

MCO SERIES

Metallized Polycarbonate

Metallized Polycarbonate Wrap & Fill Tubular Configuration

The MCO Series is specifically designed for low-drift, tight tolerance applications that require voltage to 400VDC, a continuous operating temperature to 125°C and capacitance tolerance as low as 1%. There is also a temperature coefficient of $\pm 100\text{ppm}$ and a dissipation factor $< 0.3\%$.



FEATURES

- 1% Capacitor Tolerance
- Dual Moisture Seal Construction
- Superior Protection Against Hostile Environments
- Manufactured to MIL Standards

STANDARD CONFIGURATION

- Wrap & Fill Tubular Configuration.

Specification Summary

Capacitance Range

0.0010 μ F to 20.0 μ F Capacitance shall be measured at 25°C and at or referred to a frequency of 1 kHz.

Capacitance Tolerance

Standard tolerance is $\pm 1\%$, $\pm 2\%$, $\pm 5\%$, $\pm 10\%$

Operating Temperature Range

-55°C to +125°C

Enclosure/ Construction

Extended metallized Polycarbonate film (non-inductive)

Voltage Rating

DC working voltage ratings at +125°C, are 50VDC, 100VDC, 200VDC and 400VDC.

Quality Control

Capacitors are tested 100% for:

- o Capacitance
- o Tolerance
- o Dissipation Factor
- o Dielectric withstanding Voltage
- o Insulation Resistance
- o Equivalent Series Resistance (ESR)

Process and inspection data are maintained on file and available on special request.

Environmental

| Parameter | Method | Condition |
|---------------|--------|-----------|
| Vibration | 204 | D |
| Immersion | 104 | B |
| Shock | 213 | I |
| Humidity | 106 | - |
| Thermal Shock | 107 | A |
| Life | 108 | F |

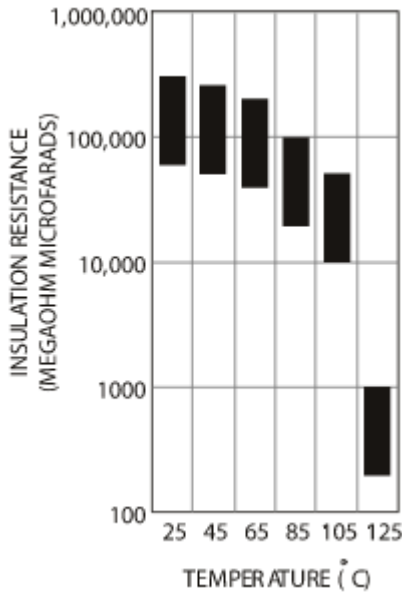
Reference MIL-STD-202

Characteristics

Insulation Resistance

| Temperature(°C) | 25 | 85 | 125 |
|------------------------|--------|-------|-----|
| Megaohms x Microfarads | 50,000 | 5,000 | 500 |

Insulation Resistance



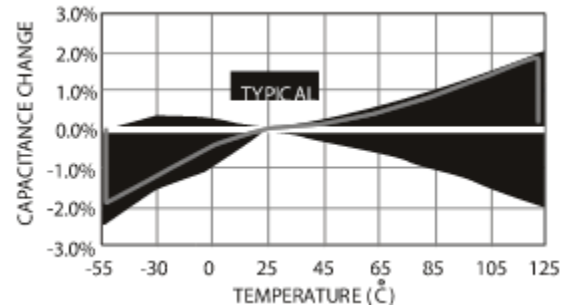
Dielectric Strength

Capacitors shall withstand a DC potential of 200% rated voltage for two (2) minutes without damage or breakdown. Test voltage must be applied and discharged through a resistance of 1 OHM per volt, minimum and at 25°C.

Capacitance Change

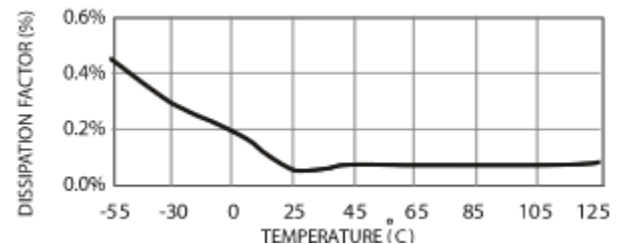
| Temperature(°C) | -55 | 25 | 85 | 125 |
|-----------------------------|------|----|-----------|-----------|
| Percentage Change (typical) | -2.5 | 0 | ± 1.0 | ± 2.0 |

Capacitance Change



Dissipation Factor

When measured at 1kHz, the dissipation factor shall not exceed 0.3% from +25°C to +125°C.



ELECTRICAL DATA

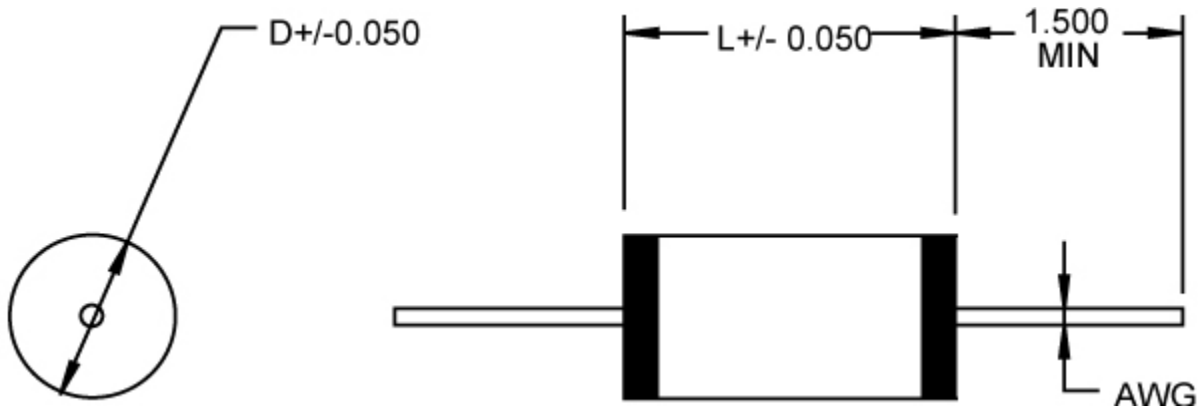
| EC PART NUMBER | MFD | 50 VDC | | | 100 VDC | | | 200 VDC | | | 400 VDC | | |
|----------------|--------|--------|------|-----|---------|------|-----|---------|------|-----|---------|------|-----|
| | | B | | | D | | | F | | | J | | |
| | | D | L | AWG | D | L | AWG | D | L | AWG | D | L | AWG |
| MCO2_102_ | 0.0010 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_122_ | 0.0012 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_152_ | 0.0015 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_182_ | 0.0018 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_222_ | 0.0022 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_272_ | 0.0027 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_332_ | 0.0033 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 |
| MCO2_392_ | 0.0039 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.16 | 0.40 | 24 |
| MCO2_472_ | 0.0047 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.17 | 0.40 | 24 |
| MCO2_562_ | 0.0056 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.53 | 24 |
| MCO2_682_ | 0.0068 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.53 | 24 |
| MCO2_822_ | 0.0082 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.53 | 24 |
| MCO2_103_ | 0.0100 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.17 | 0.53 | 24 |
| MCO2_123_ | 0.0120 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.18 | 0.53 | 24 |
| MCO2_153_ | 0.0150 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.20 | 0.53 | 24 |
| MCO2_183_ | 0.0180 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.16 | 0.40 | 24 | 0.22 | 0.53 | 24 |
| MCO2_223_ | 0.0220 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.17 | 0.40 | 24 | 0.24 | 0.53 | 24 |
| MCO2_273_ | 0.0270 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.53 | 24 | 0.27 | 0.53 | 24 |
| MCO2_333_ | 0.0330 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.15 | 0.53 | 24 | 0.29 | 0.53 | 24 |
| MCO2_393_ | 0.0390 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.16 | 0.53 | 24 | 0.27 | 0.68 | 24 |
| MCO2_473_ | 0.0470 | 0.15 | 0.40 | 24 | 0.15 | 0.40 | 24 | 0.18 | 0.53 | 24 | 0.30 | 0.68 | 24 |
| MCO2_563_ | 0.0560 | 0.15 | 0.40 | 24 | 0.16 | 0.40 | 24 | 0.19 | 0.53 | 24 | 0.33 | 0.68 | 24 |
| MCO2_683_ | 0.0680 | 0.15 | 0.40 | 24 | 0.18 | 0.40 | 24 | 0.21 | 0.53 | 24 | 0.32 | 0.78 | 22 |
| MCO2_823_ | 0.0820 | 0.15 | 0.40 | 24 | 0.15 | 0.53 | 24 | 0.23 | 0.53 | 24 | 0.35 | 0.78 | 22 |
| MCO2_104_ | 0.1000 | 0.15 | 0.40 | 24 | 0.16 | 0.53 | 24 | 0.25 | 0.53 | 24 | 0.38 | 0.78 | 22 |
| MCO2_124_ | 0.1200 | 0.15 | 0.40 | 24 | 0.17 | 0.53 | 24 | 0.27 | 0.53 | 24 | 0.41 | 0.78 | 22 |
| MCO2_154_ | 0.1500 | 0.16 | 0.40 | 24 | 0.19 | 0.53 | 24 | 0.31 | 0.53 | 24 | 0.40 | 0.95 | 22 |
| MCO2_184_ | 0.1800 | 0.15 | 0.53 | 24 | 0.20 | 0.53 | 24 | 0.29 | 0.68 | 24 | 0.44 | 0.95 | 22 |
| MCO2_224_ | 0.2200 | 0.15 | 0.53 | 24 | 0.22 | 0.53 | 24 | 0.32 | 0.68 | 24 | 0.41 | 1.17 | 22 |
| MCO2_274_ | 0.2700 | 0.16 | 0.53 | 24 | 0.24 | 0.53 | 24 | 0.32 | 0.78 | 24 | 0.45 | 1.17 | 20 |
| MCO2_334_ | 0.3300 | 0.18 | 0.53 | 24 | 0.26 | 0.53 | 24 | 0.35 | 0.78 | 22 | 0.50 | 1.17 | 20 |
| MCO2_394_ | 0.3900 | 0.19 | 0.53 | 24 | 0.29 | 0.53 | 24 | 0.38 | 0.78 | 22 | 0.54 | 1.17 | 20 |
| MCO2_474_ | 0.4700 | 0.20 | 0.53 | 24 | 0.26 | 0.68 | 24 | 0.41 | 0.78 | 22 | 0.59 | 1.17 | 20 |
| MCO2_564_ | 0.5600 | 0.22 | 0.53 | 24 | 0.29 | 0.68 | 24 | 0.39 | 0.95 | 22 | 0.64 | 1.17 | 20 |
| MCO2_684_ | 0.6800 | 0.24 | 0.53 | 24 | 0.29 | 0.78 | 24 | 0.36 | 1.17 | 22 | 0.65 | 1.45 | 20 |
| MCO2_824_ | 0.8200 | 0.26 | 0.53 | 24 | 0.31 | 0.78 | 24 | 0.39 | 1.17 | 22 | 0.63 | 1.70 | 20 |
| MCO2_105_ | 1.0000 | 0.28 | 0.53 | 24 | 0.34 | 0.78 | 24 | 0.44 | 1.17 | 22 | 0.66 | 1.90 | 20 |
| MCO2_125_ | 1.2000 | 0.26 | 0.68 | 24 | 0.37 | 0.78 | 22 | 0.48 | 1.17 | 20 | 0.72 | 1.90 | 20 |
| MCO2_155_ | 1.5000 | 0.28 | 0.68 | 24 | 0.37 | 0.95 | 22 | 0.53 | 1.17 | 20 | 0.80 | 1.90 | 20 |
| MCO2_185_ | 1.8000 | 0.29 | 0.78 | 24 | 0.40 | 0.95 | 22 | 0.58 | 1.17 | 20 | 0.87 | 1.90 | 20 |
| MCO2_205_ | 2.0000 | 0.30 | 0.78 | 24 | 0.38 | 1.17 | 22 | 0.61 | 1.17 | 20 | 0.92 | 1.90 | 20 |
| MCO2_255_ | 2.5000 | 0.34 | 0.78 | 24 | 0.42 | 1.17 | 22 | 0.62 | 1.45 | 20 | - | - | - |
| MCO2_305_ | 2.0000 | 0.37 | 0.78 | 22 | 0.45 | 1.17 | 22 | 0.61 | 1.70 | 20 | - | - | - |
| MCO2_355_ | 3.5000 | 0.40 | 0.78 | 22 | 0.48 | 1.17 | 20 | 0.66 | 1.70 | 20 | - | - | - |
| MCO2_405_ | 4.0000 | 0.37 | 0.95 | 22 | 0.52 | 1.17 | 20 | 0.66 | 1.90 | 20 | - | - | - |
| MCO2_455_ | 4.5000 | 0.39 | 0.95 | 22 | 0.55 | 1.17 | 20 | 0.70 | 1.90 | 20 | - | - | - |
| MCO2_505_ | 5.0000 | 0.36 | 1.17 | 22 | 0.58 | 1.17 | 20 | 0.73 | 1.90 | 20 | - | - | - |
| MCO2_605_ | 6.0000 | 0.39 | 1.17 | 22 | 0.62 | 1.17 | 20 | 0.80 | 1.90 | 20 | - | - | - |
| MCO2_805_ | 8.0000 | 0.45 | 1.17 | 22 | 0.63 | 1.45 | 20 | 0.92 | 1.90 | 20 | - | - | - |

Note: The fifth character of the part number represents the DC voltage rating (i.e. B=50 VDC, D=100 VDC, etc.). Additionally, the tenth character of the part number represents the Tolerance (K=±10%, J=±5%, G=±2%, F=±1%).

| EC PART NUMBER | MFD | 50 VDC | | | 100 VDC | | | 200 VDC | | | 400 VDC | | |
|----------------|---------|--------|------|-----|---------|------|-----|---------|------|-----|---------|---|-----|
| | | B | | | D | | | F | | | J | | |
| | | D | L | AWG | D | L | AWG | D | L | AWG | D | L | AWG |
| MCO2_106_ | 10.0000 | 0.50 | 1.17 | 20 | 0.64 | 1.70 | 20 | 1.02 | 1.90 | 20 | - | - | - |
| MCO2_126_ | 12.0000 | 0.54 | 1.17 | 20 | 0.65 | 1.90 | 20 | - | - | - | - | - | - |
| MCO2_156_ | 15.0000 | 0.60 | 1.17 | 20 | 0.72 | 1.90 | 20 | - | - | - | - | - | - |
| MCO2_186_ | 18.0000 | 0.58 | 1.45 | 20 | 0.78 | 1.90 | 20 | - | - | - | - | - | - |
| MCO2_206_ | 20.0000 | 0.61 | 1.45 | 20 | 0.82 | 1.90 | 20 | - | - | - | - | - | - |

Note: The fifth character of the part number represents the DC voltage rating (i.e. B=50 VDC, D=100 VDC, etc.). Additionally, the tenth character of the part number represents the Tolerance (K=±10%, J=±5%, G=±2%, F=±1%).

Mechanical Data



ADDITIONAL INFORMATION

The MCO Series is a new polycarbonate, film capacitor developed by Electronic Concepts to meet the ever changing, more demanding requirements of circuit designers. Although not called for, it is built to MIL-PRF-55514 to maximize reliability. The MCO Series is specifically designed for low-drift, tight tolerance applications that require voltage to 400VDC, a continuous operating temperature to 125°C and capacitance tolerance as low as 1%. There is also a temperature coefficient of ± 100 ppm and a dissipation factor $< 0.3\%$. Importantly, the MCO Series features a unique dual moisture seal construction (versus the single seal method of others). Dual sealing ensures greater overall electrical integrity with long term stability - and imparts the ability to accommodate adverse environments normally associated with the electronic industry.

With the introduction of the MCO Series, the designer can now build in more performance with greater reliability and operating protection. Plus overall system cost savings can often be realized.

HOW TO ORDER

| | | |
|--|---|------------|
| TYPE Metallized Polycarbonate | → | MCO |
| STYLE / VOLTAGE B=50VDC, D=100VDC, F=200VDC, J=400VDC | → | 2 J |
| CAPACITANCE IN PICO FARADS The first two digits are significant, the third represents the number of zeros (e.g. 475=4,700,000pF) | → | 106 |
| TOLERANCE K= $\pm 10\%$ J=5% G 2% F=1% | → | K |

Marking and Date Code

All capacitors are marked with company initials "EC", corporate logo or EC trademark—in addition to type MCO, capacitance, tolerance, rated DC working voltage and date code. The first two digits of the date code represent the year, the second two digits the week, i.e., 0952 is the 52nd week of 2009, 0902 is the second week of 2009.

Quality Assurance

Major emphasis is placed on quality assurance. EC is an ISO 9001-2000 and AS9100:2004 Certified Company. Raw material inspection and the use of SPC manufacturing procedures assure the highest quality standards. Procedures are fully described in the EC Quality Control Manual. Electronic Concepts will continue to advance the state-of-the-art by utilizing leading edge technology, compact capacitor designs and establishing reliability procedures.

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