



Characteristics To Consider

DIELECTRIC COMPARISON						
CHARACTERISTIC	MLCC COG / NP0	MLCC X7R	MnO ₂ TANTALUM	POLYMER TANTALUM	WET TANTALUM	ALUMINUM ELECTROLYTIC
Temperature range	-55 °C to +125 °C	-55 °C to +125 °C	-55 °C to +200 °C	-55 °C to +125 °C	-55 °C to +230 °C	-55 °C to +150 °C
Delta capacitance with temperature	0 ppm ± 30 ppm	± 15 %	± 10 %	± 10 %	+30 % to -50 %	+25 % to -30 %
DC voltage coefficient at V _R	Negligible	-20 % to -50 %	Negligible	Negligible	Negligible	Negligible
Aging rate (%/dec. h)	Negligible	1 % to 3 %	n/a	n/a	n/a	n/a
Dissipation factor (%)	0.1	2.5	8	8	8	> 5
ESR - relative	Low	Moderate to high	High	Low to moderate	Moderate to high	High
Dielectric absorption (%)	0.6	2.5	0.5	0.5	0.5	n/a
Capacitance range	0.1 pF to 0.1 µF	100 pF to 47 µF	0.1 µF to 2200 µF	1 µF to 2800 µF	1 µF to 72 000 µF	0.1 µF to 1 F
Capacitance tolerance	1 % to 10 %	5 %, 10 %, 20 %	5 %, 10 %, 20 %	5 %, 10 %, 20 %	5 %, 10 %, 20 %	20 %
Failure mode	Short	Short	Short	Short	Short	Short, open
Self healing	No	No	Limited	Limited	Yes	Limited
Reliability	High	Moderate	High	High	High	Low
Piezoelectric effect	No	Yes	No	No	No	No
Resistance to thermal and mechanical shock	Low	Moderate	High	High	High	Moderate
Polar	No	No	Yes	Yes	Yes	Yes

DIELECTRIC COMPARISON					
CHARACTERISTIC	PP FILM	PPS FILM	PET FILM	PEN FILM	EDLC
Temperature range	-55 °C to +125 °C	-55 °C to +125 °C	-55 °C to +125 °C	-55 °C to +125 °C	-40 °C to +85 °C
Delta capacitance with temperature	± 1.5 %	± 1.5 %	± 5 %	± 5 %	
DC voltage coefficient at V _R	Negligible	Negligible	Negligible	Negligible	Negligible
Aging rate (%/dec. h)	Negligible	Negligible	Negligible	Negligible	n/a
Dissipation factor (%)	0.05	0.2	n/a	0.8	n/a
ESR - relative	Very low	Very low	Low	Low	High
Dielectric absorption (%)	0.05	0.2	0.5	1	n/a
Capacitance range	100 pF to 100 µF	100 pF to 10 µF	1000 pF to 10 µF	1000 pF to 10 µF	1 F to 500 F
Capacitance tolerance	5 %, 10 %, 20 %	2.5 %, 5 %, 10 %	5 %, 10 %	5 %, 10 %	-20 % / +50 %
Failure mode	Open	Open	Open	Open	Open
Self healing	Yes	Limited	Yes	Yes	No
Reliability	High	High	High	High	Low
Piezoelectric effect	No	No	No	No	No
Resistance to thermal and mechanical shock	High	High	High	High	Moderate
Polar	No	No	No	No	Polar