TYPE 131P

PAPER / POLYESTER DIELECTRIC EXTENDED FOIL ELECTRODES

FEATURES

- Moderate cost
- Small size
- High peak current ratings
- High corona starting voltage
- Approved to MIL-PRF-19978

MAJOR APPLICATIONS:
High voltage, high current, high pulse operations, protection circuits, and snubber applications.

PHYSICAL CHARACTERISTICS

CONSTRUCTION:
Non-inductive wound paper / polyester dielectric with extended foil electrodes. Impregnated with vitamin Q.

CASE:
Hermetically sealed metal enclosure. Styles and dimensions are in Guide to Ordering section in the front of the catalog.

LEAD MATERIAL:
Solder coated solid wire.

LEAD WIRE SIZES:

Case Dia.	Lead AWG
0.235 and 0.312	No. 22
0.400 and over	No. 20

LEAD PULL:
5 lbs (2.3 kg) for one minute. No physical damage.

LEAD BEND:
After three complete consecutive bends. No damage.

MARKING:
Dearborn trademark, type or catalog number, capacitance, tolerance, and voltage.

ELECTRICAL SPECIFICATIONS

CAPACITANCE RANGE:
0.001 µF to 1.0 µF

VOLTAGE RATING:
200 VDC to 1,000 VDC

CAPACITANCE TOLERANCE:
±20%, ±10%, ±5%

OPERATING TEMPERATURE:
-65°C to +125°C

VOLTAGE DERATING:
At +125°C, 50% of the 85°C rating

DISSIPATION FACTOR:
1.0% maximum

DC VOLTAGE TEST:
200% of rated voltage for 2 minutes

INSULATION RESISTANCE:
Measure at rated VDC or 500 V, whichever is less, after a 2 minute charge.

- At +25°C, 20,000 Megaohm-Microfarads, need not exceed 30,000 Megaohms
- At +125°C, 20 Megaohm-Microfarads, need not exceed 250 Megaohms

MAXIMUM PULSE RISE TIME

Capacitor Length (inch)	Rise Time dv / dt (V / µs)			
	200 VDC	400 VDC	600 VDC	1,000 VDC
0.750	1600	1600	4500	-
0.875	1000	1400	1500	2500
1.125	500	800	1000	1500
1.375	350	500	800	1000
1.625	250	350	500	800
1.875	-	-	-	550
2.125	200	300	400	500
2.375	-	-	300	450

STANDARD RATINGS

Capacitance		Voltage Code 200 200 VDC		Voltage Code 400 400 VDC		Voltage Code 600 600 VDC		Voltage Code 1K0 1,000 VDC	
µF	Code	D	L	D	L	D	L	D	L
0.0010	102	-	-	-	-	0.235	0.750	0.400	0.875
0.0015	152	-	-	-	-	0.235	0.750	0.400	0.875
0.0022	222	-	-	-	-	0.235	0.750	0.400	0.875
0.0033	332	-	-	0.235	0.750	0.312	0.875	0.400	0.875
0.0047	472	0.235	0.750	0.235	0.750	0.312	0.875	0.400	0.875
0.0068	682	0.235	0.750	0.235	0.750	0.312	0.875	0.400	0.875
0.010	103	0.235	0.750	0.235	0.750	0.312	0.875	0.400	0.875
0.015	153	0.312	0.875	0.312	0.875	0.400	0.875	0.400	1.125
0.022	223	0.312	0.875	0.400	0.875	0.400	0.875	0.400	1.375
0.033	333	0.312	0.875	0.400	0.875	0.400	1.125	0.562	1.125
0.047	473	0.400	0.875	0.400	1.125	0.400	1.375	0.562	1.375
0.068	683	0.400	0.875	0.400	1.375	0.562	1.125	0.562	1.625
0.10	104	0.400	1.125	0.562	1.125	0.562	1.375	0.670	1.625
0.15	154	0.400	1.375	0.562	1.375	0.562	1.625	0.670	1.875
0.22	224	0.562	1.125	0.562	1.625	0.670	1.625	0.750	2.125
0.33	334	0.562	1.375	0.670	1.625	0.750	2.125	1.000	2.125
0.47	474	0.562	1.625	0.750	2.125	0.750	2.375	1.000	2.375
0.68	684	0.670	1.625	-	-	-	-	-	-
1.00	105	0.750	2.125	-	-	-	-	-	-

Additional capacitance values, voltages, and tolerances are available upon request.

* The dimensions shown are for style 02. The dimensions for other styles are included in the general section in the front of the catalog.

MILITARY APPROVED FILM CAPACITORS

MIL STYLE CAPACITORS

Military style capacitors are manufactured by Dearborn Electronics, Inc. to meet all the requirements of the pertinent military specifications. All capacitors ordered by the military part number will be manufactured, tested and marked in accordance with the military specifications. The military specification shall be used for verification for specific operational parameters and other characteristics.

COPIES OF THE MIL SPECS ARE AVAILABLE:
www.landandmaritime.dla.mil / Programs / MilSpec / DocSearch.aspx

ESTABLISHED RELIABILITY CAPACITORS

The reliability of these capacitors is established by continuous life testing performed at maximum rated voltage and maximum rated temperature. The maximum failure rate at 90% confidence level is expressed as percent failures for each 1,000 hours of test. Dearborn has attained a failure rate level of 0.001% per 1,000 hrs on certain of these specifications. This is the lowest failure rate available for these specifications and the true failure rates are much lower than stated. The failure rate levels attained for each specification are listed on the following page. Failure rate levels are 1% / 1,000 hrs (M), 0.1% / 1,000 hrs (P), 0.01% / 1,000 hrs (R), and 0.001% / 1,000 hrs (S).

MILITARY SPECIFICATION QUALIFICATIONS

Military Specifications	Style	Characteristic / Dielectric	Voltage Rating	Dearborn Type	Remarks	Failure Rate Level	Active / Inactive
C-25 / 4	CP53, 54, 55	E, F, K, Paper& / or Foil Polyester-Foil	100-1000	154P	-	Non ER	A
PRF-11693 / 7	CZ23 / CZ24	E, K, Paper / Foil	100-600	103P	-	Non ER	A
PRF-11693 / 7	CZR23 / CZR24	E, K, Paper / Foil	100-600	103P	-	M	A
C-18312 / 2	CH09	R, N, Paper / Polyester Met.	50-600	218P, 118P	See 39022 / 1	Non ER	I
C-18312 / 3	CH12	N, Paper / Polyester Met.	200-600	118P	See 39022 / 8	Non ER	I
PRF-19978 / 1	CQ08, 9, 12, 13	K, Paper / Polyester-Foil	200-1000	131P	See 19978 / 9, 10, 11	Non ER	I
PRF-19978 / 1	CQ08, 9, 12, 13	M, Polyester-Foil	30-1000	127P	See 19978 / 13, 14,15	Non ER	I
PRF-19978 / 2	CQ20	K, Paper / Polyester-Foil	1kV-15kV	205P	-	Non ER	A
PRF-19978 / 3	CQ72	E, F, G, Paper / Polyester-Foil K	400-12.5kV	263P	-	Non ER	A / I
PRF-19978 / 9	CQR09	K, Paper / Polyester-Foil	200-1000	131P	-	M, P, R	A
PRF-19978 / 10	CQR12	K, Paper / Polyester-Foil	200-1000	131P	-	M, P, R	A
PRF-19978 / 11	CQR13	K, Paper / Polyester-Foil	200-1000	131P	-	M, P, R	A
C-19978 / 12	CQR19	K, Paper / Polyester-Foil	200-600	131P	See 19978 / 9	M, P, R	I
PRF-19978 / 13	CQR29	M, Polyester / Foil	30-1000	127P	-	M, P, R	A
PRF-19978 / 14	CQR32	M, Polyester / Foil	30-1000	127P	-	M, P, R	A
PRF-19978 / 15	CQR33	M, Polyester / Foil	30-1000	127P	-	M, P, R	A
C-19978 / 16	CQR39	K, Paper / Polyester-Foil	100-1000	131P	See 19978 / 9	M, P, R	I
C-19978 / 17	CQR42	K, Paper / Polyester-Foil	100-1000	131P	See 19978 / 10	M, P, R	I
C-19978 / 18	CQR43	K, Paper / Polyester-Foil	100-1000	131P	See 19978 / 11	M, P, R	I
C-19978 / 19	CQ05	K, Paper / Polyester-Foil	100-1000	131P	See 19978 / 9	M, P, R	I
C-19978 / 20	CQ10	K, Paper / Polyester-Foil	100-1000	131P	See 19978 / 10	M, P, R	I
C-19978-21	CQ11	K, Paper / Polyester-Foil	100-600	131P	See 19978 / 11	M, P, R	I
PRF-19978 / 22	CQR44	U, Polyphenylene Sulfide-Foil	50-600	837P	Replaces / 8	Pending	A
PRF-39022 / 1	CHR09	R, N, Met	50-600	218P, 118P	-	M, P, R	A
PRF-39022 / 2	CHR19	N, Met. Paper & Polyester	200-600	118P	-	M, P, R	A
PRF-39022 / 8	CHR12	R, N, Met. Paper & / or Polyester	50-600	218P, 118P	-	M, P, R	A
PRF-39022 / 12	CHR26	Met. Polyphenylene Sulfide	80-400AC	859P	Replaces / 7	M, P, R, S	A
PRF-39022 / 13	CHR27	Met. Polyphenylene Sulfide	50-600	820P	Replaces / 10	M, P, R, S	A
PRF-55514 / 9	CFR13, 14	L. Met. Polypropylene	100-400	735P	-	M, P	A
PRF-55514 / 10	CFR15	K, Polypropylene-Foil	200-800	710P	-	M, P	A
PRF-55514 / 13	CFR30	Met. Polyphenylene Sulfide	50-200	846P	Replaces / 7	M, P	A
PRF-83421 / 2	CHR11, 12, 13	L, Met. Polypropylene	100-400	720P	-	M, P	A
PRF-84321 / 6	CHR31, 32, 33, 34, 35	Met. Polyphenylene Sulfide	30-400	871P	Replaces / 1	M, P, R, S	A

GUIDE TO FILM CAPACITORS

Dearborn Electronics has more than six decades of experience in developing and manufacturing a wide selection of capacitors for professional and industrial applications.

Our position as a market leader is based on a comprehensive knowledge of the material used and of the performance they can attain. The different technologies developed enable us to meet the users need.

THE CATALOG INCLUDES THE FOLLOWING CAPACITORS:

FOR GENERAL APPLICATIONS:

- Metalized Polyester & Polyester Film / Foil
- Metalized Polypropylene & Polypropylene Film / Foil
- Metalized Polyphenylene Sulfide & Polyphenylene Sulfide Film / Foil

FOR SPECIFIC APPLICATIONS:

- High-Voltage Capacitors
- High-Stability Capacitors
- High-Frequency Switch Mode Power Supplies
- Energy Storage Capacitors
- Military Approved Film Capacitors
- Custom Designed Capacitors

All descriptions, drawings and other data, including dimensions, materials and performance are supplied in this catalogue with the strictest possible accuracy. Nevertheless, the data provided is to be considered general information and can under no circumstance involve Dearborn Electronics liability unless a written agreement has been concluded.

All mechanical and electrical characteristics may vary within reasonable limits depending on the performance of the materials used and on rated manufacturing tolerances.

METALIZED FILM CAPACITORS & FILM FOIL CAPACITORS

Dearborn Electronics film capacitors are obtained by winding two or more layers of dielectric plastic film and metal foil.

The metal is applied by evaporation under vacuum on the dielectric (metalized film capacitors) or consist of separate metal foils (film-foil capacitors).
The leads are connected by soldering or brazing.

PROPERTIES OF DIELECTRIC FILMS

POLYESTER (Polyethylene Terephtalate, P.E.T.)

Capacitors with smaller dimensions can be manufactured due to the high dielectric constant and excellent electrical performance of this film. Metalized polyester capacitors also have outstanding self-healing properties.

POLYPROPYLENE (P.P.)

This film features very low dielectric losses, low dielectric adsorption, high dielectric strength, very high insulating strength and a practically linear temperature coefficient in all temperature ranges.

All these properties make this film suitable for the manufacturing of power electronics capacitors.

However, the operating temperature is limited to 105°C.

POLYPHENYLENE SULFIDE (P.P.S.)

The properties of this film are as follows: very low dielectric losses, low temperature coefficient, high stability of the capacitance value, resistant to humidity and a high melting point. This material is suited for surface mounted precision capacitors (SMD). This film also has high temperature advantages and can be used for temperature up to 150°C.

PROPERTIES OF METALIZED FILM CAPACITORS

The metalized film consists of an extremely thin layer (some hundredths µm) of zinc or aluminum deposited by evaporation under vacuum on the dielectric. The nature, thickness and geometry of the metalized layer modify the properties of the capacitors, especially as far as permissible peak or effective current is concerned.

Metalized film capacitors are smaller than film-foil capacitors.

Self-healing is a fundamental property of these capacitors. When a dielectric breakdown occurs between the metal layers, due to a dielectric failure, an electrical arc causes local vapor deposition of the metallization which results in an insulating metallic oxide. Thus regenerated, the capacitor is once again operational.

The self-healing operation generally requires only a very small amount of energy (5 to 15 µJoules) and is performed in several µseconds (< 50). However, a minimum amount of energy is required below which self-healing operations are unpredictable. This energy is calculated in relation to the capacitance value and the load voltage: $E = 1 / 2\ CV^2$.

PROPERTIES OF FILM-FOIL CAPACITORS

Film Foil capacitors are especially recommended to meet high voltage or current and / or power stresses.

The thickness of the metal foil enables the reduction of the series resistance and improves the general performance of the capacitors. These improvements are made to the detriment of the volume of the capacitor which also loses its self-healing properties. Composite dielectrics combine films of different types with complementary specific characteristics.

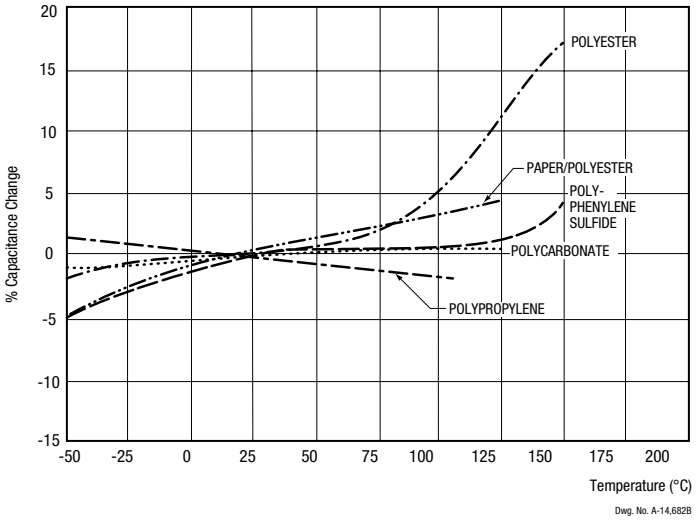
For high voltage and power electronics applications, these capacitors are usually impregnated with impregnating fluids or solid substances.

CAPACITOR PERFORMANCE VS. TEMPERATURE

The capacitors' performance versus temperature essentially depends upon the dielectric type.

The figure below shows ranges of operating temperatures.

% OF CAPACITANCE CHANGE VS. TEMPERATURE (°C)

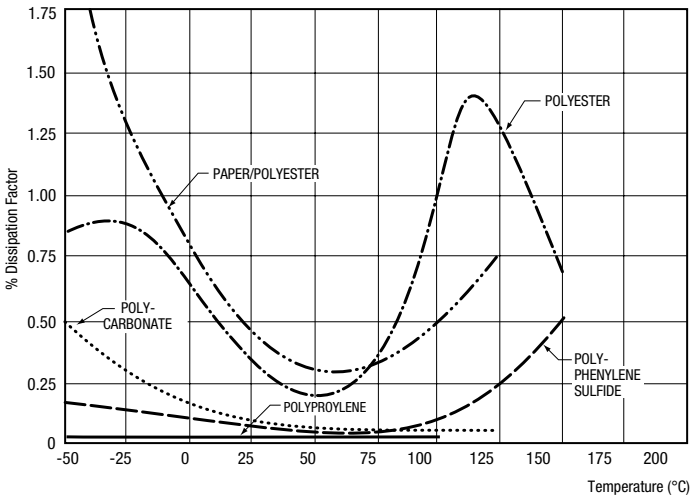


Dwg. No. A-14,682B

Important differences affect the laws governing the changes of the main electrical characteristics.

They are highlighted by the following curves:

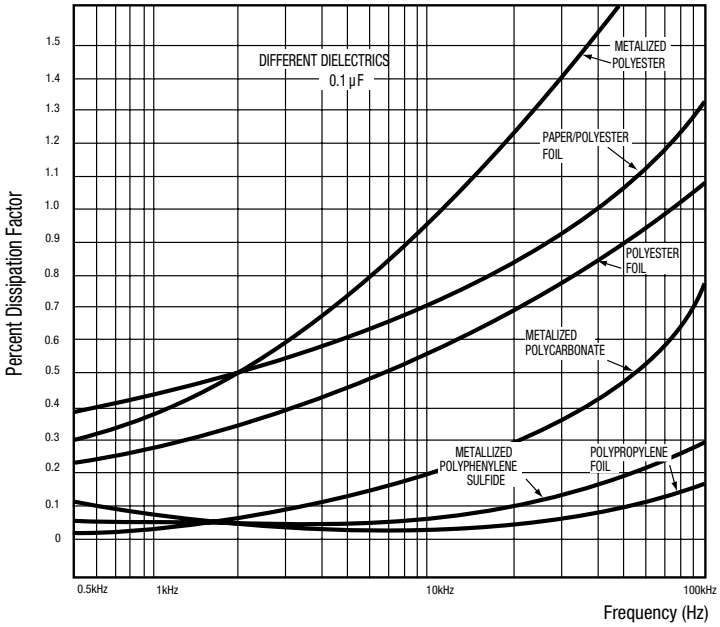
% OF DISSIPATION FACTOR (DF) VS. TEMPERATURE (°C)



Dwg. No. A-14,683C

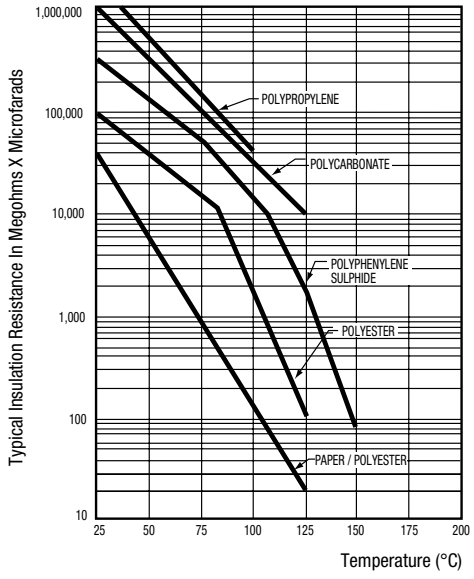
PROPERTIES OF DIELECTRIC FILMS

% OF DISSIPATION FACTOR (DF) VS. FREQUENCY (HZ)



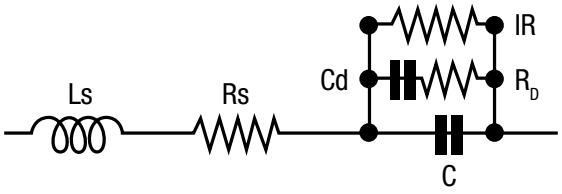
Dwg. No. A-14,684B

IR VS. TEMPERATURE (°C)



Dwg. No. A-14,687B

A REAL CAPACITOR MAY BE REPRESENTED BY THE FOLLOWING DIAGRAM:



Series Inductance	Ls
Resistance of metal foil & connections	Rs
Insulation Resistance	IR
Dielectric Absorption	Cd
Resistance equivalent to the dielectric losses	R_D
Capacitance	C

Resistive terms generate temperature rises when the capacitors carry AC current (I_{rms}). Depending upon the frequency range, they may be more or less preponderant.

THE EQUIVALENT SERIES RESISTANCE (ESR) IS THE SUM OF THE FOLLOWING TERMS:

$$ESR = Rs + DF / C\omega + 1 \ / \ IR\ C^2\ \omega^2$$

When the frequency increases, the term $1 / IRC^2\omega^2$ becomes rapidly insignificant.

For plastic dielectrics, losses remain constant within a wide range of frequencies and the affect of the term: $DF / C\omega$ decreases: $ESR = Rs + DF / C\omega$

The metal foil and the connections are designed to obtain a resistance value (Rs) as low as possible. This value is dependent on the capacitors' technology and geometry.

Inductance (Ls) also disturbs the equation of the capacitors at high frequencies.

IMPEDANCE (Z) IS STATED AS FOLLOWS:

$$Z = Rs^2 + (Ls\omega - 1 / C\omega)^2$$

When frequency increases, the affect of Ls will gradually cancel the capacitance component of the capacitors until it reaches the resonance frequency where:

$$Z = Rs \text{ and } LC\omega^2 = 1$$

GENERAL INFORMATION ON POLYESTER CAPACITORS

GENERAL INFORMATION

One of the principle characteristics of these capacitors is their small size. This is due to the high dielectric constant and high dielectric strength of the film. They also have superior self-healing properties. They may be used in AC sine wave or non sine wave applications.

GENERAL ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS:

Capacitance, dissipation factor, insulation resistance, and dielectric strength shall be measured as specified.

PHYSICAL CHARACTERISTICS:

The lead strength shall be measured as specified.

ENVIRONMENTAL CHARACTERISTICS:

Vibration Test:

Units shall be tested as required. As a result of the test no mechanical damage, short, open or intermittent circuit.

MOISTURE RESISTANCE:

The hermetically sealed units shall be tested.

As a result of the test there shall be:

- No visible damage
- Max. Δ C of $\pm$ 10%
- Min. IR = 50% of initial limit
- Max. DF = 2.0%

HUMIDITY TEST:

The non-hermetically sealed units shall be tested.

As a result of the test there shall be:

- No visible damage
- Max. Δ C of $\pm$ 10%
- Min. IR = 20% of initial limit
- Max. DF = 2.0%

DC LIFE:

125% of rated voltage at 85°C (125°C for Type 218P) for 250 hours except for Type 430P units rated at 1,000 VDC or greater which shall be tested at 100% of rated voltage at 40°C for 1,000 hours.

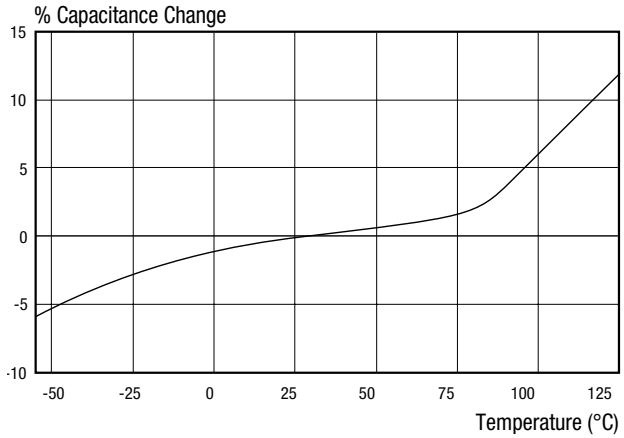
As a result of the test there shall be:

- No permanent open or short circuit
- No visible damage
- Max. Δ C of $\pm$ 10%
- Min. IR = 50% of initial limit
- Max. DF = 2.0%

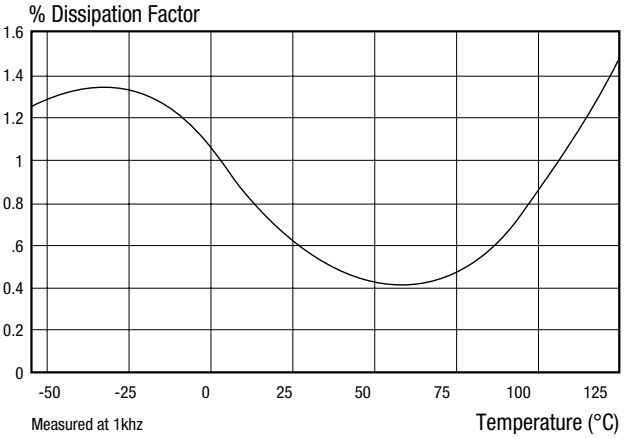
GENERAL INFORMATION ON POLYESTER CAPACITORS

CHARACTERISTICS

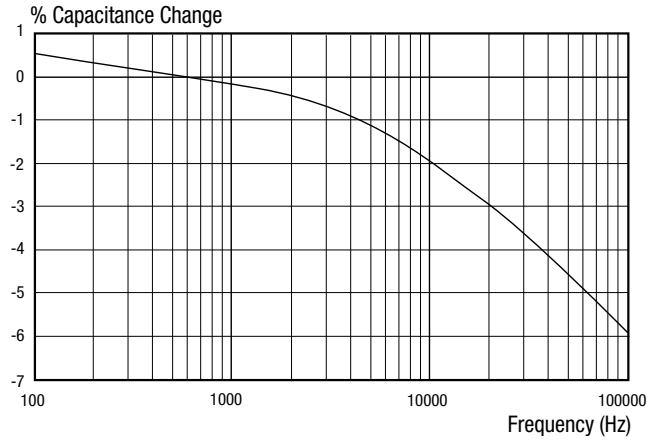
CAPACITANCE CHANGE VS. TEMPERATURE - METALIZED POLYESTER



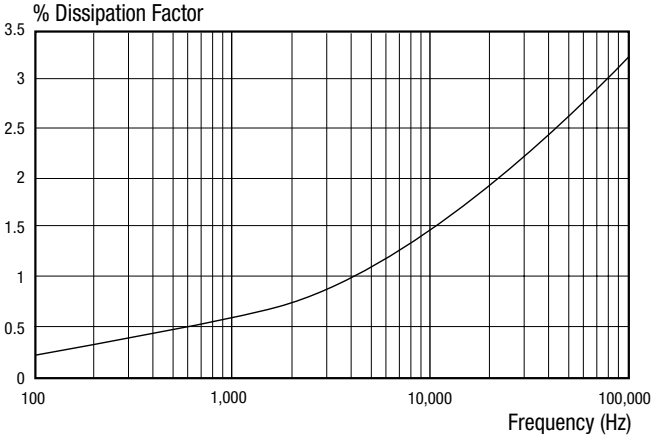
DISSIPATION FACTOR VS. TEMPERATURE - METALIZED POLYESTER



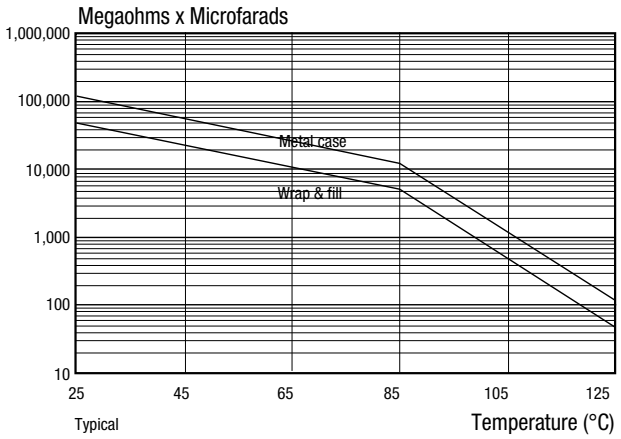
CAPACITANCE CHANGE VS. FREQUENCY - METALIZED POLYESTER



DISSIPATION FACTOR VS. FREQUENCY - METALIZED POLYESTER



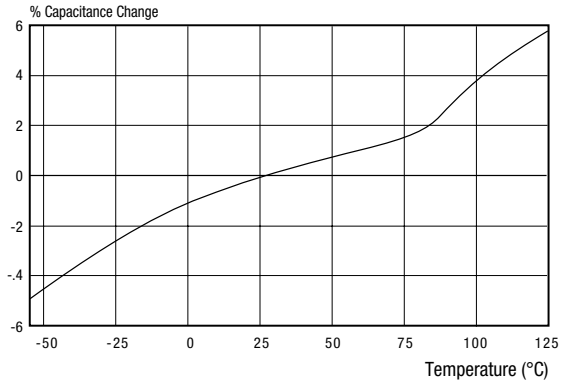
INSULATION RESISTANCE VS. TEMPERATURE - METALIZED POLYESTER



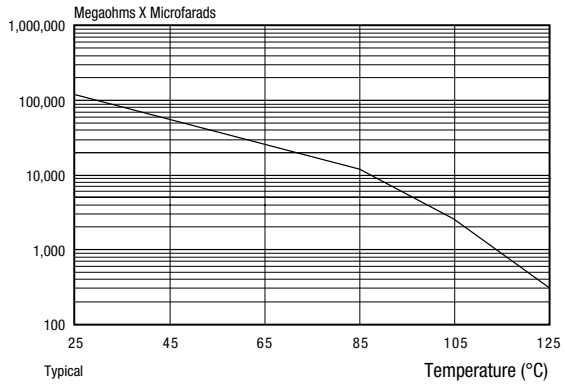
TYPICAL CHARACTERISTICS POLYESTER FILM / FOIL TYPES

TYPICAL CHARACTERISTICS

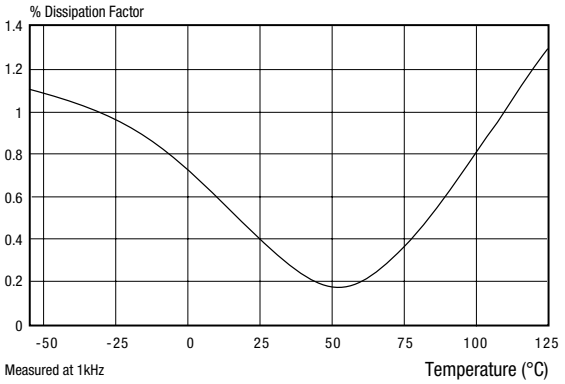
CAPACITANCE CHANGE VS. TEMPERATURE



INSULATION RESISTANCE VS. TEMPERATURE



DISSIPATION FACTOR VS. TEMPERATURE



GENERAL INFORMATION ON POLYPROPYLENE CAPACITORS

GENERAL INFORMATION

Polypropylene has excellent mechanical, chemical and electrical properties due to its non-polar structure. This film is characterized by very low dielectric losses, small dielectric absorption, high dielectric strength, very high insulating resistance and a practically linear temperature coefficient in all temperature ranges. All these properties make this film highly attractive for manufacturing precision capacitors or for power electronics capacitors.

GENERAL ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS:

Capacitance, dissipation factor, insulation resistance, and dielectric strength shall be measured as specified.

PHYSICAL CHARACTERISTICS:

The Lead Strength shall be measured as specified.

ENVIRONMENTAL CHARACTERISTICS:

Vibration Test:
Units shall be tested as required. As a result of the test no mechanical damage, short, open or intermittent circuit.

MOISTURE RESISTANCE:

The hermetically sealed units shall be tested.

As a result of the test there shall be:

- No visible damage
- Max. Δ C of ± 0.25%
- Min. IR = 33% of initial limit
- Max. DF = 0.12%

HUMIDITY TEST:

The Non-Hermetically sealed units shall be tested.

As a result of the test there shall be:

- No visible damage
- Max. Δ C of ± 2%; ±5% for 731P, 744G, 752P, and 781P
- Min. IR = 20% of initial limit
- Max. DF = 0.12%

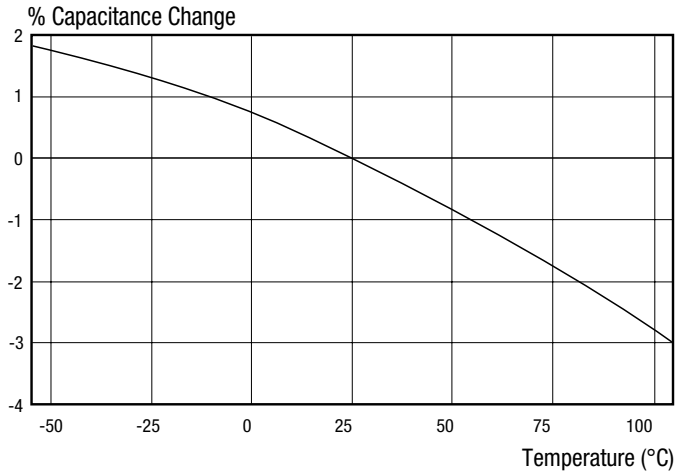
DC LIFE:

125% of rated voltage at 85°C for 250 hours (110% for 781P, 70°C for 730G).

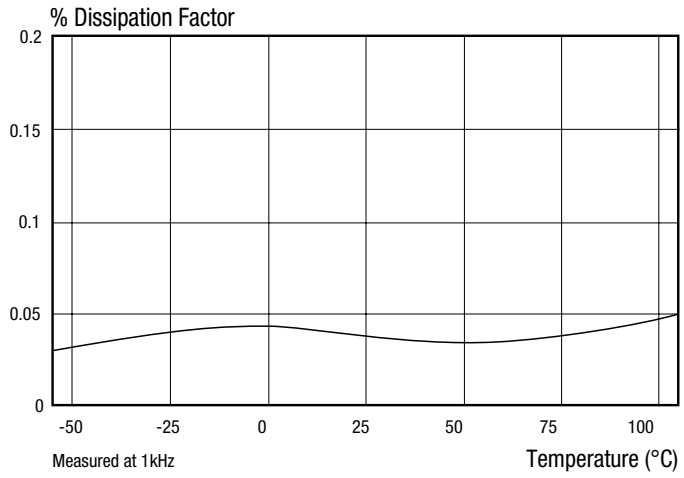
As a result of the test there shall be:

- No open or short circuit
- No visible damage
- Max. Δ C of ± 2%; 3% for 781P
- Min. IR = 33% of initial limit
- Max. DF = 0.12%; 2.5% for 781P

CAPACITANCE CHANGE VS. TEMPERATURE - METALIZED POLYPROPYLENE

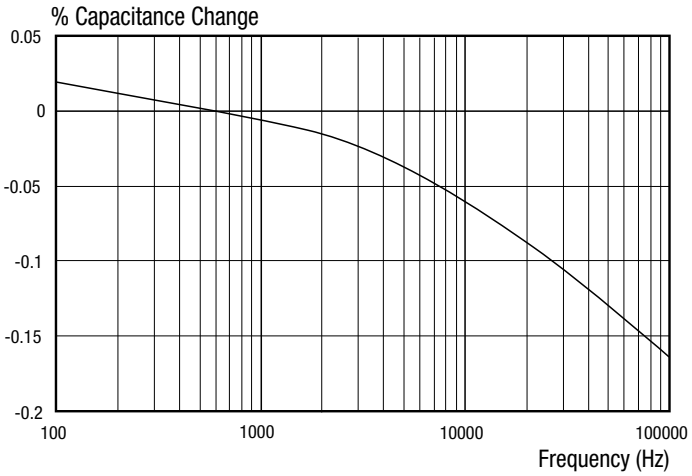


DISSIPATION FACTOR VS. TEMPERATURE - METALIZED POLYPROPYLENE

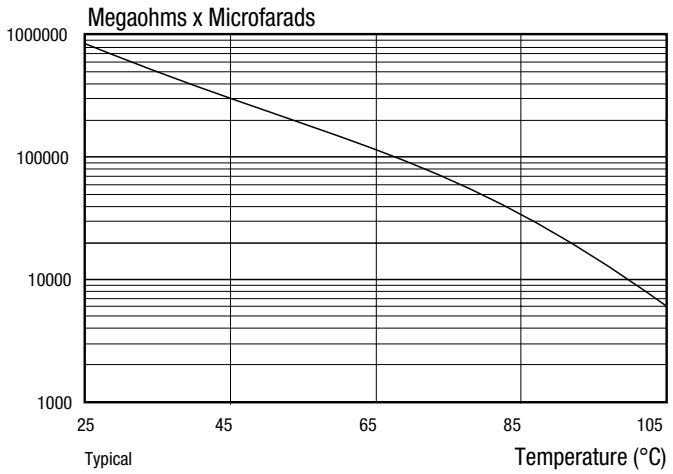


GENERAL INFORMATION ON POLYPROPYLENE CAPACITORS

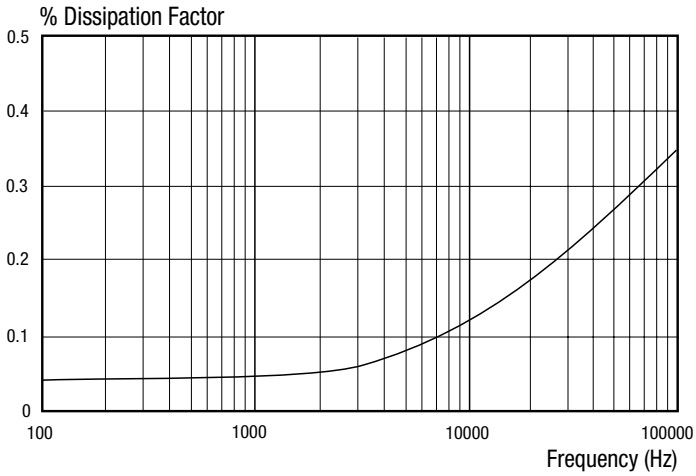
CAPACITANCE CHANGE VS. FREQUENCY - METALIZED POLYPROPYLENE



INSULATION RESISTANCE VS. TEMPERATURE - METALIZED POLYPROPYLENE



DISSIPATION FACTOR VS. FREQUENCY - METALIZED POLYPROPYLENE



GENERAL INFORMATION ON POLYPHENLYENE SULFIDE CAPACITORS

GENERAL ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS:

Capacitance, dissipation factor, insulation resistance, and dielectric strength shall be measured as specified.

PHYSICAL CHARACTERISTICS:

The lead strength shall be measured as specified.

ENVIRONMENTAL CHARACTERISTICS:

Vibration Test:

Units shall be tested as required. As a result of the test no mechanical damage, short, open or intermittent circuit.

MOISTURE RESISTANCE:

The hermetically sealed units shall be tested.

As a result of the test there shall be:

- No visible damage
- Min. IR = 50% of initial limit
- Max. Δ C of ± 5%
- Max. DF = 0.5%

HUMIDITY TEST:

The non-hermetically sealed units shall be tested.

As a result of the test there shall be:

- No visible damage
- Min. IR = 50% of initial limit
- Max. Δ C of ± 5%
- Max. DF = 0.5%

DC LIFE:

820P, 842P, 859P are tested in accordance with the applicable Mil Spec.

810P, 832P, 860P & 882P: 140% of rated voltage at 125°C for 250 hours

880P: 125% of rated voltage for 250 hours at 150°C.

As a result of the test there shall be:

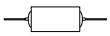
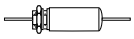
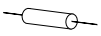
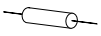
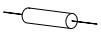
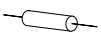
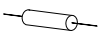
- No permanent open or short circuit
- Max. Δ C of ± 5%
- Max. DF = 0.3%
- No visible damage
- Min. IR = 50% of initial limit

AC LIFE:

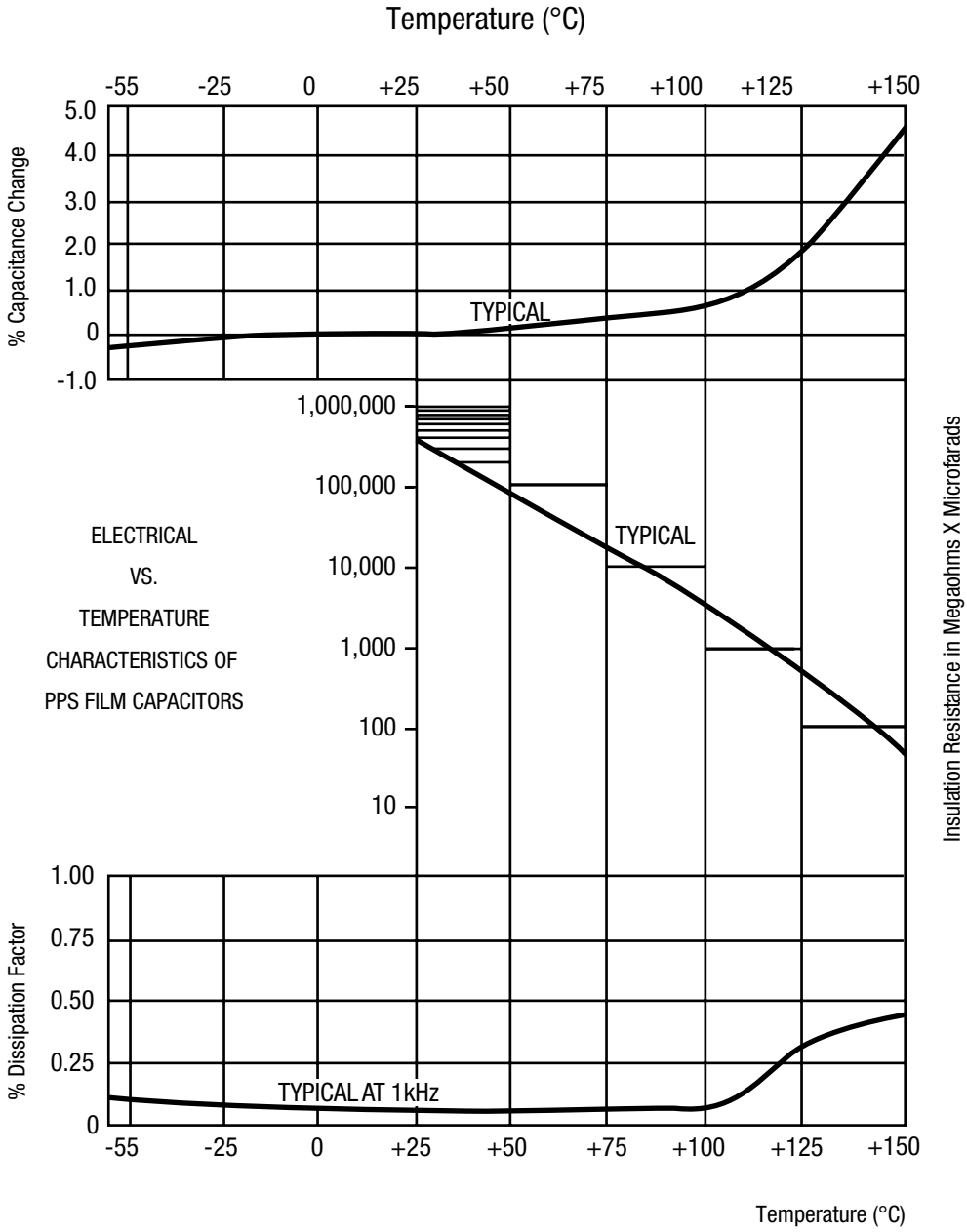
The Type 859P shall be tested at 110% of the rated rms voltage at 400Hz for 250 hours at 85°C.

As a result of the test there shall be:

- No permanent open or short circuit
- Max. Δ C of ± 5%
- Max. DF = 0.5%
- No visible damage
- Min. IR = 50% of initial limit

METALIZED POLYCARBONATE / POLYPHENYLENE SULFIDE								
POLYPHENYLENE SULFIDE (Replacement for Polycarbonate)			POLYCARBONATE		POLYCARBONATE / POLYPHENYLENE SULFIDE			
Part Number	Mil Spec Number	Catalog Page	Part Number	Mil Spec Number	Outline Drawing	Description	Cap Range µF	DC Voltage Range
859P	39022 / 12	40	259P	39022 / 7		AC Rated -55°C to +105°C	0.01 - 10.0	80 - 440 VAC
860P	-	42	260P	-		Various Configurations 55°C to +105°C	0.01 - 10.0	200 - 600
820P	39022 / 13	37	620P	39022 / 10		Small Size -55°C to +125°C	0.01 - 15.0	50 - 400
-	95008	-	629P	83439 / 4 / 6 95008		Feed Thru -55°C to +125°C	0.01 - 15.0	50 - 400
832P	-	137	632P	-		Wrap & Fill -55°C to +125°C	0.001 - 10.0	63 - 400
842P	55514 / 13	140	642P	55514 / 7		Miniature Wrap & Fill -55°C to +125°C	0.01 - 15.0	50 - 200
880P	-	143	-	-		High Temp, PPS -55°C to +150°C	0.0047 - 10.0	50 - 400
FILM / FOIL POLYCARBONATE / POLYPHENYLENE SULFIDE								
810P	-	147	610P	-		Pulse Capacitor -55°C to +125°C	0.001 - 1.0	50 - 400
882P	-	149	-	-		Zero TCC PPS -55°C to +125°C	0.001 - 0.22	200

GENERAL INFORMATION ON POLYPHENLYENE SULFIDE CAPACITORS



Dwg. No. A-14,582

GENERAL INFORMATION ON HIGH VOLTAGE CAPACITORS

GENERAL INFORMATION

CONSTRUCTION

Various composite dielectrics (plastic + paper or reconstituted mica) are used for manufacturing high-voltage capacitors.

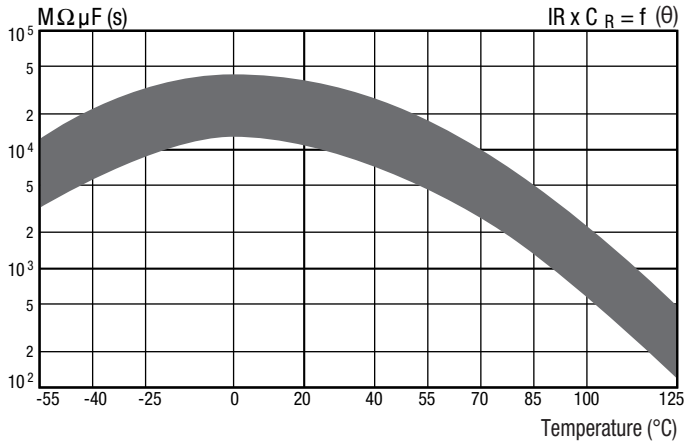
They are impregnated with solid thermo-setting resins such as epoxy, polyester or silicons.

This technology gives very high stability of mechanical and electrical characteristics with a temperature range of - 55°C to + 125°C or + 155°C and even + 200°C on request.

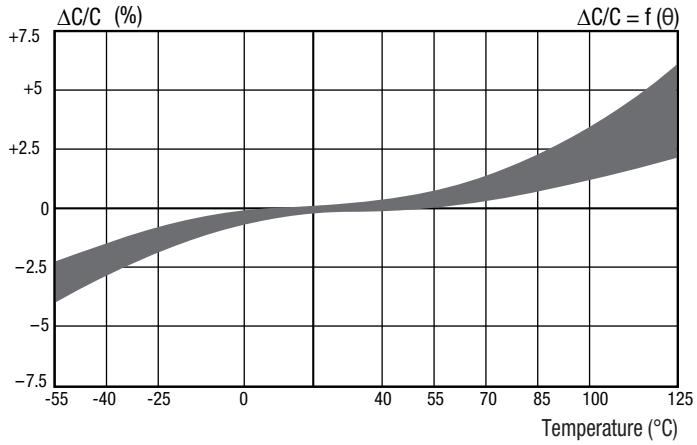
Rated voltage is applicable for all temperature ranges indicated on the data sheet (DHT 78 - DHT 86 - DHT 97).

ELECTRICAL CHARACTERISTICS VS. TEMPERATURE
(Plastic composite)

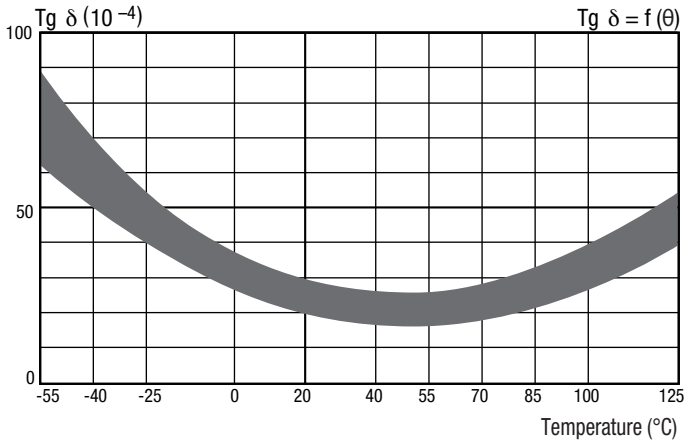
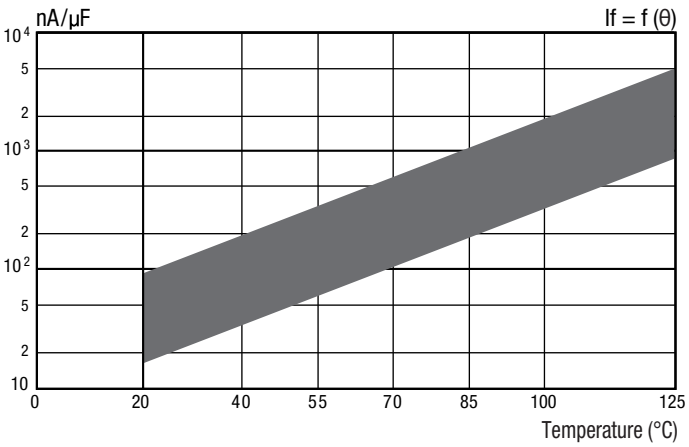
INSULATION RESISTANCE CHANGE VS. TEMPERATURE



CAPACITANCE CHANGE VS. TEMPERATURE



DISSIPATION FACTOR VS. TEMPERATURE



LEAKAGE CURRENT VARIATION VS. TEMPERATURE