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Polycarbonate Capacitors no longer available… What are the options?

It has been approximately ten years since Bayer Corporation announced they were discontinuing the manufacture of polycarbonate dielectric. Capacitor manufacturers "stocked-up" with thousands of pounds of material to ward-off the pending polycarbonate demise. In 2008, we will find most inventories of polycarbonate capacitor dielectric will be completely gone. Capacitor manufacturers are searching worldwide to find any remaining polycarbonate dielectric to meet their customer's needs. Many OEM's are scrambling to purchase any remaining polycarbonate capacitors to fill their requirements. We all need to stop, take a step back, and look at all the options.

History:
Polycarbonate was invented by Bayer Corporation in 1953, and production was started in 1958. The dielectric material was determined to have an operating temperature of -55ºC to +125ºC without derating. The insulation resistance and dissipation factor were reasonable and the size was relatively small in comparison to other dielectrics. The military latched on to this dielectric as their "silver bullet" for most applications, primarily because of the temperature range. The military specification was based on the wide temperature of -55ºC to +125ºC.

Options:
Many military QPL specifications are locked-in to polycarbonate, however some military equipment OEM's are purchasing commercial off-the-shelf (COTS) devices. They have found out that QPL is not entirely necessary. The military specifications are their only control measure for purchased components; and do not take into consideration actual application, operating temperature, as well as cost. Many OEM's can replace devices, at their option; however, this will require paperwork, justification, specification revisions and testing. There are other capacitor dielectrics available that can be a replacement for polycarbonate capacitors.

Polyphenylene Sulfide (PPS):
The closest dielectric to polycarbonate is polyphenylene sulfide (PPS). The temperature range, electrical parameters, and sizes are similar to polycarbonate.

Polypropylene (PP):
The polypropylene dielectric is electrically superior to polycarbonate. The dissipation factor is low; 0.1%. The insulation resistance is high; 100K MegOhm/uf. The major drawbacks are physical size and temperature range.

For size comparison, a 1uf / 100V wrap and fill capacitor:

Metallized Polycarbonate	Metallized Polypropylene
.29 X .39 X .78	.21 X .38 X 1.15

The temperature range is -55ºC to +85ºC; derating to 50% at +105ºC. Polypropylene can replace polycarbonate very successfully as long as the application is within the temperature limitations. Some typical applications where polypropylene is being used as the dielectric of choice are coupling/decoupling, by-pass, power factor correction, snubber, filtering and energy storage capacitors.

Polyester (Mylar):
The polyester dielectric (Mylar is the DuPont trade name) has been the work-horse of the industry for many years. The electrical parameters are somewhat lower than polycarbonate: The dissipation factor is 1.0% and the insulation resistance is 20K MegOhm/uf. The temperature range can achieve +125ºC as long as the derating is met. The size is relatively smaller than polycarbonate.

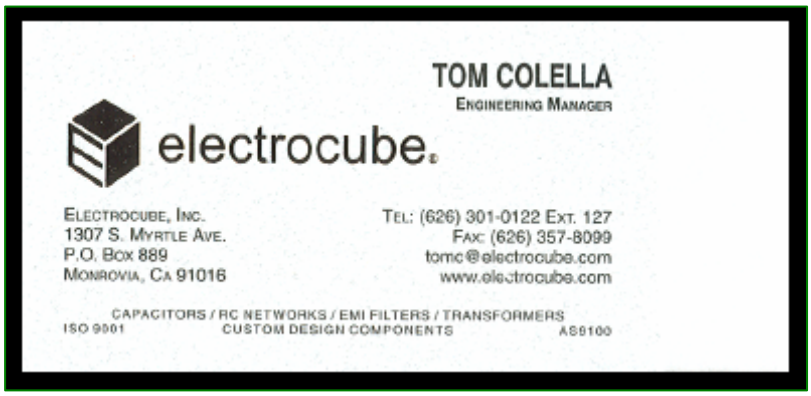
For size comparison, a 1uf / 100V wrap and fill capacitor:

Metallized Polycarbonate	Metallized Polyester
.29 X .39 X .78	.20 X .29 X .65 (100V)
	.32 X .41 X .78 (200V)*

*200V will achieve 100V at +125ºC

Polyester capacitors are used successfully in coupling/decoupling, by-pass and filtering applications.

It is recommended that Electrocube's engineering department be contacted to discuss a particular application and recommend a solution.



Tom Colella has over 30 years experience in design and application of capacitors. Many customers have already successfully made the move to an alternate dielectric. Please feel free to contact Tom with your requirements.