred no disruption in service. At +/-6, 8, 15 discharges occurred at seam(all along seam) no disruption in service	---	Complete

||||||emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-2.doc   FR0100

Figure B1. Electrostatic Discharge Test Setup.

emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

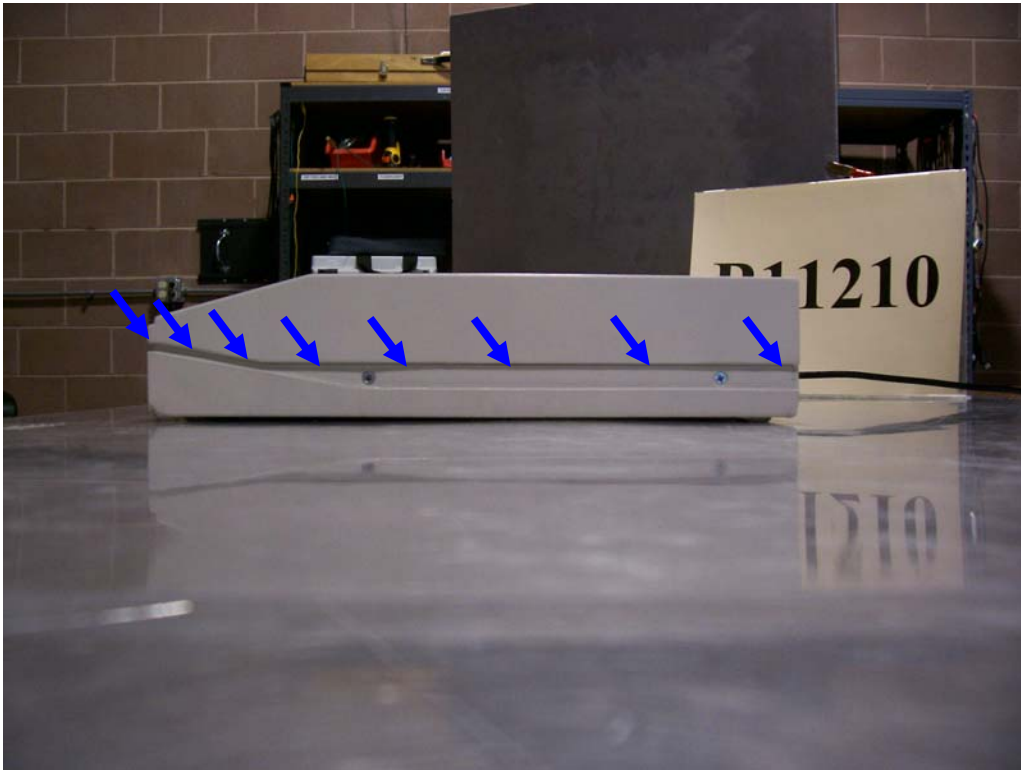B11210-4-2.doc   FR0100

Figure B2. Electrostatic Discharge Test Setup.

(Memory Card, Showing Card Placement Slot)

![emc integrity incorporated logo]

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-2.doc   FR0100

Figure B3. Electrostatic Discharge Test Setup.

emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

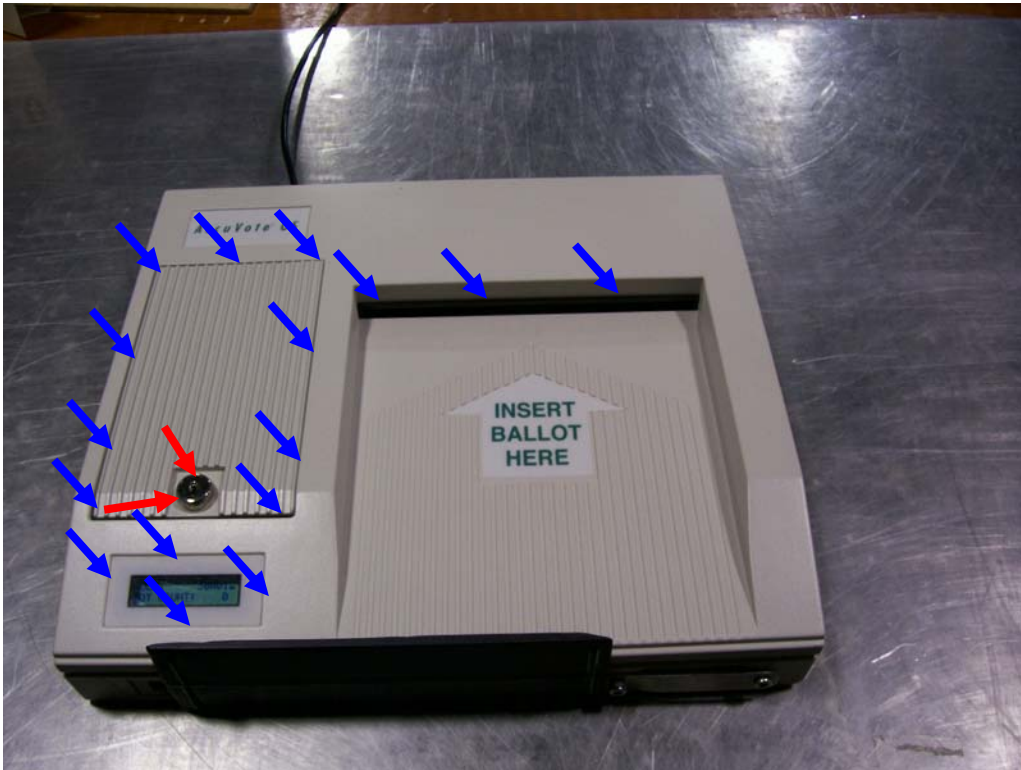B11210-4-2.doc   FR0100

Figure B4. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

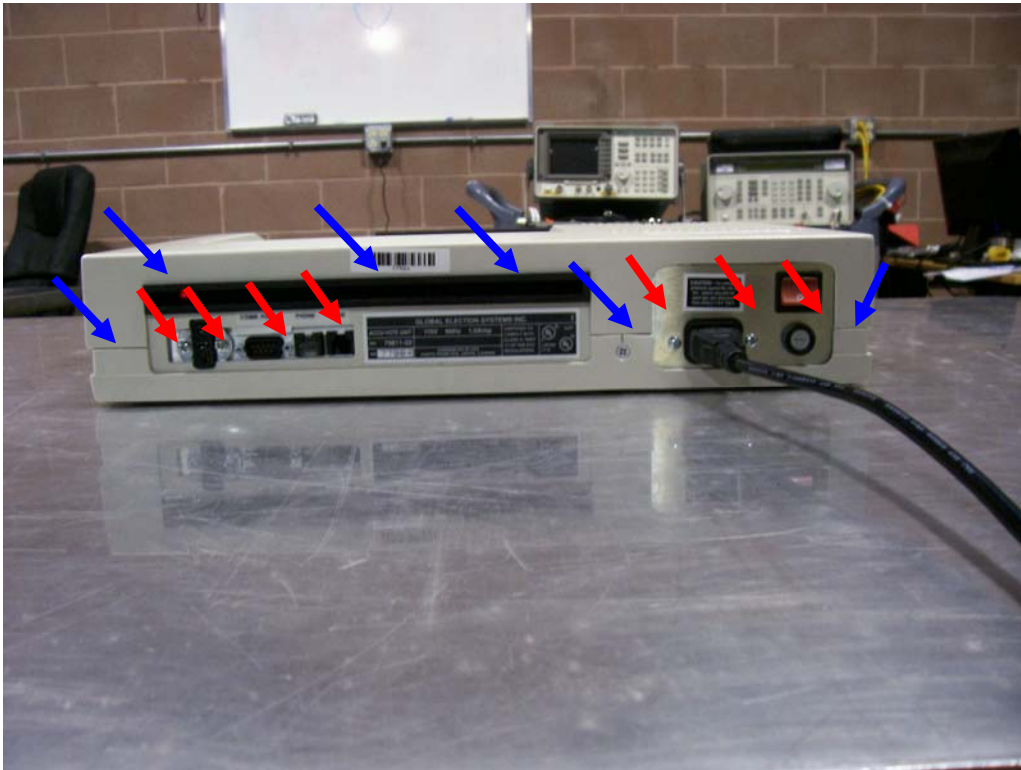B11210-4-2.doc   FR0100

Figure B5. Electrostatic Discharge Test Setup.

emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

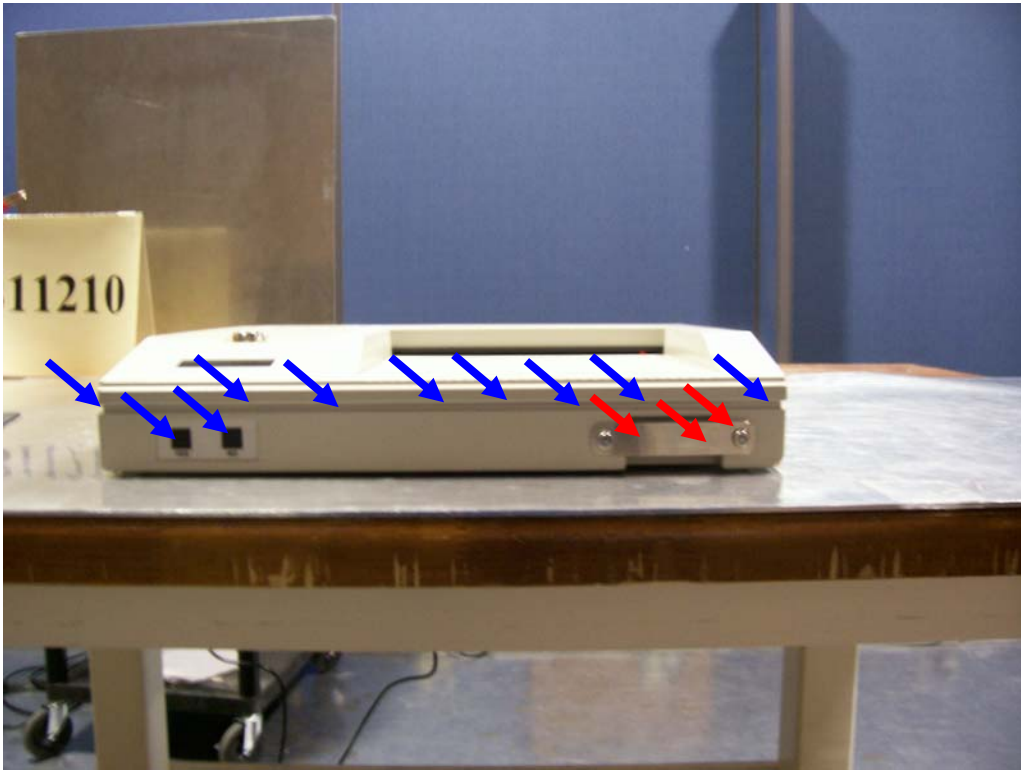B11210-4-2.doc   FR0100

Figure B6. Electrostatic Discharge Test Setup.

‖‖‖emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-2.doc   FR0100

Figure B7. Electrostatic Discharge Test Setup.

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	GP #2
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-2.doc

FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1015	KeyTek	MZ-15/EC	0010280/0010279	Mini Zap ESD Gun	03/01/2011	03/01/2012
1296	California Instruments Corporation	5001IX208-150/300	S59159	5k VA AC Power Source	08/25/2011	08/25/2012
1407	EXTECH Instruments	445715	NA	Hygro-Thermometer	10/11/2011	10/11/2012

APPENDIX C

Radiated RF Immunity Test Data

emc integrity incorporated

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

Manufacturer:	Dominion Voting Systems, Inc.	Project Number: B11210
Customer Representative:	Darrick Forester	Test Area: CALC
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N: N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date: December 8, 2011
Temperature:	22.8˚C Humidity: 42%	Pressure: 837 mb
Input Voltage:	120Vac/60Hz	
Configuration of Unit:	Normal Operating Mode	
Test Engineer:	Dean Wyant	

B11210-4-3.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**	---	---
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		---	---
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	**Right Side**	---	---
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		---	---
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	**Back Side**	---	---
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		---	---
80 - 1000	AM	80	1kHz	Sine	1	10	V	3	**Left Side**	---	---
80 - 1000	AM	80	1kHz	Sine	1	10	H	3		---	---

||||||| emci
emc integrity incorporated

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

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	CALC
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-3.doc   FR0100

Figure C1. Radiated RF Immunity Test Setup – Front Side.

![emc logo] emc
emc integrity incorporated

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

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	CALC
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-3.doc   FR0100

Figure C2. Radiated RF Immunity Test Setup – Right Side

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

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	CALC
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-3.doc   FR0100

Figure C3. Radiated RF Immunity Test Setup – Back Side.

||||||emci
emc integrity incorporated

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

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	CALC
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-3.doc   FR0100

Figure C4. Radiated RF Immunity Test Setup – Left Side.

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

Manufacturer:	Dominion Voting Systems, Inc.	Project Number:	B11210
Customer Representative:	Darrick Forester	Test Area:	CALC
Model:	AccuVote-OS memory card (Proto4 Pre-production Model)	S/N:	N/A
Standard Referenced:	IEC/EN 61000-4-2, 61000-4-3	Date:	December 8, 2011

B11210-4-3.doc

FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1005	EMCO	3140	1012	Biconilog Antenna	NA	NA
1024	Amplifier Research	FP4000	18358	Isotropic Field Probe (10 kHz - 1 GHz)	08/15/2011	08/15/2012
1056	Marconi	2041	119332/001	Signal Generator 10kHz - 2.7GHz	02/25/2011	02/25/2012
1058	Ray Proof	RF Shield Room	6698	Completely Anechoic Lined Chamber	06/15/2011	06/15/2012
1181	EMCI	RFS	NA	Release 02 July 2004	NA	NA
1214	California Instruments	1251P	10223	AC Power Source	NA	NA
1250	OPHIR	5127F	1034	RF Power Amplifier 20-1000MHz, 200 Watts	NA	NA
1404	EXTECH Instruments	445715	N/A	Hygro-Thermometer	08/17/2011	08/17/2012

APPENDIX D

Product Data Sheet

1736 Vista View Drive | Longmont, CO 80504 | tel: 303.776.7249 | fax: 303.776.7314 | info@emcintegrity.com

www.emcintegrity.com

1.0   Client Information

Client Information	
Manufacturer Name	Dominion Voting Systems, Inc.
Address	1201 18th Street, Suite 210
City	Denver
State	CO
Zip Code	80202
Client Representative	Ian Piper
Title	Director, Certification
Phone	720-257-5209 x9221
Fax	
Email	ian.piper@dominionvoting.com

2.0   Product Information - General

Product Information	
Product Name (as it should appear on test report)	AccuVote-OS Memory Card
Model Number	181-001004
Functional description of product(Detailed)	128Kb data storage card using MRAM based memory and specifically designed for use with the Dominion's AccuVote-OS optical scan unit with its 40-pin card edge connector interface.
Product type (IT, Medical, Scientific, Industrial, etc.)	IT
Is the product an intentional radiator	No
Product Dimensions	Approx. 87mmL x 54mmW x 2.25mmH (5mm at grip)
Product Weight	Approx. 1 oz.
Will fork lift be required	No
Applicable Standards, if known	VVSG 2005, VSS 2002
Describe all environment(s) where product will be used	Operating Environment: Temperature +5 to +38 ℃, Relative Humidity 30% - 90% (non-condensing). Storage environment: Temperature -15 to +40 ℃, Relative Humidity 5% to 95% (non-condensing).
Does product consist of multiple components? (If yes, please describe each system component)	No
Cycle time > 3 seconds? (If yes, How long?)	Ballot scan cycle is approx.. 3 seconds.
Highest internally generated frequency	None in memory card product. Supporting equip (AV-OS unit) can generate 32.7MHz.
Product Set-up Time	Approx. 10 minutes
Boot up time in the event of an unintentional power down	Approx. 1 minute (including stepping through the program to get to the test point.)
Identify all I/O Connections as well as maximum associated cable lengths below	

Model No.	Description	Shielded?	Length	Quantity

3.0 Power

Power Requirements	
Input Voltage Rating as it appears on unit, power supply, or power brick	Supporting equip (AV-OS unit) uses 120Vac.
Input Current (specify @ 230 Vac/50 Hz)	Supporting equip (AV-OS unit) uses 0.3Amps @120Vac 60/50Hz.
Single or Multi-Phase (If multi-phase, specify delta or wye)	Supporting equip (AV-OS unit) uses single phase power.
Is input power connector two-prong (Hot & Neutral) or 3-prong (H, N, Ground)	Supporting equip (AV-OS unit) uses a 3-prong input power connector.
Does UUT have more than 1 power cord? (If yes, explain.)	No. Supporting equip (AV-OS unit) uses only one power cord.

4.0 Unit Under Test (UUT) – Detailed Information

UUT Hardware	
Condition	Normal operation.
Configuration During Test	Unit prepared with programming to match test ballot layout. Supporting equipment configured in Test Election mode, scanning a test ballot in recirculation mode.
Input Power	Supporting equip (AV-OS unit) uses 120Vac.

UUT Components			
Name	**Model No.**	**Serial No.**	**Description**
AV-OS Memory Card	181-001004	n/a	AV-OS Memory Card, 128KB, MRAM

I/O Cabling
See Section 2.0 for details

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

UUT Operating Conditions	
List all frequencies the product generates/uses	Memory card product uses the supporting equipment's address/data bus clock cycle frequency of 7.5MHz. The supporting equipment generates the following frequencies: 32.7MHz Scanner Module Clock Crystal 15MHz CPU Clock Crystal 52KHz Power Supply Switching Frequency
How will product be exercised during test?	Recirculating test ballot scan.
How will product be monitored during test?	Visually. During testing, the ballot will continue to recirculate through the supporting equipment.
What are the product's critical parameters?	
Specify tolerance of all critical parameters.	

5.0 Support Equipment (SE) – Detailed Information

Support Equipment (SE)			
Name	**Model No.**	**Serial No.**	**Description**
AccuVote-OS	A	76008	Optical scan unit with EAC certified hardware configuration.
AccuVote-OS Unit	A MN: 79811-03	77984	Optical scan unit with EAC certified hardware configuration.
AccuVote-OS Unit	A MN: 79811-04	30799	Optical scan unit with EAC certified hardware configuration.
AccuVote-OS Unit	A MN: 79811-03	30572	Optical scan unit with EAC certified hardware configuration.

SE I/O Cabling				
Model No.	**Description**	**Shielded?**	**Length**	**Quantity**
Belden 17250 or equivalent	AC Power Cable		6.7 FT (2m)	1

SE Software/Firmware		
Name	**Version/Revision**	**Functionality**
AV-OS	PC 1.96.13	Precinct Count optical scan tabulator programming.

6.0 Block Diagram
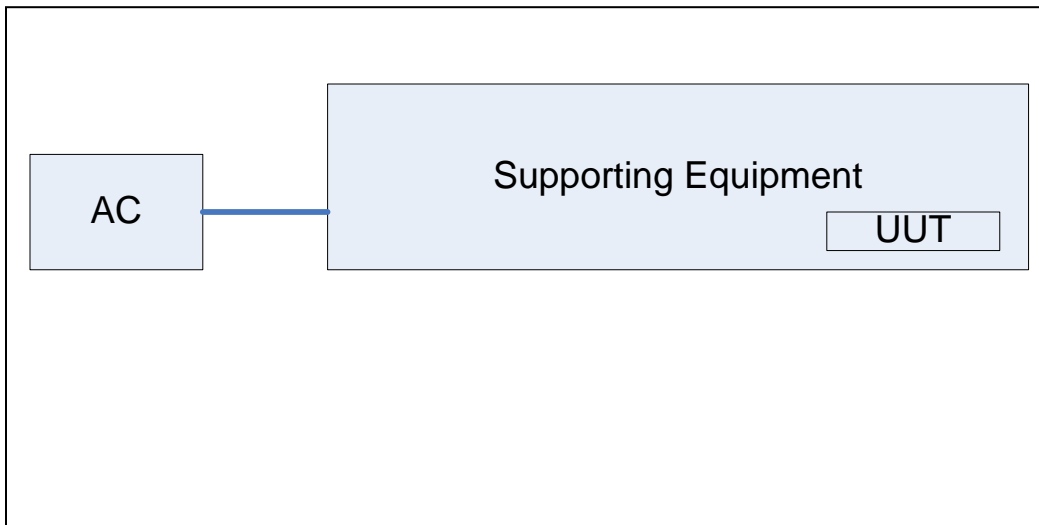
APPENDIX E

EMC/EMI Test Plan

Dominion Voting System for
Assure 1.2 AV-OS Memory Card (Proto4 / Proto5)
EMC / EMI Test Plan for compliance with the
Federal Election Commission (FEC) 2002 Voting System
Standards (VSS)

By

216 16th St, Suite 700
Denver, CO 80202
303-575-6881
www.SLIglobalsolutions.com

Revision History:

Version	Date	Comments	Contributors
0.9	12/7/11	Initial Release	D. Forester
1.0	12/8/11	Updated section 5.1.1: Measurement Distance from 3m to 10m	D. Forester
2.0	12/13/11	Added: ▪ AccuVote-OS Scanner Model A, S/N: 30799 & 30572 (spare support equip.) ▪ Assure 1.2 AV-OS memory card Proto4 / Proto5 reference	D. Forester

Table of Contents

List of Tables

List of Figures

DVS Assure 1.2 AV-OS Memory
Card_ VSS EMC EMI Test Plan
v2.0

SLI Global Solutions Restricted Document
Duplication Prohibited

Page 2 of 14

1.0   Introduction

1.1   Overview

This test plan covers the EMC (Electromagnetic Compatibility) and EMI (Electromagnetic Interference) test requirements and methods for the Dominion Assure 1.2 AV-OS Memory Card, hereafter known as the Unit Under Test (UUT), to the requirements as stated in Federal Election Commission 2002 Voting System Standards (VSS).

1.2   Scope of Testing

The evaluation of ECO ASR-001 a new AccuVote-OS memory card Proto4 the "pre-production model for the Assure product line indicates it has an impact relevant to the FEC VSS April 2002 environmental hardware test requirements of the qualified hardware configuration. The change requires revalidation of EMC / EMI requirements per VSS Vol I, sections 3.2.2.8, 3.2.2.9, and 3.2.2.10.

The appropriate EMC / EMI tests include:

- Electrostatic Disruption: IEC 61000-4-2
  - The new memory card is user-installable and potentially has access to the outside environment, it may be subject to ESD (both human and furniture discharges).
- Radiated Electromagnetic Emissions: FCC Part 15 Class B, ANSI C63.4
  - The new memory card contains active digital circuitry, it requires an EMC re-qualification per FCC Part 15 Rules & Regulations
- Electromagnetic Susceptibility: IEC 61000-4-3
  - The new memory card contains active digital circuitry; it may be susceptible to outside RF sources, such as 2-way radios, mobile phones or other wireless RF signals.

The new Assure 1.2 AV-OS Memory Card will be tested as part of the AccuVote-OS unit configuration. The device will be configured per the manufacturer documentation and placed into an operational state during hardware testing.

1.3   Qualifications

The UUT supplied by Dominion is representative of product produced in their volume manufacturing process.

1.4   Client

Dominion Voting
1201 18th Street, Suite 210
Denver, CO 80202

1.5   Company Restricted Information

This document contains confidential and restricted information and shall not be reproduced outside of SLI Global Solutions without written consent.

This document must be reproduced in whole unless written consent has been attained from SLI Global Solutions.

1.6   Reference Documents

1) FEC 2002 Voting System Standard (VSS) Volume I, Sec. 3

DVS Assure 1.2 AV-OS Memory
Card_ VSS EMC EMI Test Plan
v2.0

SLI Global Solutions Restricted Document
Duplication Prohibited

Page 3 of 14

Dominion Assure
1.2 AV-OS Memory Card EMC / EMI Test Plan

2) FEC 2002 Voting System Standard (VSS) Volume II, Sec. 4
3) NIST Handbook 150-22, 2008 Edition: National Voluntary Laboratory Accreditation Program – Voting System Testing. May 2008
4) Election Assistance Commission: NOC 07-05: Voting System Test Laboratory (VSTL) responsibilities in the management and oversight of third party testing.
5) Election Assistance Commission: NOC 08-001: Validity of Prior Non-Core Hardware Environmental and EMC Testing.
6) Election Assistance Commission: Decision on Request for Interpretation 2010-01 Voltage Levels and ESD Test
7) SLP-VC-20 APPROVED Engineering Change Evaluation and Reporting Rev3.3
8) SLI Standard Lab Procedure SLP-VC-23: Hardware Test Management
9) SLI Standard Lab Procedure SLP-VC-24: Subcontractor Laboratory Management
10) DVS ECO# ASR-001 (Signed)
11) SLI Evaluation_DVS_ECO ASR-001_v1.1 WTSreview
12) SLI Global - EMC Evaluation 20111114

2.0 EMC / EMI Test Summary

Table 1: EMC / EMI Test Requirements Summary for Dominion, Assure 1.2 AV-OS Memory Card

Applicable	Test Name	Test Specification	VSS Reference	Requirement	Comments
Electromagnetic Emissions Tests					
X	Radiated Electromagnetic Emissions	FCC, Part 15 ANSI C63.4	V1, 3.2.2.9 V2, 4.8.2	Class B	
Electromagnetic Immunity Tests					
X	Electrostatic Disruption	IEC 61000-4-2 (2008) Ed.2.0	V1, 3.2.2.8 V2, 4.8.3	±8kV contact, ±15kV air discharge The test levels stated in IEC 61000-4-2, Edition 2.0, contact discharge, are the test method and shall be applied at the specified test level only, 8 kV. Air discharge shall be used where contact discharge cannot be applied and all test levels shall be used (2, 4, 8, 15 kV). (RFI 2010-01) Voting systems are required to be immune to ESD up to the limits of 8 KV, contact discharge, and 15 KV, air discharge. During exploratory pre-testing investigation of the possibility of windowing effects should be explored. If there are indications that a unit has sensitivity at a lower voltage but not at a higher voltage, test levels shall be added to evaluate the immunity at lower voltage levels. (RFI 2010-01)	Focus this testing around the vicinity of the memory card and card slot if this is accessible from outside the product enclosure. Perform contact discharge levels at ± 2kV, ± 4kV, ± 6kV and ± 8kV
X	Electromagnetic Susceptibility	IEC 61000-4-3 (1996)	V1, 3.2.2.10 V2, 4.8.4	A field of 10 V/m modulated by a 1 kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz	1 GHz

3.0 Product Description

3.1 Intended Use

For the new AccuVote-OS memory card please refer to EMC Integrity's detailed Product Data Sheets below starting with section 3.3 product information. The Product Data Sheets will be used by EMC Integrity's test technicians during testing and also in writing the test reports.

3.2 Unit Under Test

Model No.	Serial No.	Description	Qty	Revision / Version
181-001004	N/A	AV-OS Memory Card Proto4 / Proto5, 128KB, MRAM ▪ Proto4: Pre-production Model ▪ Proto5: Production Model The new AccuVote-OS memory card is programmed with ballot and election information pertaining to the vote center once ballot layout has been completed. Election results are tallied to the memory card as ballots are counted.	1	Rev 1

3.3 Product Information - General

Product Information	
Product Name (as it should appear on test report)	AccuVote-OS Memory Card
Model Number	181-001004
Functional description of product(Detailed)	128Kb data storage card using MRAM based memory and specifically designed for use with the Dominion's AccuVote-OS optical scan unit with its 40-pin card edge connector interface.
Product type (IT, Medical, Scientific, Industrial, etc.)	IT
Is the product an intentional radiator	No
Product Dimensions	Approx. 87mmL x 54mmW x 2.25mmH (5mm at grip)
Product Weight	Approx. 1 oz.
Will fork lift be required	No
Applicable Standards, if known	VVSG 2005, VSS 2002
Describe all environment(s) where product will be used	Operating Environment: Temperature +5 to +38 ºC, Relative Humidity 30% - 90% (non-condensing). Storage environment: Temperature -15 to +40 ºC, Relative Humidity 5% to 95% (non-condensing).
Does product consist of multiple components? (If yes, please describe each system component)	No

Dominion Assure
1.2 AV-OS Memory Card EMC / EMI Test Plan

Cycle time > 3 seconds? (If yes, How long?)	Ballot scan cycle is approx... 3 seconds.
Highest internally generated frequency	None in memory card product. Supporting equip (AV-OS unit) can generate 32.7MHz.
Product Set-up Time	Approx. 10 minutes
Boot up time in the event of an unintentional power down	Approx. 1 minute (including stepping through the program to get to the test point.)

Identify all I/O Connections as well as maximum associated cable lengths below

Model No.	Description	Shielded?	Length	Quantity

3.4 Power

Power Requirements	
Input Voltage Rating as it appears on unit, power supply, or power brick	Supporting equip (AV-OS unit) uses 120Vac.
Input Current (specify @ 230 Vac/50 Hz)	Supporting equip (AV-OS unit) uses 0.3Amps @120Vac 60/50Hz.
Single or Multi-Phase (If multi-phase, specify delta or wye)	Supporting equip (AV-OS unit) uses single phase power.
Is input power connector two-prong (Hot & Neutral) or 3-prong (H, N, Ground)	Supporting equip (AV-OS unit) uses a 3-prong input power connector.
Does UUT have more than 1 power cord? (If yes, explain.)	No. Supporting equip (AV-OS unit) uses only one power cord.

3.5 Unit Under Test (UUT) – Detailed Information

UUT Hardware	
Condition	Normal operation.
Configuration During Test	Unit prepared with programming to match test ballot layout. Supporting equipment configured in Test Election mode, scanning a test ballot in recirculation mode.
Input Power	Supporting equip (AV-OS unit) uses 120Vac.

UUT Components			
Name	Model No.	Serial No.	Description
AV-OS Memory Card	181-001004	n/a	AV-OS Memory Card Proto4 / Proto5, 128KB, MRAM

I/O Cabling
See Section 2.0 for details

UUT Software/Firmware		
Name	Version/Revision	Functionality

Dominion Assure
1.2 AV-OS Memory Card EMC / EMI Test Plan

N/A		

UUT Operating Conditions	
List all frequencies the product generates/uses	Memory card product uses the supporting equipment's address/data bus clock cycle frequency of 7.5MHz. The supporting equipment generates the following frequencies: 32.7MHz Scanner Module Clock Crystal 15MHz CPU Clock Crystal 52KHz Power Supply Switching Frequency
How will product be exercised during test?	Recalculating test ballot scan.
How will product be monitored during test?	Visually. During testing, the ballot will continue to recalculate through the supporting equipment.
What are the product's critical parameters?	
Specify tolerance of all critical parameters.	

3.6   Support Equipment (SE) – Detailed Information

Support Equipment (SE)			
Name	**Model No.**	**Serial No.**	**Description**
AccuVote-OS Unit	A MN: 79811-03	77984	Optical scan unit with EAC certified hardware configuration.
AccuVote-OS Unit	A MN: 79811-04	30799	Optical scan unit with EAC certified hardware configuration.
AccuVote-OS Unit	A MN: 79811-03	30572	Optical scan unit with EAC certified hardware configuration.

SE I/O Cabling				
Model No.	**Description**	**Shielded?**	**Length**	**Quantity**
Belden 17250 or equivalent	AC Power Cable		6.7 FT (2m)	1

SE Software/Firmware		
Name	**Version/Revision**	**Functionality**
AV-OS	PC 1.96.13	Precinct Count optical scan tabulator programming.

Dominion Assure
1.2 AV-OS Memory Card EMC / EMI Test Plan

3.7   Engineering Changes

Engineering Change (EC)#	Description
ECO ASR-001 – (New AccuVote-OS Memory Card Proto4 "Pre-production Model")	Dominion has added a new AccuVote-OS memory card product to the Assure product line. See section 1.2 Scope of Testing for more details
ECO ASR-002 – (New AccuVote-OS Memory Card Proto5 "Production Model")	Modification from Proto5 (received 12/13/11): Rework PCB with bridge across Pins 39 and 40 on J1 connector via solder side.

DVS Assure 1.2 AV-OS Memory
Card_ VSS EMC EMI Test Plan
v2.0

SLI Global Solutions Restricted Document
Duplication Prohibited

Page 9 of 14

4.0 Test Plan

4.1 Operating Modes and Configurations for EMC Testing

4.1.1 Operating Mode

The new Assure 1.2 AV-OS memory card Proto4 / Proto5 will be tested as part of the AccuVote-OS unit configuration. The AccuVote-OS scanner (supporting equipment) will be configured in Test Election mode, scanning a test ballot in recirculation mode and writing results to the new Assure 1.2 AV-OS memory card Proto4 / Proto5.

Prior to each test the zero report is printed to ensure that no votes have been counted before the start of the test. At the completion of each test, election results will be validated by reviewing the election summary reports against the public counter on the AccuVote-OS optical scanner's LCD panel display to verify if any data was lost during testing. Reports can only be generated when a memory card is installed on the unit.

- o Example:
  - LCD panel display "Start Count = 0" (Start of test)
  - LCD panel display "Finish Count = 250" (Completion of test)
  - Printed Summary Report – "Total Ballots = 250"

4.1.2 Configurations

The configuration is as shown in the following block diagram.

Figure 1: UUT Block Diagram
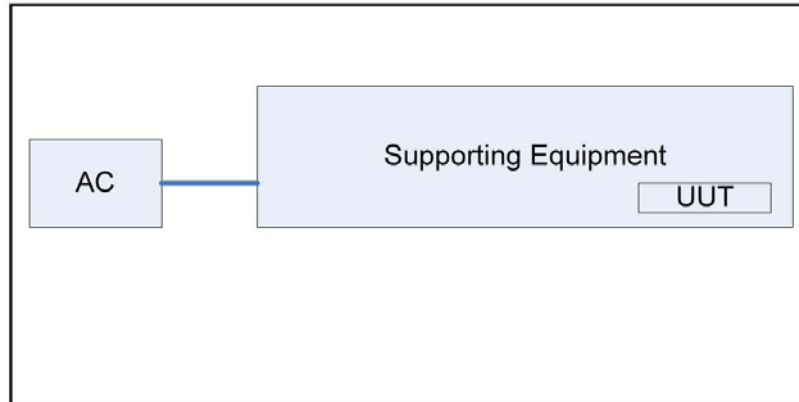
4.1.3 Exercising Software

Prior to and during testing, proper operation of the UUT shall be confirmed using Dominion software. An operational status check shall be performed prior to and at the competition of testing to fully exercise the UUT and ensure that no damage has occurred as a result of the test.

4.2 Treatment of Test Failures

Failures of EMC tests or failures of the exercising software to perform shall be documented in the EMC test report.

4.3 Test Documentation

A test report shall be attained from the test lab that meets the pertinent requirements of EN45001, and ISO/IEC17025, "General Requirements of Testing and Calibration Laboratories".

4.4 Test Facility Location

EMC Integrity, 1736 Vista View Drive, Longmont CO 80504

DVS Assure 1.2 AV-OS Memory
Card_ VSS EMC EMI Test Plan
v2.0

SLI Global Solutions Restricted Document
Duplication Prohibited

Page 11 of 14

5.0 EMC / EMI Tests

5.1 Electromagnetic Emissions

Objective: To verify that the electromagnetic emissions generated by the product under normal use and in the product's intended environment are below a level as specified by the VSS.

5.1.1 Radiated Electromagnetic Emissions

Test Method: FCC Part 15, Radio Frequency Devices
Deviations from Test Method: None
Exit Criteria: The UUT shall meet the following emissions limits:

Frequency Band (MHz)	Class B Equipment 10m Measurement Distance (dBuV/m)
30 – 88	40
88-216	43.5
216 – 960	46
960-1000	54
1000-5000	54

5.2 Electromagnetic Immunity

Objective: To verify that the product performs as intended when exposed to different types of electromagnetic energies that may be encountered under normal use in the product's intended environment.

5.2.1 Immunity Compliance Criteria

Note 1: The UUT shall be able to withstand the test without disruption of normal operation or loss of data.

Note 2: The UUT shall be able to withstand the test without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

5.2.2 Electrostatic Disruption

Test Method: IEC61000-4-2, Ed. 2, Electrostatic Disruption Test, (2008)
Test Levels:

Test Location	Discharge Voltage +/-(kV)
Indirect Contact: HCP	2, 4, 6, 8
Indirect Contact: VCP	2, 4, 6, 8
Direct Contact to Metallic Surfaces	2, 4, 6, 8
Air Discharges to Insulated Surfaces	2, 4, 8, 15

Dominion Assure
1.2 AV-OS Memory Card EMC / EMI Test Plan

Deviations from Test Method: None

Exit Criteria:

Note 2: The UUT shall be able to withstand the test without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

5.2.3 *Electromagnetic Susceptibility*

Test Method: IEC61000-4-3, Radiated, Radio-Frequency, Electromagnetic Field Immunity Test, (1996)

Test Levels:

Frequency Range (MHz)	Test Level (V/m)	Modulation / Sweep
80.0 to 1000.0	10	80% AM at 1.0kHz 1% steps with 3s dwell
Clock Frequencies	10	80% AM at 1.0kHz 1% steps with 3s dwell

Deviations from Test Method: None

Exit Criteria:

Note 1: The UUT shall be able to withstand the test without disruption of normal operation or loss of data.

6.0 Handling Hardware Anomalies and Incidents

6.1 Hardware Test Anomalies

An anomaly with the subcontractor's test equipment or a procedural misstep can cause a test to fail. For any suspected test equipment issue or procedural error, analysis will be performed and the decision whether to continue testing based on the severity of the anomaly will be appropriately tracked. The subcontractor test lab will issue a corrective action to address any test equipment and/or procedure errors. This is part of the hardware test subcontractor's quality system process that allows the hardware test lab to train all personnel, repair/calibrate equipment, and prevent any recurrence.

6.2 Hardware Incident Process

For every test failure of any voting system component at the hardware test lab, the lab completes a data sheet (per their laboratory procedures and templates) and immediately informs the SLI Hardware Specialist. This can be communicated in the daily status update, with the data sheet attached.

- Failure Analysis: Once a failure has occurred, the SLI Hardware Specialist will be involved with the subcontractor test lab(s) to identify the hardware discrepancy in the device. The results of the analysis will be documented and tracked in the discrepancy reporting tool, and the ECO database under Hardware Incident. The analysis will focus on the failure, what caused the failure, the severity (minor or major), and possible impacts to other testing.

- Mitigation: The SLI Hardware Specialist monitors any work done by the manufacturer, with the full understanding of what is occurring and why.

  - The Manufacturer will document what work is done and the SLI Hardware Specialist will sign off on or can stop the work at any time.
  - The Hardware Specialist will determine the number of "minor" fixes the manufacturer can incorporate without a re-start of the test.
  - A **minor** change made by the manufacturer can include grounding the chassis or adding ferrites.
  - Any **major** component replacement is cause for failing a test and requiring a re-start. Example: Bad motherboard. Analysis: What was the cause; did the ESD test cause the motherboard to malfunction? Does this impact other hardware tests? The Manufacturer can only replace like for like components and this process must be monitored by the SLI Hardware Specialist.
  - Any modification to the equipment is followed up with the related manufacturer EC(s). All related ECs must be entered into the hardware test report and the certification test report

When issues are identified during hardware environmental testing, they result in discrepancies. Discrepancies are tracked in JIRA and the ECO database under the "Hardware Test Incident" category. The incident number will be tracked along with the equipment that is taken out of testing due to the failure.

DVS Assure 1.2 AV-OS Memory
Card_ VSS EMC EMI Test Plan
v2.0

SLI Global Solutions Restricted Document
Duplication Prohibited

Page 14 of 14

APPENDIX F

EMI Test Log

EMI Test Log

Manufacturer:	Dominion Voting Systems, Inc.			Project Number:	B11210	
Model:	AccuVote-OS memory card (Proto4 Pre-production Model & Proto5 the Production Model)			S/N:	N/A	
Customer Representative:	Darrick Forester					
Standard Referenced:	FCC Part 15					

FR0105

10m Emissions

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
RE	6002	December 8, 2011 0800-0900	Test#1: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz Unit failed at 232 MHz		1.0	Fail	KJ
		0900-1000	Test#2: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz Client claims that the cables (9 pin and telephone) are service ports. Cables removed. Unit failing at 202 and 240MHz		1.0	Fail	KJ
RE	6002	December 9, 2011 1000-1100	Test#3: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz Client changed voting machines to SN: 30799		1.0	Fail	KJ
		1100-1200	Test#4: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz Original unit		1.0	Fail	KJ
		1200-1205	Test#5: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz Original unit Prescan stopped		---	Fail	KJ
		1205	Hand sniffing unit.		---	---	KJ
	6001	1215-1230	Test#6: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz SN: 30799		0.25	---	KJ
		1230-1300	Test#7: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance 120Vac/60Hz Original unit NOTE: 935MHz is a transient spike.		0.5	Complete	KJ
RE		December 14, 2011 1000	Test #8: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote - OS Memory Card Serial#: 30572 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13		1.0	---	TW

10m Emissions

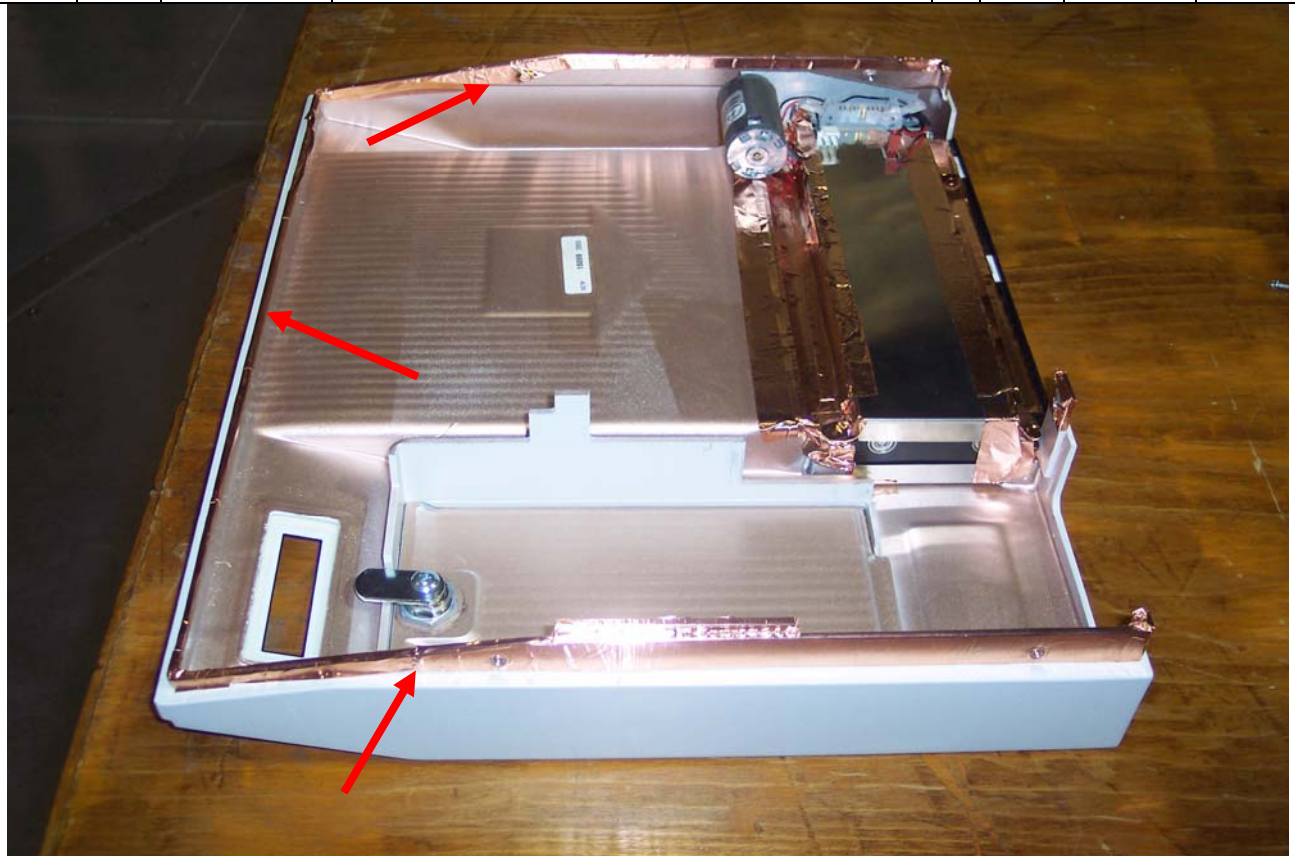| Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
RE		1100	Test# 9: 8 rads, 4 heights, 3 second dwell, ref level 80dBuV, 10 meter spacing Ambient scan		0.5	---	TW
RE		1130	Test# 10: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30572 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13		0.5	---	TW
RE		1200	Test# 11: 8 rads, 4 heights, 3 second dwell, ref level 80dBuV, 10 meter spacing Changed out power supply and display		1.5	---	TW
RE		1330	Test# 12: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30799 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13 Changed out older (Version A) power supply and display again		0.25	---	TW
RE		---	Test# 13: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30799 Power: 120Vac/60Hz Original power supply installed		---	---	
RE		---	Test# 14: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30799 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13 Original power supply installed?		---	---	TW
RE		---	Test# 15: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30799 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13 Original power supply installed added copper tape on front/ right corner		---	---	TW
RE		---	Test# 16: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30799 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13 Original power supply installed added more copper tape on front/ right corner		---	---	TW

10m Emissions

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
RE		---	Test# 17: 8 rads, 1 height, 3 second dwell, ref level 80dBuV, 10 meter spacing Model#: AccuVote-OS Memory Card Serial#: 30799 Power: 120Vac/60Hz Notes: No cables attached, Version 1.96.13 Original power supply, added copper tape all around unit at seams New engine installed, same model		---	---	TW
RE	1342	December 15, 2011 1630-1830	Test#18: 30MHz - 1GHz, 8 rads, 4 heights, 3 second dwell, ref level = 80dB, 10 meter distance Model#: AccuVote-OS Memory Card Serial#: 30779 (serial number for the AccuVote-OS optical scanner - support equipment) Proto5 memory card (RA 005) Copper tape on seams No signal found at 899 or 917MHz		2.0	Pass	KJ
			MODIFICATIONS REQUIRED FOR COMPLIANCE		---	---	KJ
			Copper tape on seams				

<div align="right">

Regular hours: [   ]
Overtime/Prem hours: [   ]
Total hours: [   ]

</div>

Ground Planes / CALC

Test	Test Code	Date	Event	OT	Time (hrs)	Result	Initials
4-3	4354	December 8, 2011 1000-1200	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz		---	---	DW
		1200-1230	Lunch		---	---	DW
			Device ran through testing. No way to verify whether memory card has passed or failed until client can check data at his office.		---	---	DW
		1230-1430	Continued Radiated RF Immunity. Complete.		4.0	Complete	DW
4-2	4293	December 9, 2011 1430	Electrostatic Discharge +/- 2, 4, 6, 8 kV Contact, +/-2, 4, 8, 15 kV Air 120 VAC / 60 Hz		---	---	MT
		1630	At -6kV to lock, mem card removed system halted message appeared. Operator reset was required and testing continued. At +/- 8 kV to lock Scanner quit working, error messages appeared ISR7:0256 D666 call for service, ISR1:14e0:2f91 call for service. Done Testing for the day, Still needs contact to back and all air testing		2.0	---	MT
		December 9, 2011 0800	Continue: Electrostatic Discharge +/- 2, 4, 6, 8 kV Contact, +/-2, 4, 8, 15 kV Air 120 VAC / 60 Hz		1.0	Pass *	MT
			Note: **A Complete result was noted because client needs to take memory card(EUT) back to his lab to verify if any data is corrupt or missing. EMCI has no way at this time to verify a pass or fail.**				
		January 9, 2012	*** Test result was edited and changed from "complete" to "pass" following examination results provided by SLI. See justification email located in the PDS folder of this project.**				PS
			Note: This email has been included in Appendix G of the engineering test report (Post-test Data Review by SLI Global)				

Regular hours: 7.0
Overtime/Prem hours:
Total hours: 7.0

APPENDIX G

Post-test Data Review by SLI Global

From: Darrick Forester [DForester@sliglobalsolutions.com]
Sent: Tuesday, January 10, 2012 11:20 AM
To: Pat Schroepfer
Subject: FW: AccuVote-OS Memory Card Test Results
Hi Pat,

I may some minor updates to SLI conclusion shaded in green.

SLI Conclusion:

For each specific environmental hardware test SLI compared the election summary report against the public counter on the AV-OS optical scanners to verify if any data was lost during testing. The data that is reported corresponds to information on the new memory card. Based upon SLI's examination of all reporting data, SLI concludes the new AV-OS memory card (Proto IV / V) retained all election results and the integrity of data was not compromise.

Thanks,

Darrick

From: Darrick Forester
Sent: Friday, January 06, 2012 3:56 PM
To: 'Pat Schroepfer'
Subject: AccuVote-OS Memory Card Test Results

Hi Pat,

Concerning hardware test results. EMC Integrity Test log states " A complete result was noted because client (SLI) needs to take memory cart (EUT) back to SLI to verify if any data is corrupt or missing. EMCI has no way at this time to verify a pass or fail.

SLI Conclusion:

For each specific environmental hardware test SLI compared the election summary report against the public counter on the AV-OS optical scanners to verify if any data was lost during testing. Based upon SLI's examination of all reporting data, SLI concludes the new MRAM memory card (Proto IV / V) retained all election results and the integrity of data was not compromise.

When available I would like to discuss with you how to handle this in your hardware test reports.

Thanks,

Darrick

Darrick E. Forester, CTFL
Hardware Specialist
SLI Global Solutions
216 16th Street, Suite 700
Denver, Colorado 80202
☎ Phone: 720.975.9196
🖷 Fax: 303.575.6882
✉ Email: dforester@SLIglobalsolutions.com
🖰 Web: www.SLIglobalsolutions.com

END OF REPORT