

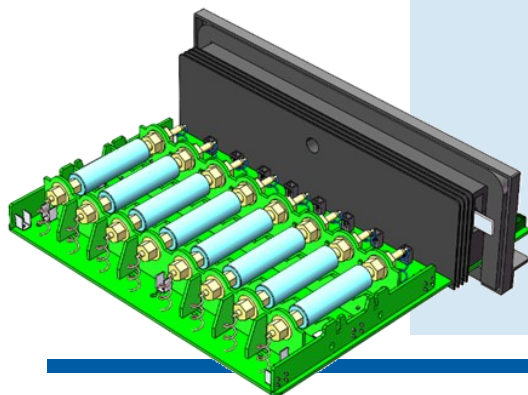
Parallel Differential Battery Testing

PDBT Benchtop Series



Key Features

- ✓ **High Precision and Resolution:** Offers industry-leading 24-bit resolution with 150ppm measurement accuracy for detailed and accurate data collection.
- ✓ **Fast Self-Discharge Measurement:** Reduces measurement time significantly by using a novel approach to self-discharge current measurement (SDCM) in a parallel setup.
- ✓ **Auto Equalization:** Ensures all cells start at the same voltage through automatic pre-charge/discharge before tests begin.
- ✓ **True Battery Paralleling:** Enables direct comparison by physically paralleling multiple batteries, allowing for more intuitive analysis of performance discrepancies.
- ✓ **Integrated Temperature Control:** Includes a built-in chamber for precise temperature management, ensuring stable testing conditions across all cells.



Redefining Battery Comparison

The Arbin Parallel Differential Battery Testing (PDBT) system introduces an innovative solution for advanced battery testing and comparison. Designed to parallel multiple batteries rather than channels, it enables more accurate and intuitive analysis of cell performance discrepancies.

The system improves test efficiency by applying uniform voltage to all cells, enhancing data precision and accelerating processes like Self-Discharge Current Measurement (SDCM). With versatile configurations, precision measurement, and integrated environmental control, PDBT caters to research and industrial needs for reliable and faster battery evaluations.

Standard Configuration

Voltage Range	0 to 5V
Current Range	5A/1A/10mA/1mA
Tray Option 1	Cylindrical (18650/21700)
Tray Option 2	Coin Cell



System Information

Application Focus

System Characteristics	
Channels per Module	8
Channels per Chassis	8
Current Ranges per Channel	4
Channel Parallel	Up to 40 A
Current Rise Time	<100 μ s
Control & Measurement Specifications	
Accuracy	$\pm 0.02\%$ FSR
Precision	$\pm 0.015\%$ FSR
Measurement Resolution	24 Bit
Control Resolution	16 Bit
Time Resolution	100 μ s
Data Acquisition Rate	Up to 1 kHz
MZTC Chamber Specifications	
Chamber Zone Qty	1 zone with 8 cell fixtures
Temperature Range	[Ambient-10 $^{\circ}$ C] to 60 $^{\circ}$ C
Temperature Uniformity	$\pm 1.5^{\circ}$ C
Temperature Control Stability	$\pm 0.5^{\circ}$ C
Chassis Specifications	
Cooling	Air-cooled with built-in variable speed fans
Input Power	110V1P – 240V1P
Chassis Size	Width: 16" (407 mm) Depth: 17" (432 mm) Height: 16" (407 mm)



Facility integration to interface with temperature chambers, test facilities, or other third party systems.



Data Sampling and Logging: Powerful embedded controllers provide ultra-fast data sampling and logging.



Comprehensive safety features for lithium-ion battery testing.



Cell-level Quality Control & Grading



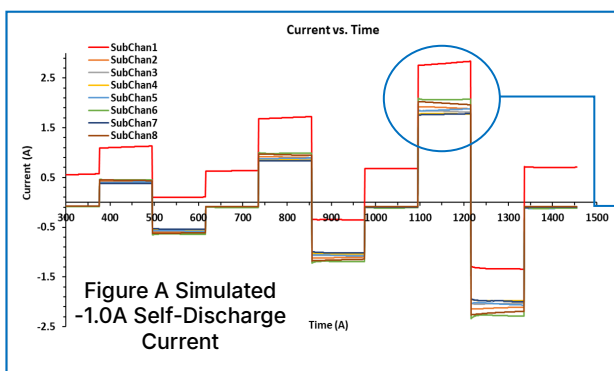
Faster Self-Discharge Current Measurement



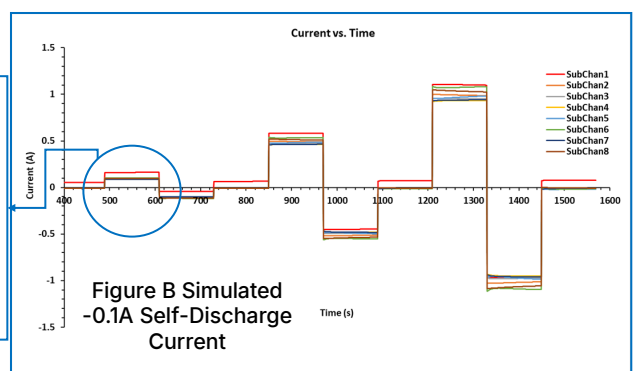
Validate formation procedure for Arbin's formation solution

Showcasing the Power of Parallel: Instant Detection of Abnormal Cell Behavior

Among the eight paralleled sub-channels, SubCH1 was superimposed with an additional -1 A and -0.1 A (Figures A and B) to simulate elevated self-discharge. As shown, SubCH1 (red trace) consistently deviates from nominal current behavior across all charge and discharge conditions, demonstrating the effectiveness of real-time anomaly detection enabled by the parallel monitoring structure. This capability enhances battery safety by helping prevent thermal runaway and ensuring reliable performance.



The **Red** line is the battery with simulated -0.1 A and -1.0 A Self-Discharge current.



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