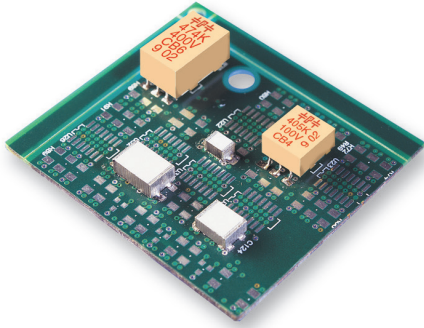


# MULTILAYER POLYMER CAPACITORS



- Ultra Low ESR
- High Frequency
- High Ripple Current
- Long Life

## MLP Capacitor Advantages over Ceramics

Paktron specializes in Ultra Low ESR multilayer polymer film capacitors and leads in Film-Chip and SMT designs. Paktron has been manufacturing film capacitors for over 50 years. Paktron holds in excess of seventyfive patents for film capacitors and machine design.

Capacitors featured are:

**Angstor®** Miniature Radial

**Capstick®** Lead-Framed MLP

**Surfilm®** Surface Mount Chip

**Quencharc®** R-C Network/Snubber

The metallized electrode used in Paktron's proprietary Interleaf® Technology process assures reliable performance. Multilayer Polymer (MLP) surface mount, chip and lead framed capacitors are replacing MLC (ceramic) capacitors in higher voltage and reliability-sensitive equipment. This includes the popular -48 volt telecom bus, off-line HVAC and PFC front ends.

Today, the fastest-growing market segment that Paktron serves is Power Conversion for industries such as Telecommunications/Datacom, military infrastructure, automotive, medical and high-end industrial. The 100 volt rated MLP film capacitor is becoming the part of choice for input/output filtering in -48 volt telecom bus power applications (on-board or dc/dc modules). The MLP capacitor provides improved stability, both electrically and mechanically, compared to multilayer ceramics. The MLP features "non-shorting" operation and does not crack like large ceramic blocks.

### Multilayer Polymer Film (MLP)

- ✓ Stable under voltage
- ✓ Stable under AC voltage
- ✓ Chip is plastic with good TCE
- ✓ Stable over temperature
- ✓ No aging mechanism
- ✓ Resilient under thermal shock
- ✓ Self-clearing thin electrodes
- ✓ Stable under mechanical stress
- ✓ Ultra Low ESR
- ✓ Dissipation Factor  $\leq 1\%$

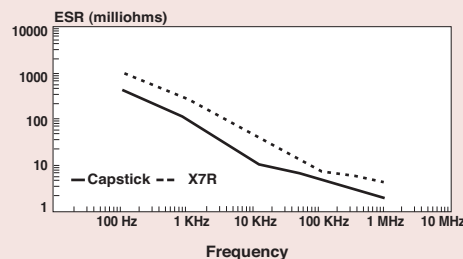
### X7R Ceramic (MLC)

- Cap drops 40% at 100 volts bias
- DF increases with AC voltage
- Body is ceramic which cracks
- DF increases at low temperature
- Cap drops per decade hour
- Ceramic body cracks easily
- Thick film electrodes fail short
- Piezoelectric voltage sensitive
- Low ESR
- Dissipation Factor  $\leq 2.5\%$

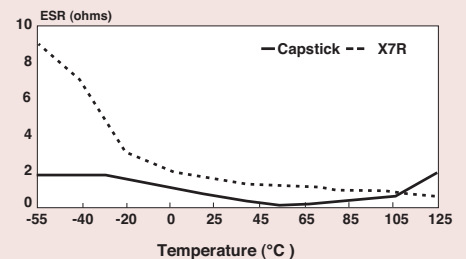
## TYPICAL CHARACTERISTICS

The following graphs contrast important characteristics of MLP Capsticks to MLC ceramic units in typical, dynamic converter conditions. The electrical stability of the MLP capacitor is clear.

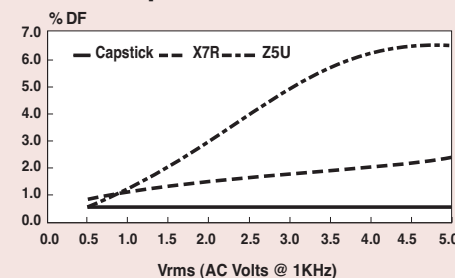
**ESR vs. Frequency**



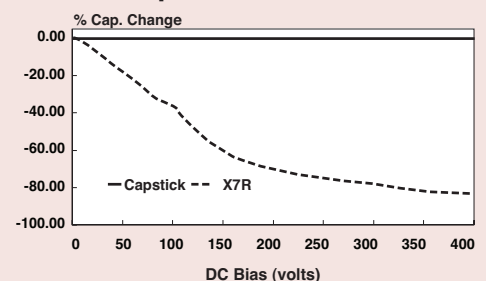
**120 Hz ESR vs. Temperature**



**Dissipation Factor vs Vrms**



**Capacitance vs DC Bias**



## Metallized PET-SMD (Low Shrinkage Polyester) dielectric — MLP Capacitor Styles

Category	Series	Case Style	Lead Style	Voltages (V)	Capacitance (μF)	Page
Angstor	RA	Taped	Radial	100 - 500	0.1 - 10.0	4
Capstick	CS	Epoxy coated	Lead frame	50 - 500	0.33 - 20.0	10
Capstick	CB	Shell	Lead frame	100	2.0 - 10.0	12
Capstick	CB-FS	Shell	Lead frame	100 - 500	0.47 - 10.0	13
Surfilm	ST	Chip	Surface mount	100	1.0 - 2.2	16

## Metallized PET (Polyester) dielectric with series resistor (snubber network)

Category	Series	Case Style	Lead Style	Voltages (V)	Capacitance (μF)	Page
Quencharc	Q/QRL	Epoxy coated	Radial	200 - 1600	0.1 - 1.0	18
<b>Soldering Guidelines</b>						20
<b>Paktron System Summary</b>						22
<b>Paktron RoHS Position Statement</b>						23

## Ordering/Part Number Information

### Example:

405 K 100 CS4 G --

**Suffix:** A two-letter suffix may be added by the factory to denote special construction and/or RoHS (Pb-Free) status.

**Lead Style or Packaging:** G = Gull-wing lead, C = Tape/Reel

**Product Type:** Identifies the basic capacitor design and lead spacing. Includes resistor value for Type Q/QRL.

**DC Voltage Rating:** Expressed in hundreds of volts, except for Type Q/QRL, which is expressed in two digit voltage code.

**Capacitance Tolerance:** J = ±5%, K = ±10%, M = ±20%

**Capacitance:** Expressed in picofarad code. The first two digits are the significant figures, the third digit is the number of zeros following. (i.e. 405 = 4000000 pF = 4.0 μF)