

# Automotive Applications for Capacitors

## Advanced Electric Motors

### Windshield wiper & other small motors

#### Water pump



Electrolytic: PEG126, PEH126  
Leaded film: MMK  
SMD film: MMC, GMC



Leaded film: MMK, GMR  
SMD film: MMC, GMC

#### Air conditioner compressor



Electrolytic: PEG124, PEG126  
PEH126, PEH526  
Leaded film: MMK  
SMD film: MMC, GMC

#### Cooling fan



Electrolytic: PEG126, PEH126  
Leaded film: MMK, SMR, GMR  
SMD film: MMC, SMC, GMC

#### Power steering



Electrolytic: PEG124, PEG126  
PEH126, PEH526  
Leaded film: MMK  
SMD film: MMC, GMC

#### Active suspension



Electrolytic: PEG126, PEH526  
Leaded film: MMK, SMR, GMR  
SMD film: MMC, SMC, GMC  
SPC, GPC

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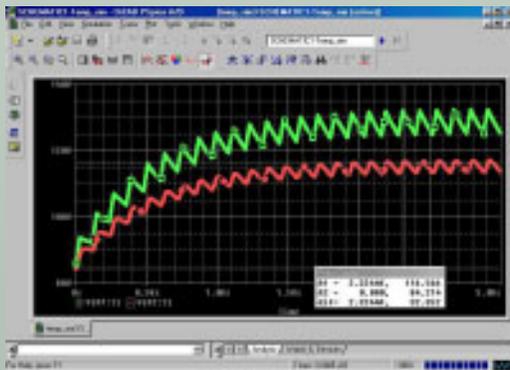
Advanced Electric Motors

## For reliable, cost effective designs

### Optimize the electrolytic capacitor in intermittent current applications

Many motor applications in automotive devices call for maximum current on an intermittent basis. This opens up the possibility for optimizing the electrolytic capacitor selection. Otherwise if the capacitor is selected to meet the peak current requirement on a continuous basis, unnecessary cost is added to the circuit.

To take advantage of this possibility without compromising quality one must have accurate thermal models. Evox Rifa can provide these models plus PSpice simulations of the thermal performance.



PSpice simulation of electrolytic capacitor thermal performance with intermittently applied ripple current. Time is represented on the horizontal axis, temperature on the vertical. Depending on the conditions the capacitor can be operated this way at several times the specified maximum steady-state current.

### capacitors must be chosen for the environment

## Electrolytic capacitors

In motor applications electrolytics are often used for energy storage



Metal lid and high-performance gasket.

and ripple filtering. The ripple current, combined with high ambient temperatures, can severely limit the life of the capacitor.

Evox Rifa capacitors employ specially developed electrolytes for operation up to 150°C. A metal lid and high performance gasket reduce electrolyte evaporation. Multiple electrode tabs reduce ESR for increased ripple current. PEG126 (axial) and PEH526 (snap-in) also offer a vibration resistant construction.



Electrolytic capacitors in an electric power steering controller.



Multiple tabs for low ESR

## Film capacitors

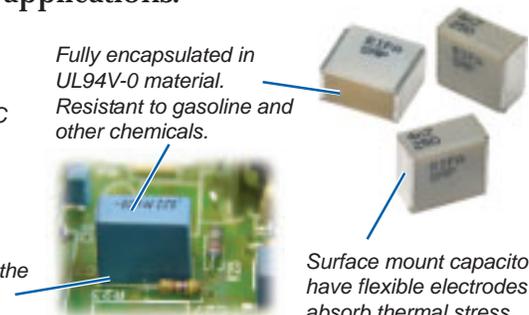
Film capacitors offer excellent performance in electric motors for interference suppression and for fast energy storage applications.

Up to 150°C operating temperature with 175°C in development.

Fully encapsulated in UL94V-0 material. Resistant to gasoline and other chemicals.

Overmolding possible.

Outer box rests flat on the PC board for excellent vibration resistance.



Surface mount capacitors have flexible electrodes to absorb thermal stress.

Self healing design is ideal when voltage spikes are present.