

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 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.

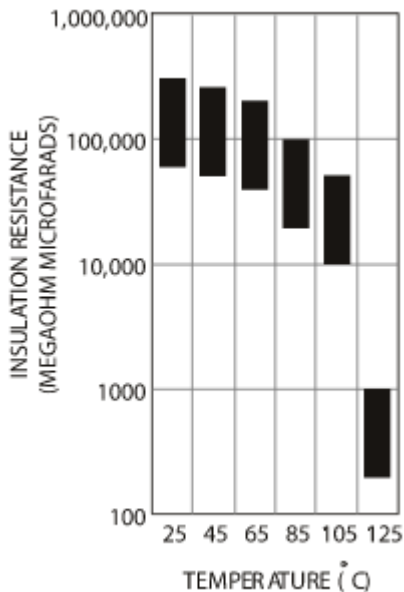
Environmental

Parameter	Method	Condition
Vibration	204	D
Shock	213	I
Humidity	106	-
Thermal Shock	107	A
Life	108	F
Reference MIL-STD-202		

Characteristics

Insulation Resistance

Temperature(°C)	25	85	125	
Megaohmsx Microfarads	50,000	5,000	500	
Insulation Resistance				

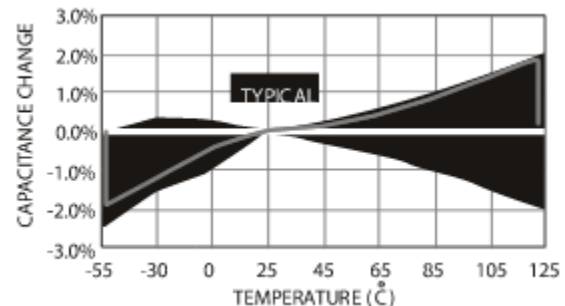


Dielectric Strength

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.

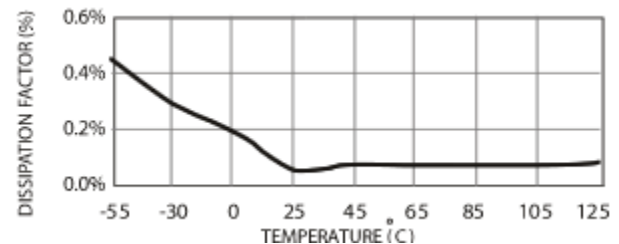
Capacitance Change

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	100 VDC			200 VDC			400 VDC		
		D			F			J		
		D	L	AWG	D	L	AWG	D	L	AWG
MC02_102_	0.0010	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_122_	0.0012	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_152_	0.0015	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_182_	0.0018	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_222_	0.0022	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_272_	0.0027	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_332_	0.0033	0.15	0.40	24	0.15	0.40	24	0.15	0.40	24
MC02_392_	0.0039	0.15	0.40	24	0.15	0.40	24	0.16	0.40	24
MC02_472_	0.0047	0.15	0.40	24	0.15	0.40	24	0.17	0.40	24
MC02_562_	0.0056	0.15	0.40	24	0.15	0.40	24	0.15	0.53	24
MC02_682_	0.0068	0.15	0.40	24	0.15	0.40	24	0.15	0.53	24
MC02_822_	0.0082	0.15	0.40	24	0.15	0.40	24	0.15	0.53	24
MC02_103_	0.0100	0.15	0.40	24	0.15	0.40	24	0.17	0.53	24
MC02_123_	0.0120	0.15	0.40	24	0.15	0.40	24	0.18	0.53	24
MC02_153_	0.0150	0.15	0.40	24	0.15	0.40	24	0.20	0.53	24
MC02_183_	0.0180	0.15	0.40	24	0.16	0.40	24	0.22	0.53	24
MC02_223_	0.0220	0.15	0.40	24	0.17	0.40	24	0.24	0.53	24
MC02_273_	0.0270	0.15	0.40	24	0.15	0.53	24	0.27	0.53	24
MC02_333_	0.0330	0.15	0.40	24	0.15	0.53	24	0.29	0.53	24
MC02_393_	0.0390	0.15	0.40	24	0.16	0.53	24	0.27	0.68	24
MC02_473_	0.0470	0.15	0.40	24	0.18	0.53	24	0.30	0.68	24
MC02_563_	0.0560	0.16	0.40	24	0.19	0.53	24	0.33	0.68	24
MC02_683_	0.0680	0.18	0.40	24	0.21	0.53	24	0.32	0.78	22
MC02_823_	0.0820	0.15	0.53	24	0.23	0.53	24	0.35	0.78	22
MC02_104_	0.1000	0.16	0.53	24	0.25	0.53	24	0.38	0.78	22
MC02_124_	0.1200	0.17	0.53	24	0.27	0.53	24	0.41	0.78	22
MC02_154_	0.1500	0.19	0.53	24	0.31	0.53	24	0.40	0.95	22
MC02_184_	0.1800	0.20	0.53	24	0.29	0.68	24	0.44	0.95	22
MC02_224_	0.2200	0.22	0.53	24	0.32	0.68	24	0.41	1.17	22
MC02_274_	0.2700	0.24	0.53	24	0.32	0.78	24	0.45	1.17	20
MC02_334_	0.3300	0.26	0.53	24	0.35	0.78	22	0.50	1.17	20
MC02_394_	0.3900	0.29	0.53	24	0.38	0.78	22	0.54	1.17	20
MC02_474_	0.4700	0.26	0.68	24	0.41	0.78	22	0.59	1.17	20
MC02_564_	0.5600	0.29	0.68	24	0.39	0.95	22	0.64	1.17	20
MC02_684_	0.6800	0.29	0.78	24	0.36	1.17	22	0.65	1.45	20
MC02_824_	0.8200	0.31	0.78	24	0.39	1.17	22	0.63	1.70	20
MC02_105_	1.0000	0.34	0.78	24	0.44	1.17	22	0.66	1.90	20
MC02_125_	1.2000	0.37	0.78	22	0.48	1.17	20	0.72	1.90	20
MC02_155_	1.5000	0.37	0.95	22	0.53	1.17	20	0.80	1.90	20
MC02_185_	1.8000	0.40	0.95	22	0.58	1.17	20	0.87	1.90	20
MC02_205_	2.0000	0.38	1.17	22	0.61	1.17	20	0.92	1.90	20
MC02_255_	2.5000	0.42	1.17	22	0.62	1.45	20	-	-	-
MC02_305_	2.0000	0.45	1.17	22	0.61	1.70	20	-	-	-
MC02_355_	3.5000	0.48	1.17	20	0.66	1.70	20	-	-	-
MC02_405_	4.0000	0.52	1.17	20	0.66	1.90	20	-	-	-
MC02_455_	4.5000	0.55	1.17	20	0.70	1.90	20	-	-	-
MC02_505_	5.0000	0.58	1.17	20	0.73	1.90	20	-	-	-
MC02_605_	6.0000	0.62	1.17	20	0.80	1.90	20	-	-	-
MC02_805_	8.0000	0.63	1.45	20	0.92	1.90	20	-	-	-

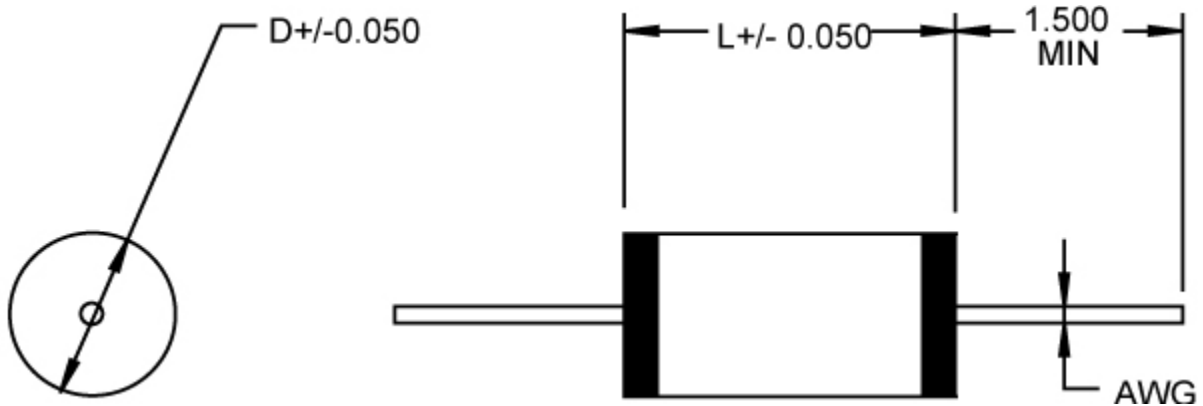
Note: The fifth character of the part number represents the DC voltage rating (i.e. D=100 VDC, F=200 VDC, etc.). Additionally, the tenth character of the part number represents the Tolerance (K=±10%, J=±5%, G=±2%, F=±1%).



EC PART NUMBER	MFD	100 VDC			200 VDC			400 VDC		
		D			F			J		
		D	L	AWG	D	L	AWG	D	L	AWG
MC02_106_	10.0000	0.64	1.70	20	1.02	1.90	20	-	-	-
MC02_126_	12.0000	0.65	1.90	20	-	-	-	-	-	-
MC02_156_	15.0000	0.72	1.90	20	-	-	-	-	-	-
MC02_186_	18.0000	0.78	1.90	20	-	-	-	-	-	-
MC02_206_	20.0000	0.82	1.90	20	-	-	-	-	-	-

Note: The fifth character of the part number represents the DC voltage rating (i.e. D=100 VDC, F=200 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 MC0 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 MC0 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 MC0 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 MC0 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	→	MC0
STYLE / VOLTAGE D=100VDC, F=200VDC, J=400VDC	→	2 J
CAPACITANCE IN PICOFARADS 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 MC0, 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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website: www.ecicaps.com

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European Headquarters

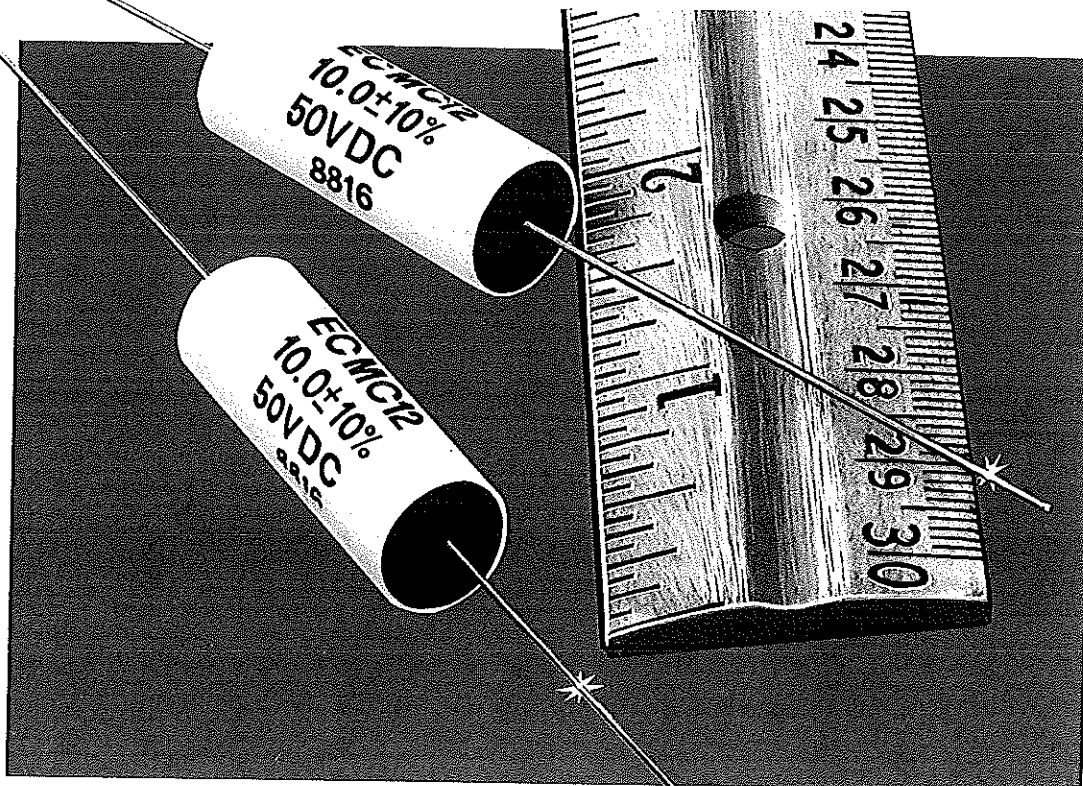
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Capacitors

Metallized Polycarbonate Capacitors Type MC12 Wrap and Fill Tubular Configuration



Type MC12 is a versatile metallized polycarbonate capacitor offered in a wrap and fill tubular configuration with axial leads, designed for the following typical applications:

- Analog circuits
- Timing circuits
- High frequency
- Filter networks

Outstanding features are:

- Small size
- Low temperature coefficient
- High insulation resistance
- Operating temperature range: -55 to $+125^{\circ}\text{C}$
- Dissipation factor less than 0.3%
- Voltage range 30 to 400 V.D.C.
- Excellent retrace

electronic concepts, inc. 

Specifications

Construction

Extended metallized polycarbonate film (non-inductive).

Life Test

All capacitors shall withstand a potential of 140% of rated voltage at +125°C between terminals for a minimum of 250 hours, with not more than one failure in each group of 18 tested. Failure is defined as a permanent short or open circuit.

Humidity Resistance

Will exceed requirements of MIL-STD-202, Method 103.

Pull Test

Capacitors shall withstand a steady pull of 5 pounds applied axially to leads for ten seconds.

Lead Bending Test

Leads shall be bent without breakage about the point of egress from the capacitors first 90° in one direction, then back to the original position and then 90° in the opposite direction.

High Frequency Vibration

These capacitors will meet the 2000 cycle vibration test in accordance with method 204 of MIL-STD-202A, condition B. The vibration shall be for 4 hours in each of 2 directions, parallel and perpendicular to the major axis. Rated voltage shall be applied during measurement. A cathode ray oscilloscope or other comparable means shall be used as an indicating device in determining the electrical intermittency during test.

Capacitors shall be rigidly mounted by suitable mounting means other than the lead wires. It is recommended that capacitors of this type be encapsulated in epoxy blocks when subjected to this test.

As a result of the tests specified, there shall be no mechanical damage and the measurement shall show no evidence of intermittent contacts or open or short circuiting.

Lead Material

Copper-clad steel wire
Solder coated

Capacitors are tested 100% for:

- CAPACITANCE TOLERANCE
- DISSIPATION FACTOR
- DIELECTRIC WITHSTANDING VOLTAGE
- INSULATION RESISTANCE

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

Capacitors can meet or exceed all requirements of MIL-C-55514.

See page 4 for Electrical Characteristics.

Marking

All capacitors shall be marked with E.C. and/or E.C. trademarks, the type (MC12), capacitance, tolerance, the rated D.C. working voltage and date code.

Date Code

The first two digits represents the year, the second two digits represents the week. ie: 8352 is the 52nd week of 1983. 8408 is the 8th week of 1984.

Quality Assurance

Emphasis is placed on quality assurance. The areas of raw material inspection, manufacturing process inspection and final product inspection are under constant surveillance by our quality control department. Complete quality control procedures are described in our quality control manual. E.C.I. will continue its progression by the use of advanced technology, ultraminiature capacitor designs and established reliability programs.

In the construction of the components described, the full intent of the specification will be met. Electronic Concepts, Inc., however, reserves the right to make from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products. Components made under military approvals will be in accordance with the approval requirements.

The information included herein is believed to be accurate and reliable. However, Electronic Concepts, Inc. assumes no responsibility for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

Catalog Numbering System

MC 12 B 106 K

**METALLIZED POLYCARBONATE
DIELECTRIC**

TOLERANCE

K = ±10% J = ±5%
G = ±2% F = ±1%

STYLE

Wrap and Fill
Axial Leads

VOLTAGE

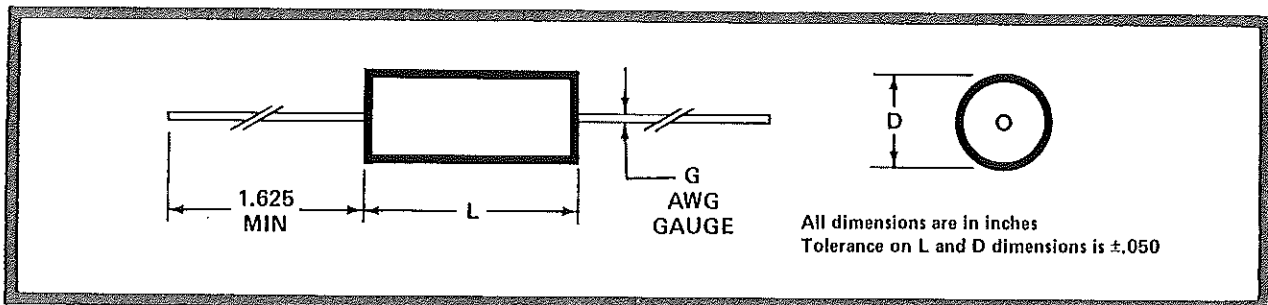
A - 30 vdc
B - 50 vdc
D - 100 vdc
F - 200 vdc
J - 400 vdc

CAPACITANCE

Expressed in Picofarads, the first two digits are significant figures. The third is the number of zeros. (e.g., 106 equals 10,000,000 pF)

EC Part No.	MFD	30 VDC			50 VDC			100 VDC			200 VDC			400 VDC		
		D	L	G	D	L	G	D	L	G	D	L	G	D	L	G
MC12-102-	.0010	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-122-	.0012	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-152-	.0015	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-182-	.0018	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-222-	.0022	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-272-	.0027	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-332-	.0033	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.400	24
MC12-392-	.0039	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.160	.400	24
MC12-472-	.0047	—	—	—	.150	.400	24	.160	.400	24	.160	.400	24	.170	.400	24
MC12-562-	.0056	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.530	24
MC12-682-	.0068	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.530	24
MC12-822-	.0082	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.150	.530	24
MC12-103-	.010	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.170	.530	24
MC12-123-	.012	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.180	.530	24
MC12-153-	.015	—	—	—	.150	.400	24	.150	.400	24	.150	.400	24	.200	.530	24
MC12-183-	.018	—	—	—	.150	.400	24	.150	.400	24	.160	.400	24	.220	.530	24
MC12-223-	.022	—	—	—	.150	.400	24	.150	.400	24	.170	.400	24	.240	.530	24
MC12-273-	.027	—	—	—	.150	.400	24	.150	.400	24	.150	.530	24	.270	.530	24
MC12-333-	.033	—	—	—	.150	.400	24	.150	.400	24	.150	.530	24	.290	.530	24
MC12-393-	.039	—	—	—	.150	.400	24	.150	.400	24	.160	.530	24	.270	.680	24
MC12-473-	.047	—	—	—	.150	.400	24	.150	.400	24	.180	.530	24	.300	.680	24
MC12-563-	.056	—	—	—	.150	.400	24	.160	.400	24	.190	.530	24	.330	.680	24
MC12-683-	.068	—	—	—	.150	.400	24	.180	.400	24	.210	.530	24	.320	.780	24
MC12-823-	.082	—	—	—	.150	.400	24	.150	.530	24	.230	.530	24	.350	.780	22
MC12-104-	.10	—	—	—	.150	.400	24	.160	.530	24	.250	.530	24	.380	.780	22
MC12-124-	.12	—	—	—	.150	.400	24	.170	.530	24	.270	.530	24	.410	.780	22
MC12-154-	.15	—	—	—	.160	.400	24	.190	.530	24	.310	.530	24	.400	.950	22
MC12-184-	.18	—	—	—	.150	.530	24	.200	.530	24	.290	.680	24	.440	.950	22
MC12-224-	.22	—	—	—	.150	.530	24	.220	.530	24	.320	.680	24	.410	1.170	22
MC12-274-	.27	—	—	—	.160	.530	24	.240	.530	24	.320	.780	24	.450	1.170	20
MC12-334-	.33	—	—	—	.180	.530	24	.260	.530	24	.350	.780	22	.500	1.170	20
MC12-394-	.39	—	—	—	.190	.530	24	.290	.530	24	.380	.780	22	.540	1.170	20
MC12-474-	.47	.200	.400	22	.200	.530	24	.260	.680	24	.410	.780	22	.590	1.170	20
MC12-564-	.56	.200	.400	22	.220	.530	24	.290	.680	24	.390	.950	22	.640	1.170	20
MC12-684-	.68	.230	.400	22	.240	.530	24	.290	.780	24	.360	1.170	22	.650	1.450	20
MC12-824-	.82	.260	.400	22	.260	.530	24	.310	.780	24	.390	1.170	22	.630	1.700	20
MC12-105-	1.0	.280	.400	22	.280	.530	24	.340	.780	24	.440	1.170	22	.660	1.900	20
MC12-125-	1.2	.250	.500	22	.260	.680	24	.370	.780	22	.480	1.170	20	.720	1.900	20
MC12-155-	1.5	.280	.500	22	.280	.680	24	.370	.950	22	.530	1.170	20	.800	1.900	20
MC12-185-	1.8	.290	.531	22	.290	.780	24	.400	.950	22	.580	1.170	20	.870	1.900	20
MC12-205-	2.0	.300	.531	22	.300	.780	24	.380	1.170	22	.610	1.170	20	.920	1.900	20
MC12-255-	2.5	.320	.531	22	.340	.780	24	.420	1.170	22	.620	1.450	20			
MC12-305-	3.0	.350	.531	22	.370	.780	22	.450	1.170	22	.610	1.700	20			
MC12-355-	3.5	.380	.531	22	.400	.780	22	.480	1.170	20	.660	1.700	20			
MC12-405-	4.0	.350	.625	22	.370	.950	22	.520	1.170	20	.660	1.900	20			
MC12-455-	4.5	.360	.625	22	.390	.950	22	.550	1.170	20	.700	1.900	20			
MC12-505-	5.0	.360	.687	22	.360	1.170	22	.580	1.170	20	.730	1.900	20			
MC12-605-	6.0	.380	.687	22	.390	1.170	22	.620	1.170	20	.800	1.900	20			
MC12-805-	8.0	.450	.687	20	.450	1.170	22	.630	1.450	20	.920	1.900	20			
MC12-106-	10.0	.490	.687	20	.500	1.170	20	.640	1.700	20	1.020	1.900	20			
MC12-126-	12.0	.470	.937	20	.540	1.170	20	.650	1.900	20						
MC12-156-	15.0	.530	.937	20	.600	1.170	20	.720	1.900	20						
MC12-186-	18.0	.580	.937	20	.580	1.450	20	.780	1.900	20						
MC12-206-	20.0	.600	.937	20	.610	1.450	20	.820	1.900	20						

Dimensional Data



Characteristics

OPERATING TEMPERATURE RANGE

-55°C + 125°C

INSULATION RESISTANCE

When measured at the applicable test temperature, and rated voltage, the insulation resistance shall equal or exceed the following values:

	25°C	85°C	125°C
Megohm x Microfarads	50,000	5,000	500

Except the insulation resistance in Megohms need not exceed

	100,000	50,000	5,000
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DISSIPATION FACTOR

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

CAPACITANCE CHANGE

The Capacitance change vs. temperature for these capacitors shall not exceed the following:

Temperature Degrees C.	-55	+25	+85	+125
Percent Change	-2.5	0	±1.0	±2.0

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.

VOLTAGE RATING

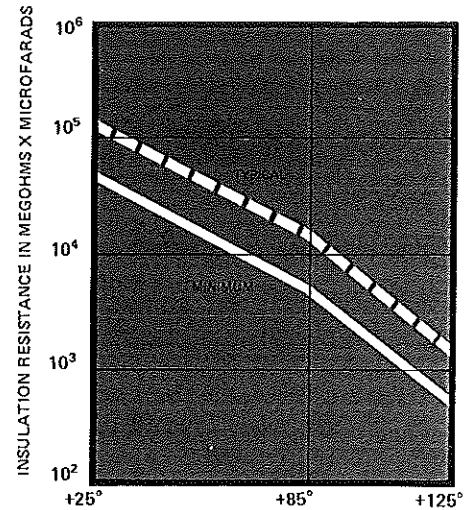
DC working voltage ratings at +125° C, 30 VDC, 50 VDC, 100 VDC, 200 VDC and 400 VDC.

CAPACITANCE RANGE

See Table

Note: Capacitance shall be measured at 25° C, and at or referred to a frequency of 1 kHz.

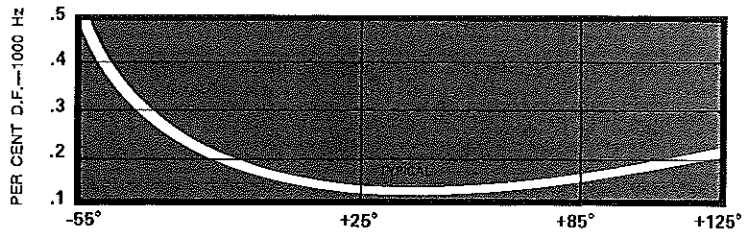
INSULATION RESISTANCE VS. TEMPERATURE



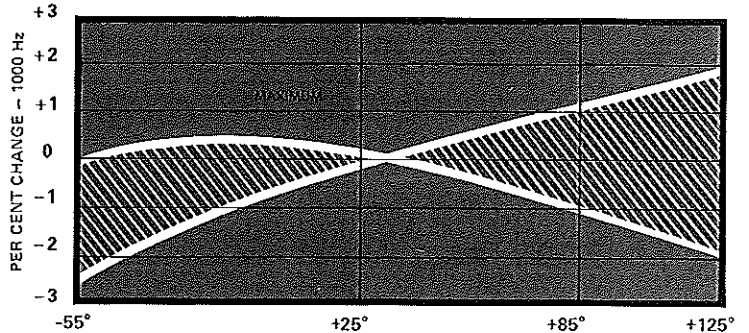
ELECTRICAL CHARACTERISTICS VS. TEMPERATURE

TEMPERATURE IN DEGREES CENTIGRADE

DISSIPATION FACTOR VERSUS TEMPERATURE



CAPACITANCE CHANGE VERSUS TEMPERATURE



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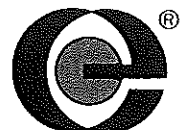
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