

# National Technical Systems Test Report for Electromagnetic Interference (EMI) Testing of the ExpressVote 2.1

**Prepared For**

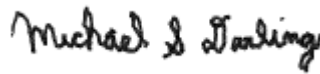
Pro V&V, Inc. | 6705 Odyssey Dr NW Ste C | Huntsville, AL 35806

**Prepared By**

National Technical Systems | 1736 Vista View Drive | Longmont, CO. 80504 | (303) 776-7249 |

A handwritten signature in blue ink, appearing to read "Greg Gagne", written over a horizontal line.

Greg Gagne  
Technical Writer

A handwritten signature in blue ink, appearing to read "Michael Darling", written over a horizontal line.

Michael Darling  
EMI Department Manager



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**Revision History**

<b>Rev.</b>	<b>Description</b>	<b>Issue Date</b>
0	ETR-PR120980-00	10/29/2020

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### 1.0 Introduction

This document presents the test procedures used and the results obtained during the performance of an Electromagnetic Interference test program. The test program was conducted to assess the ability of the specified Equipment Under Test (EUT) to successfully satisfy the requirements listed in Section 2.0.

### 2.0 References

The following references listed below form a part of this document to the extent specified herein.

- Pro V&V, Inc. Purchase Order(s) 2020-004, dated 07/01/2020
- National Technical Systems (NTS) Quote(s) OP0554725, dated 06/24/2020
- NTS Corporate Quality Policy Manual, Revision 9, dated 9/20/2018
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/1/2017
- Test Specification: FCC Part 15

### 3.0 Product Selection and Description

Pro V&V, Inc. selected and provided the test sample(s) to be used as the Equipment Under Test. Details below:

**Table 3.0-1: Product Identification - Equipment Under Test (EUT)**

Item	Qty.	Name/Description	Part Number	Serial Number
1	1	ExpressVote 2.1	ExpressVote 2.1	EV0219400585

### 3.1 Security Classification

Non-classified

### 4.0 General Test Requirements

#### 4.1 Test Equipment

NTS-provided equipment is calibrated according to ISO/IEC 17025:2017(E) and calibration is traceable to the National Institute of Standards and Technology (NIST). Calibration records are maintained on file at NTS.

#### 4.2 Measurement Uncertainties

Measurement uncertainty data is available upon request.

#### 4.3 Notice of Deviation

In accordance with NTS' quality procedures, when the EUT is observed to exceed or display susceptibility, a Notice of Deviation (NOD) document is generated by the technician performing the test. This NOD documents the requirement, how the EUT deviated from the requirement, and allows room for resolution of the deviation.

This document is reviewed and approved by the NTS Program Manager or Engineer and the NTS Quality Assurance Representative, and then forwarded to the customer contact. Once mitigated (or passed over), the steps taken to correct the deviation (or simply instruction from the customer to continue testing) are recorded in the NOD and a copy of the NOD is integrated into the body of the report, in the appropriate location.

### 5.0 Test Descriptions and Results

**Table 5.0-1: Summary of Test Information & Results**

Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Test Result*
5.1	Conducted Emissions, 150 kHz - 30 MHz	FCC Part 15	Longmont	09/09/2020 - 09/09/2020	ExpressVote 2.1	EV0219400585	Complied

\*The decision rule used to state compliance is in accordance with the test specification used for testing. Unless otherwise noted, testing was performed in accordance with the latest published version of test specification at time of test.



**5.1 Conducted Emissions, 150 kHz - 30 MHz**

**Conducted Emissions, FCC Part 15**

Manufacturer:	Pro V&V, Inc./ES&S	Project Number:	PR120980-00
Customer Representative:	Michael Walker	Test Area:	10M #1
Model:	ExpressVote 2.1 (Configuration 2)	S/N:	EV0219400585
Standard Referenced:	FCC Part 15 Class B, EAC 2005 VVSG	Date:	September 9, 2020
Temperature:	17°C	Humidity:	34%
Input Voltage:	120Vac/60Hz	Pressure:	846 mb
Configuration of Unit:	Counting Ballots		
Test Engineer:	Mike Tidquist		

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Type	Frequency (MHz)	Level (dBuV)	Transducer (dB)	Gain / Loss (dB)	Final (dBuV)	Test Point	Margin: FCC Class B AV (dB)	Margin: FCC Class B QP (dB)
AV	0.198	23.9	0.0	16.1	40.1	Line 1	14.54	-
QP	0.198	31.2	0.0	16.1	47.3	Line 1	-	17.32
AV	0.224	31.2	0.0	16.1	47.4	Line 1	6.50	-
QP	0.224	38.5	0.0	16.1	54.7	Line 1	-	9.22
AV	0.314	24.6	0.0	16.1	40.7	Line 1	10.63	-
QP	0.314	32.0	0.0	16.1	48.1	Line 1	-	13.17
AV	0.691	10.1	0.0	16.1	26.2	Line 1	19.77	-
QP	0.691	30.1	0.0	16.1	46.2	Line 1	-	9.82
AV	2.378	2.0	0.1	16.2	18.3	Line 1	27.75	-
QP	2.378	11.2	0.1	16.2	27.4	Line 1	-	28.60
AV	9.883	5.3	0.4	15.9	21.6	Line 1	28.42	-
QP	9.883	13.2	0.4	15.9	29.5	Line 1	-	30.51
AV	22.108	4.3	0.5	15.9	20.8	Line 1	29.23	-
QP	22.108	15.5	0.5	15.9	32.0	Line 1	-	28.05
AV	0.222	31.5	0.0	16.1	47.6	Neutral	6.29	-
QP	0.222	39.0	0.0	16.1	55.1	Neutral	-	8.82
AV	0.313	26.4	0.0	16.1	42.5	Neutral	8.85	-
QP	0.313	38.7	0.0	16.1	54.8	Neutral	-	6.54
AV	0.435	11.1	0.0	16.1	27.2	Neutral	20.69	-
QP	0.435	25.4	0.0	16.1	41.6	Neutral	-	16.29
AV	0.645	10.6	0.0	16.1	26.7	Neutral	19.27	-
QP	0.645	28.8	0.0	16.1	44.9	Neutral	-	11.08
AV	2.402	2.9	0.1	16.2	19.1	Neutral	26.90	-
QP	2.402	9.7	0.1	16.2	26.0	Neutral	-	30.04
AV	9.549	4.3	0.3	16.0	20.7	Neutral	29.33	-
QP	9.549	10.7	0.3	16.0	27.1	Neutral	-	32.94
AV	22.875	7.3	0.5	16.0	23.8	Neutral	26.17	-
QP	22.875	16.8	0.5	16.0	33.3	Neutral	-	26.69

The highest emission measured was at **0.224 MHz**, which was **6.50 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 9 kHz, VBW is 3 MHz
  - QP = Quasi-Peak Measurement: RBW is 9 kHz, VBW is 3 MHz, and QP Detection is ENABLED
  - AV = Video Average Measurement: RBW is 9 kHz, VBW is 10 Hz
- The “field strength” (FS) emissions level is attained by adding the received amplitude measured (RA), Antenna factor (AF), and cable factor (CF) minus the amplifier gain (AG).  $FS = RA + AF + CF - AG$ . 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:  $49.6 \text{ dBuV} + 11.4 \text{ dB/m} - 28.8 \text{ dB (CF/AG)} = 32.2 \text{ dBuV/m}$ . **Important Note:** This is a sample calculation only for the purpose of demonstration, and does not reflect data in this report.)
- The “TestPoint” indicates which AC or DC input power line or which I/O cable the measurement was made on.
- 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 9 kHz, and the VBW set to 3 MHz

### Conducted Emissions, FCC Part 15

Manufacturer: Pro V&V, Inc./ES&S  
 Customer Representative: Michael Walker  
 Model: ExpressVote 2.1 (Configuration 2)  
 Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
 Test Area: 10M #1  
 S/N: EV0219400585  
 Date: September 9, 2020

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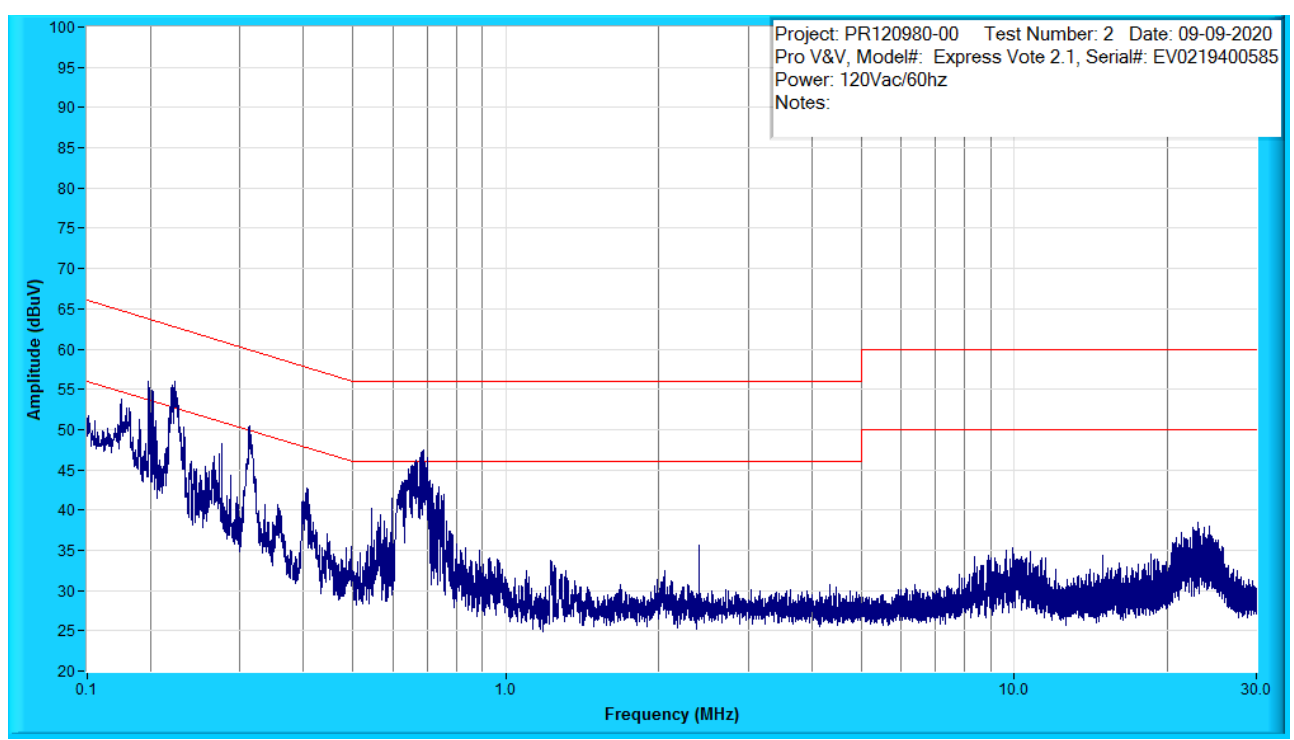


Figure B1: Conducted Emissions Prescan, Line 1, 0.150MHz to 30MHz, Peak Measurements

### Conducted Emissions, FCC Part 15

Manufacturer: Pro V&V, Inc./ES&S  
 Customer Representative: Michael Walker  
 Model: ExpressVote 2.1 (Configuration 2)  
 Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
 Test Area: 10M #1  
 S/N: EV0219400585  
 Date: September 9, 2020

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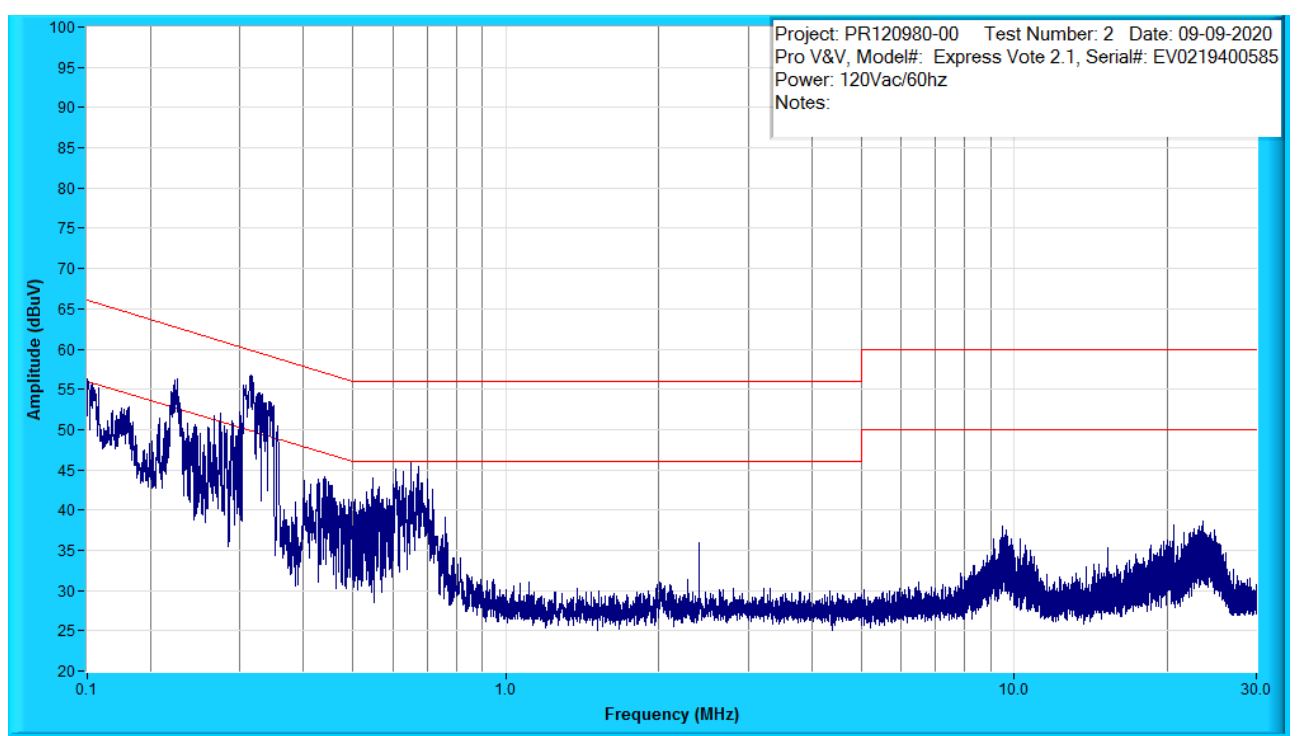


Figure B2: Conducted Emissions Prescan, Neutral, 0.150MHz to 30MHz, Peak Measurements



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## Conducted Emissions, FCC Part 15

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Manufacturer: Pro V&V, Inc./ES&S  
Customer Representative: Michael Walker  
Model: ExpressVote 2.1 (Configuration 2)  
Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
Test Area: 10M #1  
S/N: EV0219400585  
Date: September 9, 2020

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Figure B3: Conducted Emissions Test Setup – Front Side

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## Conducted Emissions, FCC Part 15

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Manufacturer: Pro V&V, Inc./ES&S  
Customer Representative: Michael Walker  
Model: ExpressVote 2.1 (Configuration 2)  
Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
Test Area: 10M #1  
S/N: EV0219400585  
Date: September 9, 2020

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Figure B4: Conducted Emissions Test Setup – Right Side

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## Conducted Emissions, FCC Part 15

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Manufacturer: Pro V&V, Inc./ES&S  
Customer Representative: Michael Walker  
Model: ExpressVote 2.1 (Configuration 2)  
Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
Test Area: 10M #1  
S/N: EV0219400585  
Date: September 9, 2020

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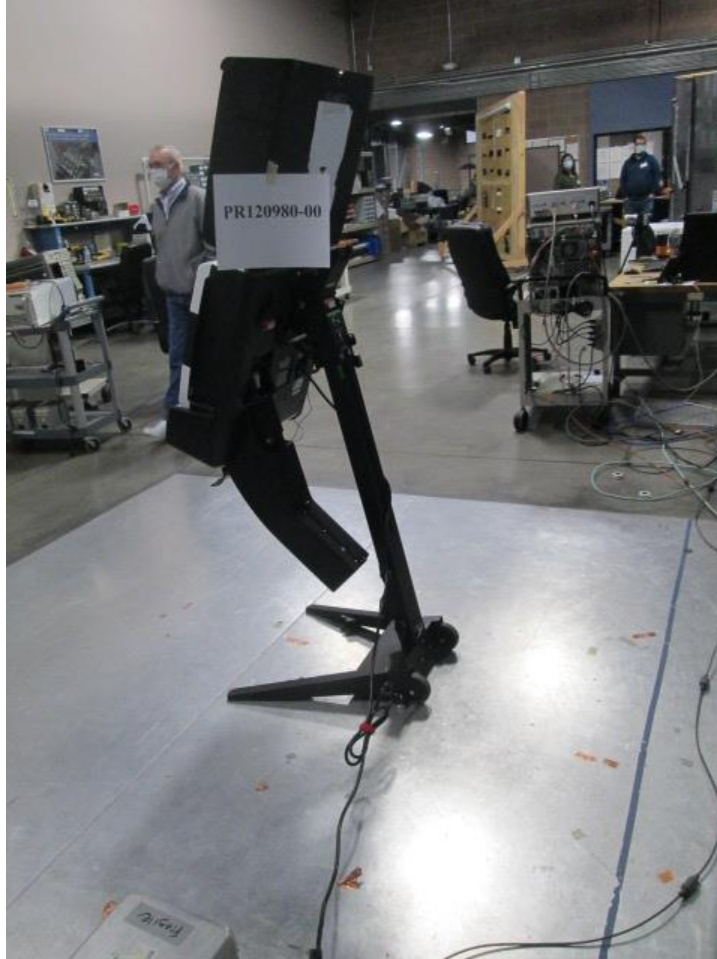


Figure B5: Conducted Emissions Test Setup – Back Side

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## Conducted Emissions, FCC Part 15

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Manufacturer: Pro V&V, Inc./ES&S  
Customer Representative: Michael Walker  
Model: ExpressVote 2.1 (Configuration 2)  
Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
Test Area: 10M #1  
S/N: EV0219400585  
Date: September 9, 2020

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Figure B6: Conducted Emissions Test Setup – Left Side



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## Conducted Emissions, FCC Part 15

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Manufacturer: Pro V&V, Inc./ES&S  
Customer Representative: Michael Walker  
Model: ExpressVote 2.1 (Configuration 2)  
Standard Referenced: FCC Part 15 Class B, EAC 2005 VVSG

Project Number: PR120980-00  
Test Area: 10M #1  
S/N: EV0219400585  
Date: September 9, 2020

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### Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1041	Fluke	83-3	70130434	Multimeter/Frequency Meter	06/29/2020	06/29/2021
1200	Agilent Technology	11947A	3107A03807	Transient Limiter, 9 kHz to 200 MHz	04/24/2020	04/24/2021
1223	Hewlett Packard	85650A	3303A01859	Quasi-Peak Adaptor	04/01/2020	04/01/2021
1335	Hewlett Packard	85662A	2542A10937	Spectrum Analyzer Display	04/01/2020	04/01/2021
1336	Hewlett Packard	8566B	2532A02062	Spectrum Analyzer RF Section	04/01/2020	04/01/2021
1338	Hewlett Packard	85685A	3506A01551	RF Preselector	04/01/2020	04/01/2021
1556	EMCI	EMCI, 2 Phase LISN	10	150 kHz to 30 MHz, 277 Vac/400 Vdc, 50/60 Hz, 16 A	04/23/2020	04/23/2021
1591	EMCI	CEAS	V4.1.1	Commercial Emissions Automation Software - 10 M#1	NA	NA
1901	EXTECH	445703	0617	Hygrometer-Thermometer (WC059899)	06/29/2020	06/29/2021



**6.0 Test Log**

**EMI Test Log**

Manufacturer:	Pro V&V, Inc./ES&S	Project Number:	PR120980-00
			B91114
Model:	ExpressVote 2.1(Configuration 2)	S/N:	EV0219400621
			EV0219400585
Customer Representative:	Michael Walker		
Standard Referenced:	FCC Class B		

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**10m Emissions**

Test	Test Code	Date	Event	O T	Time (hrs)	Result	Initials
CE		September 9, 2020 0800	Test #1: Conducted Emissions, 150 kHz – 30 MHz 120Vac/60Hz Failed @ .240MHz, Switching to backup EUT: EV0219400585		---	Fail	MT
CE		0930	Test #2: Conducted Emissions, 150 kHz – 30 MHz 120Vac/60Hz		1.5	Pass	MT



**End of Report**