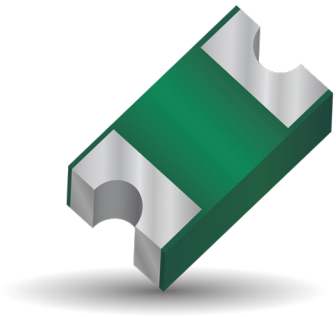
Multilayer Organic (MLO®) Capacitors
General Information



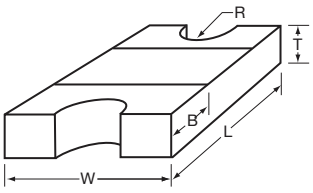
GENERAL DESCRIPTION
Based on its patented multilayer low loss organic (MLO®) technology. These new capacitors represent a paradigm shift from traditional ceramic and thin film passive SMD components. Multilayer Organic Capacitors (MLOC) are polymer based capacitors that use high conductivity copper interconnects in a multilayer fashion. The ability to fabricate these components on large area substrates and state of the art laser direct imaging allow for improved cost benefits and tolerance control. The end result is a state of the art low ESR and high SRF low profile RF capacitor that can support frequencies well above one GHz. Additionally MLOCs are expansion matched to printed circuit boards to allow for improved reliability.

FEATURES
- Low ESR
- Hi-Q®
- High Self Resonance
- Tight Tolerance
- Low Dielectric Absorption (0.0015%)

APPLICATIONS
- RF Power Amplifiers
- Low Noise Amplifiers
- Filter Networks
- Instrumentation

HOW TO ORDER

ML	03	7	1	1R8	P	A	P	2A
Style	**Case Size** 03 = 0603	**Voltage Code** 5 = 50V V = 250V	**Temperature Coefficient Code** 1 = 0±30ppm	**Capacitance** EIA Capacitance Code in pF. First two digits = significant figures or "R" for decimal place. Third digit = number of zeros or after "R" significant figures.	**Capacitance Tolerance Code** P = ± 0.02 pF A = ± .05 pF B = ±.10 pF C = ±.25 pF D = ±.5 pF F = ±1% G = ±2% J = ±5%	**Failure Rate Code** A = Not Applicable	**Termination Style Code** T = Ni, Sin	**Packaging Code** 2A = 7" Reel Unmarked



LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

MECHANICAL DIMENSIONS: inches (millimeters)

Case	Length (L)	Width (W)	Thickness (T)	Band Width (B)	Castellation Radius (R)
0603	0.063 ± 0.004 (1.600 ± 0.102)	0.033 ± 0.004 (0.838 ± 0.102)	0.025 ± 0.004 (0.635 ± 0.102)	0.015 ± 0.005 (0.381 ± 0.127)	0.008 ± 0.002 (0.203 ± 0.051)

TAPE & REEL: All tape and reel specifications are in compliance with EIA RS481 (equivalent to IEC 286 part 3).

—8mm carrier
—7" reel, 3,000 pcs per reel

ENVIRONMENTAL CHARACTERISTICS

TEST	CONDITIONS	REQUIREMENT
Life (Endurance) MIL-STD-202F Method 108A	125°C, 2UR, 1000 hours	No visible damage ΔC/C ≤2% for C≥5pF ΔC/C ≤0.25pF for C<5pF
Accelerated Damp Heat Steady State MIL-STD-202F Method 103B	85°C, 85% RH, UR, 1000 hours	No visible damage ΔC/C ≤2% for C≥5pF ΔC/C ≤0.25pF for C<5pF
Temperature Cycling MIL-STD-202F Method 107E MIL-STD-883D Method 1010.7	–55°C to +125°C, 15 cycles – MLO®	No visible damage ΔC/C ≤2% for C≥5pF ΔC/C ≤0.25pF for C<5pF
Resistance to Solder Heat IEC-68-2-58	260°C ± 5°C for 10 secs.	C remains within initial limits

MECHANICAL SPECIFICATIONS

TEST	CONDITIONS	REQUIREMENT
Solderability IEC-68-2-58	Components completely immersed in a solder bath at 235°C for 2 secs.	Terminations to be well tinned, minimum 95% coverage
Leach Resistance IEC-68-2-58	Components completely immersed in a solder bath at 260±5°C for 60 secs.	Dissolution of termination faces ≤15% of area Dissolution of termination edges ≤25% of length
Adhesion MIL-STD-202F Method 211A	A force of 5N applied for 10 secs.	No visible damage
Termination Bond Strength IEC-68-2-21 Amend. 2	Tested as shown in diagram	No visible damage C/C ≤2% for C≥5pF ΔC/C ≤0.25pF for C<5pF
Robustness of Termination IEC-68-2-21 Amend. 2	A force of 5N applied for 10 secs.	No visible damage
Storage	12 months minimum with components stored in "as received" packaging	Good solderability

QUALITY & RELIABILITY

MLO® capacitors utilize high density interconnect wiring technology on well established low loss organic materials.

FINAL QUALITY INSPECTION

Finished parts are tested for standard electrical parameters and visual/mechanical characteristics. Each production lot is 100% evaluated for: capacitance and proof voltage at 2.5 U_R. In addition, production is periodically evaluated for:

- Average capacitance with histogram printout for capacitance distribution;
- IR and Breakdown Voltage distribution;
- Temperature Coefficient;
- Solderability;
- Dimensional, mechanical and temperature stability.

QUALITY ASSURANCE

The reliability of these multilayer organic capacitors has been extensively studied. Various methods and standards have been used to ensure a high quality component including JEDEC, Mil Spec and IPC testing. KYOCERA AVX quality assurance policy is based on well established international industry standards. The reliability of the capacitors is determined by accelerated testing under the following conditions:

Life (Endurance)	125°C, 2U_R, 1000 hours
Accelerated Damp Heat Steady State	85°C, 85% RH, U_R, 1000 hours.

TABLE I: CASE SIZE ML03

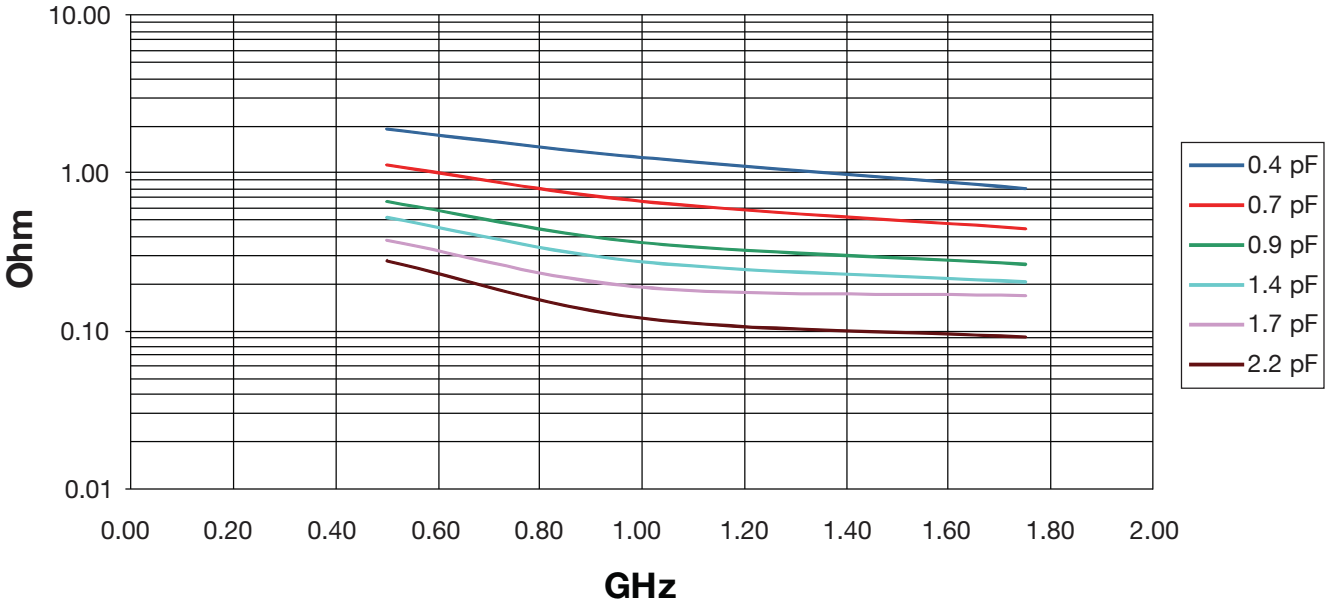
Cap. pF	Cap. Tol.	WVDC
0.1	P, A, B	50, 250
0.2	P, A, B	50, 250
0.3	P, A, B	50, 250
0.4	P, A, B	50, 250
0.5	P, A, B, C	50, 250
0.6	P, A, B, C	50, 250
0.7	P, A, B, C	50, 250
0.8	P, A, B, C	50, 250
0.9	P, A, B, C	50, 250
1.0	P, A, B, C	50, 250
1.1	P, A, B, C	50, 250
1.2	P, A, B, C	50, 250

Cap. pF	Cap. Tol.	WVDC
1.3	P, A, B, C	50, 250
1.4	P, A, B, C	50, 250
1.5	P, A, B, C	50, 250
1.6	P, A, B, C	50, 250
1.7	P, A, B, C	50, 250
1.8	P, A, B, C	50, 250
1.9	P, A, B, C	50, 250
2.0	P, A, B, C	50, 250
2.2	P, A, B, C	50, 250
2.4	P, A, B, C	50, 250
2.5	P, A, B, C	50, 250
2.7	P, A, B, C	50, 250

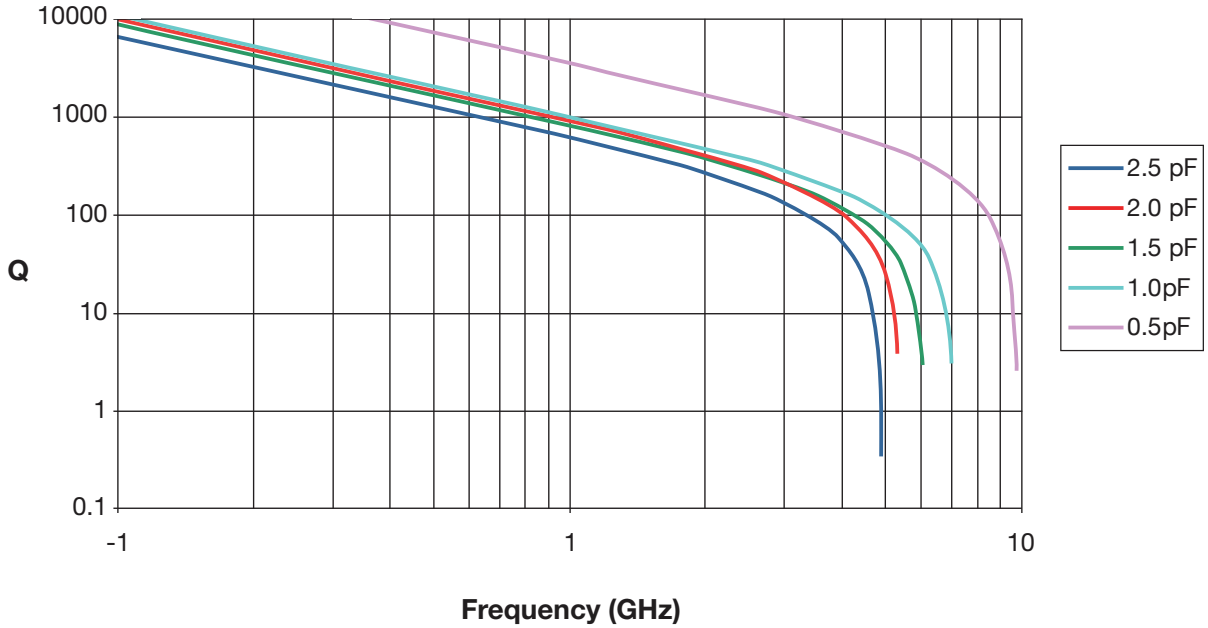
Cap. pF	Cap. Tol.	WVDC
3.0	P, A, B, C	50, 250
3.3	P, A, B, C	50, 250
3.6	P, A, B, C	50, 250
3.9	P, A, B, C	50, 250

Note: Capacitance measured at 1MHz.

Typical ESR vs. Frequency
MLO® 0603



Typical Q vs. Frequency
MLO® 0603



Typical Self Resonant Frequency vs. Capacitance
MLO® 0603