



Introduction

Supercapacitors are different!

- Whether you call them “supercapacitors,” “ultra-capacitors,” or “EDLC” caps, these devices have max capacities well into the thousands of ***Farads***.
- No dielectric! Supercaps are based on a carbon (nanotube) technology which creates a very large double-layer surface area (as thin as a molecule!) with an extremely small separation between layers.
- When an electrical charge is applied to the nanotube material, a double electric field is generated which acts like a giant dielectric.
- While individual supercaps can have very high capacitance, max voltage ratings are low. This is why there is a need for *supercapacitor modules*.



Quick Look at Supercapacitors

More than a capacitor...different than a battery

- Used with or as alternative to batteries
- Not as volumetrically efficient and more expensive than batteries, but have advantages in specific applications (*Costs are coming down*)
- Can be very quickly charged/discharged many thousands of times
- Used in applications where short bursts of energy are needed
- Capacitances from 1 Farad to hundreds of Farads...or even thousands
- Voltage range: 2.3 to 2.7 for a single cell package



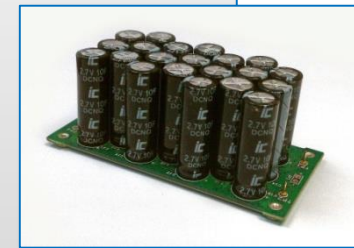
Quick Look at Supercap Modules

- Modules are primarily intended to provide very high capacity with voltage ratings higher than individual components
- May contain anywhere from two to many identical supercaps
- While standard modules are available, most production applications require some level of customization
- Modules are typically encased in a plastic or metal package, but may sometimes be contained in customer packaging
- Capacitors are configured in active or passive balanced arrays

Illinois Capacitor Supercap Modules



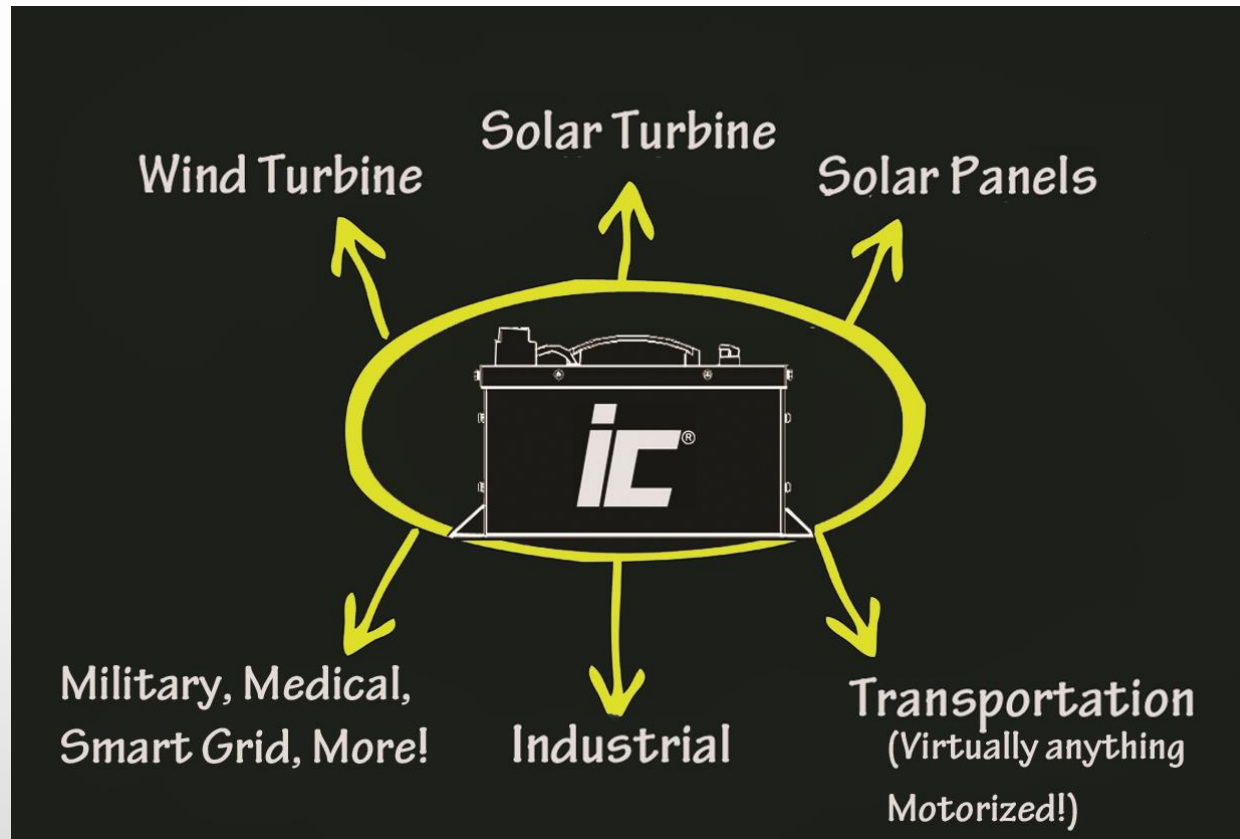
- Virtually *any* capacitance and voltage
- Built to meet customer's space and shape limits
- 500,000 charge/discharge cycles or more!
- Durable modular construction
- Open or closed style modules
- Ready-to-go solution...saves design time, cost
- Provide new design options for engineers





Where are modules being used?

For a growing number of applications, supercap modules are the technology of choice!





Application Overview

It's easy to remember major application categories. Just think I-T-E-M





Industrial



- Automation – Including robotics and other factory automation, providing power boosts and backup
- Fork lifts, cranes, electric carts – providing power boosts and backup
- Fuel cell systems
- Regenerative breaking captures energy
- UPS Systems – Faster than conventional UPS

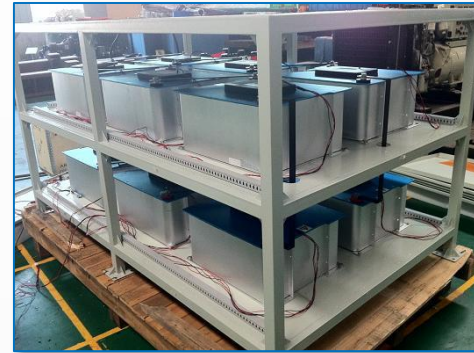




Example...

Industrial Generator Starting

- Multiple modules are used to start large commercial diesel powered generator
- 12 volt modules

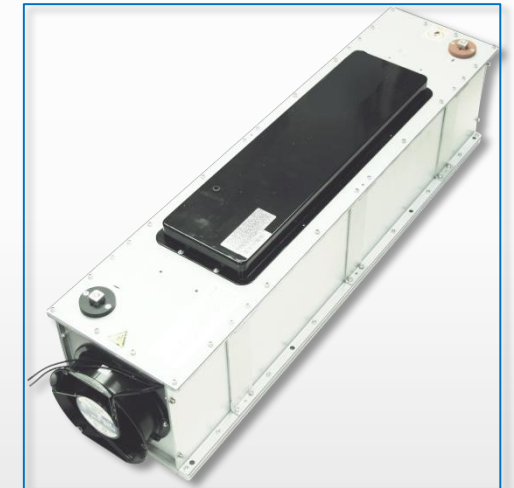


Basic Specifications	
Voltage Range	448V~672V
Working Current	298A~447A
Power	200KW; 15s
Capacitance	27.7F
Dimensions	2.02x1.96x1m

Transportation



- Battery propelled electric vehicles (BEVs)
- Hybrid electric vehicles (HEVs)
- Engine starting – auto, truck, train
- Regenerative braking/energy capture – trucks, busses, trains
- Fuel cell vehicle support – electric power output smoothing
- Trains – electric power grid stabilization



Transportation Can Take Many Forms

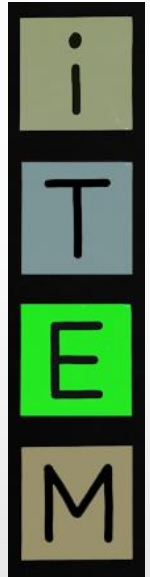


- 48V Systems for Electric Vehicles
- For fork lift trucks, in plant vehicles, golf carts, etc.
- Provides extra boost of energy to support batteries or fuel cell
- May be used for regenerative braking to capture energy otherwise lost



Basic Specifications	
Voltage	48V
Surge Voltage	50.4V
Max Charge / Discharge Current	810A
Standard Charge / Discharge Current	32.4A
Capacitance	166F
Dimensions	416x212x226mm

Green Energy



- **Wind turbine** – Prop pitch
- **Solar turbines** – Mirror power
- **Solar Panels** – Storage, smoothing
- **Wave energy converters** – Smoothing, turbine startup power (initiates startup and minimizes starting surge, regenerative braking of turbines)





Example...
**Wind Turbine
Energy Storage Application**

- 500,000 charge/discharge cycles
- Overvoltage monitoring
- Ultra low ESR
- High power
- Dual-fan air cooled
- RS or CAN output interface
- Integrated supercapacitor management system



**52 F, 129 WVDC, -40 to +60C,
Charge/Discharge current 674 A
Weight: 110 lb.**



More Applications!



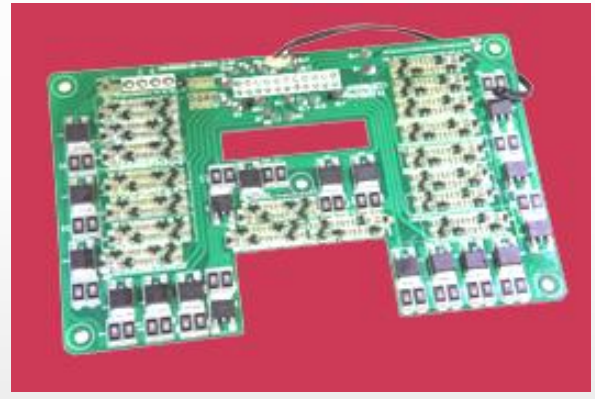
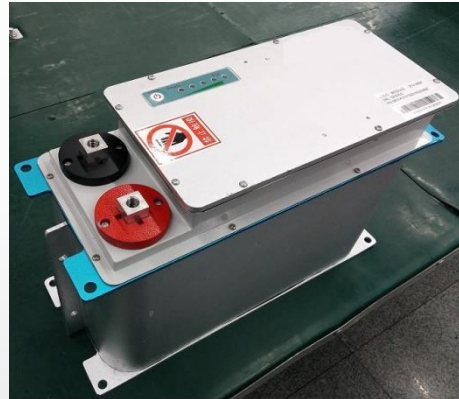
- Military – similar needs to those found in other markets, plus any military equipment that is motorized
- Medical – Non-life critical applications, such as support for motor driven diagnostic and patient mobility equipment
- Smart Grid – Power smoothing, backup, energy storage
- Commercial Cooking Equipment





Examples of Custom Modules

- Complete flexibility over electrical and mechanical specifications.

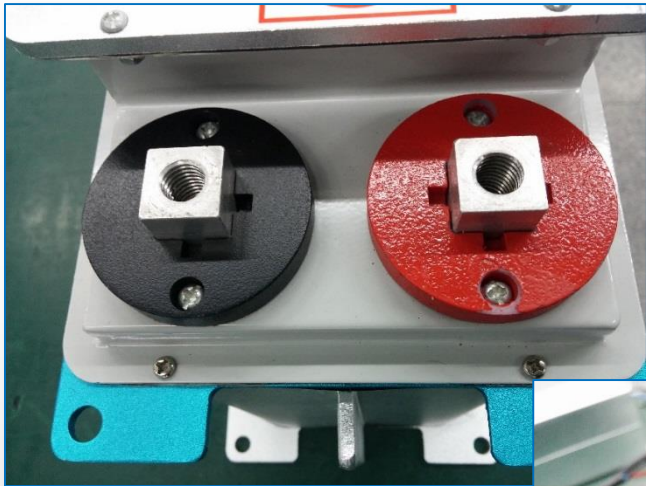


Options

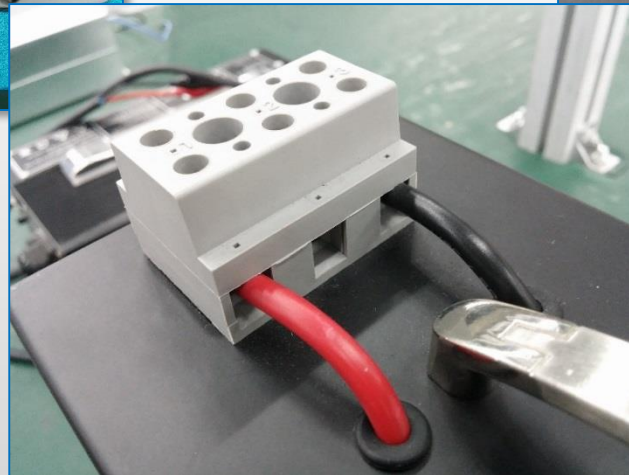
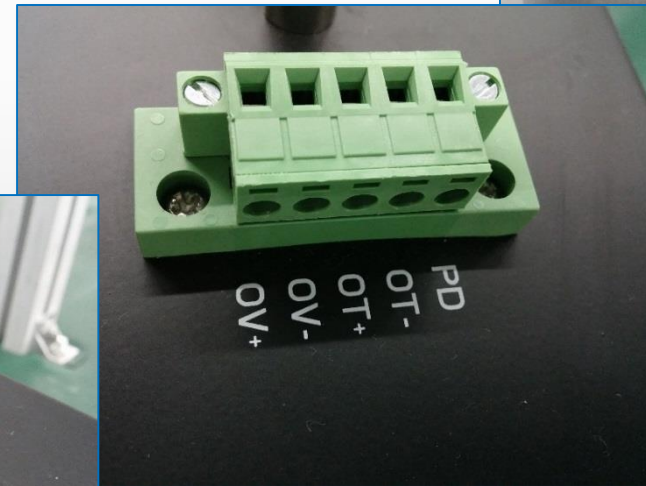
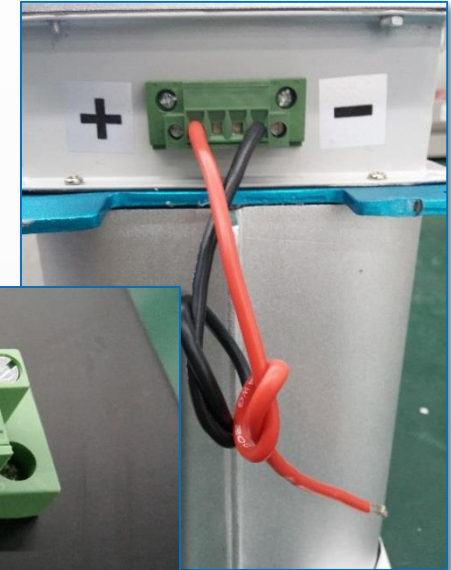
- Overvoltage protection
- Over temperature protection – user defined
- Active or passive voltage balancing
- Voltage level indication
- Safety circuits - relays/fuses
- Charging circuit – limits current
- Power booster – very custom
- DC-DC converter (bidirectional)
- Cooling and more!



Connector Examples



Many more types are available





Learn More at IllinoisCapacitor.com

- Website featuring catalog pages in PDF format and individual product specifications
- Technical assistance
- Gateway to Quote & Samples
- Net Components System- inventory locator
- Glossary

SCM
Supercapacitor Module

FEATURES Over-voltage protection

Part number: SCM 104

Electrical Specification		
Capacitance	14.5	Farads
Tolerance	+20/-20	%
VDC	60	VDC
ESR	150	mOhms MAX
ESR	200	mOhms MAX
Energy capacity	7.25	Wh
Leakage current	2	mA MAX
	-40/+60	°C

Specifications		
309x115x160		LxHxT (mm)
wires		AWG #W#W#W
Metal		
IP 54		
5		Kg

Drawing

SUPERCAPACITOR MODULE DESIGN FORM

Need a quote on a supercapacitor/EDLC module?
Fill in available information. Complete as many fields as possible.

Date:

Customer:

Address:

Contact Person:

Phone Number:

Email:

Project Name:

ILLINOIS CAPACITOR, INC.

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EDLC/Supercapacitors
Highest Capacitance Values
Aluminum Electrolytic
Wide Capacitance Range
Aluminum Polymer
High Ripple Current, Low ESR
High Freq.
Film Capacitors
Many termination choices
Power Film
For High-Demand Applications
Class X2 / AC & Motor Run
Competitor Series

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SUPERCAPACITOR (EDLC) MODULES EXPAND YOUR POWER STORAGE OPTIONS WITH GREATER CAPACITANCE AND VOLTAGE OPTIONS.

ILLINOIS CAPACITOR EDLC MODULES MULTIPLY CAPACITANCE OR VOLTAGE MAXIMUMS WITHOUT GUESSWORK OR RISK.

Choose a standard module from the table below or talk to us about creating custom modules.

- Virtually unlimited capacitance and voltage ratings by combining networked leading-edge supercaps with appropriate balancing circuitry
- Ultra-high capacitance storage with extended operating voltages
- Temperature ratings to match your needs
- Operating life up to 10 years with 500,000 cycles.
- Durable module construction
- Active or passive balancing
- Choice of termination styles

Learn more by contacting Illinois Capacitor today!
847-675-1760 SALES@ILLCAP.COM

[CLICK FOR EDLC/SUPERCAPACITOR MODULE DESIGN FORM](#)

Capacitance (F)	WVDC	Dimensions (LxHxT)	Module Number	Image
110	8.1	111x70x25	SCM2T	
10	12.5	115x24x48	SCM1	





IC Supercap Modules Solve Engineering Problems!





IC Supercap Modules Solve Engineering Problems!

