

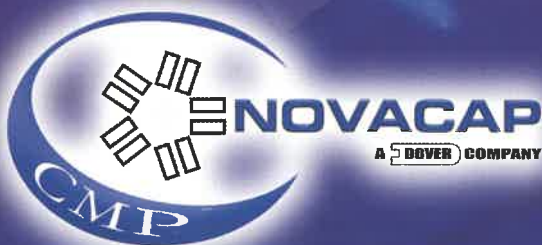
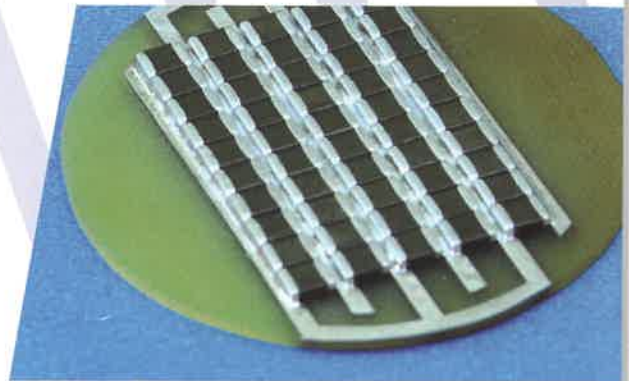
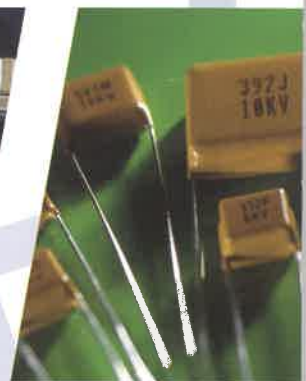
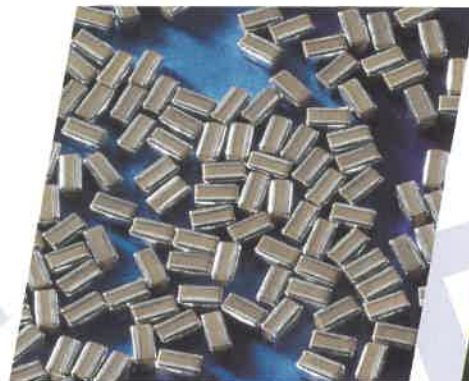
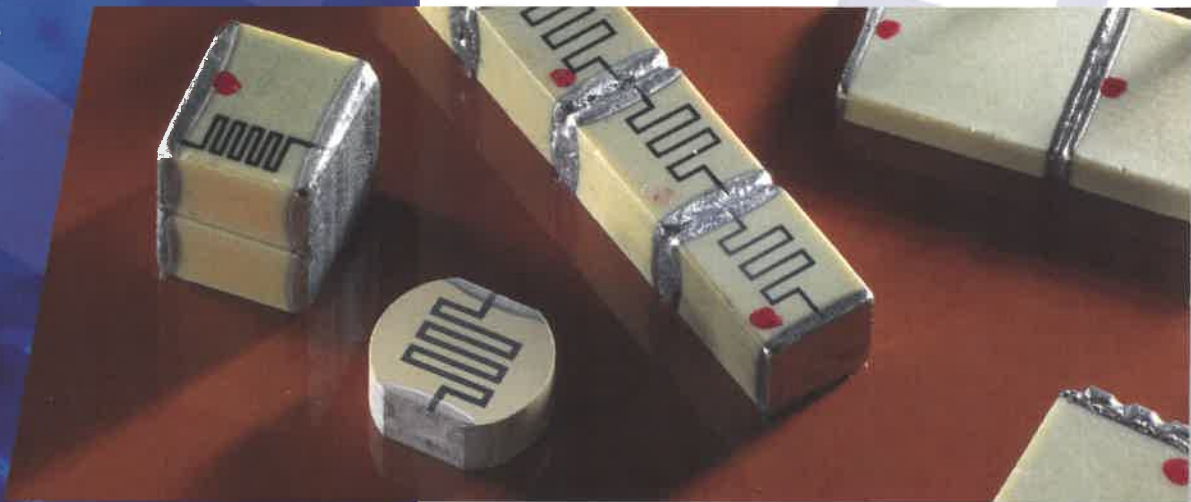
Your Premier Source for Specialty Products

Novacap is recognized as a leading supplier of specialty multilayer ceramic capacitors, differentiated by offering a wide range of high-voltage, high-reliability, high-temperature and high-energy components for specialized applications. Application specific custom chips and modules are available, operating from 1.5V to >20KV and sized from 0201 to >7560 throughout a range of material options. Modular units in series/parallel arrangements are offered.

Novacap Specialty Components takes it one step further. Our catalog is only the starting point. Our unique dielectric systems coupled with a "Can Do" attitude and a multi-disciplined engineering staff can create and manufacture capacitors and modules impossible to find off the shelf.

Have an unusual package size? We can do that. Have a non-standard capacitance/voltage requirement? We can do that. Need to take to the extremes of temperature and shock/vibration? We can do that too!

Novacap excels at application specific ceramic capacitor solutions for unique applications. We possess a full machine shop that affords the customer quick development times and lower NRE charges. We have extensive tooling and screens for a wide variety of sizes other than EIA and what is listed in this catalog. Novacap's R&D and Engineering Departments have extensive industry experience to provide a solution for your application. Please consult the factory with your specific requirements.



Specialty Products

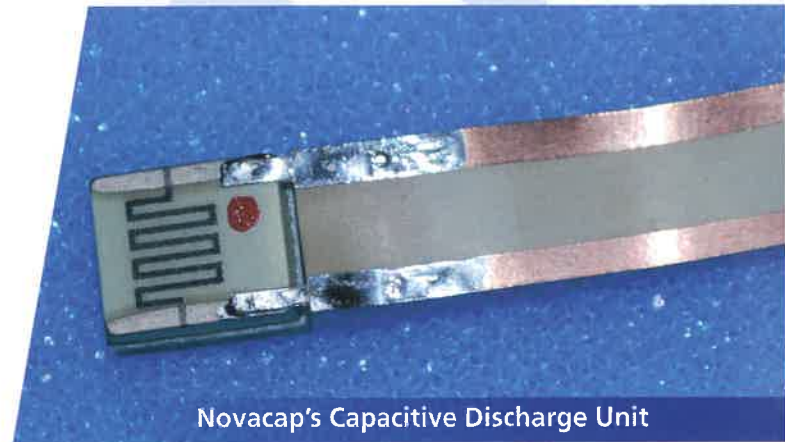
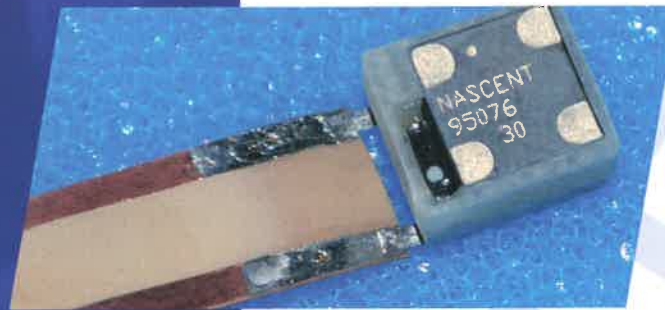
Capacitive Discharge Unit (CDU)

- Military/Aerospace
- Detonation for bombs, ordnance, rockets, weapons
- Down hole oil wells
- Perforation
- Exploration

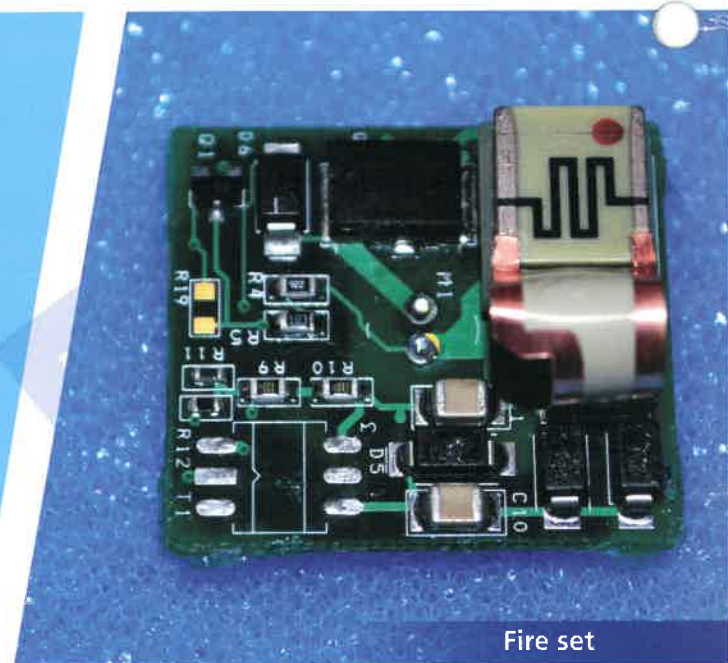
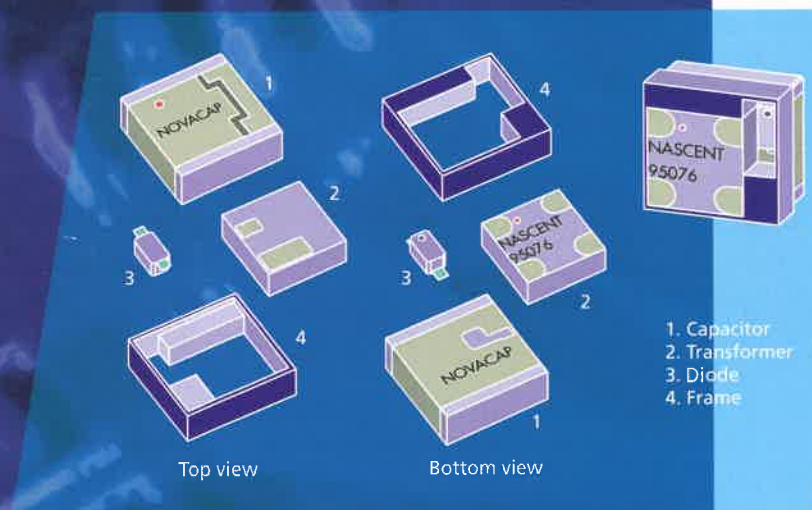
The integration of a high energy discharge capacitor, a multilayer ferrite transformer and a diode make up the CDU for Pulsed Power and Pulsed energy applications.

In fire sets, the high energy discharge capacitor is charged by a transformer. The most efficient transformer in terms of charging, small size and the ability to withstand hard target/deep penetration shock is the multilayer ferrite. By combining these components with a charge diode, making a monolithic block, integrating a printed on bleed resistor and cabling for circuit connection, a compact hard target/deep penetration module is produced.

Application for military and commercial applications exist for this technology replacing individual components which take up space and may not be the ideal choice for the application.

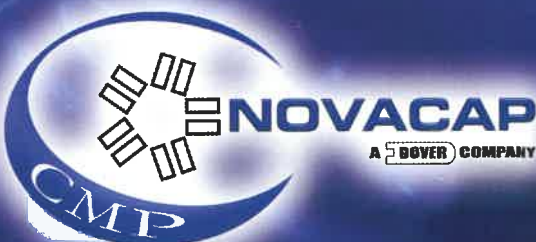


Novacap's Capacitive Discharge Unit



Fire set

**Your Premier Source
for Specialty Products**



Specialty Products

Fused Energy Modules

- Military/Aerospace
- Oil well logging
(acoustic, magnetic resonance, neutron)
- DC to AC inverters
- Rocket motors
- Lasers
- High energy delivery modules

Reliability means never fail. The problems associated with the "short" failure mode of multilayer construction ceramic capacitors and their use in parallel arrangements has been overcome with unique novel fusing to render the operation "fail open" and not "fail short" as has been the nature of this product.

High energy modules require high values of capacitance in the multiple microfarad range. Since most of these applications require high voltage to achieve the energy levels necessary for application, many capacitors are required to be arranged in a parallel network. If during application one of these capacitors should fail, the mode of failure has been short and the unit fails to continue operation.

With unique individual capacitor fusing designed to withstand the normal discharge current of operation but to open in the case of a capacitor failure, the capacitor module continues to function. By designing in sufficient capacitance determined by the MTBF, the module has excess capacitance that allows for the failure rate and operation continues for the life of the application.

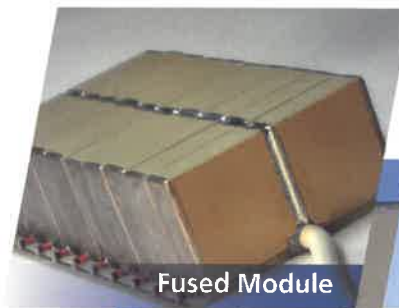
Delivered Energy (Pulsed Power/Pulsed Energy)

- Military/Aerospace
- Detonation for bombs, ordnance, rockets, weapons
- Down-hole oil wells
- Perforation
- Exploration

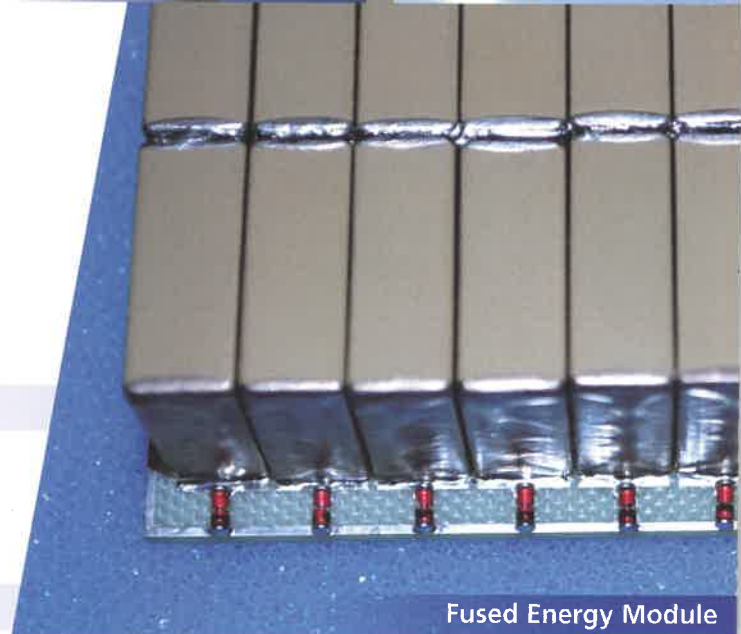
Designed with proprietary dielectric compositions this series of capacitors serve the military and commercial markets by delivering energy to exploding foil initiators, bridge wire, and other electronic detonators for weaponry and missile ignition. Operating over the temperature range of -55 to +200°C these products support military applications and oil field down-hole applications where the fast release of high energy levels are necessary for detonation or ignition.

Typical voltage ranges are from 900 VDC to 1800 VDC with some applications approaching 10,000 VDC. Most EFI and LEEFI load resistances are from .025 ohms to .250 ohms with occasional values down to .005 ohms.

Designed for hard target and deep penetration, the monolithic construction and subsequent assembly that may be required makes this product ideal for weaponry, missiles and the vibration associated with oil field application.



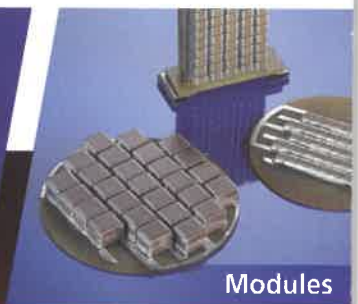
Fused Module



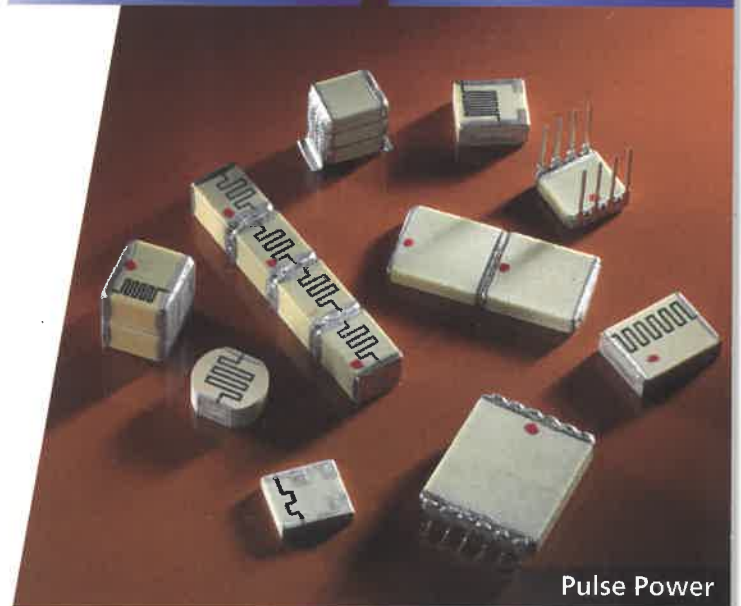
Fused Energy Module



Stacked Capacitors



Modules



Pulse Power

Specialty Products

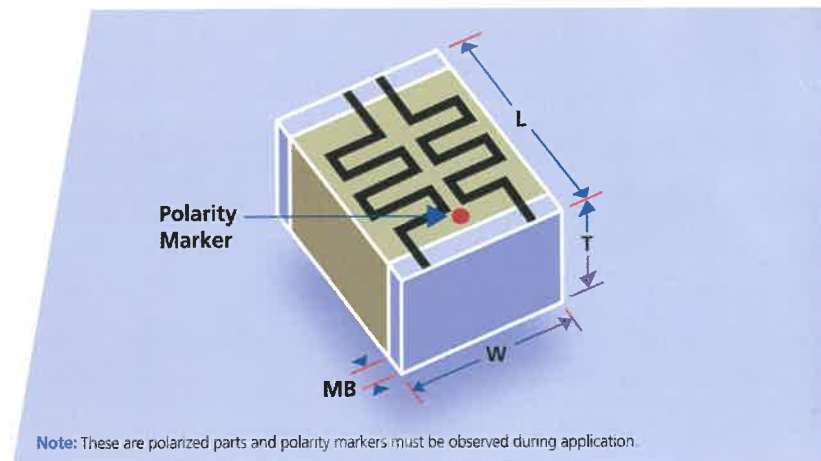
Pulsed Power Capacitors

- In sizes 3530, 3640, 5440, 7565
- Exceptional discharge energy at elevated voltages

These devices are manufactured using a unique dielectric formulation which has a positive voltage coefficient and a high dielectric constant. These properties can provide over 7 joules/cc of discharge energy depending on part size, capacitance value and voltage applied, far surpassing conventional X7R or Temperature Compensating Dielectrics, permitting discharge solutions in greatly reduced component footprint and volume.

These devices require a high electric field for maximum energy storage and pulse delivery. Voltage ratings for these components are thus between 500Vdc and 2800Vdc typically, depending on application. Individual chip capacitors can also be assembled into parallel, series or series parallel arrangements for higher voltage and energy requirements. Multiple units can be used in series, parallel or series-parallel arrangements for increased delivered energy. 500 Megohm and 1 Gigohm safety bleed resistors are standard, but other values are available.

Additional case sizes, custom designed sizes, and assemblies are also available. Please consult the sales office to best determine part size needed to meet your requirements.



Dimensions - inches/mm

Size	3530	3640	5440	7565
Length L	0.350/8.89 ±0.018/0.46	0.360/9.14 ±0.018/0.46	0.540/13.70 ±0.025/0.64	0.750/19.10 ±0.038/0.97
Width W	0.300/7.62 ±0.015/0.381	0.400/10.20 ±0.020/0.51	0.400/10.20 ±0.025/0.64	0.650/16.50 ±0.033/0.84
Tmax inches - mm:	0.250/6.35	0.200/5.08	0.250/6.35	0.300/7.62

Pulsed Power - Capacitance and Voltage Selection

Size	3530	3640	5440	7565
800V	114	154	194	584
1kV	104	144	184	544
1.2kV	953	134	174	514
1.4kV	903	124	154	484
1.6kV	553	703	903	294
2kV	473	553	703	234
2.5kV	403	453	603	184
3kV	203	253	333	114

Note: 1) Maximum capacitance values are shown above as 3 digit code: 2 significant figures followed by the no. of zeros e.g. 473 = 47,000pF

2) Capacitance values at 25°C, 1vrms & 1kHz. Additional case sizes & voltages available. Listed capacitance values and performance characteristics are for reference only.

Specialty Products

Pulsed Power Applications

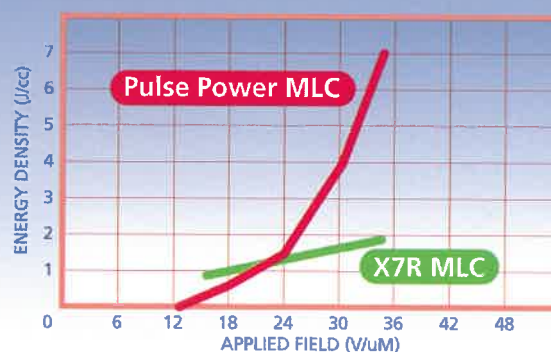
- Detonation circuitry
- Oil field exploration circuitry - Photo flash
- Laser
- Power interruption
- Ignition circuits
- Power storage modules
- HID Ignition



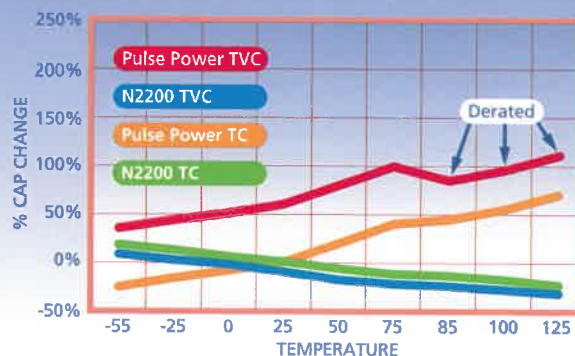
Dielectric Characteristics - Pulse Power (P)

Operating temperature range:	-55°C to 85°C (derate at 125°C)
Temperature coefficient	-55°C to 85°C: 3000 ±1000 ppm/°C +25°C to +125°C: 7000 ±1000 ppm/°C
Voltage coefficient:	+60% to +80% based on application voltage
Dissipation factor @ 25°C:	1.0% Max.
Insulation resistance	@25°C: >10GΩ or >100ΩF whichever is less @125°C: >1GΩ or >10ΩF whichever is less
Dielectric withstanding voltage:	Rated voltage +100V
Ageing rate:	<2% per decade
Test parameters:	1KHz, 1.0 ±0.2 VRMS, 25°C
Energy Density:	0.5 to 7.0 joules/cc based on voltage rating & part size

Active Energy Density Performance Pulsed Power Capacitors Vs. X7R MLC



Temperature-Voltage Coefficient (3640P104K122P)



How to Order - Pulsed Power Capacitors

RC	3606	P	803	K	122	P	X	T
STYLE	SIZE	DIELECTRIC	CAPACITANCE	TOLERANCE	VOLTAGE VDCW	TERMINATION	THICKNESS OPTION	PACKING
RC = Bleed Resistor (optional)	See chart	P = Pulsed Power	Value in Picofarads. Two significant figures, followed by number of zeros: 803 = 80,000pF	K = ± 10% M = ± 20% P = +100% -0%	Two significant figures, followed by number of zeros: 122 = 1200V	K = Palladium Silver for Lead Free Solder P = Palladium Silver	X = Non-standard thickness. Specify in Mils. if non-standard is required. Standard items are any thickness to maximum shown in charts.	T = Reeled

Specialty Products

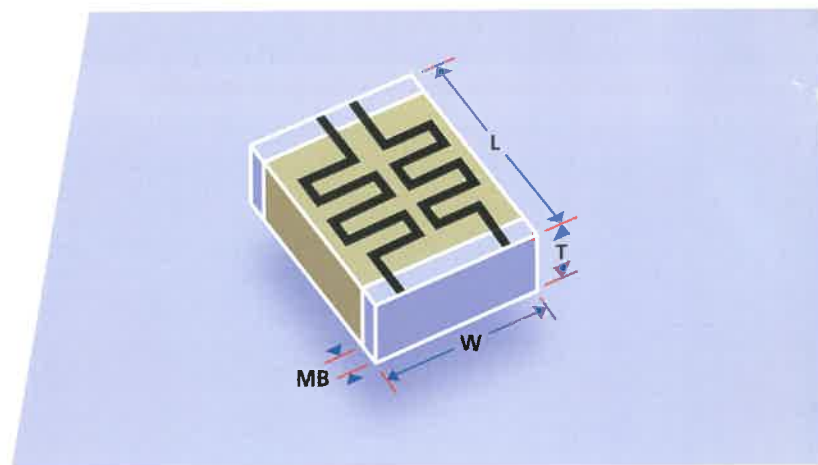
Detonator & Pulse Energy

- In sizes 1825, 2225, 3040, 3640, 6560
- Designed for oil field exploration and perforation

These high temperature, high energy, capacitors are manufactured with a dielectric formulation designed for reliable operation under single or multiple pulse firing applications. Energy density exceeds that of conventional Class 1 materials and offers excellent short duration pulse delivery at temperatures to 200°C. Discharge pulse width which is typically less than 100 nanoseconds will vary with load conditions which are influenced by inductive and resistive load components.

All parts are 100% tested to Novacap High Reliability Pulse Screening tests and are evaluated at temperature extremes up to 200°C consistent with munitions and oil field exploration/seismic detonation conditions.

As an added safety feature, these pulse discharge capacitors can be supplied with integral bleed resistors at various resistance values. With exceptionally low ESR and low signal distortion, additional applications at high temperature include power supply filtering, energy storage and coupling/decoupling. When operated at temperatures less than 200°C, higher capacitance values are available.



Dimensions - inches/mm

Size	1825	2225	3040	3640	6560
Length L	0.180/4.57 ±0.012/0.31	0.220/5.59 ±0.015/0.38	0.300/7.62 ±0.015/0.38	0.360/9.14 ±0.018/0.46	0.750/19.10 ±0.038/0.97
Width W	0.250/6.35 ±0.015/0.38	0.250/6.35 ±0.015/0.38	0.400/10.20 ±0.015/0.38	0.400/10.20 ±0.020/0.51	0.650/16.50 ±0.033/0.84
Tmax inches - mm*	0.150/3.81	0.150/3.81	0.250/6.35	0.200/5.08	0.300/7.62

Pulsed Power - Capacitance and Voltage Selection

Size	1825	2225	3040	3640	6560
1kV	473	683	174	204	594
1.5kV	223	393	124	144	404

Note: 1) Maximum capacitance values are shown above as 3 digit code: 2 significant figures followed by the no. of zeros e.g. 473 = 47,000pF
2) Capacitance values at 25°C, 1vrms & 1kHz. Additional case sizes & voltages available. Listed capacitance values and performance characteristics are for reference only.

Specialty Products

Detonator & Pulse Energy

Other sizes, voltages and capacitance ratings are available in single, series and series/parallel arrangement for custom applications.

500 Megohm safety bleed resistor are standard but other values are available.

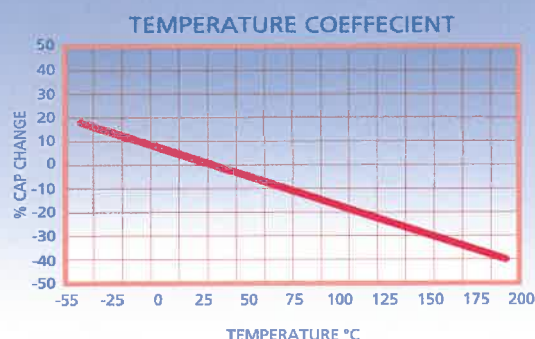
Please consult the sales office to best determine part size needed to meet your application requirements.



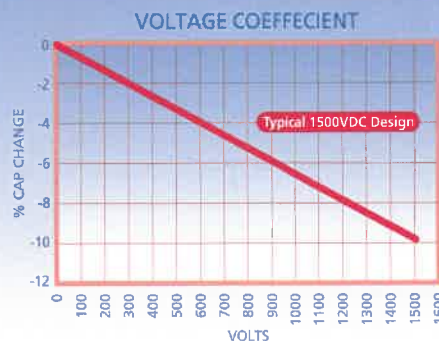
Dielectric Characteristics - Pulse Energy (R)

Operating temperature range:	-55°C to 200°C
Temperature coefficient:	-2200 $\pm$ 500 ppm/°C
Dissipation factor @ 25°C:	0.1% Max.
Insulation resistance	@25°C: >100G Ω or >1000 Ω F whichever is less @200°C: >1G Ω or >10 Ω F whichever is less
Dielectric withstanding voltage:	120%
Ageing rate:	0% per decade
Test parameters:	1KHz, 1.0 $\pm$ 0.2 VRMS, 25°C

Temperature-Capacitance Coefficient



Voltage-Capacitance Coefficient

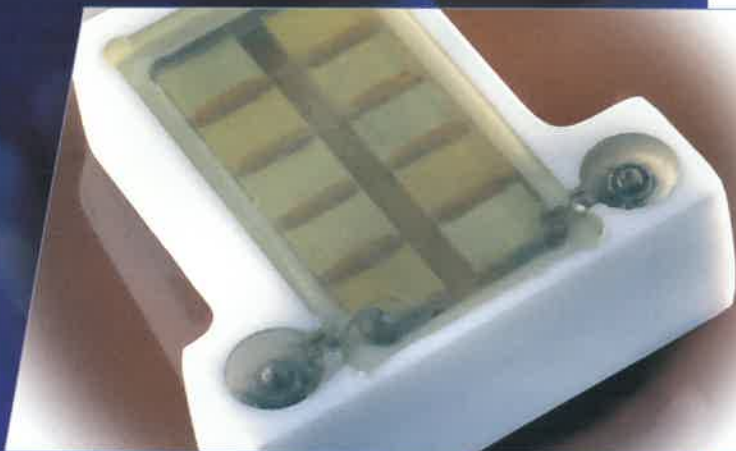


How to Order - Detonator & Pulse Energy

RC	3640	R	124	K	102	P	X	T
STYLE RC = Bleed Resistor (optional)	SIZE See chart	DIELECTRIC R = R2D	CAPACITANCE Value in Picofarads. Two significant figures, followed by number of zeros: 124 = 120,000pF	TOLERANCE J = $\pm$ 5.0% K = $\pm$ 10% M = $\pm$ 20% Z = +80-20% P = +100-0%	VOLTAGE VDCW Two significant figures, followed by number of zeros: 102 = 1000V	TERMINATION K = Palladium Silver for Lead Free Solder P = Palladium Silver	THICKNESS Size 1825 & 2225 require an X in the part number.	PACKING T = Reeled

Specialty Products

Custom Designs

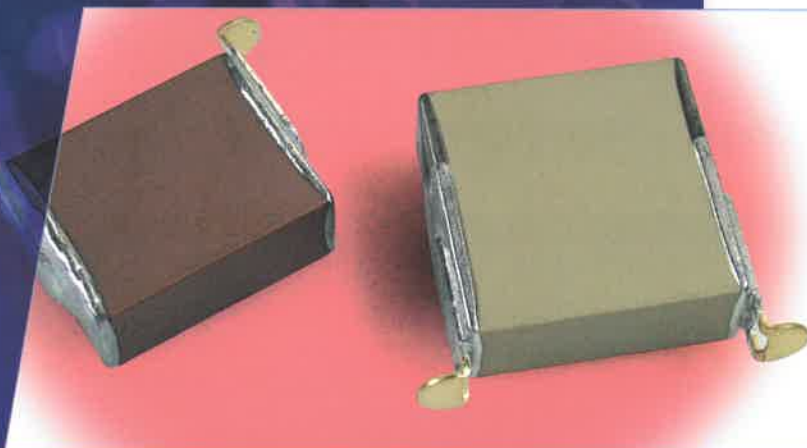


High Voltage Encapsulated Assemblies

Series-parallel assemblies encapsulated for harsh environments.

Specialty Feed Thru Capacitors

Feed Thru/High Current units for pacemaker/defibrillator applications. These units provide signal conduits through openings while suppressing EMI and RFI interference. Manufactured to customer SCD.
(Patent numbers 5,825,608 & 6,058,004)



Vertical Mount Capacitor

A vertical surface mount of a single large capacitor using specially designed and developed leads to allow for board space savings.