45000 Helm Street
Suite 150
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Telephone: 734-582-2900
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www.intertek.com

Test Report for:

PANASONIC INDUSTRIAL DEVICES CORPORATION OF AMERICA
Attn: Mr. Gary Drew

UN 38.3 BATTERY TESTING
Model Number: 205-0013
Lithium Ion Battery Packs

Client PO No.: Gary Drew

Juan V. Saldana	Nick Diamond
Electrical Engineer - Testing	Sr. Associate Engineer
February 11, 2016	
Report No.: 102373414DET-001	Page 1 of 35

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TEST VERIFICATION OF CONFORMANCE

TEST METHOD: UN Manual of Tests and Criteria "Recommendations on the Transport of Dangerous Goods," section 38.3 "Lithium Batteries"
Document number ST/SG/AC.10/11/Rev.5, Amend 2
Revision #: 5th Edition, Amendment 2
Effective Date: 2013

SAMPLE DESCRIPTION: Sixteen (16) Neato Huey, 14.4V, 2100mAh, 31Wh, Lithium Ion Battery Packs

MANUFACTURER: Panasonic Industrial Devices Corporation of America

MODEL NUMBER: 205-0013

SPECIFICATION SECTIONS T1 through T5:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

SPECIFICATION SECTION T7:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 05 (UN85-05-01-F)
- SN 06 (UN85-06-01-F)
- SN 07 (UN85-07-01-F)
- SN 08 (UN85-08-01-F)

50 Cycles
- SN 13 (UN85-13-50-F)
- SN 14 (UN85-14-50-F)
- SN 15 (UN85-15-50-F)
- SN 16 (UN85-16-50-F)

Condition of Test Sample: Engineering Sample

DATE RECEIVED: 12/09/2015
DATES TESTED: 01/19/2016 through 02/05/2016

RESULT SUMMARY: The tested samples met the test requirements. See below breakout for tests performed.

Specification Section	Test Description	Results
T1	Altitude Simulation	PASS
T2	Thermal Test	PASS
T3	Vibration	PASS
T4	Shock	PASS
T5	External Short Circuit	PASS
T7	Overcharge	PASS

Juan V. Saldana	Nick Diamond
Electrical Engineer - Testing	Sr. Associate Engineer
February 11, 2016	
Report No.: 102373414DET-001	

Attn: Mr. Gary Drew
Panasonic Industrial Devices Corporation of America
3461 Plano Parkway
The Colony, TX 75056
Phone: (469) 362-5680
E-mail Address: gary.drew@us.panasonic.com

DATE RECEIVED: 12/09/2015
DATE TESTED: 01/19/2016 through 02/05/2016

WORK REQUESTED / APPLICABLE DOCUMENTS:

Per the client's request and in accordance with UN 38.3 and our quotation number Qu-00675443, dated 2/11/2016; perform Battery Testing as described below:

- T1 – Altitude Simulation
- T2 – Thermal Test
- T3 – Vibration
- T4 – Shock
- T5 – External Short Circuit
- T7 – Overcharge

DESCRIPTION OF TEST SAMPLES:

Sixteen (16) Neato Huey, 14.4V, 2100mAh, 31Wh, Lithium Ion Battery Packs

SPECIFICATION SECTIONS T1 through T5:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

SPECIFICATION SECTION T7:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 05 (UN85-05-01-F)
- SN 06 (UN85-06-01-F)
- SN 07 (UN85-07-01-F)
- SN 08 (UN85-08-01-F)

50 Cycles
- SN 13 (UN85-13-50-F)
- SN 14 (UN85-14-50-F)
- SN 15 (UN85-15-50-F)
- SN 16 (UN85-16-50-F)

Condition of Test Sample: Engineering Samples

EQUIPMENT LIST:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
UN-02	ALTITUDE SIMULATOR	LACO	LVC1218	040124-1-01	06-22-2015	06-22-2016
UN-06	LASERUSB CONTROLLER	LDS	LAS-200	4460858	09-17-2015	09-17-2016
UN-07	ACELEROMETER	PCB	353-B03	93123	03-02-2015	03-02-2016
UN-09	PCI-CARD	NATIONAL INSTRUMENTS	PCI-6024E	15366D8	02-12-2015	02-12-2016
UN-08	ACELEROMETER	PCB	353-B03	93129	03-02-2015	03-02-2016
UN-11	DATA CHANNEL AUX	MRAD	IO5RA	1400-77	N/A	N/A
UN-12	DATA LOGGER	AGILENT	34972A	MY49001076	09-29-2015	09-29-2016
UN-13	ENVIROMENTAL CHAMBER	ESPEC	ESL-3CA	14175	10-21-2015	10-21-2016
UN-14	MULTICHANNEL CYCLE MACHINE	IEM	1333	N/A	09-29-2015	09-29-2016
UN-20	DIGITAL SCALE 0-4200 GRMS	SHIMADZU	UW4200H	D447740047	09-29-2015	09-29-2016
UN-32	THERMAL SHOCK CHAMBER	ESPEC	TSA-71L	153004021	10-21-2015	10-21-2016
UN-28A	BATTERY TESTER	HIOKI	BT3562-01	141019846	03-27-2015	03-27-2016

T1 – ALTITUDE SIMULATION

Date Received: 12/09/2015
Date(s) Tested: 01/19/2016

Description of Samples:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

Purpose:
This test simulates air transport under low-pressure conditions.

Test Procedure:
Prior to testing the voltage and mass were measured on each sample. The samples were then placed into an altitude cabinet, stored at a pressure of 11.6 kPa or less for six (6) hours at ambient temperature. After testing, the voltage and mass were measured on each sample.

Acceptance Criteria:
Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Results:
The test samples conformed to the acceptance criteria; there was no mass loss, no leakage, no venting, no disassembly, no rupture, no fire and the open circuit voltage of each test sample after testing was not less than 90% of its voltage immediately prior to this procedure.

Test Data T1 Altitude Simulation

Battery No.		Mass(g)		Mass difference (%) (=<0.1%)	Voltage(V)		Voltage Retention(%) (=>90%)	Meets Requirement
		Before test	After test		Before test	After test		
At first cycle,in fully charged states	SN1	371.72	371.70	0.005	16.73	16.72	99.94	Yes
	SN2	371.16	371.13	0.008	16.72	16.71	99.94	Yes
	SN3	372.39	372.37	0.005	16.74	16.73	99.94	Yes
	SN4	373.22	373.21	0.003	16.70	16.69	99.94	Yes
After 50 cycles ending in fully charged states	SN9	373.95	373.94	0.003	16.70	16.70	100.00	Yes
	SN10	373.64	373.62	0.005	16.71	16.71	100.00	Yes
	SN11	373.61	373.58	0.008	16.72	16.72	100.00	Yes
	SN12	370.38	370.35	0.008	16.68	16.68	100.00	Yes

Appendix:
Appendix A – Photograph
Appendix B – Altitude Simulation Graph

Disposition of Test Samples:
At the completion of testing, the samples continued to T2 – Thermal Test.

T2 – THERMAL TEST

Date Received: 12/09/2015
Date(s) Tested: 01/19/2016 through 01/25/2016

Description of Samples:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

Purpose:
This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.

Test Procedure:
Prior to testing the voltage and mass were measured on each sample. The samples were placed into an environmental chamber and stored for six (6) hours at 72°C ± 2°C, followed by storage of equal time at a temperature of -40°C ± 2°C. The maximum time interval between test temperature extremes was 30 minutes. This procedure was repeated 10 times, after which all samples were stored for 24 hours at ambient temperature. After testing the voltage and mass were measured on each sample.

Acceptance Criteria:
Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Results:
The test samples conformed to the acceptance criteria; there was no mass loss, no leakage, no venting, no disassembly, no rupture, no fire and the open circuit voltage of each test sample after testing was not less than 90% of its voltage immediately prior to this procedure.

Test Data T2 Thermal Cycle

Battery No.		Mass(g)		Mass difference (%) (=<0.1%)	Voltage(V)		Voltage Retention(%) (=>90%)	Meets Requirement
		Before test	After test		Before test	After test		
At first cycle,in fully charged states	SN1	371.70	371.64	0.016	16.72	16.45	98.39	Yes
	SN2	371.13	371.08	0.013	16.71	16.43	98.32	Yes
	SN3	372.37	372.31	0.016	16.73	16.45	98.33	Yes
	SN4	373.21	373.16	0.013	16.69	16.43	98.44	Yes
After 50 cycles ending in fully charged states	SN9	373.94	373.90	0.011	16.70	16.45	98.50	Yes
	SN10	373.62	373.57	0.013	16.71	16.46	98.50	Yes
	SN11	373.58	373.53	0.013	16.72	16.47	98.50	Yes
	SN12	370.35	370.32	0.008	16.68	16.44	98.56	Yes

Appendix:
Appendix A – Photograph
Appendix C – Thermal Test Graph

Disposition of Test Samples:
At the completion of testing, the samples continued to T3 – Vibration.

T3 – VIBRATION

Date Received: 12/09/2015
Date(s) Tested: 01/28/2016 through 01/29/2016

Description of Samples:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

Purpose:
This test simulates vibration during transport.

Test Procedure:
Prior to testing the voltage and mass were measured on each sample. The samples were firmly secured to the platform of the vibration machine without distorting the packs in such a manner as to faithfully transmit the vibration. The test samples were subjected to sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle was repeated 12 times for a total of three (3) hours for each of the three (3) mutually perpendicular mounting positions of the sample. One of the directions of vibration must be perpendicular to the terminal face.

The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1g is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of 8g occurs (approximately 50 Hz). A peak acceleration of 8g is then maintained until the frequency is increased to 200 Hz. After testing the voltage and mass were measured on each sample.

Acceptance Criteria:
Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Results:
The test samples conformed to the acceptance criteria; there was no leakage, no venting, no disassembly, no rupture and no fire and the open circuit voltage of each test cell or battery after testing was not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Test Data T3 Vibration

Battery No.		Mass(g)		Mass difference (%) (≤<0.1%)	Voltage(V)		Voltage Retention(%) (≥>90%)	Meets Requirement
		Before test	After test		Before test	After test		
At first cycle,in fully charged states	SN1	371.64	371.66	0.005	16.45	16.44	99.94	Yes
	SN2	371.08	371.09	0.003	16.43	16.41	99.88	Yes
	SN3	372.31	372.33	0.005	16.45	16.44	99.94	Yes
	SN4	373.16	373.18	0.005	16.43	16.42	99.94	Yes
After 50 cycles ending in fully charged states	SN9	373.90	373.90	0.000	16.45	16.44	99.94	Yes
	SN10	373.57	373.58	0.003	16.46	16.44	99.88	Yes
	SN11	373.53	373.54	0.003	16.47	16.45	99.88	Yes
	SN12	370.32	370.34	0.005	16.44	16.42	99.88	Yes

T3 – VIBRATION (cont'd)

Appendices:
Appendix A – Photographs
Appendix D – Vibration Plots

Disposition of Test Samples:
At the completion of testing, the samples continued to T4 – Shock.

T4 – SHOCK

Date Received: 12/09/2015
Date(s) Tested: 01/29/2016

Description of Samples:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

Purpose:
This test simulates possible impacts during transport.

Test Procedure:
Prior to testing the voltage and mass were measured on each sample. The samples were secured to the testing machine by means of a rigid mount with support on all mounting surfaces of each test battery. Each sample was subjected to a half-sine shock with a peak acceleration of 150G's and pulse duration of six (6) milliseconds. Each sample was subjected to three (3) shocks in the positive direction followed by three (3) shocks in the negative direction of the three mutually perpendicular mounting positions. After testing the voltage and mass were measured on each sample.

Acceptance Criteria:
Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Results:
The test samples conformed to the acceptance criteria; there was no leakage, no venting, no disassembly, no rupture and no fire and the open circuit voltage of each test cell or battery after testing was not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Test Data T4 Shock

Battery No.		Mass(g)		Mass difference (%) (=<0.1%)	Voltage(V)		Voltage Retention(%) (=>90%)	Meets Requirement
		Before test	After test		Before test	After test		
At first cycle,in fully charged states	SN1	371.66	371.67	0.003	16.44	16.36	99.51	Yes
	SN2	371.09	371.11	0.005	16.41	16.34	99.57	Yes
	SN3	372.33	372.34	0.003	16.44	16.36	99.51	Yes
	SN4	373.18	373.16	0.005	16.42	16.34	99.51	Yes
After 50 cycles ending in fully charged states	SN9	373.90	373.92	0.005	16.44	16.36	99.51	Yes
	SN10	373.58	373.58	0.000	16.44	16.36	99.51	Yes
	SN11	373.54	373.54	0.000	16.45	16.38	99.57	Yes
	SN12	370.34	370.34	0.000	16.42	16.34	99.51	Yes

T4 – SHOCK (cont'd)

Appendices:
Appendix A – Photographs
Appendix E – Shock Plots

Disposition of Test Samples:
At the completion of testing, the samples continued to T5 – External Short Circuit.

T5 – EXTERNAL SHORT CIRCUIT

Date Received: 12/09/2015
Date(s) Tested: 02/05/2016

Description of Samples:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 01 (UN85-01-01-F)
- SN 02 (UN85-02-01-F)
- SN 03 (UN85-03-01-F)
- SN 04 (UN85-04-01-F)

50 Cycles
- SN 09 (UN85-09-50-F)
- SN 10 (UN85-10-50-F)
- SN 11 (UN85-11-50-F)
- SN 12 (UN85-12-50-F)

Purpose:
This test simulates an external short circuit.

Test Procedure:
The samples were temperature stabilized until the external case temperature reached 55°C ± 2°C and then the samples were subjected to a short circuit condition with a total external resistance of less than 0.1 Ohm at 55°C ± 2°C. This short circuit condition continued for one (1) hour after the sample's external case temperature returned to 55°C ± 2°C. The samples were observed for a further six (6) hours for the test to be concluded.

Acceptance Criteria:
Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire within six hours of this test.

Results:
The test samples conformed to the acceptance criteria; at the completion of testing the cells and batteries external temperature did not exceed 170°C and there was no disassembly, no rupture or fire within six hours of this test.

Test Data T5 External Short Circuit

Battery No.		Maximum temperature (°C)	Meets Requirement
At first cycle,in fully charged states	SN1	56.43	Yes
	SN2	56.21	Yes
	SN3	56.17	Yes
	SN4	56.18	Yes
After 50 cycles ending in fully charged states	SN9	56.48	Yes
	SN10	56.31	Yes
	SN11	56.22	Yes
	SN12	56.37	Yes

Appendices:
Appendix A – Photograph
Appendix F – External Short Circuit Graphs

Disposition of Test Samples:
At the completion of testing, the samples were recycled per client's instructions.

T7 – OVERCHARGE

Date Received: 12/09/2015
Date(s) Tested: 01/27/2016 through 02/04/2016

Description of Samples:
Eight (8) Neato Huey, 14.4V Lithium Ion Battery Packs, sample numbers:

01 Cycle
- SN 05 (UN85-05-01-F)
- SN 06 (UN85-06-01-F)
- SN 07 (UN85-07-01-F)
- SN 08 (UN85-08-01-F)

50 Cycles
- SN 13 (UN85-13-50-F)
- SN 14 (UN85-14-50-F)
- SN 15 (UN85-15-50-F)
- SN 16 (UN85-16-50-F)

Purpose:
This test evaluates the ability of a rechargeable battery to withstand an overcharge condition.

Test Procedure:

Test Parameters:	
Number of Samples:	8
Manufacturer's Maximum Charge Current:	1.4 Amp
Manufacturer's Maximum Charge Voltage:	16.8 V
Test Charge Current: (Two Times the Manufacturer's Charge Current)	2.8 Amp
Test Charge Voltage: (If less than 18V: The lessor of twice the Maximum Charge Voltage or 22V, If more than 18V: 1.2 time the Maximum Charge Voltage)	22 V
Duration:	24 Hours

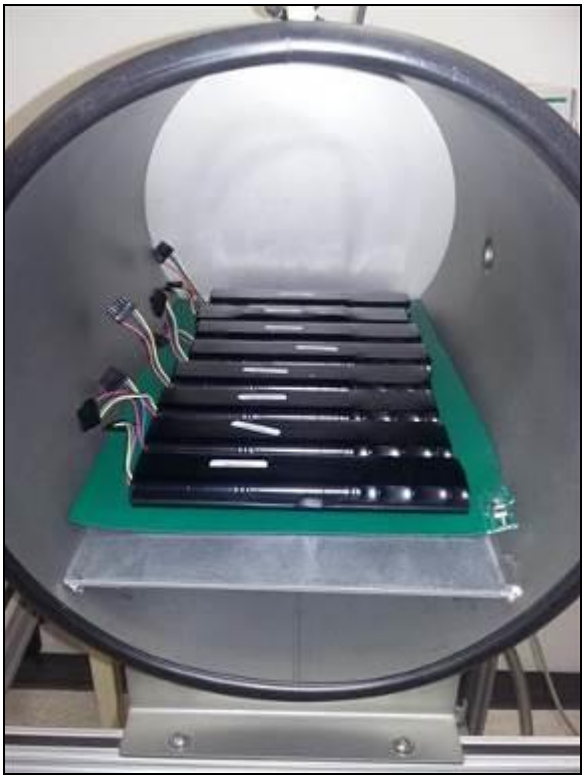
Acceptance Criteria:
Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven (7) days of the test.

Results:
The test samples conformed to the acceptance criteria; there was no disassembly and no fire within seven days of the test.

Appendices:
Appendix A – Photograph
Appendix G – Overcharge Graphs

Disposition of Test Samples:
At the completion of testing, the samples were recycled per client's instructions.

APPENDIX A – PHOTOGRAPHS
T1 – Altitude Simulation

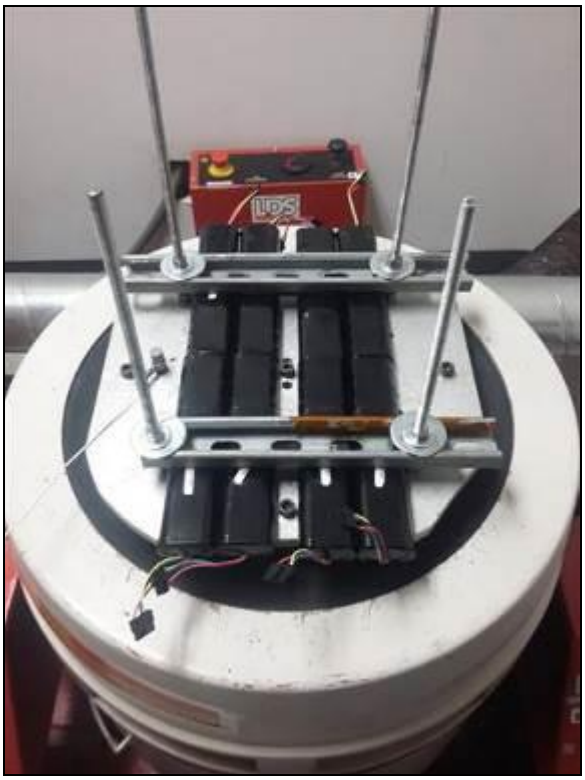


Photograph 1: Altitude Simulation Test Setup

APPENDIX A – PHOTOGRAPHS (cont'd)
T2 – Thermal Test

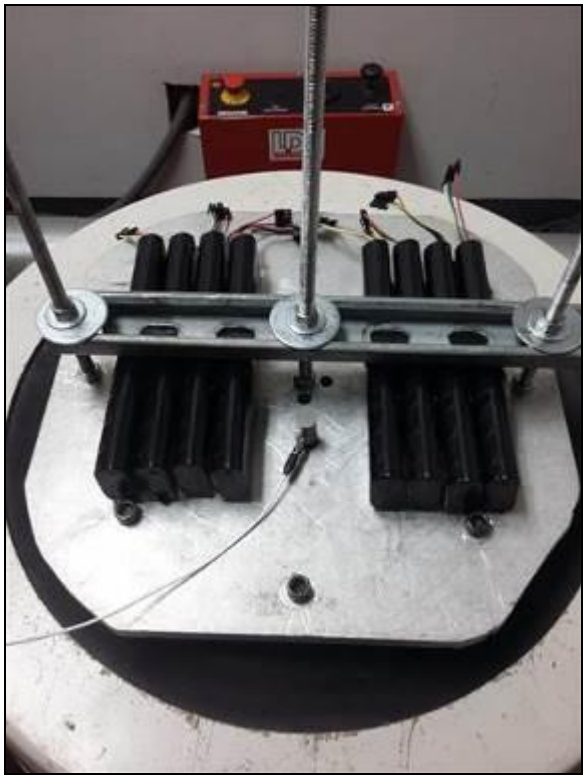
Photograph 2: Thermal Test Setup

APPENDIX A – PHOTOGRAPHS (cont'd)
T3 – Vibration



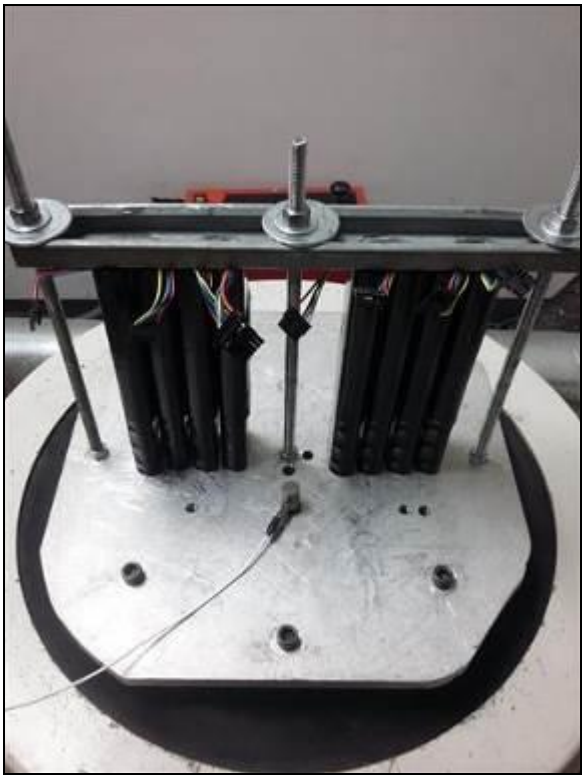
Photograph 3: Vibration Test Setup – Fore/Aft Direction,

APPENDIX A – PHOTOGRAPHS (cont'd)
T3 – Vibration



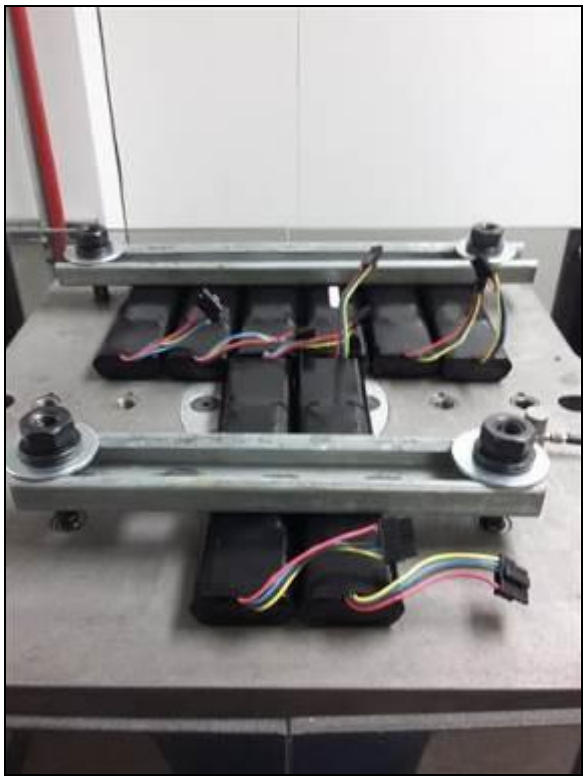
Photograph 4: Vibration Test Setup – Lateral Direction

APPENDIX A – PHOTOGRAPHS (cont'd)
T3 – Vibration

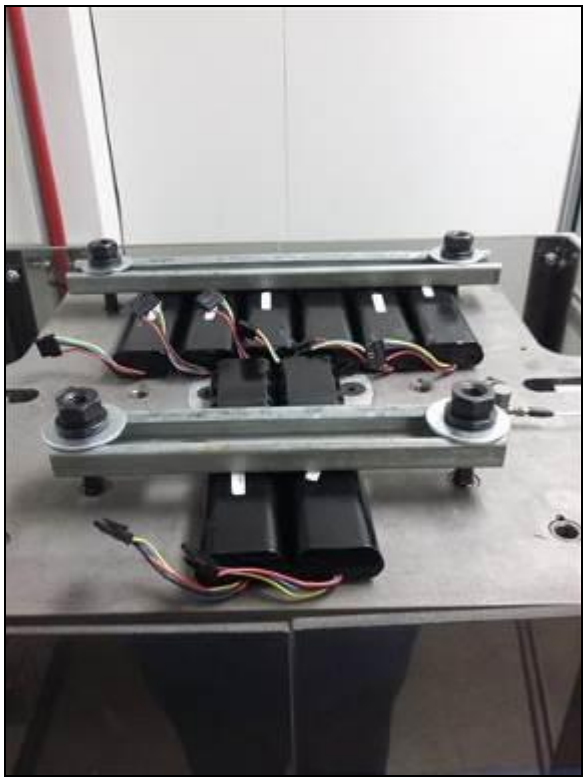


Photograph 5: Vibration Test Setup – Vertical Direction

APPENDIX A – PHOTOGRAPHS (cont'd)
T4 – Shock



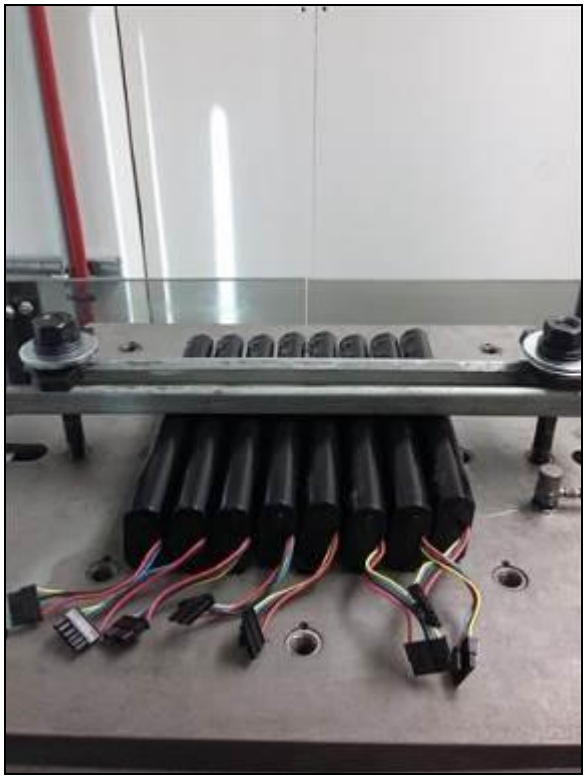
Photograph 6: Shock Test Setup –Fore/Aft, Positive Direction



Photograph 7: Shock Test Setup –Fore/Aft, Negative Direction

APPENDIX A – PHOTOGRAPHS (cont'd)
T4 – Shock

Photograph 8: Shock Test Setup – Lateral, Positive Direction



Photograph 9: Shock Test Setup – Lateral, Negative Direction

APPENDIX A – PHOTOGRAPHS (cont'd)
T4 – Shock

Photograph 10: Shock Test Setup – Vertical, Positive Direction

Photograph 11: Shock Test Setup – Vertical, Negative Direction

APPENDIX A – PHOTOGRAPHS (cont'd)
T5 – External Short Circuit

Photograph 12: External Short Circuit Test Setup, SN 01-04

Photograph 13: External Short Circuit Test Setup, SN 09-12

APPENDIX A – PHOTOGRAPHS (cont'd)
T7 – Overcharge

Photograph 14: Overcharge Test Setup

APPENDIX B
T1 – Altitude Simulation Graph

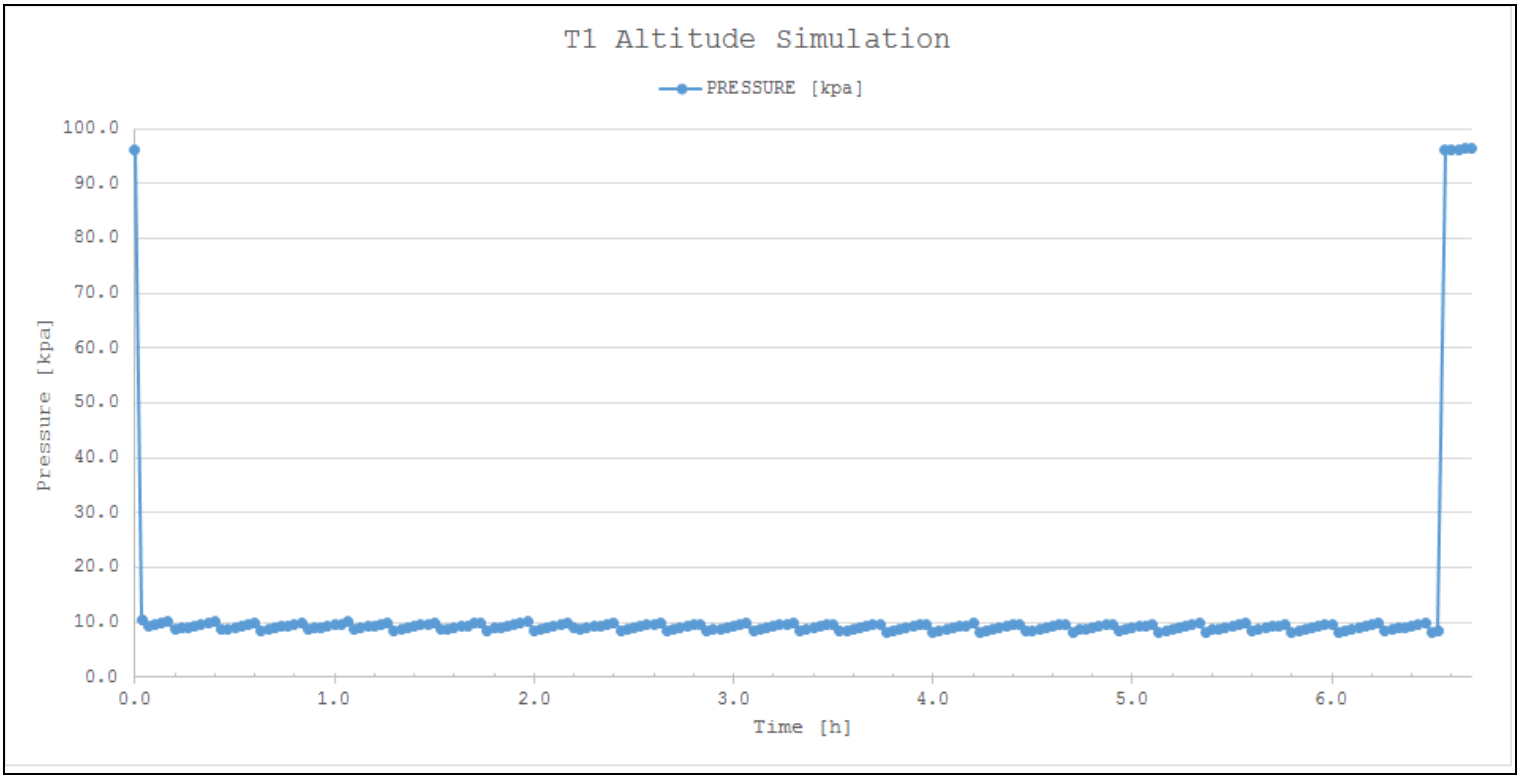


Figure 1: Altitude Simulation Graph; SN 1 – 4 and 9 – 12

APPENDIX C
T2 – Thermal Test Graph

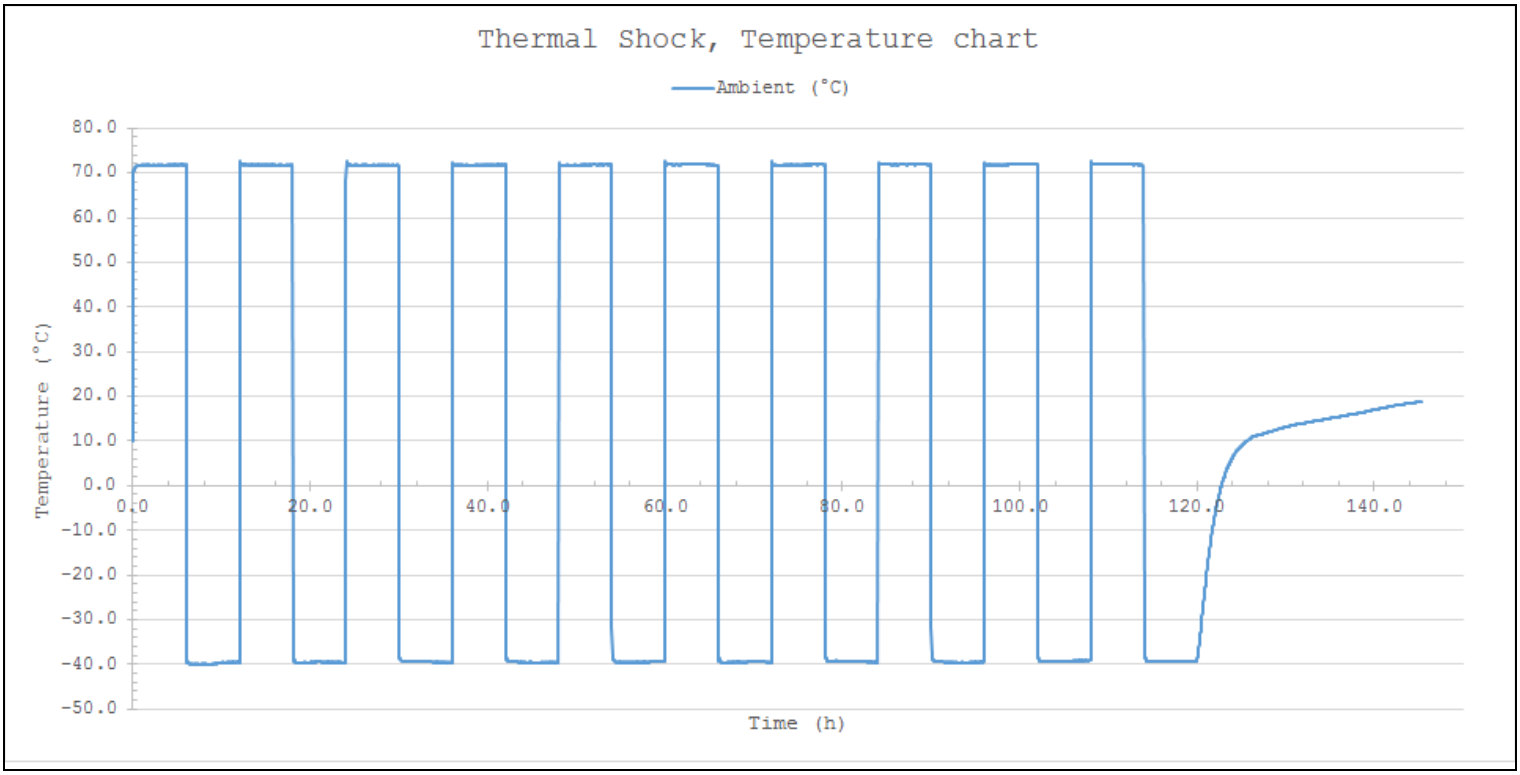


Figure 2: Thermal Test Graph; SN 1 – 4 and 9 – 12

APPENDIX D
T3 – Vibration Plots

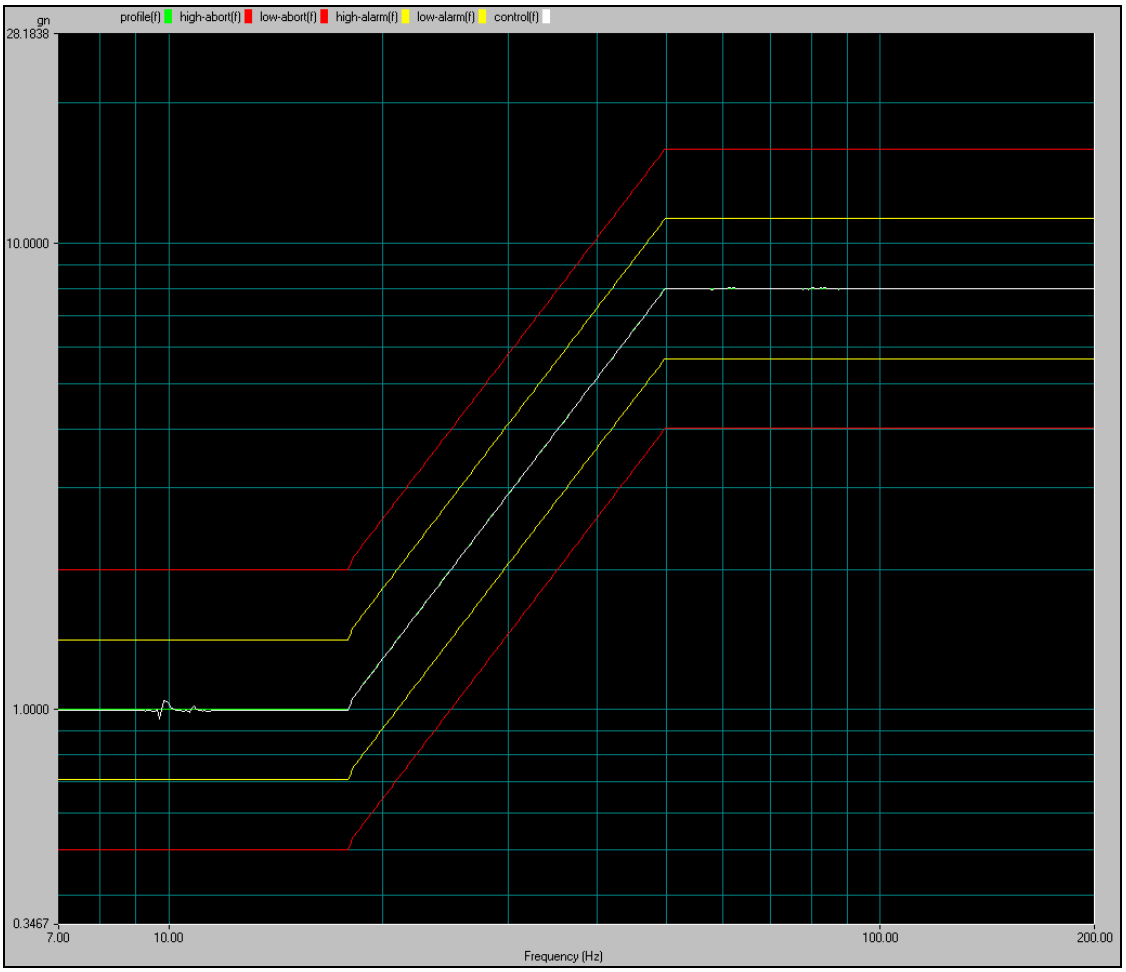


Figure 3: Vibration Plot – Fore/Aft Direction SN 1 – 4 and 9 – 12

APPENDIX D
T3 – Vibration Plots (cont'd)

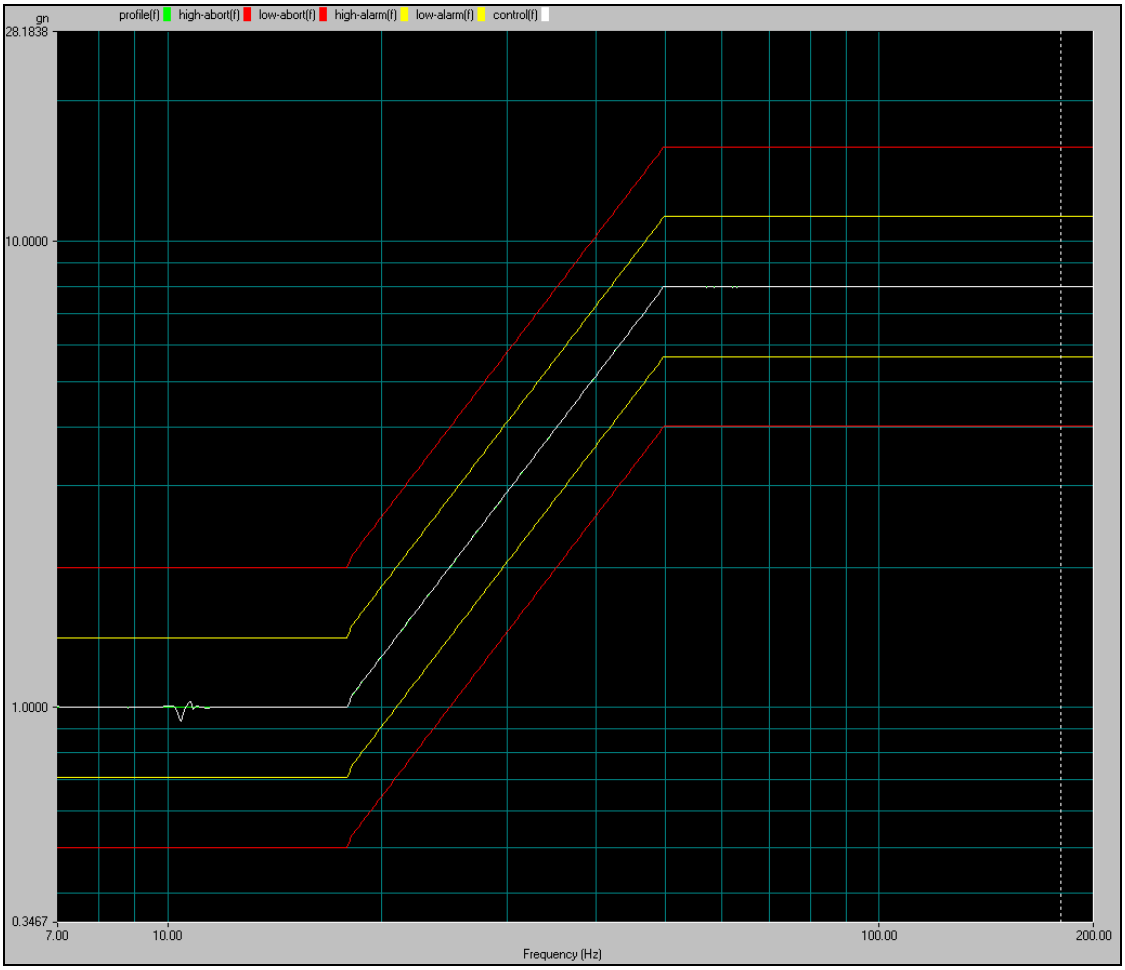


Figure 4: Vibration Plot – Lateral Direction SN 1 – 4 and 9 – 12

APPENDIX D
T3 – Vibration Plots (cont'd)

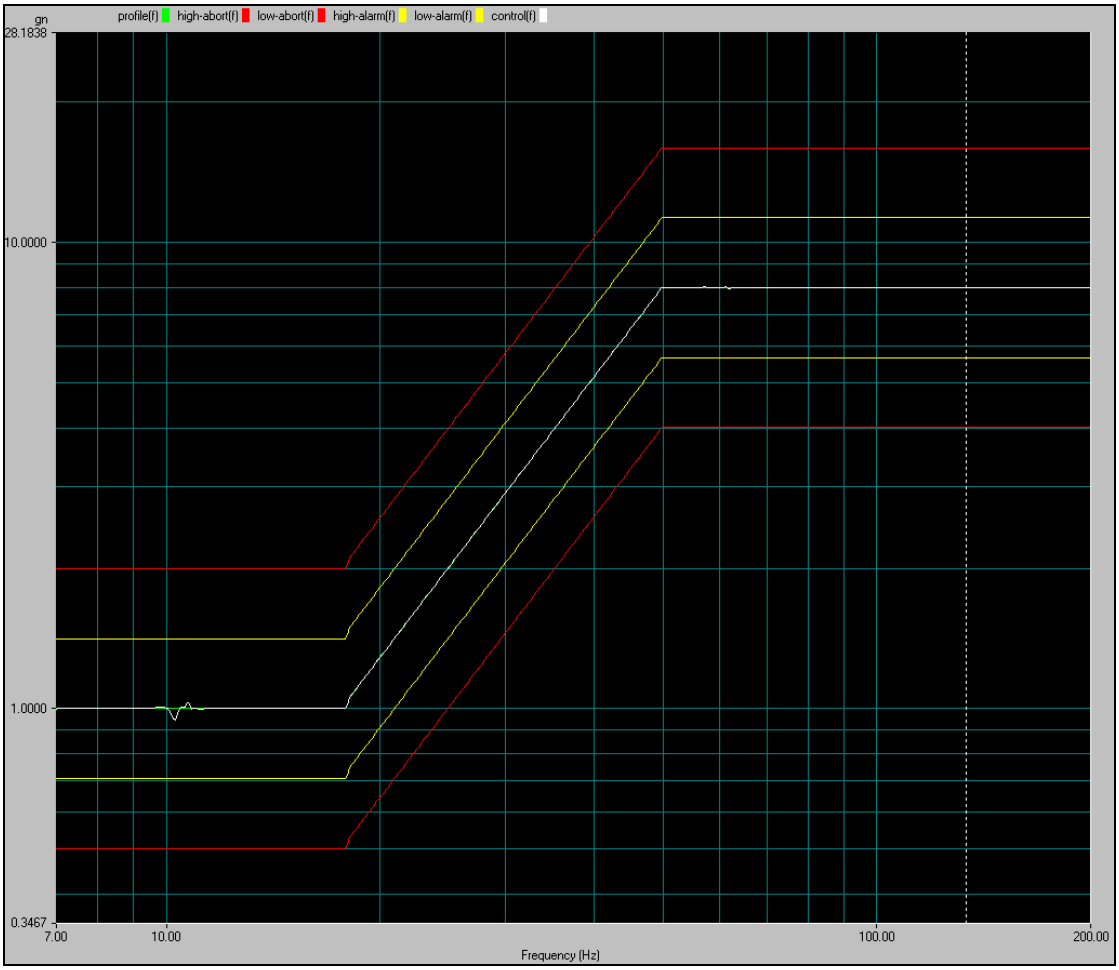
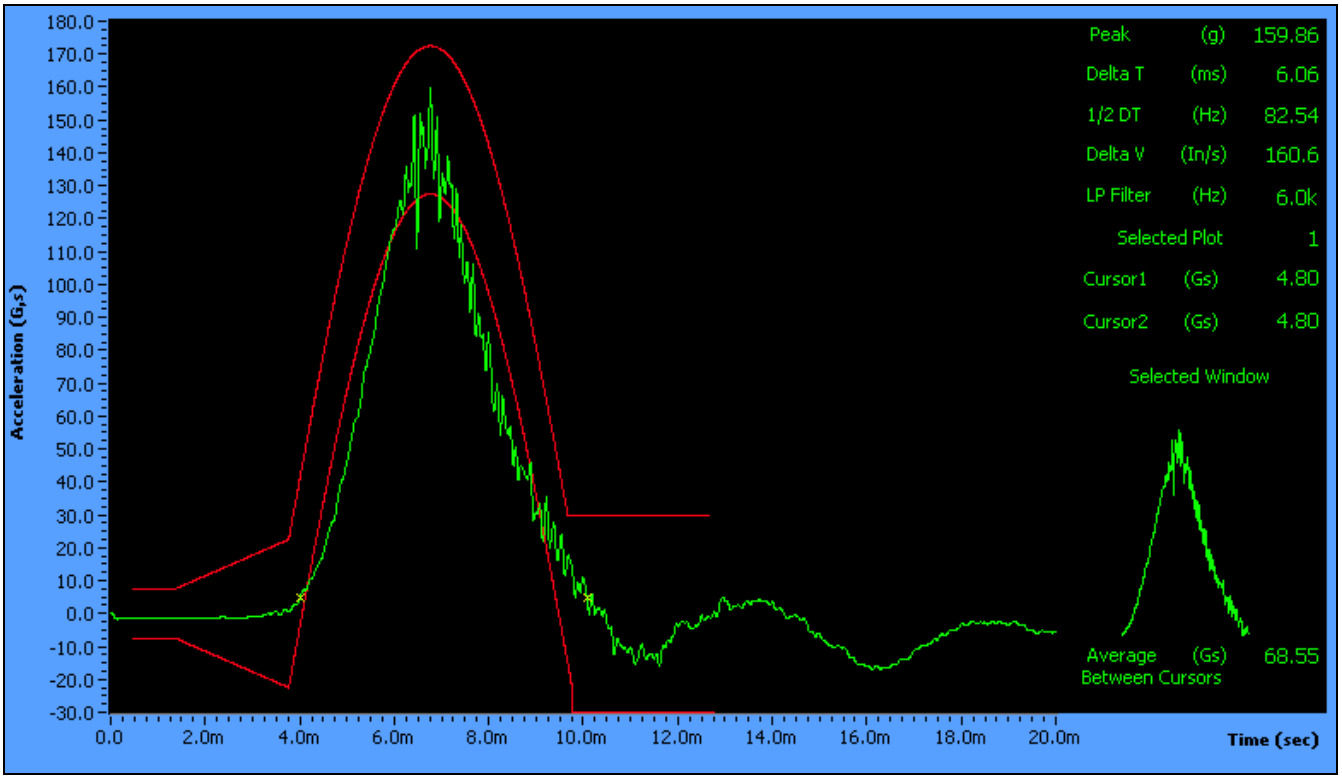
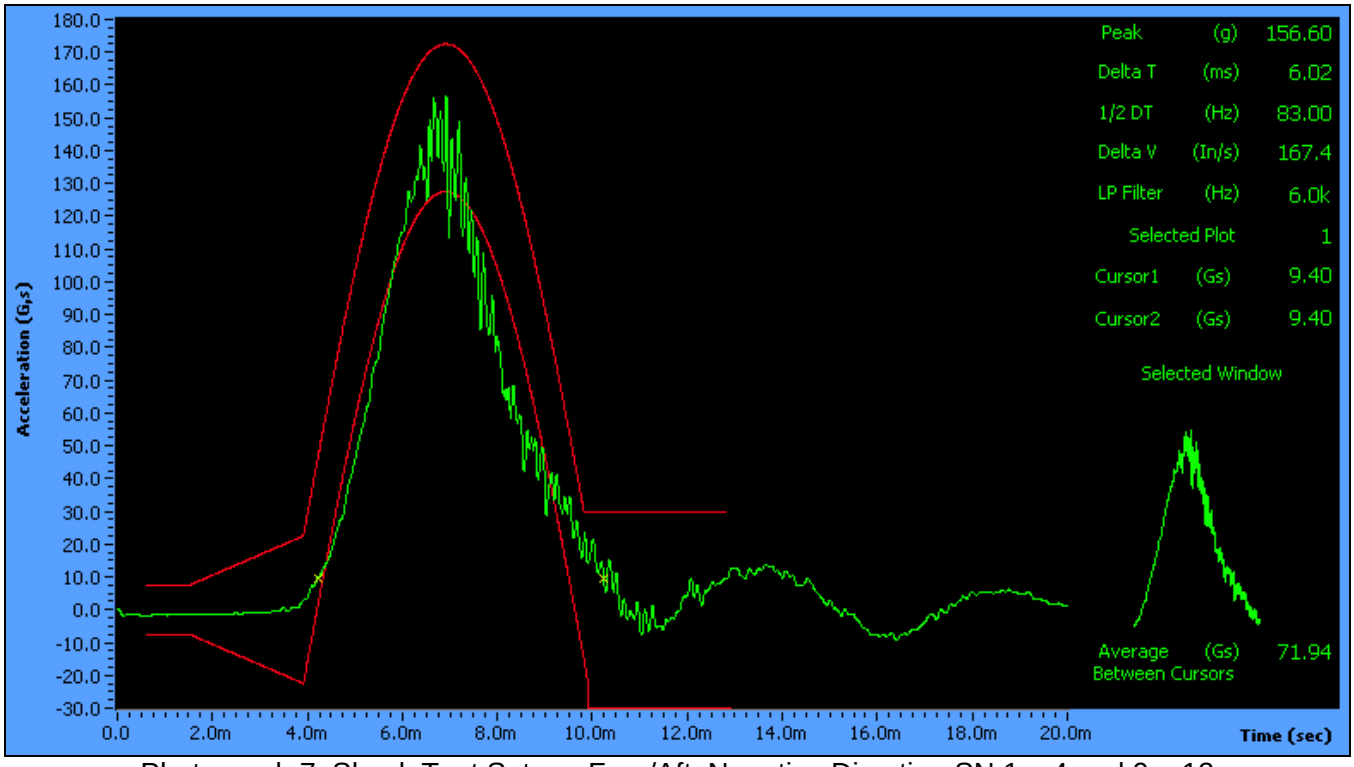


Figure 5: Vibration Plot – Vertical Direction SN 1 – 4 and 9 – 12

APPENDIX E
T4 – Shock Plots

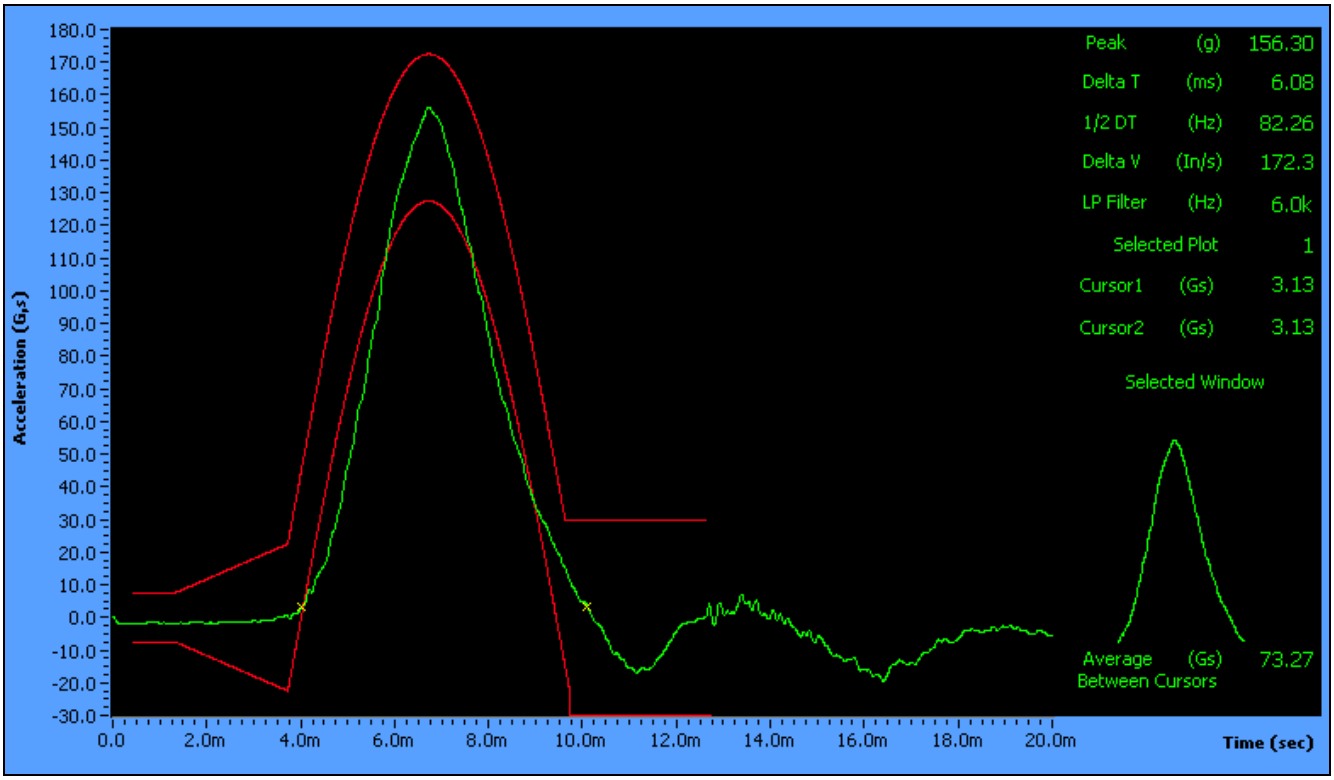


Photograph 6: Shock Test Setup –Fore/Aft, Positive Direction SN 1 – 4 and 9 – 12

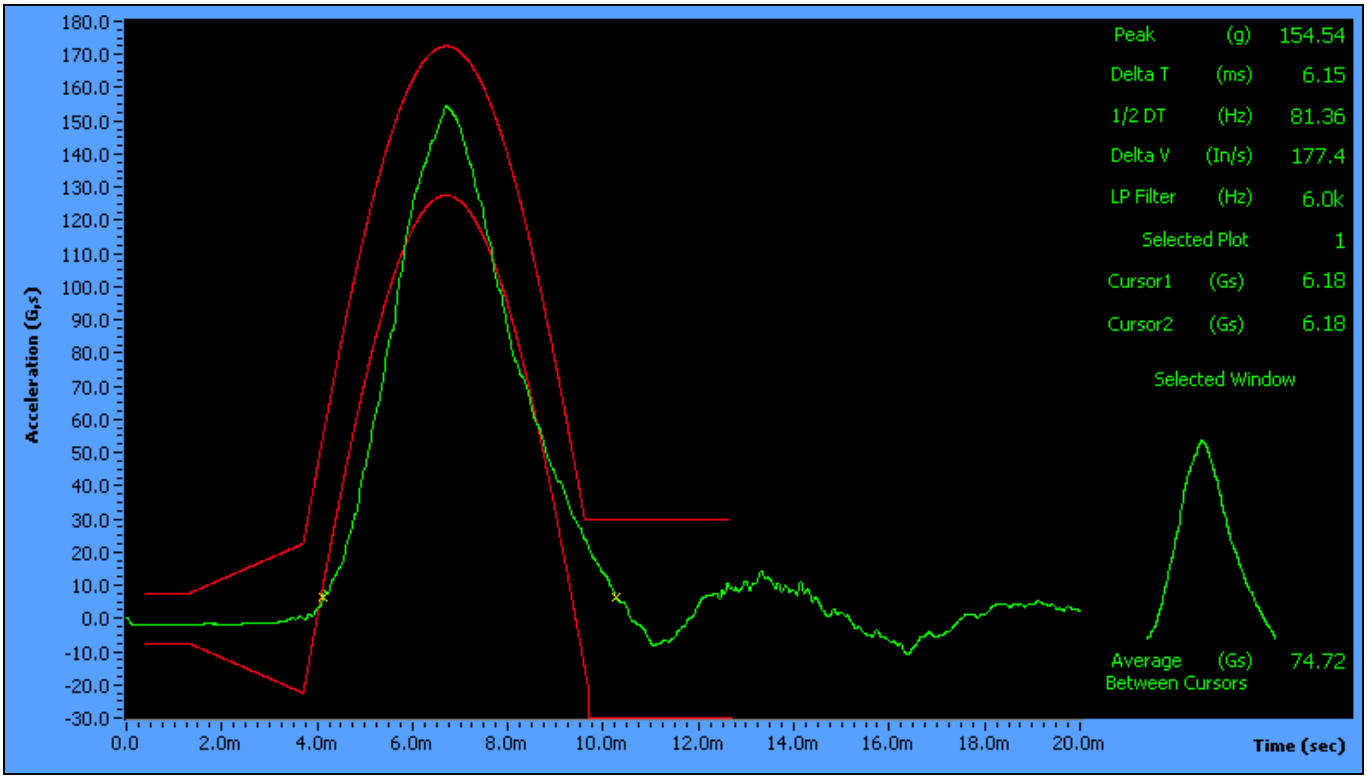


Photograph 7: Shock Test Setup –Fore/Aft, Negative Direction SN 1 – 4 and 9 – 12

APPENDIX E
T4 – Shock Plots (cont'd)

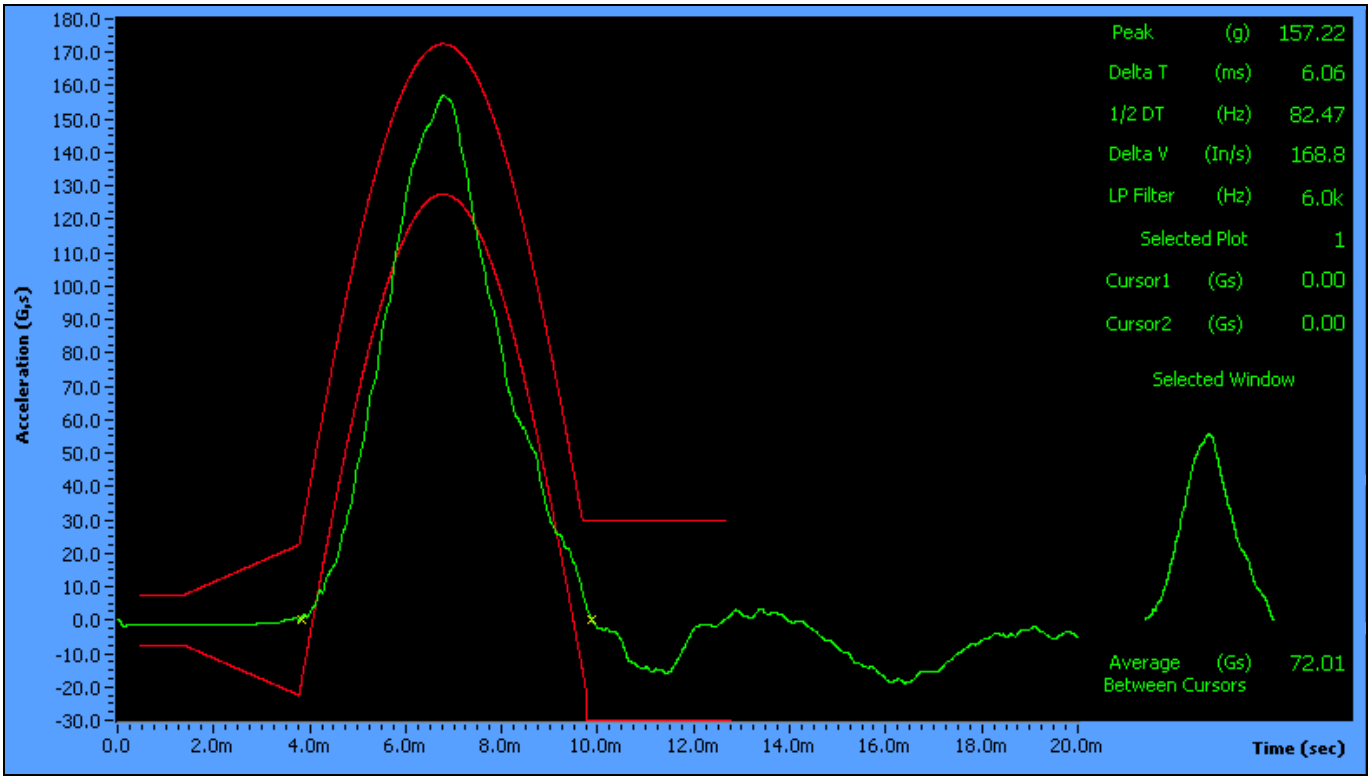


Photograph 8: Shock Test Setup – Lateral, Positive Direction SN 1 – 4 and 9 – 12

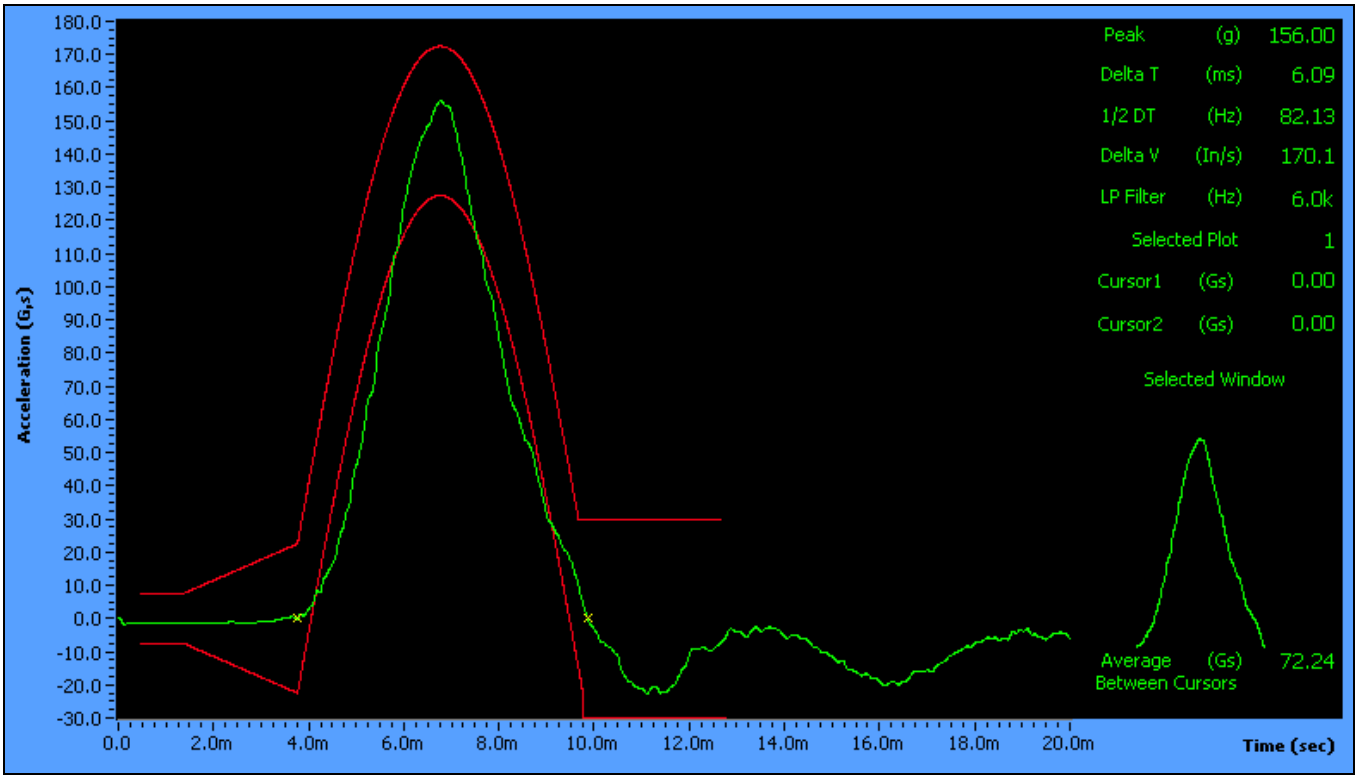


Photograph 9: Shock Test Setup – Lateral, Negative Direction SN 1 – 4 and 9 – 12

APPENDIX E
T4 – Shock Plots (cont'd)



Photograph 10: Shock Test Setup – Vertical, Positive Direction SN 1 – 4 and 9 – 12



Photograph 11: Shock Test Setup – Vertical, Negative Direction; SN 1 – 4 and 9 – 12

APPENDIX F
T5 – External Short Circuit Graphs

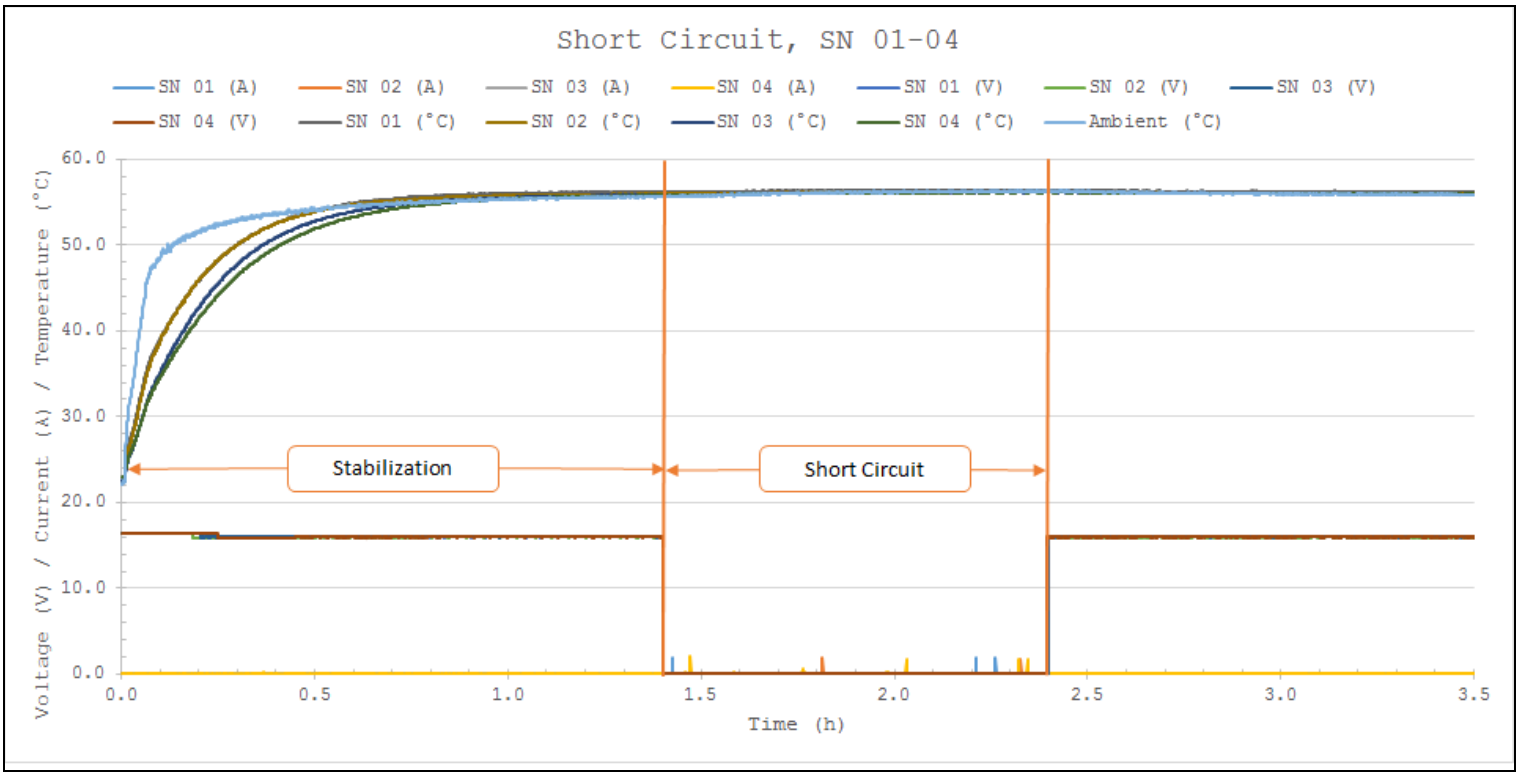


Figure 12: External Short Circuit Graph – Voltage / Temperature vs. Time, SN 01 – 04

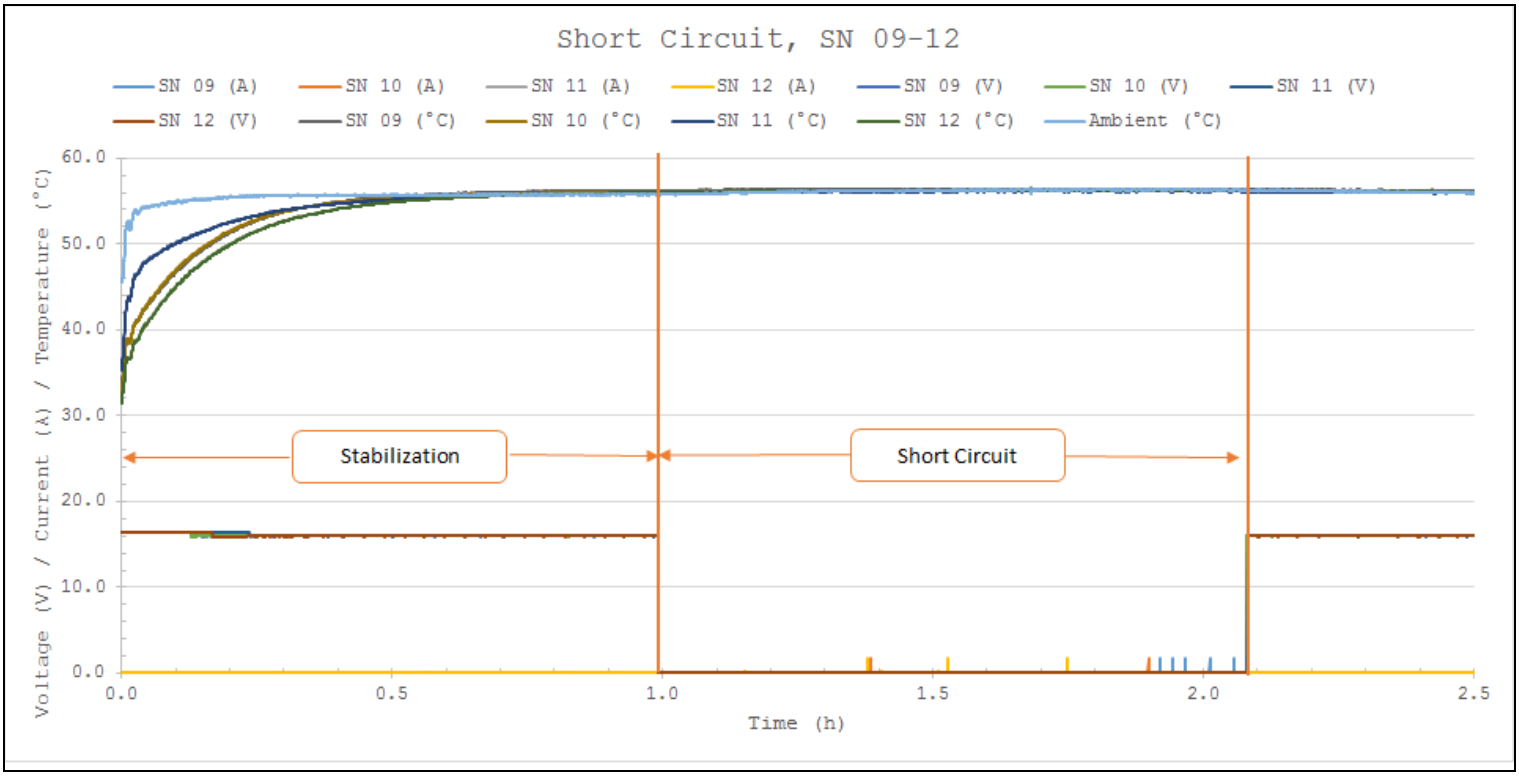


Figure 13: External Short Circuit Graph – Voltage / Temperature vs. Time, SN 09 – 12

APPENDIX G
T7 – Overcharge Graphs

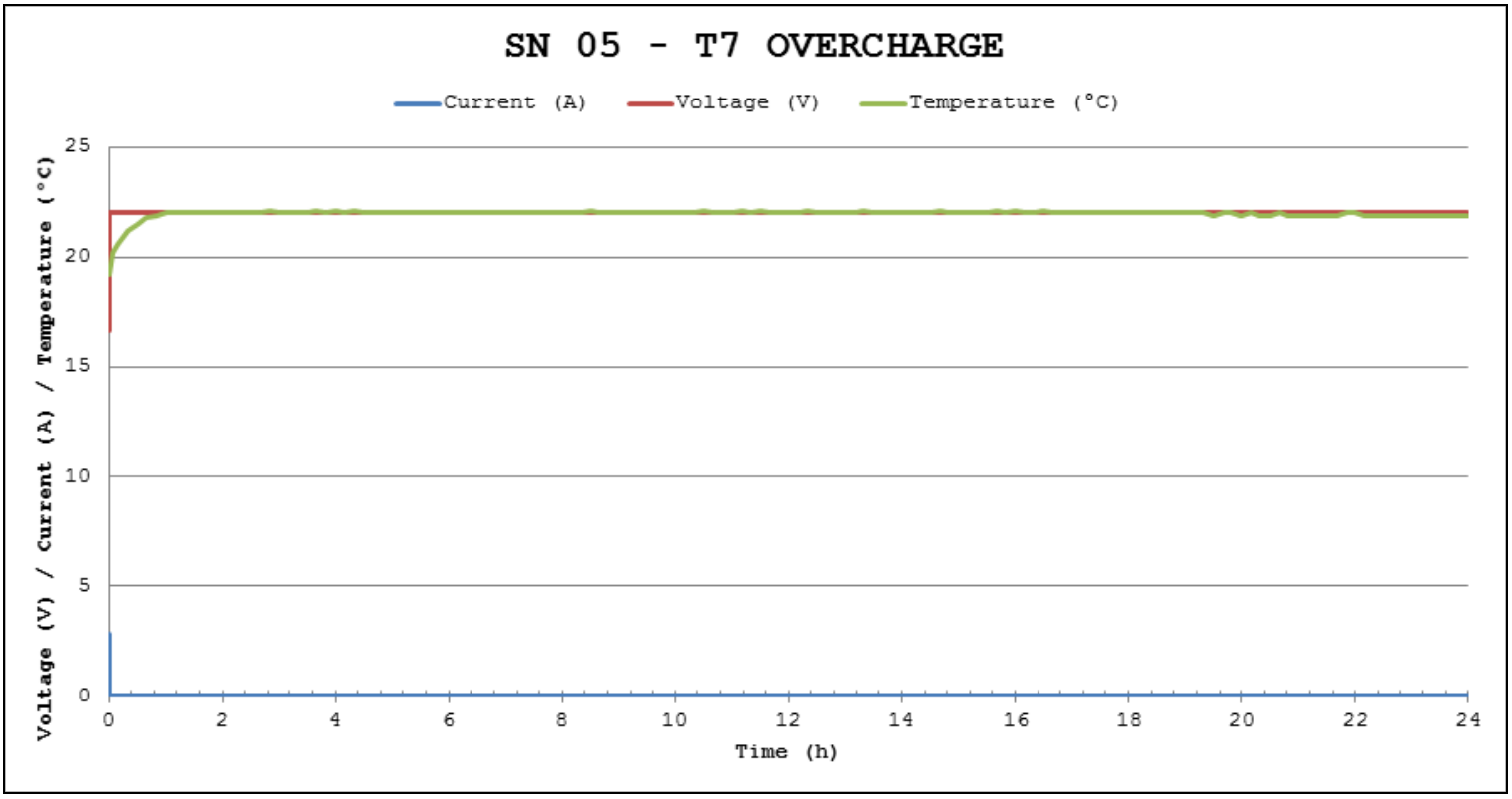


Figure 14: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 05

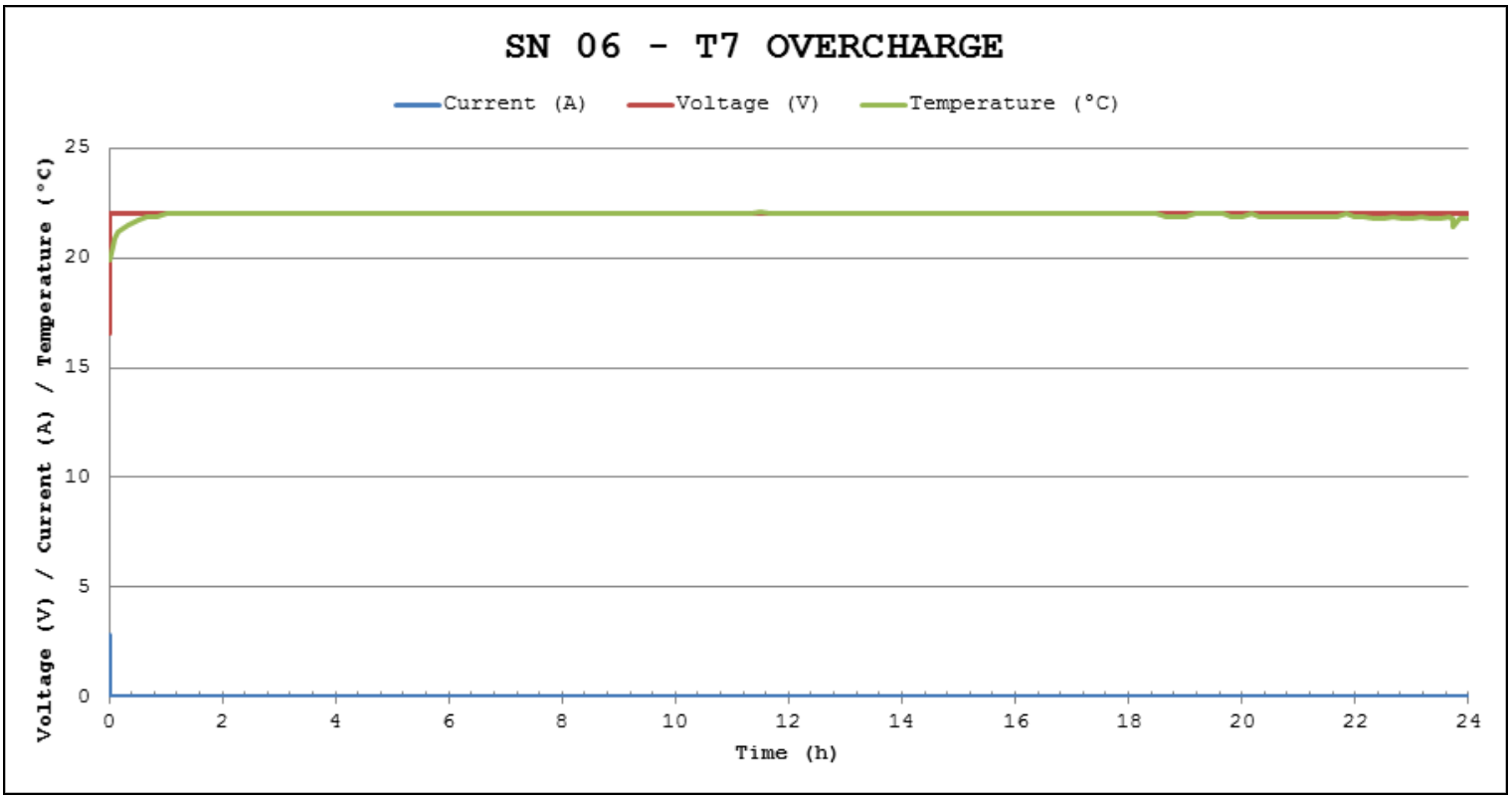


Figure 15: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 06

APPENDIX G
T7 – Overcharge Graphs (cont'd)

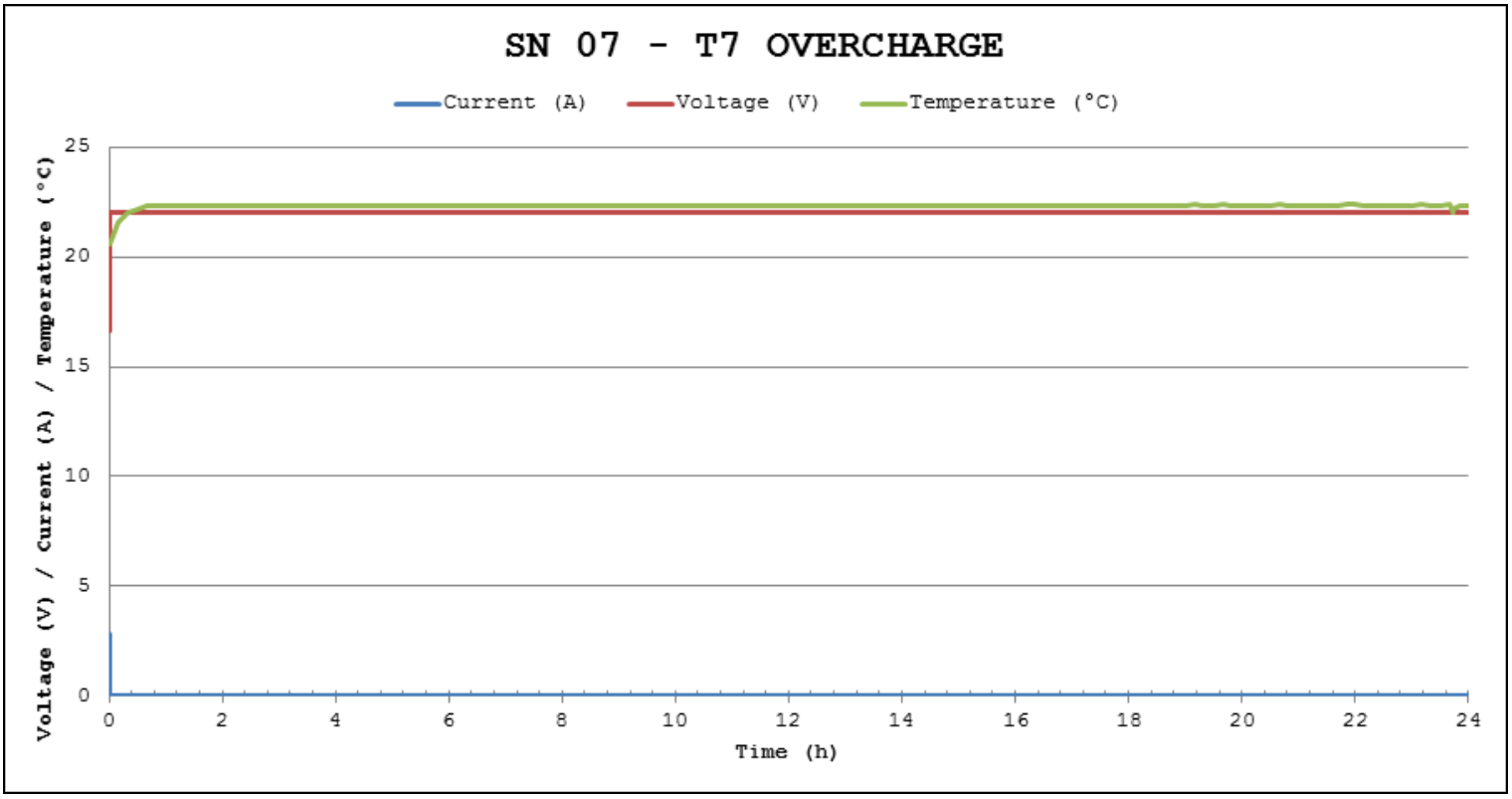


Figure 16: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 07

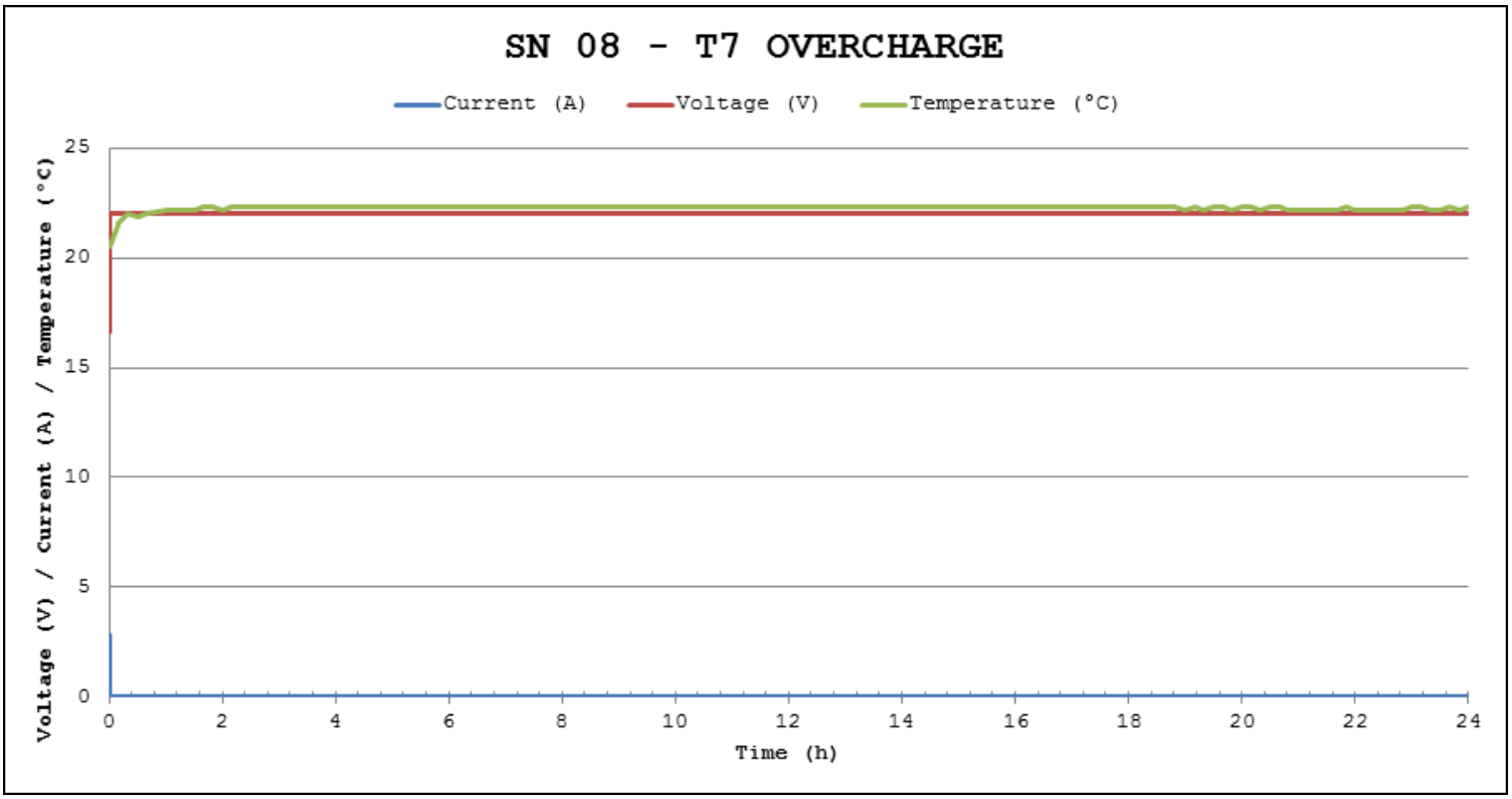


Figure 17: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 08

APPENDIX G
T7 – Overcharge Graphs (cont'd)

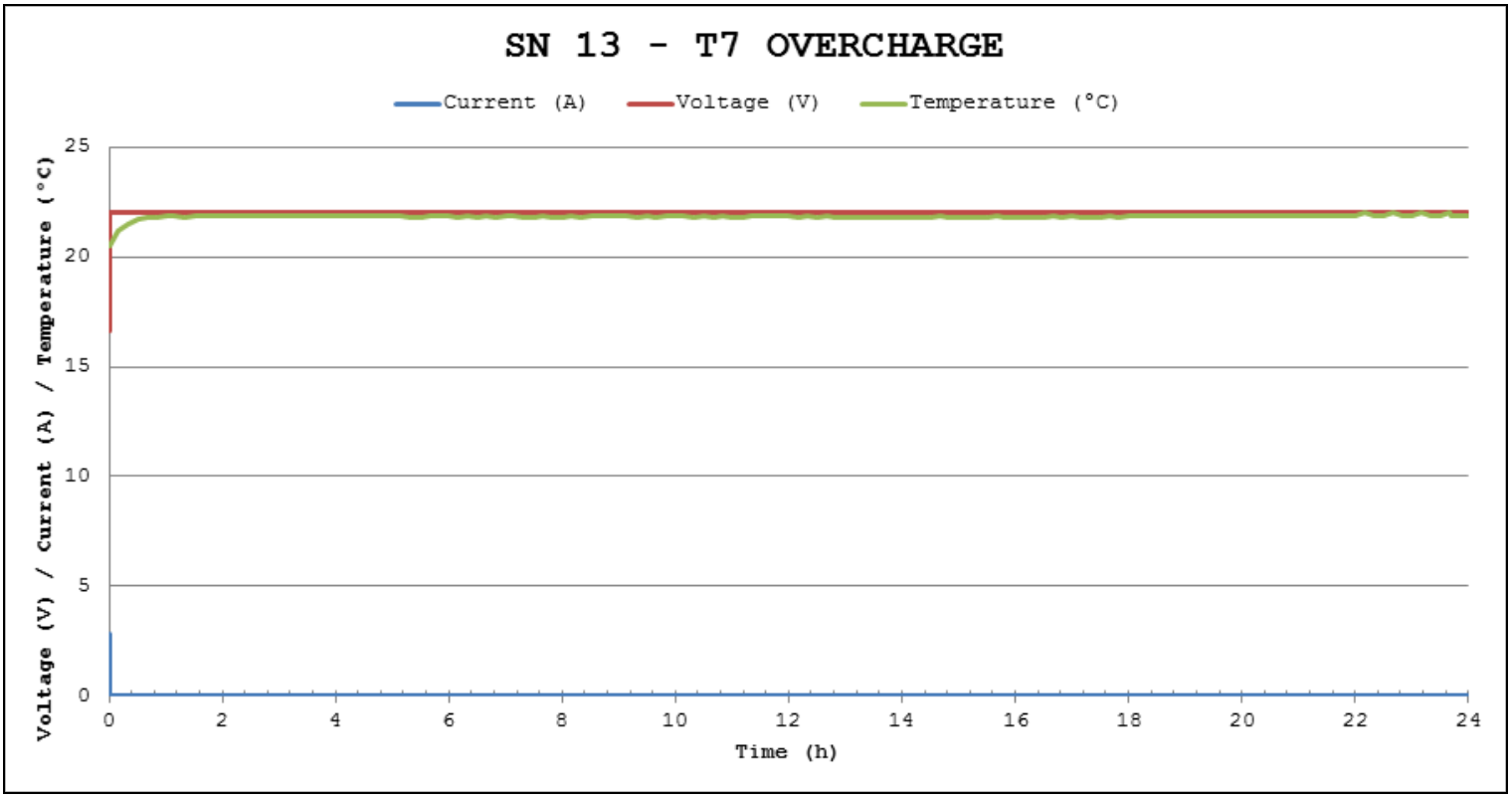


Figure 18: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 13

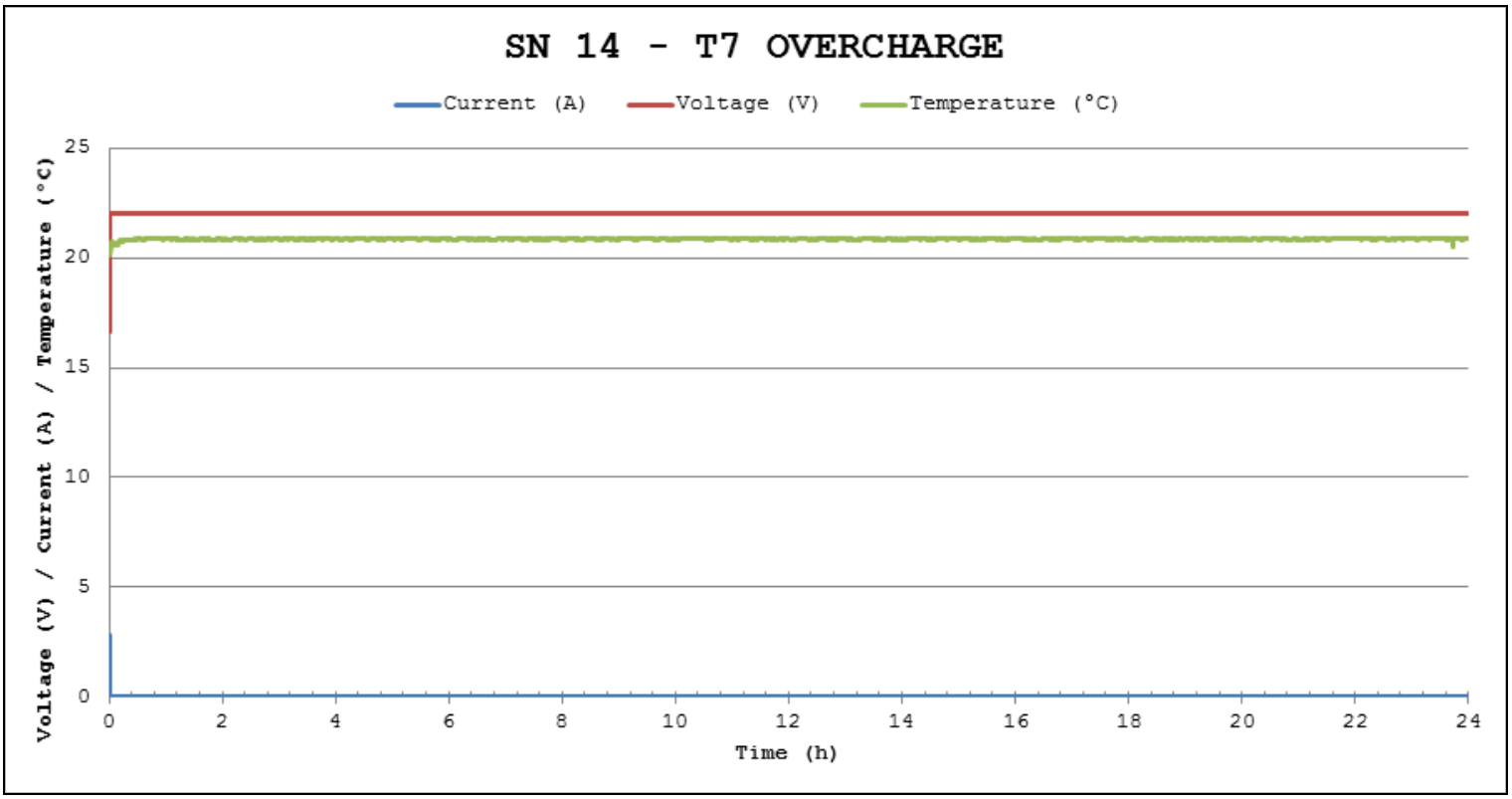


Figure 19: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 14

APPENDIX G
T7 – Overcharge Graphs (cont'd)

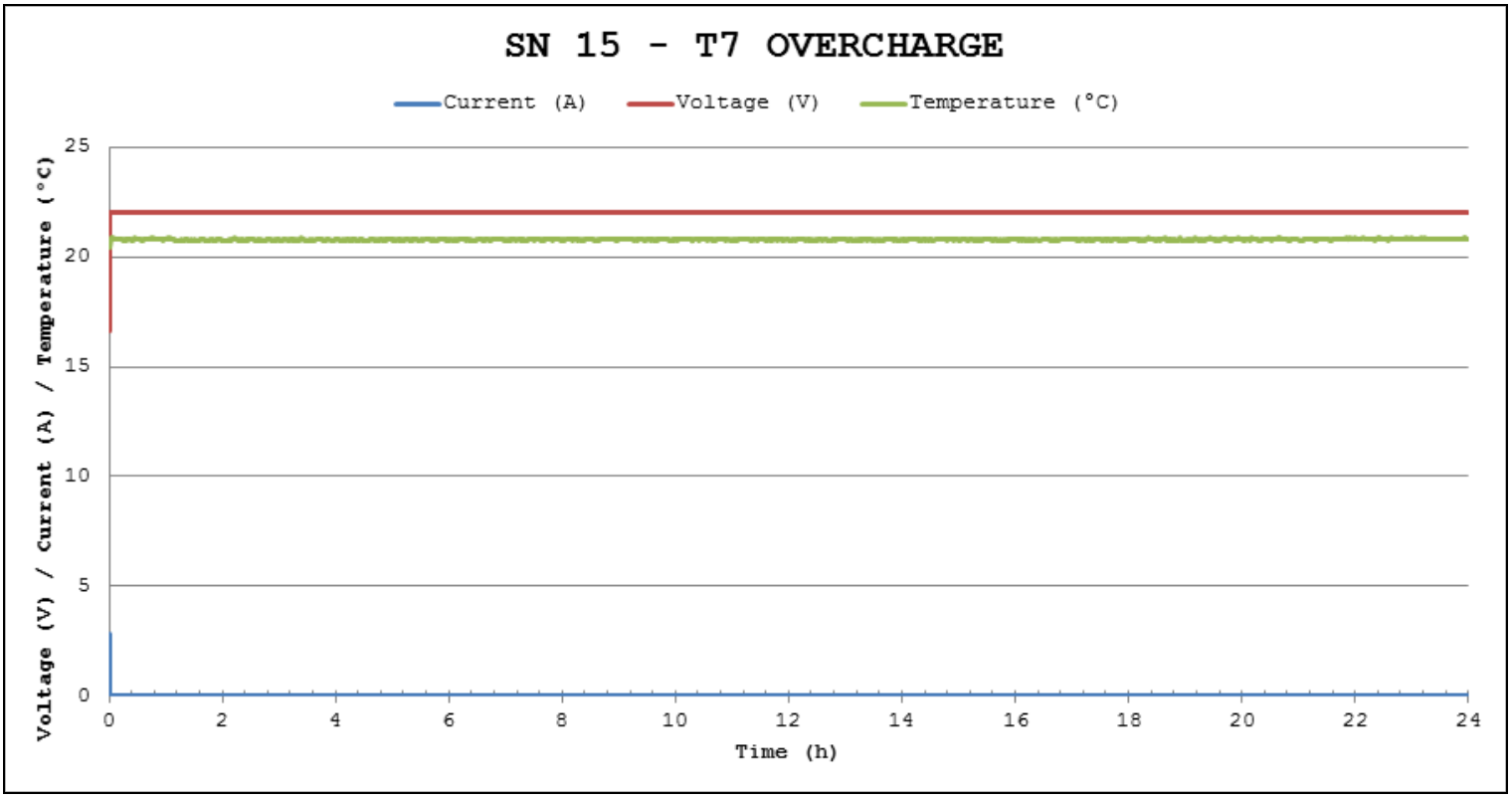


Figure 20: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 15

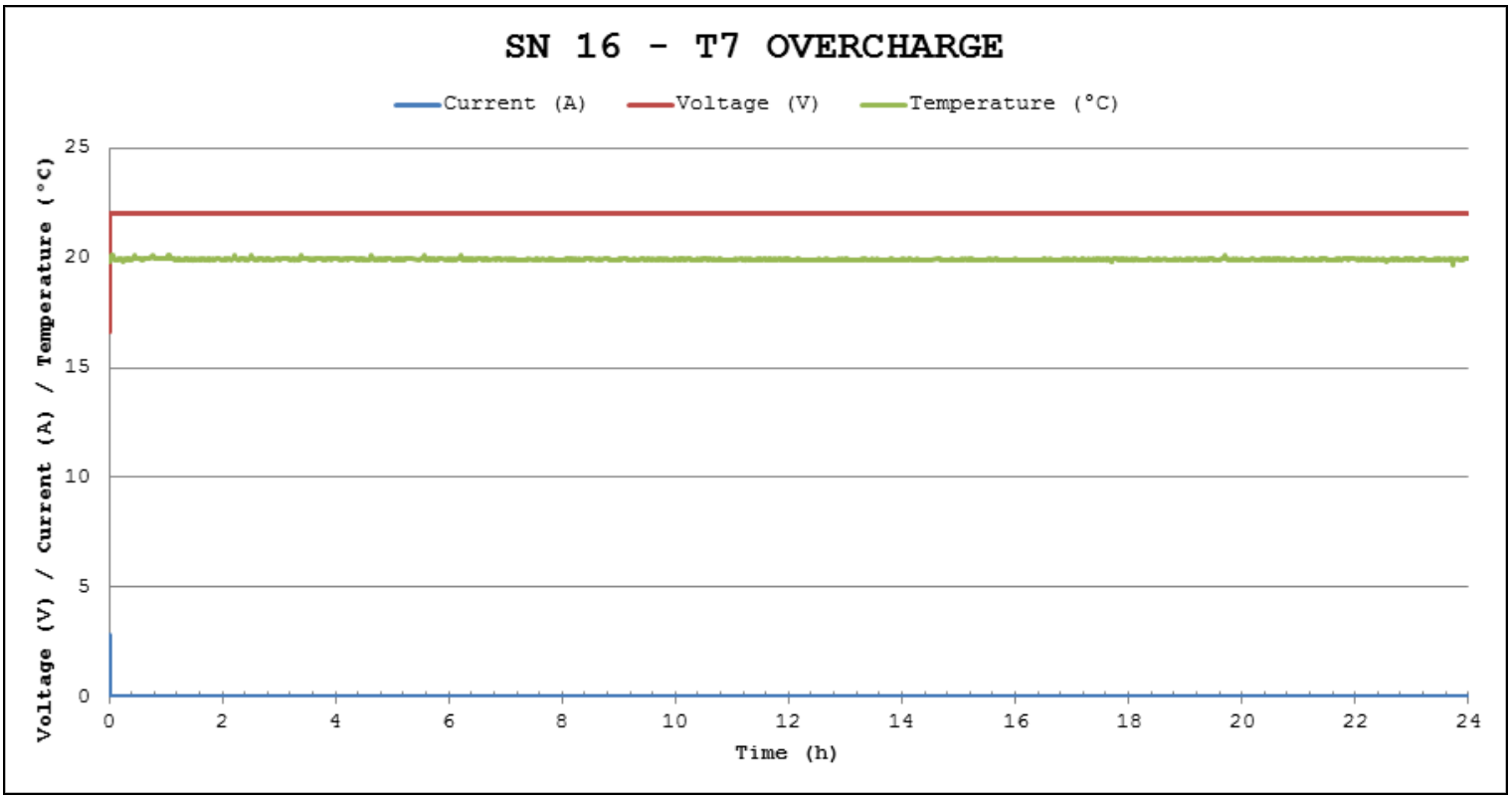


Figure 21: Overcharge Graph – Current, Temperature and Voltage vs. Time, SN 16