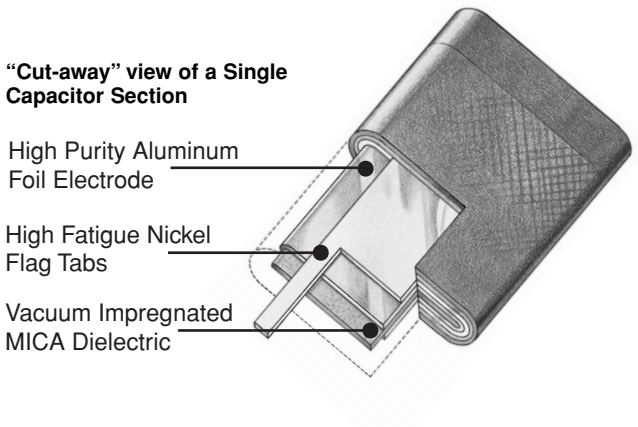
Fabmika® Capacitors

When applications extend beyond the capability of ceramic capacitors, consider Vishay Cera-Mite's Fabmika high voltage mica film technology. Offering high voltage and Hi-Rel packaging, it is applied in single or network designs.

Fabmika® capacitors are generally made over the range of .001µF to 1.0µF and 1500VDC to 30KVDC. Product is supplied either unencapsulated, polyester film wrapped and end potted, fiberglass epoxy housed or epoxy molded.

AEROSPACE & ELECTRICAL POWER APPLICATIONS:

- Military Aircraft Radar Transmitters
- Jet Engine Ignitors
- Missile Destruct Systems
- Pulse Forming Networks
- Power Generation Commutating Capacitors



APPLICATION CONSIDERATIONS

- **VOLTAGE & CURRENT STRESS ON DIELECTRICS:** The specified operating DC rating for the mica capacitor is that voltage which the capacitor can withstand continuously at rated temperature. The current is limited to a very small value equal to the leakage current, determined by the IR. In the case of an applied AC voltage, the capacitor dielectric must withstand both RMS voltages, peak voltage and peak-to-peak voltages. Each application must be considered carefully.

  In AC, there are both continuous currents and transient currents that can generate steady state heating and localized heating. The steady state heating would be the function of the continuous repetitive wave form or equivalent duty cycle. The transient currents are a function of the dv/dt and di/dt of the wave form or pulses.

  For any AC application, the user should define the wave forms and duty cycle at the time of request for quotation.

  An important factor governing a mica capacitor's ability to withstand current surges is the amount of electrical tab area. In high peak current applications, the tab area is increased to prevent erosion between the aluminum electrode foil and connecting tab.

- **THERMAL STRESS:**
  Even though mica capacitors have low losses relative to other types of capacitors, internal thermal heating is often the limiting factor in high-frequency applications. The capacitor temperature due to internal heating plus the ambient temperature should not exceed the maximum allowable operating temperature.

  $$\text{Power Dissipation} = (I_{RMS})^2 \times ESR$$

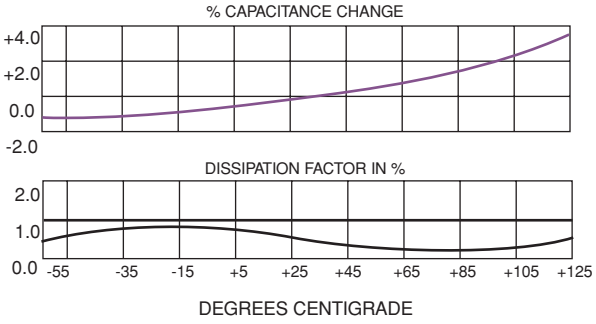
- **EQUIVALENT SERIES RESISTANCE:**
  ESR of the capacitor includes a frequency dependent factor which reflects the losses in the dielectric material and other internal losses.

  $$\text{Approx. ESR} = \frac{D.F.}{2\pi fC}$$

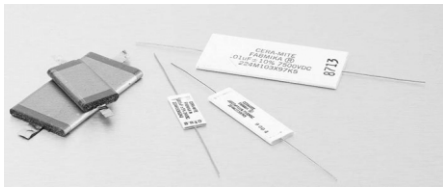
  The design may have to be made larger to increase the power dissipation for high-frequency design.

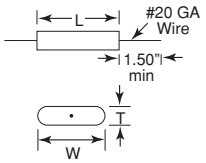
- **INDUCTANCE:**
  Fabmika capacitors have inductance (50 to 250 nano henrys), proportional to voltage and capacitance rating.

CAPACITANCE AND DISSIPATION FACTOR VS. TEMPERATURE



224M SERIES





This product consists of one section, available either unencapsulated or wrapped with polyester film tape and end potted with epoxy compound. The 224M offers the smallest volume part available. Wire leads or ribbon leads are terminations available.

Standard Ratings and Sizes:

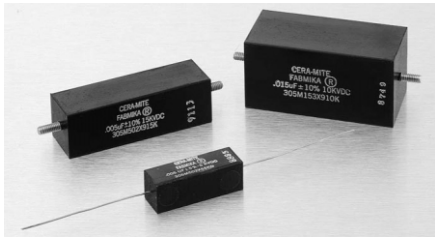
1500 Volts DC Working • Cap Range of 0.01µF to 1.0µF
1.50"L x 0.50"W x 0.105"T to 5.13"L x 2.00"W x 0.310"T

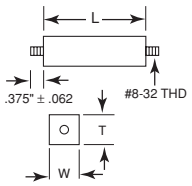
3000 Volts DC Working • Cap Range of 0.01µF to 1.0µF
1.50"L x 0.75"W x 0.155"T to 5.13"L x 3.50"W x 0.495"T

5000 Volts DC Working • Cap Range of 3300pF to 0.33µF
2.63"L x 0.75"W x 0.175"T to 5.13"L x 3.50"W x 0.600"T

7500 Volts DC Working • Cap Range of 1500pF to 0.15µF
2.63"L x 0.75"W x 0.190"T to 5.13"L x 3.50"W x 0.500"T

305M SERIES





This product is the bare impregnated section, available in a laminated epoxy fiberglass housing. The assembly is then potted with an epoxy compound. The 305M offers the greatest environmental protection available. Terminations can be wire leads or threaded studs.

Standard Ratings and Sizes:

5KV DC Working • Cap Range of 0.001µF to 0.1µF
1.56"L x 0.53"W x 0.53"T to 2.75"L x 1.03"W x 1.03"T

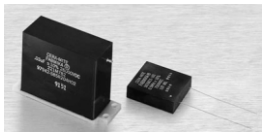
10KV DC Working • Cap Range of 500pF to 0.05µF
2.25"L x 0.63"W x 0.63"T to 4.25"L x 1.35"W x 1.35"T

20KV DC Working • Cap Range of 500pF to 0.01µF
2.75"L x 0.63"W x 0.63"T to 4.25"L x 1.03"W x 1.03"T

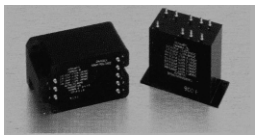
30KV DC Working • Cap Range of 500pF to 0.01µF
4.00"L x 0.88"W x 0.88"T to 5.50"L x 1.35"W x 1.35"T

221M SERIES

Power Utilities
High BIL for measurements. Dual 0.3µF, 1400 VRMS commutating capacitors for brushless exciters.



High Energy Storage
For radar and guidance transmitters.



Network Capability
With multiple voltages and capacitance value

The rugged 221M Series offers a high voltage, high current capability multiple capacitor network in a single package. This single pretested device can internally house several capacitors of different values and voltage ratings or combine units in series-parallel combinations. Rugged electrical and mechanical packaging can be configured to allow curved surfaces, special mounting and irregular shapes, while offering superior strength and reliability. Such features lead to greater utilization of space and in many cases, lighter weight capacitor assemblies.

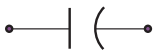
Either a single section or an assembly of sections may be epoxy encapsulated utilizing a metal or epoxy mold. Terminations can be wire leads, turret terminals, threaded studs or inserts, or high voltage connectors.

221M Series is available in voltages from 1500 VDC to 200 KVDC; and capacitance values of .001µF to 10µF.

TYPICAL PERFORMANCE CHARACTERISTICS

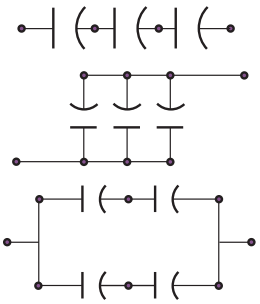
Parameter	Specification	MIL-STD-202
Capacitance	At 25°C & 1kHz	Method 305
Dissipation Factor	0.5% max @ 25°C & 1kHz 0.8% max @ 125°C & 1kHz	Method 306
Insulation Resistance	5G ohms-uF minimum @ 25°C 20M ohms-uF minimum @ 125°C	Method 302 Test Condition B
Dielectric Withstanding Voltage	200% of rated DC voltage	Method 301
ACrms, 60Hz Voltage Rating	30% of rated DC voltage	Method 301
Temperature Range	-55°C to +125°C	—
Voltage Derating	No voltage derating required below +125°C	—
Capacitance Change	±4% max over the range of -55°C to +125°C (see curve)	—
Humidity Resistance (not applicable to bare sections)	Capacitance, DF and IR shall meet initial requirements	Method 103B
Moisture Resistance (not applicable to 224M style)	Capacitance, DF and IR shall meet initial requirements	Method 106F Test Condition B
Immersion (not applicable to 224M style)	Capacitance, DF and IR shall meet initial requirements	Method 104A Test Condition B
Temperature Cycling	Examine for physical damage	Method 107G Test Condition A
Vibration	No opens or shorts greater than 0.5 milliseconds	Method 201A and 204D
Shock	No opens or shorts greater than 0.5 milliseconds	Method 205E
Solderability	95% wetted by new solder	Method 208F
Terminal Strength	No evidence of breaking or loosening of the terminals	Method 211A

TYPICAL SECTION ARRANGEMENTS



Single Section
CV Product (KV x µF) = .25 max
Max Voltage = 5KVDC
Corona Start Voltage = 500Vrms, 60 Hz

Split-Wound Section
CV Product (KV x µF) = .25 max
Max Voltage = 15KVDC
Corona Start Voltage = 1000Vrms, 60 Hz



Sections in Series
For voltages over 10KVDC

Sections in Parallel
For CV Product over .25µF•KV

Sections in Series/Parallel
For Applications Requiring High Voltage and Large Capacitance