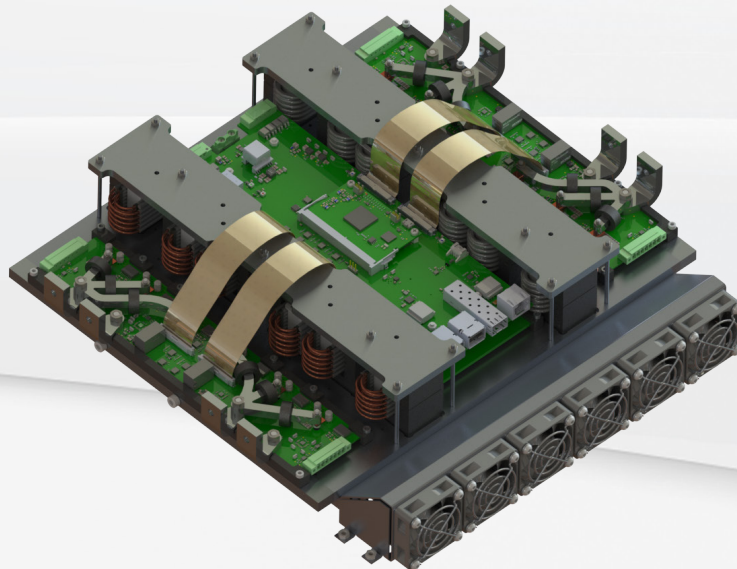


# CELL FORMATION

## BAT350

High Power Battery Cell Formation Channels



### High Current Rapid Formation System

UNICO's high current cell formation channels are a cost-effective way to achieve the necessary currents for rapid formation in a package that is ready for integration into a cell manufacturing line. The fully regenerative channels provide clean and efficient power for charging and recover energy during discharging. Pulse formation charging can also be achieved due to the FPGA-controlled SiC power stages with, full current pulses as short as 1ms.

# NEXT GEN CELL FORMATION



Performance



Reliability



Efficiency



Flexibility



Value



Compact

## BENEFITS



### FLEXIBLE OUTPUT AND CONTROL

#### Flexible, Isolated DC Outputs

- 4-Channel, 0-5VDC at the Cell
- Built-in charge and discharge profile storage
- $\pm 100A$  or  $\pm 300A$  per channel



### FLEXIBLE POWER INPUT

#### Common AC or DC Bus

- 400-850VDC
- 380-480VAC (future)



### EXTREME EFFICIENCY

#### Significant Energy Savings for Formation

- Better than 95% efficiency
- Fully bi-directional for energy efficient formation



### ULTRA COMPACT PERFORMANCE

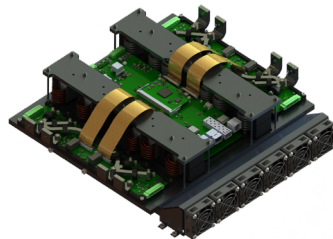
#### Flexible Integration into Formation Lines

- Up to 12kW/L power density
- High performance, interleaved SIC power stages for low output ripple
- Air or water cooled with same design

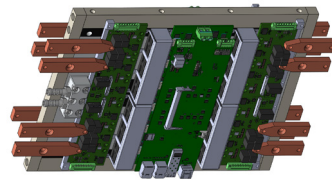
# CELL FORMATION WITH IDAC - BAT350 SERIES

The BAT350 Series of IDAC cell formation based on UNICO IDAC technology brings a new level of performance, compactness, flexibility, and value to the formation market. The universal power board can be either air or water cooled and utilizes high-performance SiC technology switching up to 1MHz, utilizing FPGA control. Four-channel versions will be available at launch utilizing a simple REST API control architecture for running formation processes which are stored in the device.

## FLEXIBLE COOLING METHODS



Air Cooled Example  
(1) BAT350



Water Cooled  
(2) BAT350's with a shared Heatsink

## BAT350 CORE TECHNOLOGY - UNICO IDAC

ULTRA COMPACT AND EFFICIENT POWER CONVERSION

Wide range of input options (Examples):

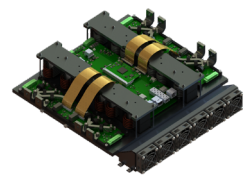
- 120VAC
- 240VAC
- 480VAC
- 400VDC
- 800VDC



Wide range of output options (Examples):

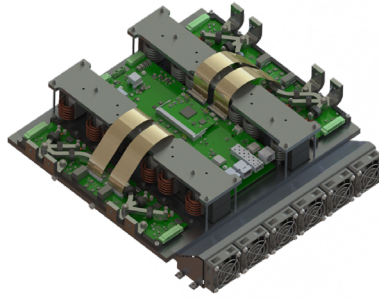
- 0-10VDC
- 0-100VDC
- 0-400VDC
- 0-1000VDC

Multiple outputs also available  
(1) 0-1000VDC + (1) 0-60VDC  
(800V OBC + 48VDC DC/DC)



IDAC Cell Channel  
for formation

The BAT350 has an incredibly small size that allows integrators to mount the complete power electronics - input power conversion, isolation, DC output control - extremely close to the cell. Its high efficiency of better than 95% and complete bi-directional charging and discharging provide a new level of energy efficiency in the Gigafactory.



Target Specifications	
Input Voltage:	400-850VDC or 380VAC-480VAC +/-10%, 50/60Hz (future)
Separate Control Voltage:	24VDC
Output Voltage:	0-5VDC at the Cell
Output Current:	±100A or ±300A
Output Power:	600W for 100A or 1500W for 300A per Channel
# of Output Channels:	4
Efficiency:	Better than 95% Fully Regenerative
Minimum Current Accuracy:	Better than 1% FS (±3A)
Target Current Accuracy:	Better than 0.1% FS (±0.3A or ±300mA)
Minimum Voltage Accuracy:	Better than 0.1% FS (±0.01V or ±10mV)
Target Voltage Accuracy:	Better than 0.01% FS (±0.001V or ±1mV)
Control Modes:	CC, CV, CP + Limits & Safeties
Cooling:	Air or Water
Remote Voltage Sense:	Yes
Charge/Discharge Profile Storage:	Yes
Pulse Charging/Discharging Capable:	Yes
External Contactor Control:	Yes, 1 contactor per channel
Internal Temperature Measurement:	Power Circuits & Power Terminals
External Temperature Measurement:	Yes, 1 thermistor per channel
Control Protocol:	REST API over Ethernet
Visual Feedback:	Basic LED Status Feedback



Specifications are subject to change without notice

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