

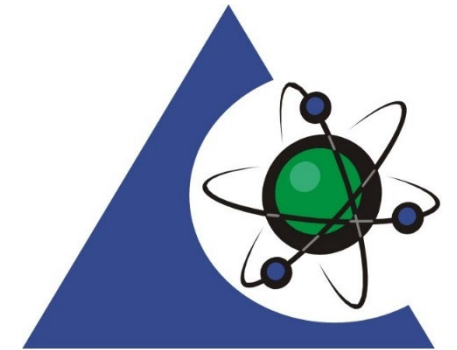
MACCOR

BATTERY & CELL TEST EQUIPMENT WORLDWIDE



18 February 2024

Manufacture Comprehensive Automated Battery Test Equipment.



PJLA
Calibration
Accreditation #: 76376

ISO/IEC 17025:2017

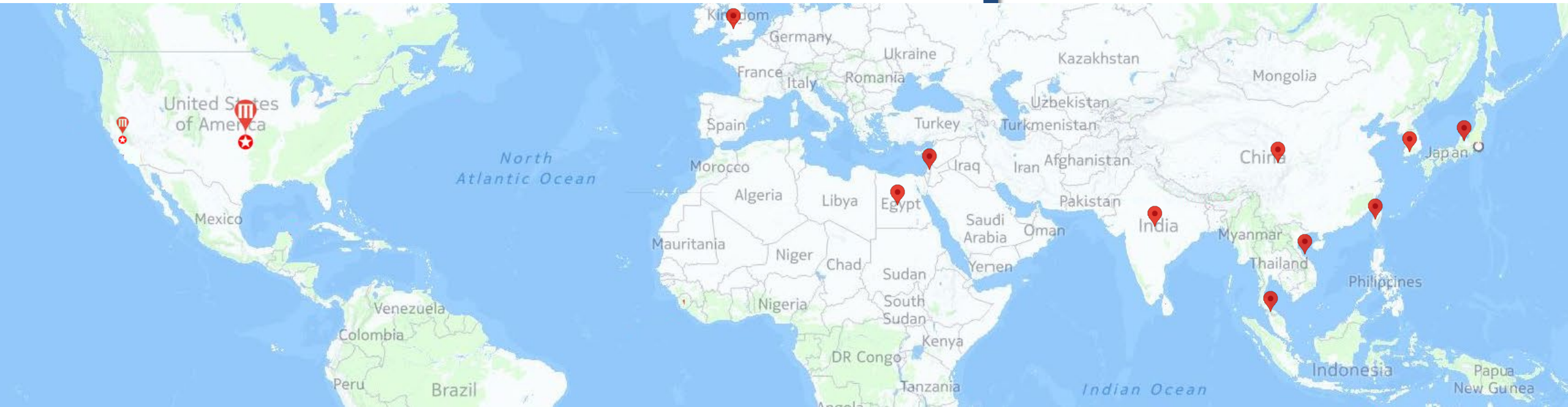
MACCOR
BATTERY & CELL TEST EQUIPMENT WORLDWIDE

Company-owned 100,000 ft² manufacturing facility in



Tulsa, OK USA

Global Footprint



China

Egypt

Europe

India

Israel

Japan

Malaysia

Taiwan

Vietnam

Applications

- **Cell Development**
- **Material Research**
- **Life Cycle**
- **Performance**
- **Quality Control**
- **State of Health**
- **Destructive Evaluation**
- **Vendor Qualification**
- **SMBus**
- **CAN**
- **Temperature**
- **Drive Cycles**

Industries

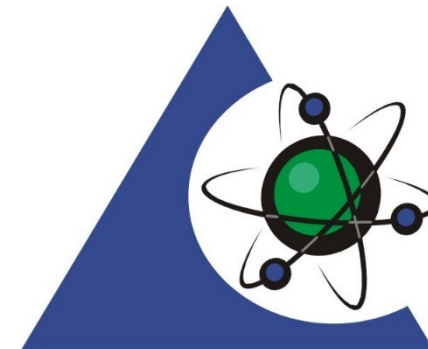
- **Aerospace**
- **Automotive**
- **Medical**
- **Military & Defense**
- **Grid Storage**
- **Consumer Electronics**
- **Research & Development**
- **Safety**
- **Marine**
- **Recycling**
- **OEM's**
- **Giga Factories**



MACCOR
BATTERY & CELL TEST EQUIPMENT WORLDWIDE

Products

World Class Line Up



PJLA
Calibration
Accreditation #: 76376



Software

**Software License included with
Hardware**

No third-party software required

Software

MACCOR J07945

File Tools Actions Maintenance Help

Detailed Intermediate Normal Chart Quick

1 Available	25 Available	49 Available
2 Available	26 Available	50 Available
3 Available	27 Available	51 Available
4 Available	28 Available	52 Available
5 Available	29 Available	53 Available
6 Available	30 Available	54 Available
7 Available	31 Available	55 Available
8 Available	32 Available	56 Available
9 Available	33 Available	57 Available
10 Available	34 Available	58 Available
11 Available	35 Available	59 Available
12 Available	36 Available	60 Available
13 Available	37 Available	61 Available
14 Available	38 Available	62 Available
15 Available	39 Available	63 Available
16 Available	40 Available	64 Available
17 Available	41 Available	65 Available
18 Available	42 Available	66 Available
19 Available	43 Available	67 Available
20 Available	44 Available	68 Available
21 Available	45 Available	69 Available
22 Available	46 Available	70 Available
23 Available	47 Available	71 Available
24 Available	48 Available	72 Available

Legends: Charge, Discharge, Rest, Hold, Complete, Error, Picktest, Fail, OK

Communication status: Status: 163, Data points: 0

System status: Messages

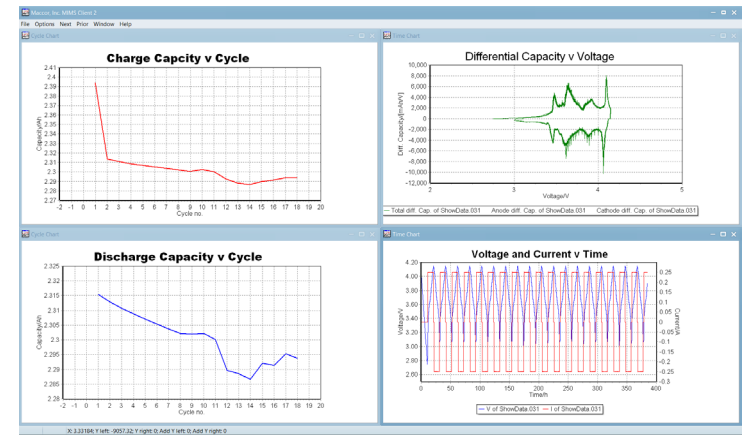
MACCOR Procedure SampleProc.000

File Edit Options Window Help

Description: Easy to use edit

Step	Type	Mode	Value	Limit	Value	End Type	Op	Value	Go to	Report Type	Value	Options	Step Note (80 character maximum)
1	Rest					Step Time	*	00:00:05	002	Step Time	00:00:01	ANNN	
2	E-Chamber					Degrade C	*	80.0	003	Step Time	00:00:30		
3	Del1												
4	Charge	Current	2.0	Voltage	4.18	Step Time	*	00:00:05	005	Step Time	00:00:01	ANNN	
5	Rest					Voltage	**	4.2	005				
6	Del2												
7	Discharge	Current	19.0			Step Time	*	00:00:05	008	Step Time	00:00:01	ANNN	
8	Rest					Voltage	**	2.5	008				
9	Loop2					Loop Count	*	1200	010				
10	Loop1					Loop Count	*	1255	011				

Step 12 Column 14 Row 40 Total End 10 Total Report 6



MACCOR J07945

File Tools Actions Maintenance Help

Detailed Intermediate Normal Chart Quick

Channel 4 Max voltage: 5.000 V, Max current: 5.000 A, Board load: 10.0 mA, Safety

Status: Available, Min voltage: 5.000 V, Current range: 5.000 A, Special device: No special device

Test info: Test name: Comment: Start date: Test procedure: Comment: Case: Max: 0.000 1.00

Actual readings: Voltage: 4.174 V, Capacity: 0.0000 Ah, Power: 0.0000 W, Last 1/4 Cycle: 0.0000 Ah, Resistance: Energy: 0.0000 Wh, Test time: 00:00:00, 1/4 Cycle: 0.0000 Wh, Step time: 00:00:00, 1/4 Cycle: 0.0000 Wh, Step: 0, Cycle: 0

Loop cover remaining: Loop 1: 0, Loop 2: 0, Loop 3: 0, Loop 4: 0

Asay input: Loop: Value

Legends: Charge, Discharge, Rest, Hold, Complete, Error, Picktest, Fail, OK

Communication status: Status: 162, Data points: 6

System status: Messages

MACCOR Data 2

File Data Next Prior Help

Name: ShowData
Channel: 02
Tester: 2 th nr
Started: 9/25/2018 14:23 PM
Procedure: ShowData.000
Mass: 0.6 g
Area: 0.6 cm²
Ch. max. V: 5.0 V
Ch. max. I: 5.0 A
DisCh. max. V: -5.0 V
DisCh. max. I: 5.0 A

Comment: #5127 records, 45126 data, 19 cycles, 13 columns:

Sec	Cycle #	Cycle C	Step	Step Time	Capacity	Energy	Current	Voltage	MD	ES	DPT Time
1	0	1	1	00:00:01	0.0000	0.0000	0.0000	3.51	R	0	9/25/2018 14:23:04 PM
2	0	1	1	00:00:02	0.0000	0.0000	0.0000	3.508	R	1	9/25/2018 14:23:05 PM
3	0	1	1	00:00:03	0.0000	0.0000	0.0000	3.509	R	1	9/25/2018 14:23:06 PM
4	0	1	1	00:00:04	0.0000	0.0000	0.0000	3.509	R	1	9/25/2018 14:23:07 PM
5	0	1	1	00:00:05	0.0000	0.0000	0.0000	3.509	R	1	9/25/2018 14:23:08 PM
6	0	1	1	00:00:05	0.0000	0.0000	0.0000	3.51	R	129	9/25/2018 14:23:08 PM
7	1	1	6	00:00:05	0.0000	0.0000	0.0000	2.749	R	0	9/25/2018 11:42:08 PM
8	1	1	6	00:00:35	0.0000	0.0000	0.0000	2.749	R	1	9/25/2018 11:42:38 PM
9	1	1	6	00:01:05	0.0000	0.0000	0.0000	2.749	R	1	9/25/2018 11:43:08 PM
10	1	1	6	00:01:35	0.0000	0.0000	0.0000	2.749	R	1	9/25/2018 11:43:38 PM
11	1	1	6	00:02:05	0.0000	0.0000	0.0000	2.749	R	1	9/25/2018 11:44:08 PM
12	1	1	6	00:02:35	0.0000	0.0000	0.0000	2.749	R	1	9/25/2018 11:44:38 PM
13	1	1	6	00:03:05	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:45:08 PM
14	1	1	6	00:03:35	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:45:38 PM
15	1	1	6	00:04:05	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:46:08 PM
16	1	1	6	00:04:35	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:46:38 PM
17	1	1	6	00:05:05	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:47:08 PM
18	1	1	6	00:05:35	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:47:38 PM
19	1	1	6	00:06:05	0.0000	0.0000	0.0000	2.75	R	1	9/25/2018 11:48:08 PM
20	1	1	6	00:06:35	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:48:38 PM
21	1	1	6	00:07:05	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:49:08 PM
22	1	1	6	00:07:35	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:49:38 PM
23	1	1	6	00:08:05	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:50:08 PM
24	1	1	6	00:08:35	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:50:38 PM
25	1	1	6	00:09:05	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:51:08 PM
26	1	1	6	00:09:35	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:51:38 PM
27	1	1	6	00:10:05	0.0000	0.0000	0.0000	2.751	R	1	9/25/2018 11:52:08 PM
28	1	1	6	00:10:35	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:52:38 PM
29	1	1	6	00:11:05	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:53:08 PM
30	1	1	6	00:11:35	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:53:38 PM
31	1	1	6	00:12:05	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:54:08 PM
32	1	1	6	00:12:35	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:54:38 PM
33	1	1	6	00:13:05	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:55:08 PM
34	1	1	6	00:13:35	0.0000	0.0000	0.0000	2.752	R	1	9/25/2018 11:55:38 PM

MACCOR System Active>ShowData.02 Filter Off Test is Active Total Records: 45126

MACCOR Export 2

File Help

Data Records Cycle FRA Cycle Statistics

Exported: Record num, Cycle F, Cycle C, Step, Test Time, Step Time, Capacity, Energy, Current, Voltage, Mode, ES, Code, DPT

Available: AC Impedance, DC Imp, Digital I/O, EV Num, EV Range, Aux, SMC, CAN, Substrate, Spec. Capacity, Power, VWF, Loop, Resistance, Conductivity, CSR, Panasonic 18650-2 (2018,07,13,18,49,50) UTC10011, VAG1, VAG2, VAG3, VAG4, VAG5, VAG7

Total Progress: ShowData.02 (11), ShowData.030 (11), ShowData.031 (11), ShowData.025 (11), ShowData.028 (11), ShowData.027 (11), Panasonic 18650-2 (2018,07,13,18,49,50) UTC10011 (10), SingleCycle.025 (9)

Output Path: C:\Maccor\Data\MaccorExport\Exported Data\

Output Format: .xml, .csv, .xls, .xlsx

Output Options: Discharge current negative, Step Impedance, Include proc and desc, High BA DSG Out

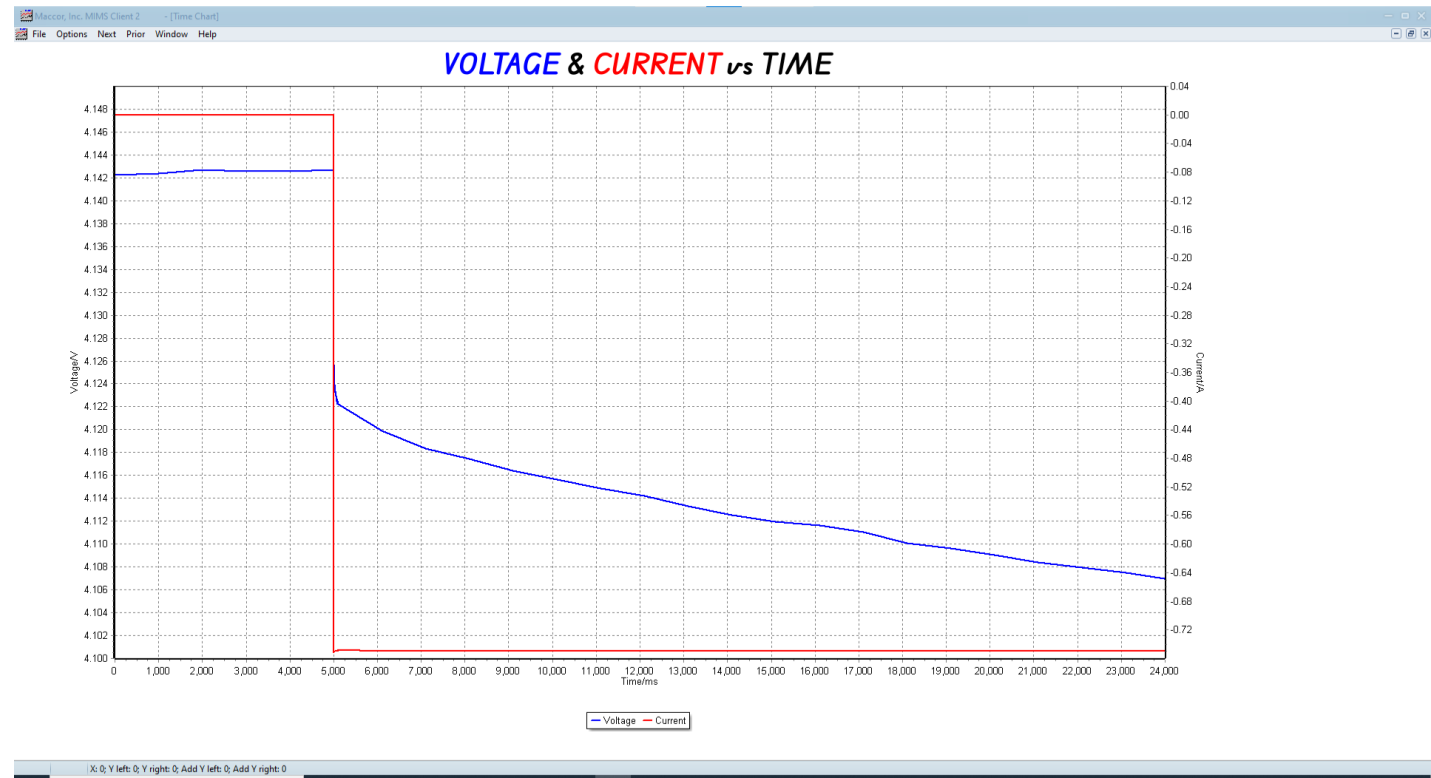
Buttons: Import, Save As, Convert, Append

Series 6000 High Speed Tester

- **1 mS Measure and Control**
- **Pulses as little as 750 μ S with a 1 μ S increments**
- **Capture Voltage and Current at a 20 kHz rate (50 μ S)**

Series 6000 Scope Trace

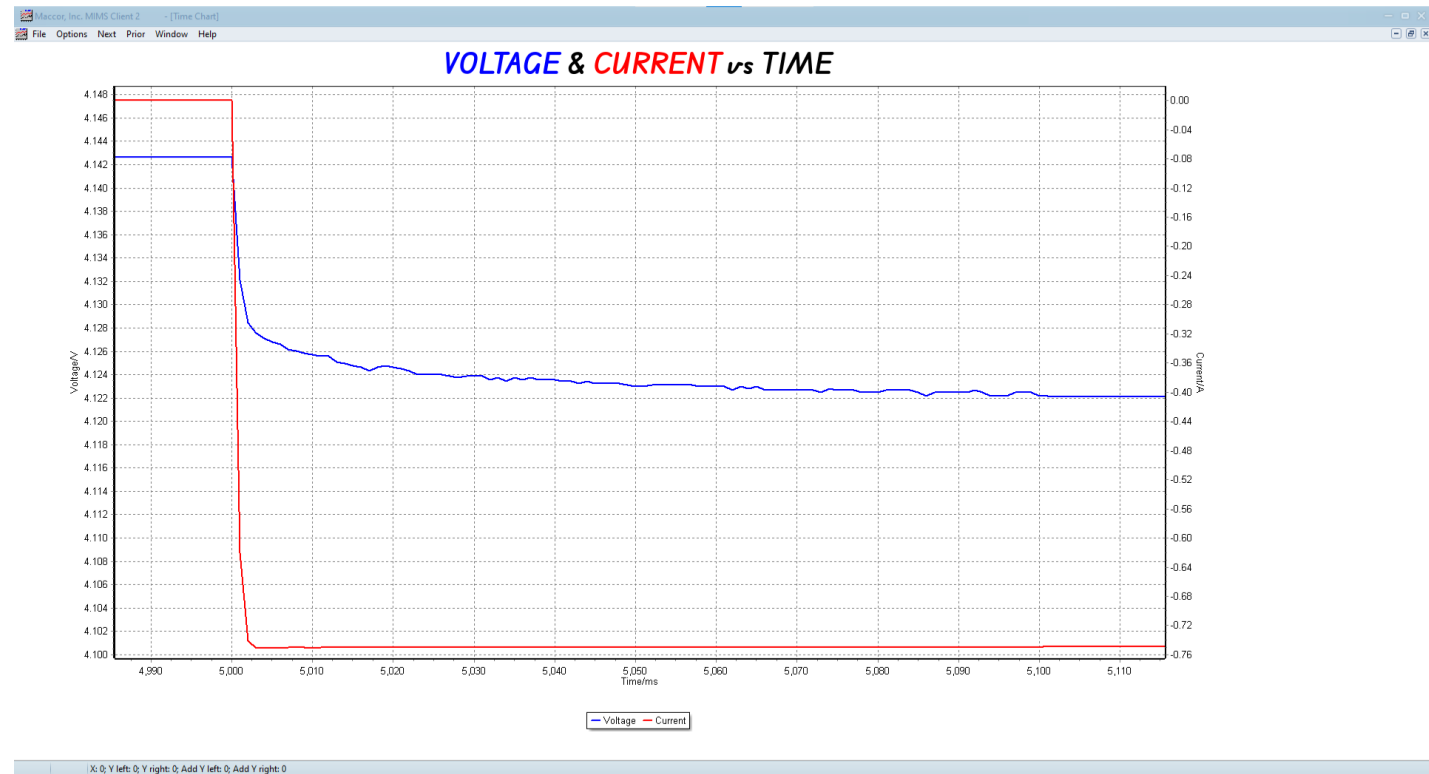
Typical Discharge Curve



Series 6000 Scope Trace

Typical Discharge Curve

Data collected every mS

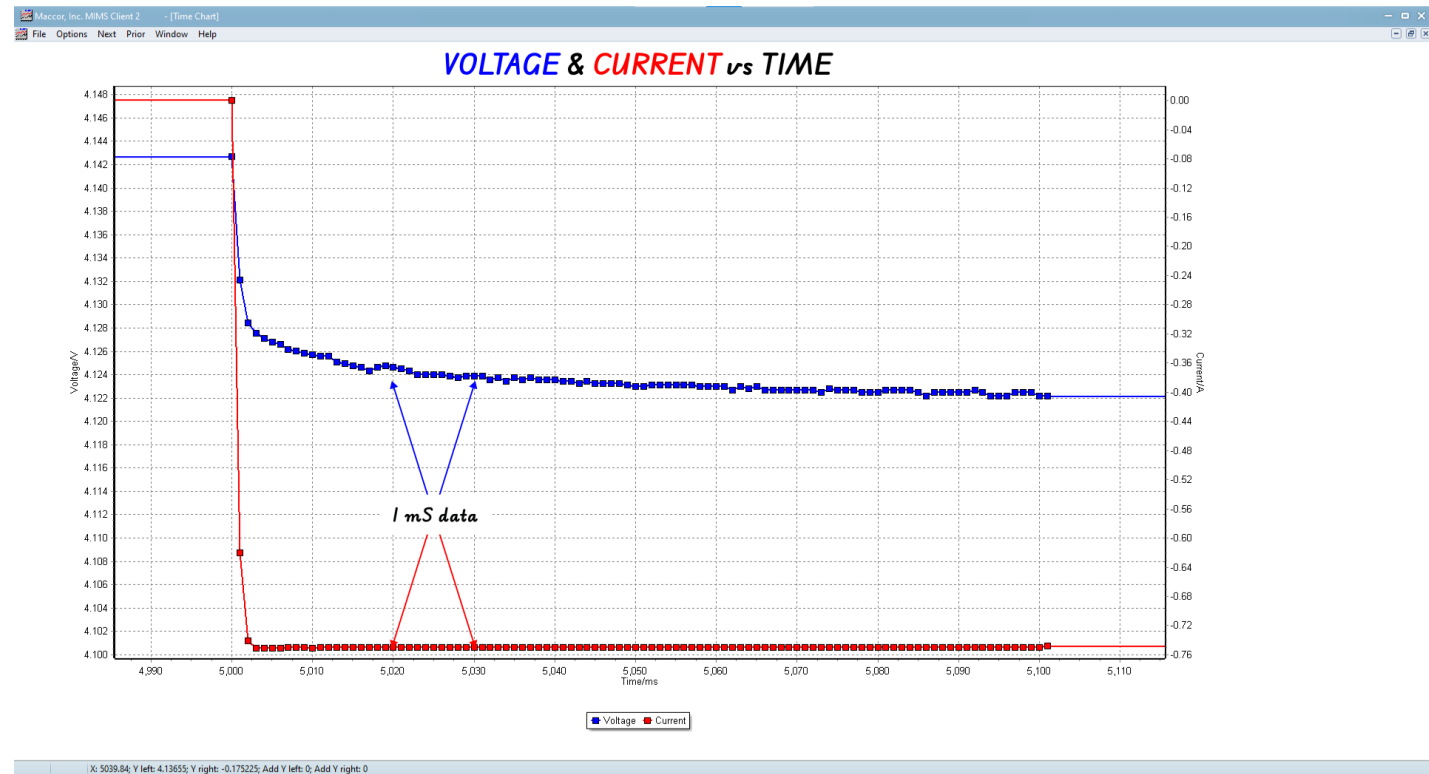


Series 6000 Scope Trace

Typical Discharge Curve

Data collected every mS

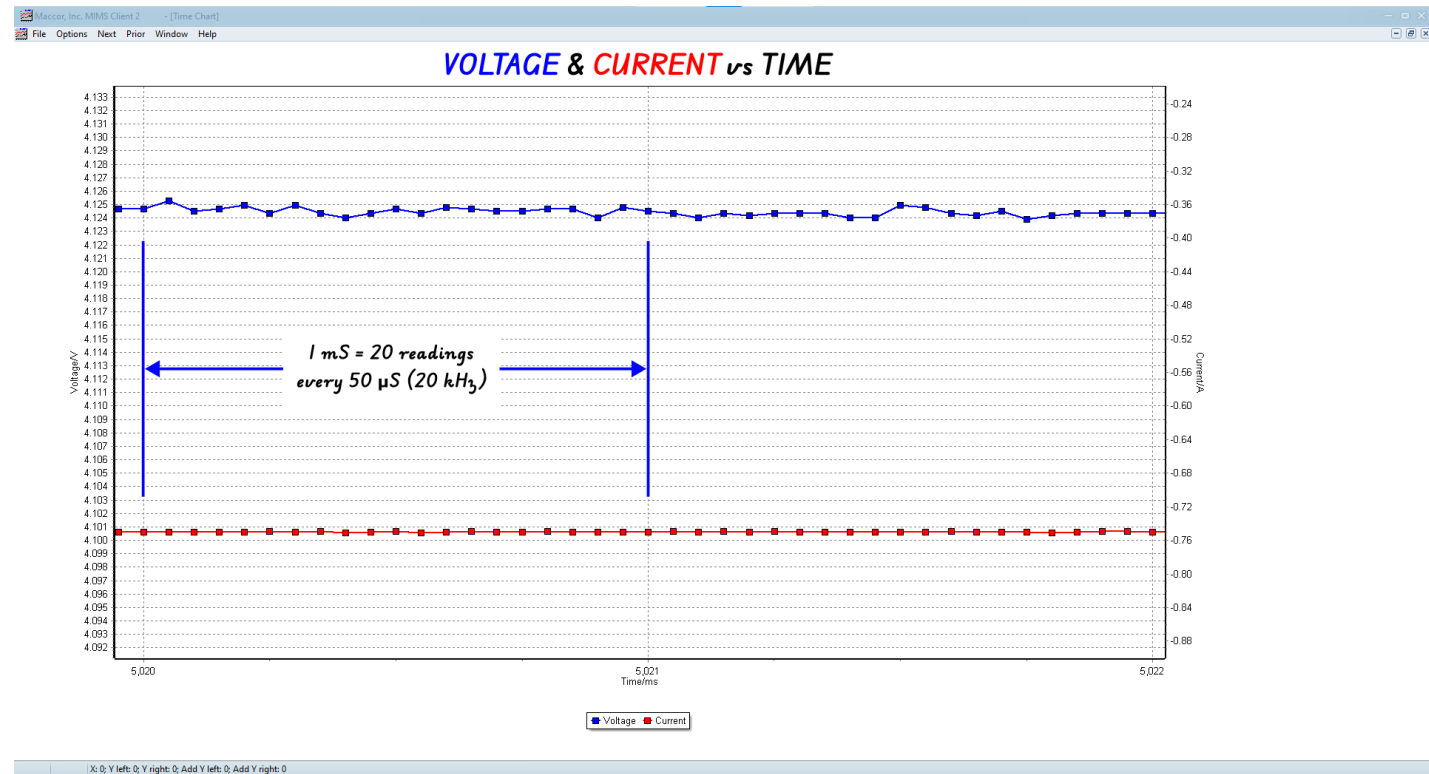
With Data markers



Series 6000 Scope Trace

Typical Discharge Curve

Zoom in to see Voltage and Current every 50 μ S!



Questions?



Please come by our booth

Thank You

MACCOR

BATTERY & CELL TEST EQUIPMENT WORLDWIDE

**Prepared by:
Mike Sandoval
Vice President Business
Development**

