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Laboratory Battery Testing System For Module Applications upto 60V

Product Description

Arbin's Laboratory Battery Testing (LBT) series offer industry-leading hardware with high-precision measurements and high-frequency data sampling. Software flexibility gives users full control over the system to handle even the most complex research experiments or real-world test applications. Technology engineered for LBT was commercialized from a successful ARPA-E project for which Arbin and its industry partners Sandia Nat'l Lab and Ford won an R&D 100 award. Arbin's LBT provides **true bipolar circuitry** to ensure cross-zero linearity with no switching time between charge and discharge. We invite battery researchers and engineers to compare our I/V control performance and see for themselves why it is trusted around the world more than any other tester.

Product Highlights

- Each channel provides three or four current ranges with industry-leading 0.02% accuracy.
- Powerful embedded controllers provide ultra-fast data logging (up to 2000pts/sec, per system).
- Easily simulate custom EV drive profiles or stationary grid storage profiles without complicated scripts.
- **Fully parallelable** so any number of channels can be connected to increase the current handling capability.
- Dynamic data acquisition based on changes in time, voltage, and current to capture more data when it's needed and maintain efficient file sizes.
- Full set of **auxiliary options** for cell monitoring, temperature monitoring, environmental chamber control, and more.

Primary Applications

- Module and Pack Life Cycle Testing
- Simulate Dynamic Real World Test Profiles
- Test & Qualify Battery Management System (BMS) via CANBus
- Smart Battery Testing via SMBus









Stana	ara moaeis
LBT	25V - 10A
LBT	25V - 20A
LBT	25V - 50A
LBT	25V - 100A
LBT	40V - 20A
LBT	40V - 75A
LBT	40V - 150A
LBT	60V - 15A
LBT	60V - 50A
LBT	60V - 100A
Bipolar Circuitry	2000 pts/s Data Logging
Custom Simulation	Fully Parallelable
User-Friendly	Redundant Real-Time

"We did side-by-side comparisons of Arbin and other tester technology. Armed with this data, we moved forward with confidence using Arbin for what is critical to our electrification future [EV]."

— T. Miller, Ford Motors

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Experts in Test Instrumentation



We re-defined what comprises state-of-the-art test equipment is during our **3-year ARPA-E project** with **Ford Motors** and **Sandia National Laboratories**. We use premium reference meters and shunts representing the global standard for metrology. Arbin has all the tools necessary to develop testing circuits beyond the old industry standards, and under a wide range of environmental conditions. This allows

us to have a proper understanding of instrument performance and deliver the best possible product to our customers around the world.

"Arbin testers generate high confidence data you can rely on, and provide the most comprehensively safe testing environment."

How We Treat Safety as Top Priority:

- Each system has a fully redundant microcontroller dedicated to monitoring internal communication, and voltage - current safety limits.
- Testing schedules utilize global safety limits for voltage, current, power, and temperature (if auxiliary is present).
- Logic-driven scheduling interface allows for additional safety layers based on real-time measurements and external inputs such temperature, current, or voltage measurements.
- All test equipment has multiple failsafe's of internal fusing and overtemperature control measures.
- Communicate with internal battery management system (BMS) via SMBus, CANBus, or other protocol. Verify smart circuitry readings and functionality.
- Current Voltage control automatically adjusts for changing internal re-
- sistance to always maintain safe control of the charge/discharge regime.
- Optionally interface control with most 3rd party temperature chambers.





3-year ARPA-E project to Develop a true high precision testing system for currents up to 200A! We scaled down technology for low current applications.



Arbin + leading industry partners: Ford Motors, Sandia National Laboratories, and Montana Tech completed ARPA-E, high-precision tester project.



Technology learned during this project has revolutionized Arbin's products, which has resulted in the **highest precision testers** commercially available on the market.

"High precision measurements are not the only answer to understanding battery life, but it is a key component. Sandia National Lab brings their expertise in metrology and precision measurements and has helped Arbin as they've designed the new series of testers."

— S. Ferreira, Sandia



Cell Voltage

Measurement

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Available Auxiliary Options

Select from the options below to expand the capability of your LBT system.

 Monitoring
 Aux Voltage
 within a module or pack.

 Temperature
 Thermocouple or Thermist

<u></u>

Thermocouple or Thermistor inputs used to record temperature as well as be used control the test schedule.

CAN Config File Windows CANConfi

This option adds auxiliary voltage measurement inputs to monitor cells

CANBus / SMBus



Aux Temperature

> The CANBus and SMBus options allow the Arbin system to communicate with a battery management system inside a module or pack. It will both send and receive CAN and SMBus messages to the device under test. There are no 3rd party DLL packages or licenses required.

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	Meta Variable Name	Nick Name	CAN Message ID	DLC of CAN Message	E
52	CAN_MV_RX52	mod_volt_04_detect_chann	0x361	7	Li
53	CAN_MV_RX53	mod_volt_03_sensor_open	0x361	7	Li
54	CAN_MV_RX54	mod_volt_03_detect_chann	0x361	7	Li
55	CAN_MV_RX55	mod_volt_02_sensor_open	0x361	7	Li
56	CAN_MV_RX56	mod_volt_02_detect_chann	0x361	7	Li
57	CAN_MV_RX57	mod_volt_01_sensor_open	0x361	7	Li
58	CAN_MV_RX58	mod_volt_01_detect_chann	0x361	7	Li
59	CAN_MV_RX59	max_voltage_charge	0x231	8	Li
60	CAN_MV_RX60	min_voltage_discharge	0x231	8	Li
61	CAN_MV_RX61	max_current_charge	0x231	8	Li
62	CAN_MV_RX62	max_current_discharge	0x231	8	Li
63	CAN_MV_RX63	max_charge_power	0x231	8	Li
64	CAN_MV_RX64	max_discharge_power	0x231	8	LÌ
65	CAN_MV_RX65	Min_module_voltage	0x231	8	Li
66	CAN_MV_RX66	Max_module_voltage	0x231	8	Li
					-

CAN Signal Configuration

3rd Party Chamber Interface



Interface with a 3rd party temperature chamber so Arbin software can turn chamber on/off and adjust temperature.



UPS



Uninterrupted power supply for PC so tests can resume automatically after brief power outages.

Digital & Analog Input/Output



Analog I/O Digital I/O A

Digital: Send and receive a simple on/off signal to interact with external devices.





Software Suite

- Cycle a battery until discharge capacity is 80% of nominal
- Parallel any number of channels together
- Over 90+ meta variables to select from in addition to numeric values
- User-defined variables using data from active test New Feature
- Results stored in SQL database for robust storage solution
- Automatically export data into Excel or CSV format for easy reporting
- Plot data in real-time to see what is happening

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Interface control with 3rd part chambers and other hardware

"Arbin software gives the user complete control over the voltage / current charge-discharge functionality of the tester."



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Hardware Specifications

Model Name	Channel Voltage Range	Channel Current Ranges (±)	Max Continuous Channel Power
LBT22043 25V - 10A	0V to 25V	10A / 1A / 100mA	250W
LBT22043 25V - 20A	0V to 25V	20A / 2A / 100mA	500W
LBT22023 25V - 50A	OV to 25V	50A / 5A / 100mA	1250W
LBT22013 25V - 100A	OV to 25V	100A / 10A / 1A	2500W

	Specification	LBT22043 25V - 10A LBT22043 25V - 20A	
	Measurement Resolution	<0.8mV (16-bit)	< 0.8mV (16-bit)
Voltage	Precision	< 100ppm (0.01%)	< 100ppm (0.01%)
vonago	Control Accuracy	< 0.02%	< 0.02%
	Input Impedance	4M Ohm	4M Ohm
	Noise Free Resolution	16-bit	16-bit
	Precision	< 100ppm	< 100ppm
Current	Control Accuracy (0.02% FSR)	10A Range < 4mA 1A Range < 0.4mA 100mA Range < 0.04mA	20A Range < 8mA 2A Range < 0.8mA 100mA Range < 0.04mA
	Rise Time	<1 ms Time required for current output to get from 10-90% of setpoint value	<1ms Time required for current output to get from 10-90% of setpoint value
	Minimum Step Time		5mS
Time	Data Logging Rate	2000 points per	second, per system
	Measurement Precision	1	00µS
Bipolar Linear Circuit Type		Allows cross-zero linearity and no switching time between charge & discharge	
	Connection for PC	TCP/IP	(Ethernet)
	Ventilation Method	Air cooled, variable speed fans	



Hardware Specifications

Model Name	Channel Voltage Range	Channel Current Ranges (±)	Max Continuous Channel Power
LBT22043 25V - 10A	0V to 25V	10A / 1A / 100mA	250W
LBT22043 25V - 20A	0V to 25V	20A / 2A / 100mA	500W
LBT22023 25V - 50A	0V to 25V	50A / 5A / 100mA	1250W
LBT22013 25V - 100A	0V to 25V	100A / 10A / 1A	2500W

	Specification	LBT22023 25V - 50A	LBT22013 25V - 100A	
	Measurement Resolution	<0.8mV (16-bit)	< 0.8mV (16-bit)	
Voltage	Precision	< 100ppm (0.01%)	< 100ppm (0.01%)	
volidge	Control Accuracy	< 0.02%	< 0.02%	
	Input Impedance	4M Ohm	4M Ohm	
	Noise Free Resolution	16-bit	16-bit	
	Precision	< 100ppm	< 100ppm	
Current	Control Accuracy (0.02% FSR)	50A Range < 20mA 5A Range < 2mA 100mA Range < 0.04mA	100A Range < 40mA 10A Range < 4mA 1A Range < 0.4mA	
	Rise Time	<1 ms Time required for current output to get from 10-90% of setpoint value	<1 ms Time required for current output to get from 10-90% of setpoint value	
	Minimum Step Time		5mS	
Time	Data Logging Rate	2000 points per	second, per system	
	Measurement Precision	1	00µS	
Bipolar Linear Circuit Type		Allows cross-zero linearity and no switching time between charge & discharge		
	Connection for PC TCP/IP (Ethernet)		(Ethernet)	
	Ventilation Method	Air cooled, variable speed fans		



Hardware Specifications

Model Name	Channel Voltage Range	Channel Current Ranges (±)	Max Continuous Channel Power
LBT22023 40V - 20A	0V to 40V	20A / 2A / 100mA	800W
LBT22013 40V - 75A	0V to 40V	75A / 15A / 1A	3kW
LBT22013 40V - 150A	OV to 40V	150A / 75A / 15A / 1A	6kW

Sp	pecification	LBT22023 40V - 20A	LBT22013 40V - 75A	LBT22013 40V - 150A
	Measurement Resolution	~1mV (16-bit)	~1mV (16-bit)	~1mV (16-bit)
Voltage	Precision	< 100ppm (0.01%)	< 100ppm (0.01%)	< 100ppm (0.01%)
	Control Accuracy	< 0.02%	< 0.02%	< 0.02%
	Input Impedance	4M Ohm	4M Ohm	4M Ohm
	Noise Free Resolution	16-bit	16-bit	16-bit
	Precision	< 100ppm	< 100ppm	< 100ppm
Current	Control Accuracy (0.02% FSR)	20A Range < 8mA 2A Range < 0.8mA 100mA Range < 0.04mA	75A Range< 30mA	150A Range < 60mA
	Rise Time	<1ms Time required for current output to get from 10-90% of setpoint value	<1ms Time required for current output to get from 10-90% of setpoint value	<2ms Time required for current output to get from 10-90% of setpoint value
	Minimum Step Time	5mS		
Time	Data Logging Rate	2000 points per second, per system		tem
	Measurement Precision	100µS		
	Bipolar Linea	ar Linear Circuit Type Allows cross-zero linearity and no switching time between charge & discharge		y and no switching time ge & discharge
	Connecti	on for PC	TCP/IP (E	Ethernet)
Ventilation Method Air cooled, variable speed fans		able speed fans		



Hardware Specifications

Model Name	Channel Voltage Range	Channel Current Ranges (±)	Max Continuous Channel Power
LBT22023 60V - 15A	OV to 60V	15A / 2A / 100mA	900W
LBT22013 60V - 50A	0V to 60V	50A / 10A / 1A	3kW
LBT22013 60V - 100A	0V to 60V	100A / 50A / 10A / 1A	6kW

Sp	pecification	LBT22023 60V - 15A	LBT22013 60V - 50A	LBT22013 60V - 100A
	Measurement Resolution	< 2mV (16-bit)	< 2mV (16-bit)	< 2mV (16-bit)
Voltage	Precision	< 100ppm (0.01%)	< 100ppm (0.01%)	< 100ppm (0.01%)
	Control Accuracy	< 0.02%	< 0.02%	< 0.02%
	Input Impedance	4M Ohm	4M Ohm	4M Ohm
	Noise Free Resolution	16-bit	16-bit	16-bit
	Precision	< 100ppm	< 100ppm	< 100ppm
Current	Control Accuracy (0.02% FSR)	15A Range < 6mA 2A Range < 0.8mA 100mA Range < 0.04mA	50A Range< 30mA	100A Range< 40mA
	Rise Time	<1ms Time required for current output to get from 10-90% of setpoint value	<1ms Time required for current output to get from 10-90% of setpoint value	<2ms Time required for current output to get from 10-90% of setpoint value
	Minimum Step Time	5mS		
Time	Data Logging Rate	2000 points per second, per system		tem
	Measurement Precision	100µS		
	Bipolar Linea	Bipolar Linear Circuit Type Allows cross-zero linearity and no switching time between charge & discharge		y and no switching time ge & discharge
	Connecti	on for PC	TCP/IP (E	Ethernet)
Ventilation Method Air cooled, variable speed fans		able speed fans		



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Chassis Sizes

Multiple chassis sizes are available ranging from small benchtop units up to large wheeled chassis.



Training & Support

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Arbin's knowledgeable customer service team is wellknown throughout the industry for their responsiveness and dedication. Application engineers are always available by phone or email, and with equipment running in over 50 countries, Arbin has experienced support technicians nearby to help install equipment, answer questions, and provide any maintenance

that may be necessary over the life of your system. Additionally, our expansive library of video tutorials make it easy for novice users to learn or experienced users to refresh their knowledge at any time.



2 Year Standard Warranty
Arbin Headquarters College Station, Texas USA
Worldwide Locations Canada China Germany Hong Kong Korea Taiwan
Representatives Australia Brazil France India Israel Italy Japan Singapore Spain Thailand Turkey UAE United Kingdom

"With Arbin, you can see minute changes in the battery and this gives researchers better predictability of when the end of life will occur in a reduced amount of time."

— J. Novak, Sandia