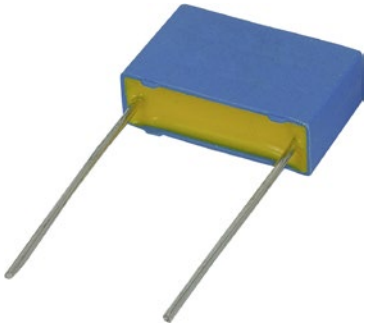
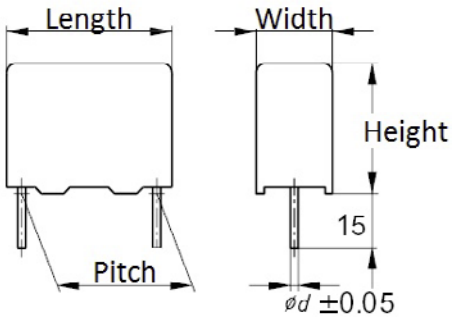
Polyester Capacitors

MKT Metallized Polyester Film Capacitors





High moisture resistance

Non-inductive construction and self-healing property

Flame retardant epoxy resin coating

SPECIFICATION:

Capacitance tolerance	±10%
Min. Temperature	-40 °C
Max. temperature	+105 °C
Dielectric	Metallized polyester
Loss factor	1%max @ 1KHz

PRODUCT RANGE:

Art. Nr.	Capacitance	Rated voltage	Pitch	Width	Height	Length
RND 150MKT103K2AB	0.01 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT103K2EB	0.01 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT103K2GB	0.01 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT103K2JB	0.01 µF	630 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT153K2AB	0.015 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT153K2EB	0.015 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT153K2GB	0.015 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT153K2JB	0.015 µF	630 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT154K2AB	0.15 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT154K2EB	0.15 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT154K2GB	0.15 µF	400 VDC	15 mm	5 mm	11 mm	18 mm
RND 150MKT223K2AB	0.022 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT223K2EB	0.022 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT223K2GB	0.022 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT223K2JB	0.022 µF	630 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT224K2AB	0.22 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT224K2EB	0.22 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT224K2JB	0.22 µF	630 VDC	15 mm	10 mm	16 mm	18 mm
RND 150MKT333K2AB	0.033 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT333K2EB	0.033 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT333K2GB	0.033 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT333K2JB	0.033 µF	630 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT334K2AB	0.33 µF	100 VDC	10 mm	6 mm	12 mm	13 mm
RND 150MKT334K2EB	0.33 µF	250 VDC	15 mm	5 mm	11 mm	18 mm
RND 150MKT334K2GB	0.33 µF	400 VDC	15 mm	7 mm	13 mm	18 mm
RND 150MKT473K2AB	0.047 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT473K2EB	0.047 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT473K2GB	0.047 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT473K2JB	0.047 µF	630 VDC	15 mm	5 mm	11 mm	18 mm
RND 150MKT474K2AB	0.47 µF	100 VDC	10 mm	6 mm	12 mm	13 mm
RND 150MKT474K2EB	0.47 µF	250 VDC	15 mm	6 mm	12 mm	18 mm

Art. Nr.	Capacitance	Rated voltage	Pitch	Width	Height	Length
RND 150MKT474K2GB	0.47 µF	400 VDC	15 mm	7 mm	13 mm	18 mm
RND 150MKT563K2AB	0.056 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT563K2EB	0.056 µF	250 VDC	10 mm	5 mm	11 mm	18 mm
RND 150MKT563K2GB	0.056 µF	400 VDC	10 mm	5 mm	11 mm	18 mm
RND 150MKT563K2JB	0.056 µF	630 VDC	15 mm	5 mm	11 mm	18 mm
RND 150MKT564K2AB	0.56 µF	100 VDC	15 mm	7 mm	13 mm	18 mm
RND 150MKT564K2EB	0.56 µF	250 VDC	15 mm	7 mm	13 mm	18 mm
RND 150MKT683K2AB	0.068 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT683K2EB	0.063 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT683K2GB	0.068 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT683K2JB	0.068 µF	630 VDC	15 mm	6 mm	12 mm	18 mm
RND 150MKT684K2AB	0.68 µF	100 VDC	15 mm	7 mm	13 mm	18 mm
RND 150MKT684K2EB	0.68 µF	250 VDC	15 mm	7 mm	13 mm	18 mm
RND 150MKT823K2AB	0.082 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT823K2EB	0.082 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT823K2GB	0.082 µF	400 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT823K2JB	0.082 µF	630 VDC	15 mm	6 mm	12 mm	18 mm
RND 150MKT824K2AB	0.82 µF	100 VDC	15 mm	5 mm	14 mm	18 mm
RND 150MKT824K2EB	0.82 µF	250 VDC	15 mm	5 mm	14 mm	18 mm
RND 150MKT104K2AB	0.1 µF	100 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT104K2EB	0.1 µF	250 VDC	10 mm	5 mm	11 mm	13 mm
RND 150MKT104K2GB	0.1 µF	400 VDC	15 mm	5 mm	11 mm	18 mm
RND 150MKT104K2JB	0.1 µF	630 VDC	15 mm	7.5 mm	11 mm	18 mm
RND 150MKT105K2AB	1 µF	100 VDC	15 mm	8.5 mm	14.5 mm	18 mm
RND 150MKT105K2EB	1 µF	250 VDC	15 mm	8.5 mm	14.5 mm	18 mm

SPECIFICATION & TEST METHODS

1. SCOPE	This specification applies to film capacitors of following type. Used in electronic equipment.
2. PRODUCT NAME	Metallized Polyester film capacitor
3.CONSTRUCTION (Dimensions and materials)	Dimensions: Refer to dimensions drawing Materials 1.Element: Metallized Polyester film. 2. Metal spray: Special solder (Lead free) 3. Lead wire: Tinner copper clade steel wire (Lead free) 4. Inner coating: Epoxy resin (UL-94V-0 Standard) 5. Outer case: Plastic case (UL-94-V-0 Standard)
4.CHARACTERISTICS	Standard atmospheric condtions. Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows: Ambient temperature : 15 to 35 °C Relative humidity : 45 to 85 % Air Pressure : 86 to 106 kpa If there may be any doubt on the results, measurements shall be made within the following limits. Ambient temperature : 20±5 °C Relative humidity : 60 to 70 % Operating temperature range : -40 to +105 °C Operating temperature range is the range of ambient temperature for which the capacitor can be operated continuously at rated voltage.

5. Electrical characteristics

5-1. Rated Voltage(V_R): 100 VDC, 250 VDC, 400 VDC, 630 VDC

Category voltage (V_C): up to 85 °C $V_C=V_R$
For temperature between +85 and +105°C, a decreasing factor of 1.25% per degree °C on the nominal voltage V_R has to be applied.

5-2. Rated upper limit temperature: 85 °C

Usable upper limit temperature: 105 °C

5-3. Capacitance range: 0.01uF to 1.0uF

5-4. Capacitance tolerances: (Measured at 1KHZ,1V) ±5% (J), ±10% (K)

5-5. Dissipation factor (DF%): LCR METER:HP-4284A, at 20°C ±5 °C

KHZ	C≤ 0.1 uF	0.1 uF<C≤1.0 uF
1	≤ 1.0%	≤ 1.0%
10	≤ 1.5%	≤ 1.6%

5-6. Insulation resistance between terminals Test conditions:

Temperature: 20 °C ±5 °C
Voltage charge time: 1 minute
Voltage charge: 10 VDC (10V ≤ VR < 100V)
100 VDC (100V ≤ V_R < 500V)
500 VDC (500V ≤ V_R)

Performance:

For V_R ≤100VDC
≥ 10000MΩ ≥ 5000MΩ×uF For ≤C 0.33uF
For >C 0.33uF

For V_R >100VDC
≥ 10000MΩ For ≤C 0.33uF
≥8000MΩ×uF For >C 0.33uF

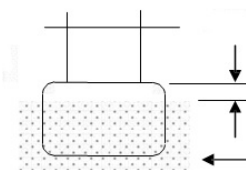
5-7. Test voltage between terminals

1.5×V_R applied for 2 sec, at 20 °C ± 5 °C (cut off current 10mA)

Performance: There shall be no dielectric breakdown or other damage

5-8. Dielectric strength

Between terminal and enclosure
Apply 200% of rated voltage between terminals and enclosure for 2~5 sec. Method of the test described as below.
Put the 1 mm diameters of small metallic balls in a vessel.
The test capacitor shall be submerged with the small metallic balls , Distance of the metallic balls and the terminals shall be kept about 2 mm as shown in the picture below.
The test voltage shall be applied between the short-circuited terminals and the metallic balls.
Performance: There shall be no dielectric breakdown or other damage.



5-9. Rapid change of temperature. (Testing method IEC 68-2-14 Na)

The test capacitor shall be kept in the testing oven and kept at condition of following table, and it shall be repeated for 5 cycles successively. After the test, the capacitor shall be let alone at the ordinary condition for 2 hours.

Step	Temperature	Minute
1	-40±3°C	30±3
2	Ordinary	3 or under
3	105±2°C	30 ± 3
4	Ordinary	3 or under

Performance
Capacitance change: Δ C/C : ≤ ± 10%
DF change: Δtan δ : ≤ 0.1% at 1 KHZ
Insulation resistance: ≥ 50% of limit value

6.Mechanical characteristics

6-1.Terminal strength (Testing method IEC 68-2-21)

Tensile: (Test Ual)

A load of 10 N(1.0kg) shall be gradually applied to the terminal in the axial direction and held thus for 10 sec.

Bending : (Test Ub)

While a load of 500g applied to the lead wire, the body of the capacitor shall be bent 90º and returned to the original position. This operation shall be conducted in a few seconds. Then the body shall be bent 90º at the same speed in the opposite direction and returned to the original position.

Performance :

There shall be no such mechanical damage as terminal damage etc.

7.Endurance characteristics

7-1. Solderability (Testing method IEC 68-2-20 Ta)

Solder temperature: 235 °C±2 °C.

Immersion time: 2±0.5 sec.

For other procedures refer to JIS C 0050

Performance:

At least 95% of the circumferential face of lead wire up to immersed level shall be covered with new solder.

7-2. Resistance to soldering heat: (Testing method IEC 68-2-20 Tb)
For other procedures that those specificied below refer to JIS C 5102).

Solder bath method:
Solder temperature: 260±5 °C
Solder temperature Immersion time : 10±1 sec.
Thickness of heat shunt
(Printer wiring board): 1.6 mm

Performance:
Capacitance change Δ C/C: ≤ ± 3%
DF change: Δtan δ : ≤ 1.0% at 1 KHZ

7-3. Vibration proof: (Testing method IEC 68-2-6 Fc

The frequency shall be varied form from 10Hz to 55Hz at 1.5mm amplitude and back to 10Hz In approximately 1 minute intervals.

This motion shall be applied for a period of 2 hours in each of 3 mutually perpendicular directions. During the last 30 min of vibration in each direction, checks shall be made for open or short-circuiting and interruption. For other procedures, refer to JIS C 0040.

Performance :

Bending strength: There shall be no open or short-circuiting and the connections must be stabilized.

Appearance: There shall be no such mechanical damage as terminal damage etc.

7-4. Damp heat (steady state): (Testing method IEC 68-2-3 Ca)

The capacitor shall be stored at a temperature of 40±2 °C and relative humidity of 90% to 95% for 1000 hours.

And then the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurement shall be made. For other procedures, refer to JIS C 0022.

Performance :

Capacitance change: Δ C/C : ≤ ± 5%
DF change: Δtan δ : ≤ 1.0% at 1 KHZ
Insulation resistance: ≥ 50% of limit value

7-5. Damp heat with load :

The DC rated voltage shall be applied continuously to the capacitor at a temperature of 40±2 °C and a relative humidity of 90% to 95% for 1000 hours.

And then the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurement shall be made. The load resistor in series with the capacitor shall be 20 Ω to 1 KΩ. For other procedures, refer JIS C 0022.

Performance:
Capacitance change: Δ C/C : ≤ ± 5%
DF change: Δtan δ : ≤ 1.0% at 1 KHZ
Insulation resistance: ≥ 50% of limit value

7-6. Electrical endurance: (Testing method : IEC 60384-2)

125% of rated voltage shall be applied to the capacitor at a temperature of +85±2 °C for 2000 hours. (87.5% of rated voltage shall be applied to the capacitor at a temperature of +105±2 °C for 2000 hours) And then the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours ,after which measurement shall be made.
The load resistor in series with the capacitor shall be 20Ω to 1KΩ. For other procedures, refer JIS C5102-1994.

Performance:

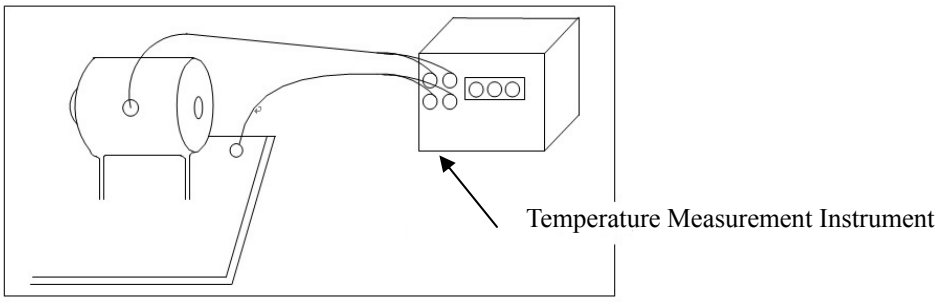
Capacitance change: Δ C/C : ≤ ± 5%
DF change: Δtan δ : ≤ 1.0% at 1 KHZ
Insulation resistance: ≥ 50% of limit value

7-7. ΔT:

Less than +8°C

Method of measuring inherent temperature rise

Inherent temperature of capacitor shall be measured by keeping away from heat influence of surrounding components after attaching thermocouple to the capacitor as show below. (They shall be measured in normal temperature.)
Measurement shall be down by soldering capacitor on the opposite side of the printed circuit board etc. in case of being influenced by heat of surrounding components.
Besides, they shall be measured in calm condition by putting capacitor into box etc. in case of being influence by convection or wind.



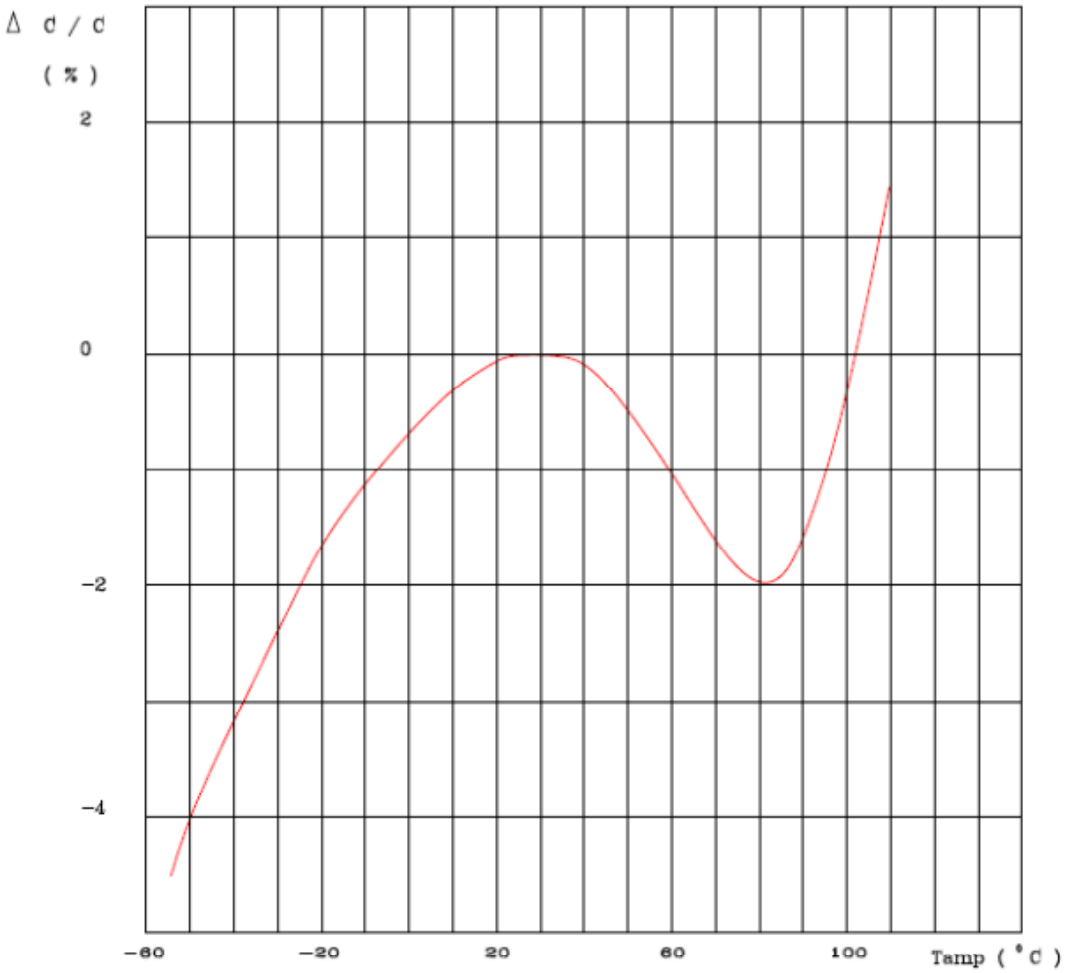
8. Rated Voltage Pulse Slope dv/dt (V/μs)

Pitch / V.R	7.5 m/m	10 m/m	15 m/m	20 m/m	27.5 m/m	32.5 m/m	37.5 m/m
100 VDC	35	30	20	10	5	35	30
250 VDC	80	110	45	20	15	80	110
400 VDC	190	160	65	30	25	190	160
630 VDC	------	200	90	35	30	------	200

Capacitance change as a function of ambient temperature:

Typical curve

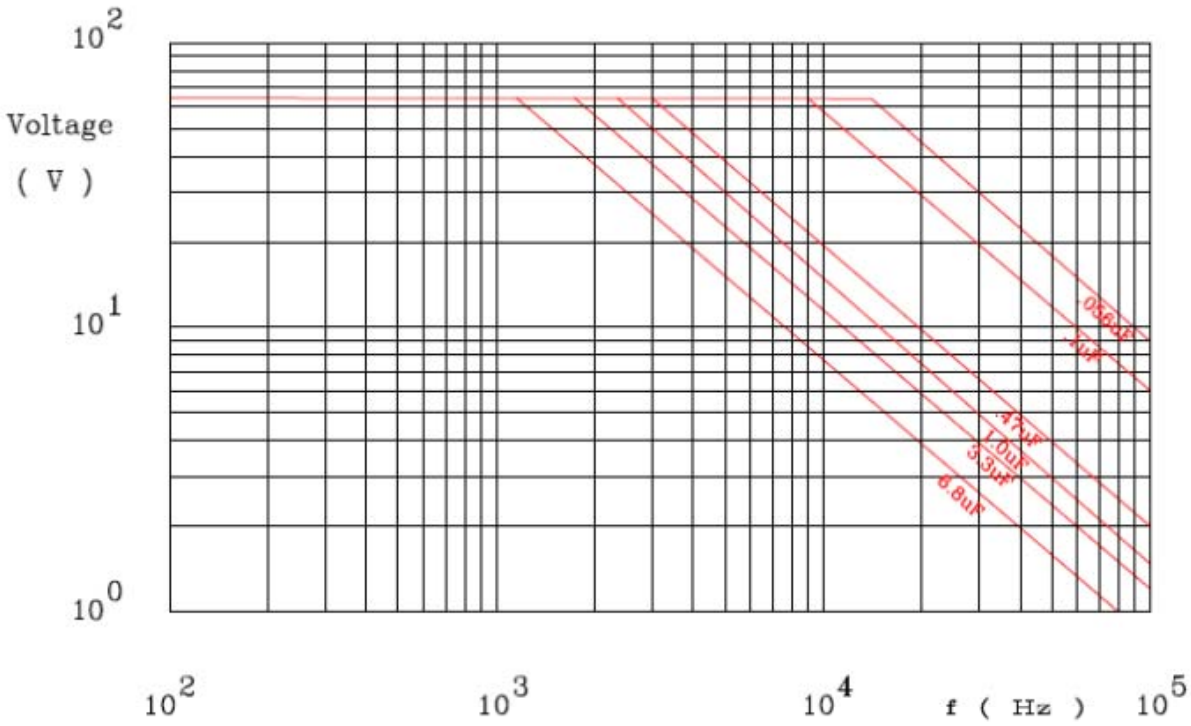
Capacitance



** **All capacitance values are specified at 1K Hz**

Rated voltage (Vrms) versus frequency

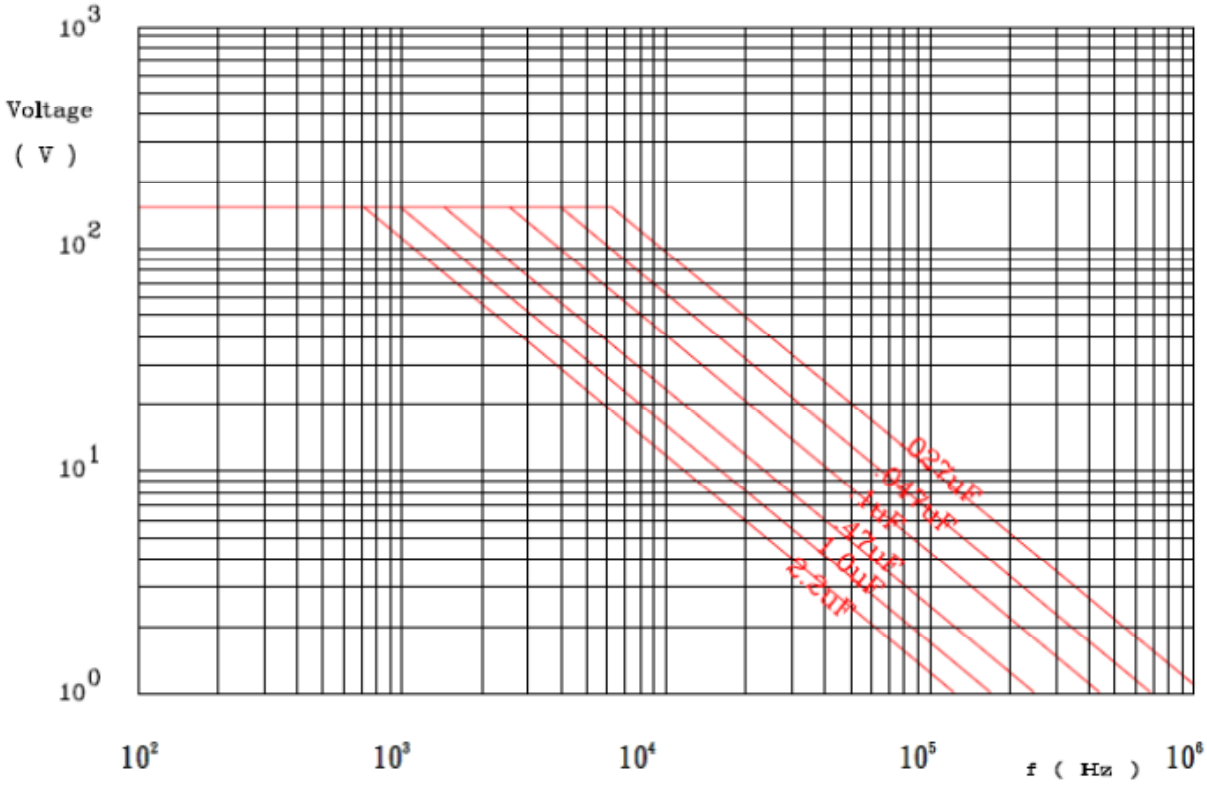
100 VDC / 63 VAC



**** AC voltage as a function of frequency at temp≦85 ℃, for Vrdc＝100V**

Rated voltage (Vrms) versus frequency

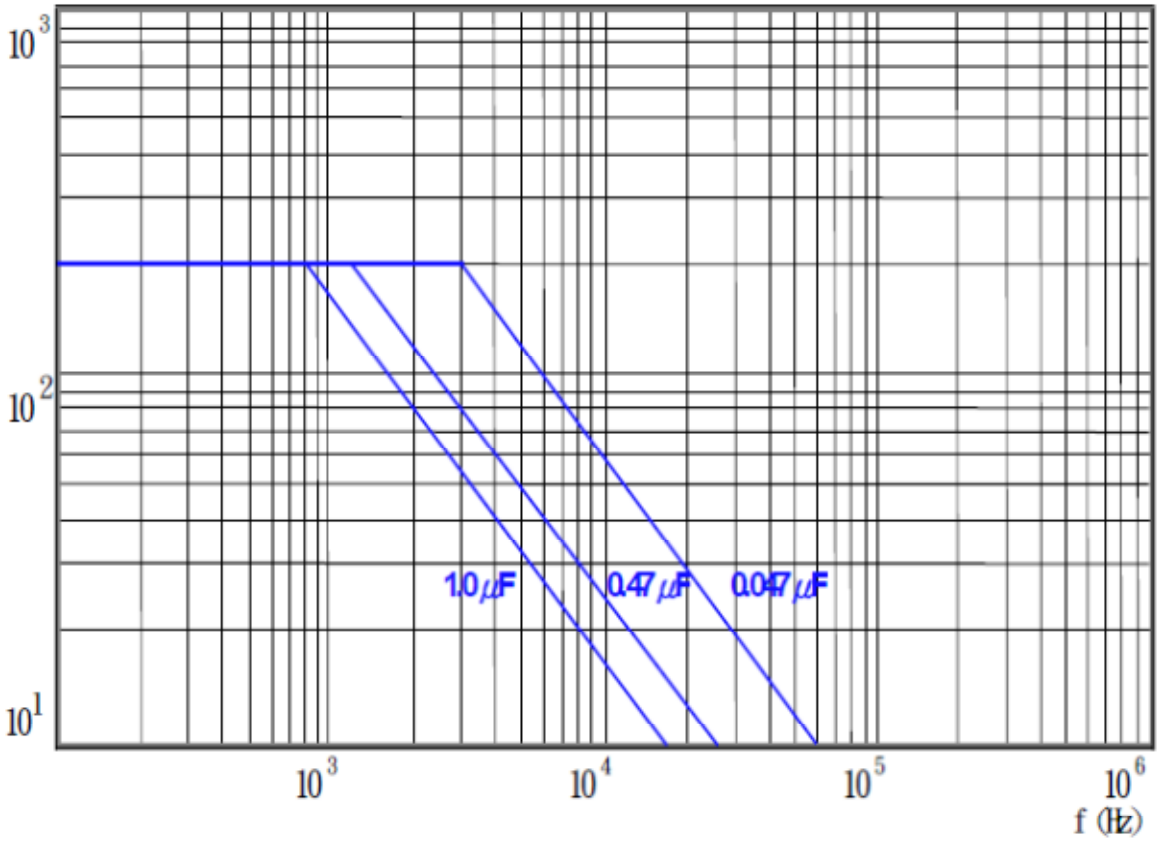
250 VDC / 160 VAC



**** AC voltage as a function of frequency at temp≦85 °C, for Vrdc＝250V**

Rated voltage (Vrms) versus frequency

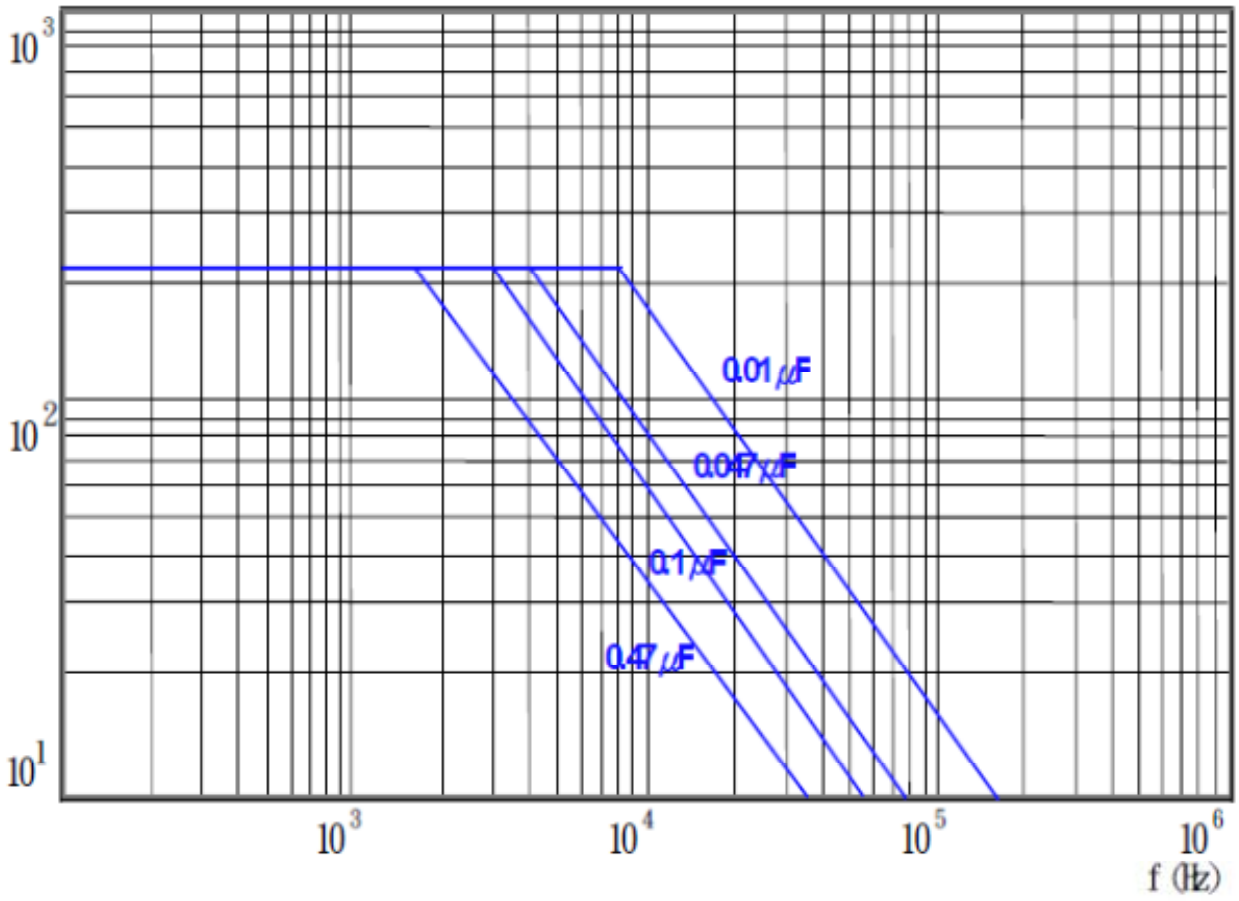
400 VDC / 200 VAC



**** AC voltage as a function of frequency at temp≦85 °C, for Vrdc＝400V**

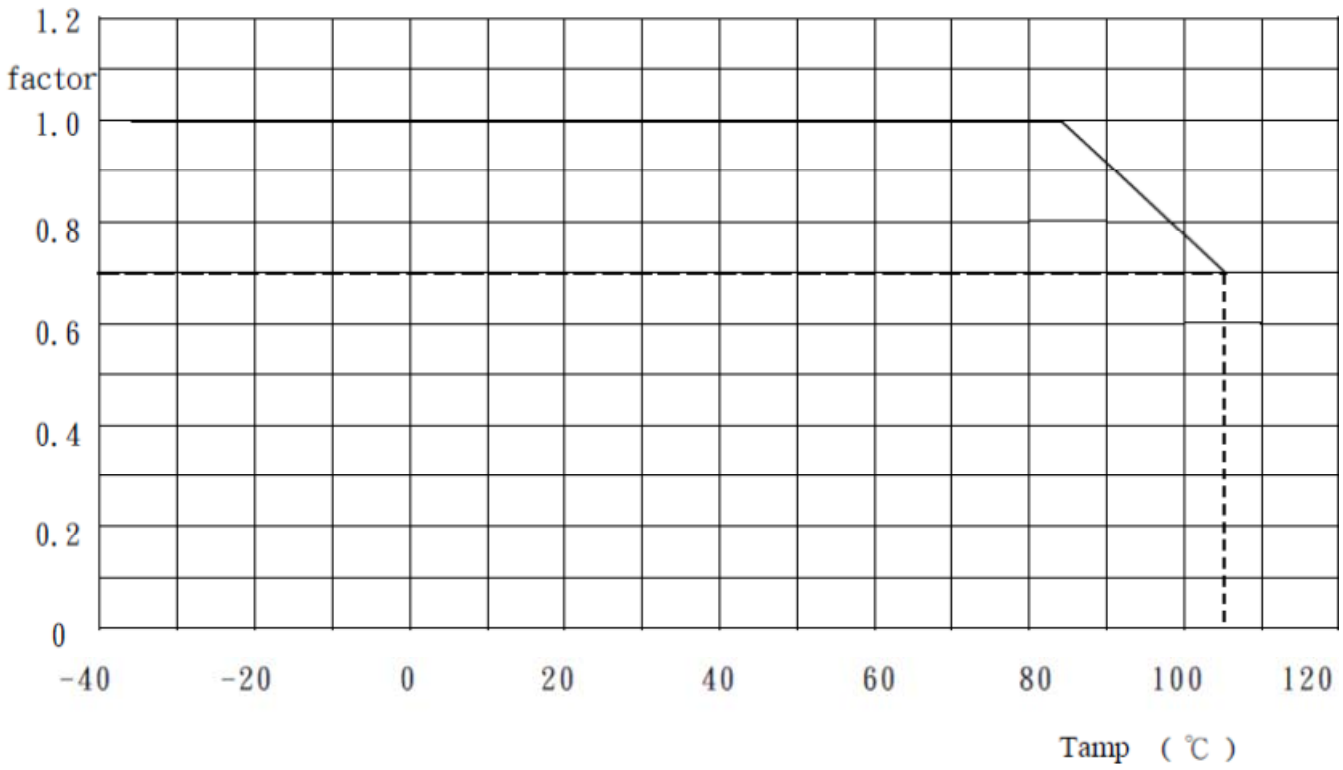
Rated voltage (Vrms) versus frequency

630 VDC / 250 VAC



**** AC voltage as a function of frequency at temp≦85 °C, for Vrdc＝630V**

Maximum DC voltage and AC voltage (sinewave) as a Function of temperature (voltage derating)



**** Multiplying factor as a function of temperature.**