





Cornell Dubilier Power Capacitors Solutions

Capacitors for Applications in Military, Aerospace and Medical

Power Film Capacitors	Flatpack Aluminum Electrolytic Capacitors	RF Mica Capacitors	Aluminum Electrolytic Capacitors
			

FLATPACK ALUMINUM ELECTROLYTIC CAPACITORS		RF MICA CAPACITORS	
Product Offering	Markets	Product Offering	Markets
MLP - 85°C Flatpack	Military / Aerospace Difibrilators Military and Commercial Aircraft Radar Systems Shipboard Antennas	Clad Mica, Type MIN for RF, High Current	Baluns MRI Arrays RF Transmission Two Way Mobile Radios
MLS - 125°C Flatpack		Dipped Mica, Type CD, for RF Applications	
Modular Packages		SMT Mica, Type MC, for RF Applications	

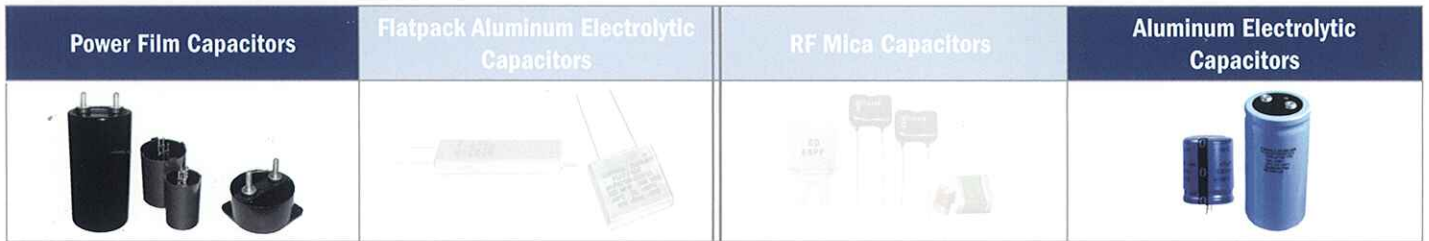
FEATURES & CAPABILITIES	
Low profile Modular packages Replace arrays of wet tantalum capacitors Stainless steel case for 125°C operation Up to 100 year life cycle Withstand altitudes greater than 80,000 ft	Established high reliability High frequency, high current High peak current Very High Q, Low ESR

COMPETITION	
None	ATC, Camel, Dielectric Labs, Samwha

QUESTIONS YOU NEED TO ASK
Flatpack Aluminum Electrolytic Capacitors
Do you have requirements for DC filter capacitors with tight space restrictions?
Do you need near hermetic seal and long life capacitors?
Are you using an array of wet tantalum capacitors?
RF Mica Capacitors
Do you use capacitors for RF, high power applications?
Do you use porcelain capacitors? Whose? What values?
Do you have requirements for high Q capacitors?
Do you have requirements for stable, high reliability capacitors?

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Capacitors for Inverter Applications



POWER FILM CAPACITORS		ALUMINUM ELECTROLYTIC CAPACITORS	
Product Offering	Markets	Product Offering	Markets
944U and 947C Bus Mount Power Film Capacitors	Renewable Energy Fuel Cell, Photovoltaic, Wind Power	Screw Terminal Capacitors DCMC...550C	Electric Transportation
UNL Board Mount Power Film Capacitors	Electric Vehicles Electric Buses, Electric Scooters, Military Tanks, Traction	Snap Mount Capacitors 380LX/381LX SLP/SLPX	Industrial Equipment Motor Drives, Semiconductor Processing Equipment, Welders
	Industrial Equipment Semiconductor Processing, Welding		Medical Lasers, MRI amplifiers, Xray
	Power Supplies & Holdup Flywheel Storage, UPS		Power Supplies & Holdup Flywheel Storage, Switch Mode Power Supplies, UPS
			Renewable Energy Fuel Cell, Solar, Wind

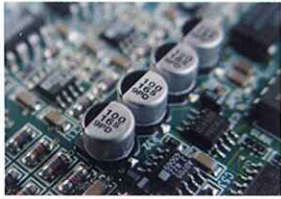
FEATURES & CAPABILITIES	
High current for DC Link: Lower cost per ampere of ripple High voltage up to 1200V DC eliminates the need for series connections and balancing resistors Standard and custom designs	High capacitance for bulk storage High ripple current capability Standard and custom designs

COMPETITION	
Arcotronics, AVX, Electronic Concepts, Electronicon, Icar, Vishay	UCC, KEMET (BHC), Rifa, Panasonic (snapmounts)

QUESTIONS YOU NEED TO ASK
Power Film Capacitors
Are you currently using film capacitors for DC Link in existing inverters?
Are you considering using film capacitors for DC Link in next generation inverter designs?
Whose capacitors are you currently evaluating for DC Link? Part Numbers? Specifications?
What capacitance values do you need? Voltage rating? Ripple current rating?
Aluminum Electrolytic Capacitors
Are you currently using screw terminal or snap in capacitors?
Any new programs/designs that will require the use of high ripple current, bulk storage capacitors?
Whose capacitors are you currently evaluating? Part Numbers? Specifications?
What capacitance values do you need? Voltage rating? Ripple current rating?

CDE AT A GLANCE

Capacitors for SMT Board Level Power Applications



Cornell Dubilier Electronics is the leading supplier of capacitors for power electronic applications, including our SMT offering for board level power requirements. Whether your application is for power conversion, telecommunications, computers, security/alarm equipment or others, with our extensive product line of aluminum electrolytic, solid polymer, film chip and mica chip capacitors, we have the right capacitor choice for your application.

SPCX and SPSX Solid Polymer Capacitors



Our solid polymer SPCX and SPSX SMT capacitors are an ideal choice for high ripple current filtering when board space is at a premium. With a low profile of 1.9mm, these capacitors pack a lot in a small package. Both the SPCX and SPSX series are ideal choices for DC/DC converters, computers, measuring equipment and industrial robots. One of our polymer chip capacitors can be used to replace two or more tantalum capacitors. If you need lower ESR and a higher ripple current, our SPSX is the series for you.

- High ripple current, 3 Amps max. at 100 kHz/+105 °C
- Ultra low ESR 9 milliohms at 100 kHz
- Low profile 1.9 mm height
- -40 °C to +105 °C operating temperatures
- Capacitance ranges from 82 µF to 470 µF

Learn more: <http://www.cde.com/catalog/smt/#spa>

MC and MCN Multilayer RF Mica Capacitors



Types MC and MCN are ideal for RF applications when other multilayer capacitors aren't recommended because of cracking. Replace two or more ceramic or porcelain capacitors with one RF mica chip capacitor.

- Extremely high Q at UHF/VHF frequencies
- Free from thermal cracking, FR4 compatible
- -55 °C to +125 °C operating temperatures
- Capacitance ranges from 0.5 pF to 2200 pF

Learn more: <http://www.cde.com/catalog/mica/#chip>



FCP Surface Mount Film Capacitors

We offer SMT film capacitors in all standard case sizes in tape and reel. The FCP series offers high capacitance density and its excellent high frequency response makes it a great choice for wireless and instrumentation applications.

- Excellent high frequency performance
- Stacked metallized polyphenylene sulfide (PPS) film.
- -55 °C to +125 °C operating temperatures
- Capacitance ranges from 100 pF to 0.22 µF

Learn more: <http://www.cde.com/catalog/smt/#film>

SMT Aluminum Electrolytic Capacitors



Our SMT aluminum electrolytic capacitors can handle all your application needs. For general purpose, our AVE and AVS series offer a great value for filter and bypass applications at 85 °C. Type AFK offers low impedance performance at a significant cost savings compared to tantalum options. If you have a high voltage application, our type AEB is for you. Offering low impedance in ratings up to 450 Vdc and long life, it is an excellent choice for power supply input and other high voltage applications. Our AVEZ capacitors are rated for 1000 hours at 105 °C with low impedance characteristics. They are ideal for high density PC board packaging.

- AEB - High voltage, low Z, long-life
- AFK - Compact, low ESR, low Z
- AVE - Low impedance, long-life
- AVEZ - Low impedance
- AVS - General purpose

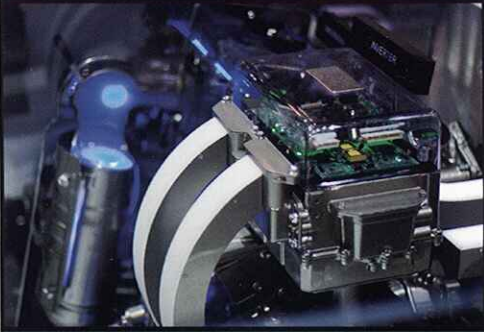
Learn more: <http://www.cde.com/catalog/alum/#smt>

Contact us for your next design:

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SMT Capacitors -
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E-mail: cdenb@cde.com

KEY MARKETS FOR CDE CAPACITORS

	SMT Aluminum Electrolytic	SMT Aluminum Polymer	SMT Film	SMT Mica
INVERTERS / CONVERTERS				
DC/DC Converters	◆	◆		◆
Brick Inverters/Converters	◆	◆		◆
COMPUTER				
Motherboards	◆	◆		◆
CPU	◆	◆		◆
LCD Monitors	◆	◆		◆
Power Supplies	◆	◆		◆
VIDEO				
Video Gaming Card	◆	◆		◆
LCD Display	◆	◆		◆
Power Supplies	◆	◆		◆
COMMUNICATIONS				
Audio Amplifiers	◆	◆	◆	
Avionics			◆	
Mobile Radios			◆	
MEDICAL				
MRI			◆	
Curettage			◆	
RF Ablation			◆	
Power Supplies	◆	◆	◆	◆

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KEY MARKETS FOR CDE ULTRACAPACITORS



RENEWABLE ENERGY

Fuel Cell	◆	◆	
Wind Turbine (Blade pitch control)	◆		◆
Solar Battery Back-up	◆	◆	
Solar Lighting	◆	◆	

TRANSPORTATION

Hybrid & Electric Vehicles	◆	◆	
Motor Drives	◆	◆	
Motor Start	◆	◆	

LIGHTING

LED and Solar Lighting	◆	◆	◆
Solar Battery Back-up	◆	◆	◆

TELECOM

Cellular Handsets			◆
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INDUSTRIAL

Cranes	◆	◆	
Loaders	◆	◆	
Forklifts	◆	◆	
Robots	◆	◆	
Welding Machines	◆	◆	

OTHER

Real Time Clock - Battery Back-up			◆
Gaming Machines			◆
Backup Power Sources			◆
AMR			◆
Toys			◆
Rechargeable Hand Tools			◆

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CDE AT A GLANCE

Ultracapacitors

Cornell Dubilier offers the most advanced ultracapacitor technology available for demanding applications in renewable energy, electric vehicles and real time clock and battery backup. With styles ranging from SMT to large cylindrical cells, CDE has the broadest array of ultracapacitors available in the industry today.

Board Mount Ultracapacitors - Type EDL



Type EDL ultracapacitors offer extremely high capacitance values (Farads) in a variety of packaging options that will satisfy low profile, surface mount, through hole and high density assembly requirements. SMT, Stacked Coin and Radial leaded styles have capacitance values ranging from .022 up to 100 Farads and voltage ranges from 2.1 to 5.5 volt.

- **Unlimited charging and discharging capability**
- **Long Life**
- **Low ESR**
- **Extend battery life up to 1.6 times**
- **Operating temperatures from -25 to +85 C**

Learn more- <http://www.cde.com/catalog/Ultracap/>

Large Cell Ultracapacitors - Type CDLC

Large ultracapacitors handle back-up and pulse power applications such as grid stabilization. They also excel in transportation applications like automotive subsystems, rail system power and utility vehicles. They provide extended power allowing critical information and functions to remain available during dips, sags, and outages in the main power source. These cells can relieve batteries of burst power functions, thereby reducing costs and maximizing space and energy efficiency. Units with axial cylindrical design enables low ESR and high peak currents with an electrostatic storage capability that can cycle a million charges and discharges without performance degradation.



- **Very Low ESR Characteristics**
- **High Power Performance**
- **Available Board Mountable, weldable or with Threaded Axial Leads**
- **Low Thermal Resistance**

Learn more- <http://www.cde.com/catalog/Ultracap/>

Hybrid Ultracapacitors - Type CDHC



CDHC Hybrid Capacitors are half ultracapacitor and half lithium ion battery. These hybrid capacitors store more than twice the energy of typical ultracapacitors and have high cycle life capability compared to batteries. Hybrid capacitors have more power than lithium ion batteries, but less energy storage. By comparison, ultracapacitors have a cycle life capability of a million cycles or more, batteries have a cycle life of around 1000 cycles and hybrid capacitors, more than 20,000 cycles. While the ultracapacitors have a usual working voltage range of 1.3 to 2.7 V, hybrid capacitors operate from 1.0 to 2.3 V. The higher energy of hybrid capacitors makes them especially suitable for use in LED lighting and emergency pulse applications, e.g. operation of electric doors and windows.

- **Rapid Charge**
- **High Cycle Life**
- **Snap mount style**

Learn more- <http://www.cde.com/catalog/Ultracap/>

ULTRACAPACITOR CAPACITANCE	<1F	<2F	<100F	100F	350F	400F	600F	3000F
SMT	♦							
Stacked Coin		♦						
Radial			♦	♦				
2 Pin, Snap-in				♦	♦	♦	♦	
Multi-pin					♦			
Large Cell, Axial, M12 threaded stud								♦
Large Cell, Axial, M6 threaded stud								♦
HYBRID CAPACITORS CAPACITANCE	220F	300F	820F	1000F				
2 Pin, Snap-in	♦	♦	♦	♦				

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CDE at a Glance

Capacitors for Inverter Applications

Cornell Dubilier Electronics excels with leading edge aluminum electrolytic and film dielectric capacitors designed to solve the unique demands presented within each of the electronic stages of power inverters. Among CDE's 35,000 worldwide customers are leading manufacturers of welders, UPS systems, motor drives, medical imaging, medical lasers, semiconductor processing and inverters for distributed/renewable power.

Power Film - DC Link



Type 947D series uses the most advanced metallized film technology for long life and high reliability in DC Link applications. This series combines high capacitance and very high ripple current capability needed for today's inverter designs for wind, solar, fuel cells, UPS systems and more.

Learn more - <http://www.cde.com/catalogs/947D.pdf>

Screw Terminal Capacitors



CDE is the industry's leading manufacturer of screw terminal aluminum electrolytic capacitors for inverter applications. Use our online Java applet tool to estimate capacitor lifetime based on operating conditions.

- DCMC Highest Capacitance
- 3186 Best Value
- 500C 95°C, Long Life
- 3188 85°C, Value, Long Life
- 520C 85°C, Inverter Grade
- 550C 105°C, Inverter Grade

Learn more - http://www.cde.com/catalog/alum/#screw_terminal

Type CDHC and CDLC Ultracapacitors



CDE's type CDLC high power ultracapacitors offer extremely high capacitance values (Farads) ranging from 100 to 3000 F. CDE's type CDHC snap mount hybrid ultracapacitors are designed for board mountable power backup applications. These hybrid capacitors charge rapidly and discharge slowly.

Learn more - <http://www.cde.com/catalog/Supercap/>

IGBT Snubber Modules



Low inductance snubbers protect IGBT modules from overvoltage transients. Choose from three styles that mount directly to single and dual IGBT modules for maximum protection.

Learn more - <http://www.cde.com/catalog/film/#igtb>

Type UNL Series - DC Filter



This series of metallized polypropylene capacitors features voltage and RMS ripple ratings extending well beyond the best aluminum snap-in capacitors. One UNL can replace up to 3 snap-in aluminums.

- Voltage ratings up to 1500 Vdc eliminating the need for serie connections
- Dry construction, no electrolyte

Learn more - <http://www.cde.com/catalogs/UNL.pdf>

Snap-In Aluminum Electrolytics



From 22 x 20mm to 50 x 105mm and 2 to 5 pin we offer the industry's widest selection of snap-ins up to 500V.

- Type SLPX 85°C, 3000 h, low cost
- Type SLP 105°C, 3000 h, low cost
- 25% smaller Types 380LQ & 381LQ
- 25% more ripple Type 381LR, 105°C
- 4 & 5 pin Types 382LX

Learn more - <http://www.cde.com/catalog/alum/#snap-in>

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POWER ELECTRONIC APPLICATIONS FOR CDE CAPACITORS

	ALUMINUM ELECTROLYTICS										DC FILM				MICA			OTHER TYPES			
	Screw Terminal - DCMC, 3186, 550C	Snap Mounts - 380LX, 381LX, SLP, SLPX	Strobe	Photoflash	MLP / MLS Flat.	Plug-In	Leaded	SMT	Aluminum Polymer	Non Polar	SMT	Leaded	Power - 947C, UNL	IGBT Snubbers	Dipped Leaded	Transmitting	Clad	SMT	AC Oils	Ultracapacitors	SCR Commutation
RENEWABLE ENERGY																					
Fuel Cell	◆	◆									◆	◆	◆								
Wind Power	◆	◆									◆	◆	◆								
Photovoltaic	◆	◆									◆	◆	◆								
MEDICAL																					
Laser	◆	◆									◆	◆	◆	◆							
MRI Gradient Amplifier	◆	◆									◆	◆	◆	◆							
Xray	◆	◆									◆	◆	◆								
ELECTRIC VEHICLES																					
Train Inverter	◆										◆	◆	◆							◆	
Train Door Opener	◆										◆	◆	◆								
Electric Scooters	◆											◆									
Electric Cars						◆	◆					◆								◆	
Military Truck and Tanks	◆	◆		◆							◆	◆	◆							◆	
POWER SUPPLIES & HOLDUP																					
UPS	◆	◆				◆					◆	◆	◆	◆					◆	◆	
SMPS		◆					◆				◆	◆									
Flywheel Storage	◆	◆									◆	◆	◆								
Battery Chargers	◆																		◆		
INDUSTRIAL EQUIPMENT																					
Welding	◆	◆									◆	◆	◆						◆		
Laser torch	◆	◆									◆	◆	◆								
Semiconductor Processing	◆	◆									◆	◆	◆								
CNC Machines	◆	◆									◆	◆	◆								
Electric Cranes	◆	◆									◆	◆	◆							◆	
Conveyors	◆	◆									◆	◆	◆								
Forklifts																				◆	
Plasma Gas Generators	◆	◆									◆	◆	◆						◆		
HVAC (AIR HANDLING)																					
Rooftop Air Conditioners	◆										◆	◆	◆						◆		
Train & Bus Air Conditioners	◆	◆									◆	◆	◆								
MOTION CONTROL																					
Elevator Drives	◆	◆									◆	◆	◆								
CNC	◆										◆	◆	◆								
Motor Drives	◆	◆									◆	◆	◆								◆

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