

## GENERAL INFORMATION

### TYPICAL PROPERTIES AND APPLICATIONS.

#### POLYESTER FILM

##### Typical Properties:

- High dielectric constant.
- Very good ratio box and dip size capacitance.
- Very wide operating temperature range.
- Good stability.
- Excellent self-healing properties.

##### Typical Applications:

- Blocking and coupling.
- Decoupling.
- Timing.
- Low filtering.
- By-passing.
- Market sector with professional characteristics.

#### POLYPROPYLENE FILM

##### Typical Properties:

- Very low dielectric absorption.
- Good behaviour in frequency.
- Very high insulation resistance.
- Very good stability.
- Excellent self-healing properties.

##### Typical Applications:

- Pulse applications.
- High current.
- AC Applications.
- SMPS & TV Set.
- Lighting.
- DC-LINK and filtering high Q.
- Timing with high stability.
- Industrial.

#### DIELECTRIC ABSORPTION(DA)

##### Typical Value 1KHz:

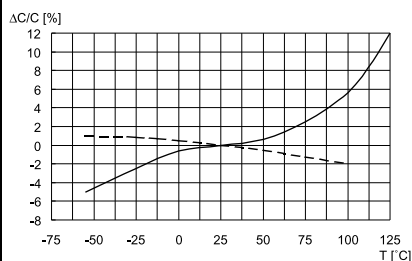
\* Polyester: 0.5

\* Polypropylene: 0.05

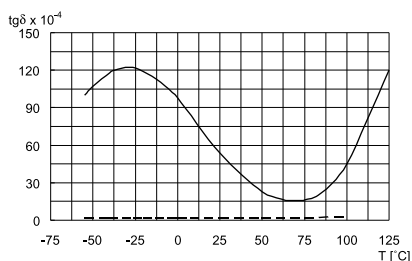
### TYPICAL GRAPHS:

———— Polyester

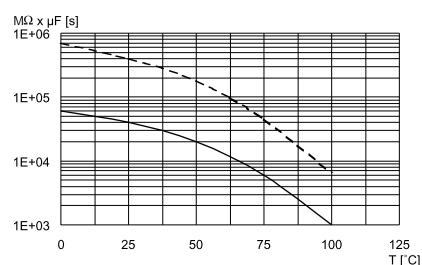
----- Polypropylene



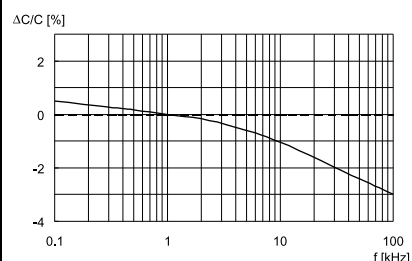
Capacitance change vs. temperature at 1kHz



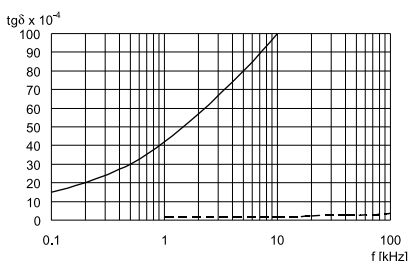
Dissipation factor vs. temperature at 1kHz



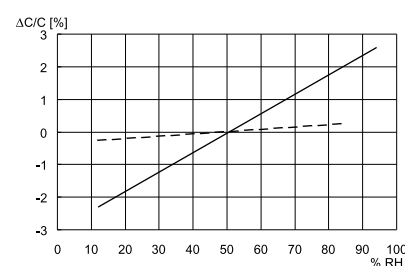
Time constant vs. temperature



Capacitance change vs. frequency (Room temperature)



Dissipation factor vs. frequency (Room temperature)



Capacitance change vs. relative humidity (RH)



## Product

MMPA series / Double Metalized Polypropylene Film Capacitors, Box type.

Application:

Specially designed for high frequency. high voltage and high circuit applications such as switching power supplies. Suitable for AC pulses in the horizontal deflection circuit of TV-sets tuning circuit. Sunbber and SCR commutating circuits.

## PRODUCT CODE SYSTEM

The part number is for MMPA as follows:

<u>MMPA</u>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4	5	6	7	8	9	10

Digit 1      Series name.

Digit 2      D.C. rated voltage  
P = 630Vdc; Y = 800Vdc; Q = 1000Vdc; T = 1600Vdc; U = 2000Vdc.

Digit 3      Pitch: (mm)  
I = 15; J = 17.5; K = 20; N = 22.5; M = 25; R = 27.5.

Digit 4 to 7      Digits 5-6-7 indicate the first three digits of capacitance value and 4<sup>th</sup> digit indicates the number of zeros that must be added to obtain the rated capacitance in pF.

Digit 8      Mechanical version  
5 = 25±5mm; J = 4.3±0.3mm; K = 3.2±0.3mm;

Digit 9      Capacitance tolerance:  
J = ±5%; K = ±10%

Digit 10.11      Internal use

## GENERAL TECHNICAL DATA

Dielectric: Polypropylene film

Plates: Aluminum layer deposited by evaporation under vacuum.

Winding: Non-inductive type

Leads: Tinned wire

Protection: Plastic case, epoxy filled. Box material is solvent resistant and flame retardant according to UL94V-0

Marking: Capacitance, tolerance, DC rated voltage and Series name

Related standard: IEC 60384-16



## Specification of MMPA Series

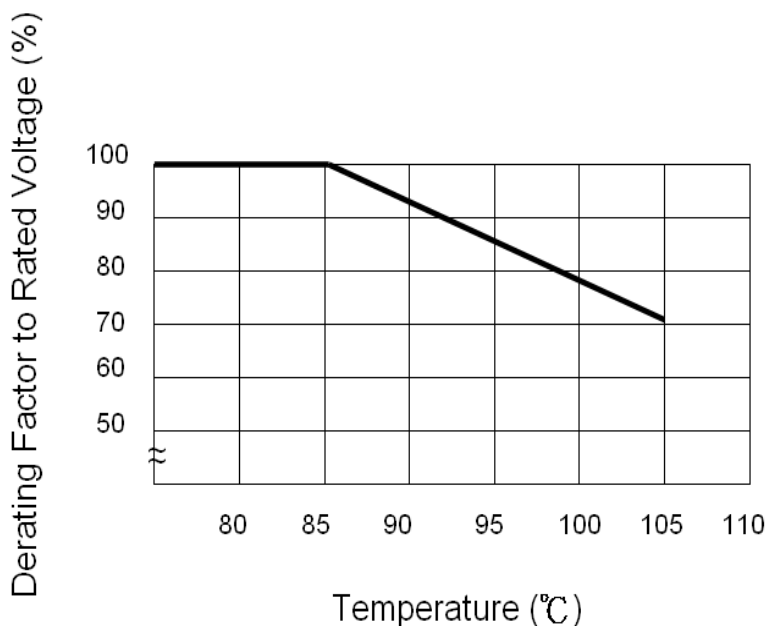
### Electrical characteristics

Rated voltage (Vr)	630Vdc, 1000Vdc, 1600Vdc, 2000Vdc..
Capacitance Range	630Vdc.0.022~0.68uf    1000Vdc.0.001~0.68uf 1600Vdc. 0.001~0.22uf    2000Vdc. 0.001~0.01uf
Rated temperature	-40°C ~ +85°C. (+85 for D.C / +75°C for A.C)
Temperature derated voltage	+85°C to +105°C: 1.25% per °C for VR (d.c.). +75°C to +105°C: 1.35% per °C for VR (a.c.)
Capacitance tolerance Temperature: +25°C Frequency: 1KHz.	±5%, ±10%, ±20%,
D.F value Temperature: +25°C	C > 1μF, D.F ≤ 0.001 at 1Khz C ≤ 1μF, D.F ≤ 0.001 at 1Khz and D.F ≤ 0.002 at 10Khz
Insulation Resistance 100Vdc Temperature: +25°C. Duration: 1 minute.	≥ 30000MΩ for C ≤ 0.33μF. ≥ 1500MΩ for C > 0.33μF.
Dielectric strength	1.6 x Vr applied for 2 sec at +25°C

### Temperature derated voltage:

\* For temperature between +85°C and +105°C decreasing factor of 1.25% at per each 1°C. on the rated voltage Vr (dc & ac). has to applied.

1. When using capacitors at temperatures higher than the normally specified maximum temperature, it is necessary to reduce the working voltage as shown in the figures below.





## Test Item and performance

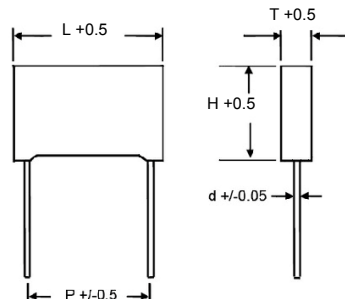
Test item	Test condition	Performance
<b>Damp heat, steady state</b>	Temperature: +40°C Humidity: 93% Duration:	$ \Delta C/C  \leq 3\%$ D.F increase $\leq 0.0005$ at 1Khz I.R $\leq 50\%$ of initial value
<b>Dry heat test</b>	Temperature: +85°C Duration: 16Hrs Removal from chamber for test less 4hrs for temperature recovery	$ \Delta C/C  \leq 3\%$ $C > 1\mu F$ , D.F change $\leq 0.0005$ at 1Khz $C \leq 1\mu F$ , D.F change $\leq 0.0008$ at 10Khz I.R $\leq 50\%$ of initial value
<b>Cold test</b>	Temperature: -40°C Duration: 2Hrs Removal from chamber for test less 4hrs for temperature recovery	$ \Delta C/C  \leq 3\%$ $C > 1\mu F$ , D.F change $\leq 0.0005$ at 1Khz $C \leq 1\mu F$ , D.F change $\leq 0.0008$ at 10Khz I.R $\leq 50\%$ of initial value
<b>Solder ability</b>	Soldering temperature: 230±5°C. Duration: 2±0.5 seconds Dipping/removing speed: 25mm/sec	Leads shall be covered with solder more than 95%.
<b>Soldering heat resistance</b>	Soldering temperature: 260±5°C. Duration: 10 ± 1 seconds	$ \Delta C/C  \leq 3\%$ $C > 1\mu F$ , D.F change $\leq 0.0005$ at 1Khz $C \leq 1\mu F$ , D.F change $\leq 0.0008$ at 10Khz I.R $\leq 50\%$ of initial value
<b>Vibration resistance</b>	It should be no short circuits or open circuits in the element and state of the connection shall be stable. It should be no anomalies in appearance after test.	The frequency shall be varied uniformly from 10Hz to 55Hz at 0.75mm amplitude and back to 10Hz in approximately 1 min intervals. The test shall be applied 2 Hrs per each direction, total 6 Hrs.
<b>Termination strength</b>	Without mechanical damage. as break of terminal damage.	The capacitors shall be fixed and unless otherwise specified. a tensile force of 10N shall be gradually applied to the axial of leads. Then maintained for 30±5 seconds.
<b>Load life test (Endurance)</b>	Temperature: +85°C Test voltage: 1.25x Vr Duration: 500Hrs Removal from chamber for test less 4hrs for temperature recovery	$ \Delta C/C  \leq 3\%$ $C > 1\mu F$ , D.F change $\leq 0.0005$ at 1Khz $C \leq 1\mu F$ , D.F change $\leq 0.0008$ at 10Khz I.R $\leq 50\%$ of initial value
<b>Long term stability</b>	Temperature: -40°C ~ +85°C Humidity $\leq 70\%$ for yearly average Duration $\leq 12$ months	$ \Delta C/C  \leq 2\%$



## Specification of MMPA Series

### Dimension

Part Number	Cap(μF)	630Vdc/400vac					
		L	H	T	P	d	dv/dt
MMPAPI2200	0.022	18.0	12.0	6.0	15.0	0.6	2500
MMPAPI2330	0.033	18.0	13.5	7.5	15.0	0.6	2500
MMPAPI2470	0.047	18.0	14.5	8.5	15.0	0.6	2500
MMPAPI2560	0.056	18.0	18.0	10.0	15.0	0.6	2500
MMPAPN2470	0.047	26.5	15.0	6.0	22.5	0.8	1500
MMPAPN2560	0.056	26.5	16.5	7.0	22.5	0.8	1500
MMPAPN2820	0.082	26.5	16.5	7.0	22.5	0.8	1500
MMPAPN3100	0.1	26.5	19.0	10.0	22.5	0.8	1500
MMPAPR3150	0.15	32.0	20.0	11.0	27.5	0.8	900
MMPAPR3200	0.22	32.0	20.0	11.0	27.5	0.8	900
MMPAPR3330	0.33	32.0	25.0	14.0	27.5	0.8	900
MMPAPR3470	0.47	32.0	30.0	15.0	27.5	0.8	900
MMPAPR3680	0.68	32.0	33.0	18.0	27.5	0.8	900
Part Number	Cap(μF)	1000Vdc/600vac					
		L	H	T	P	d	dv/dt
MMPAQI2100	0.01	18.0	11.0	5.0	15.0	0.6	3300
MMPAQI2150	0.015	18.0	11.0	5.0	15.0	0.6	3300
MMPAQI2220	0.022	18.0	12.0	6.0	15.0	0.6	3300
MMPAQI2270	0.027	18.0	13.5	7.5	15.0	0.6	3300
MMPAQI2330	0.033	18.0	13.5	7.5	15.0	0.6	3300
MMPAQI2390	0.039	18.0	14.5	8.5	15.0	0.6	3300
MMPAQI2470	0.047	18.0	14.5	8.5	15.0	0.6	3300
MMPAQI2470_P1	0.047	18.0	18.0	10.0	15.0	0.6	3300
MMPAQN2330	0.033	26.5	15.0	6.0	22.5	0.8	2100
MMPAQN2470	0.047	26.5	16.5	7.0	22.5	0.8	2100
MMPAQN2560	0.056	26.5	16.5	7.0	22.5	0.8	2100
MMPAQN2820	0.082	26.5	19.0	10.0	22.5	0.8	2100
MMPAQN3100	0.1	26.5	19.0	10.0	22.5	0.8	2100
MMPAQR3100	0.1	32.0	20.0	11.0	27.5	0.8	1000
MMPAQR3150	0.15	32.0	20.0	11.0	27.5	0.8	1000
MMPAQR3200	0.22	32.0	25.0	14.0	27.5	0.8	1000
MMPAQR3330	0.33	32.0	30.0	15.0	27.5	0.8	1000
MMPAQR3470	0.47	32.0	33.0	18.0	27.5	0.8	1000
MMPAQR3680	0.68	32.0	33.0	18.0	27.5	0.8	1000

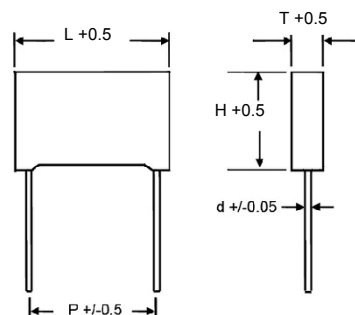




## Specification of MMPA Series

### Dimension

Part Number	Cap( $\mu$ F)	1600Vdc/650vac					
		L	H	T	P	d	dv/dt
MMPATI2220__	0.022	18.0	13.5	7.5	15.0	0.6	6000
MMPATI2270__	0.027	18.0	14.5	8.5	15.0	0.6	6000
MMPATR3100__	0.1	32.0	25.0	14.0	27.5	1.0	1150
MMPATR3150__	0.15	32.0	30.0	15.0	27.5	1.0	1150
MMPATR3220__	0.22	32.0	33.0	18.0	27.5	1.0	1150
Part Number	Cap( $\mu$ F)	2000Vdc/700vac					
		L	H	T	P	d	dv/dt
MMPAUN2220__	0.022	26.5	16.5	7.0	22.5	0.8	3300
MMPAUR2220__	0.022	32.0	20.0	11.0	27.5	1.0	1700
MMPAUR2330__	0.033	32.0	22.0	13.0	27.5	1.0	1700
MMPAUR2470__	0.047	32.0	22.0	13.0	27.5	1.0	1700
MMPAUR2680__	0.068	32.0	30.0	15.0	27.5	1.0	1700
MMPAUR3100__	0.1	32.0	33.0	18.0	27.5	1.0	1700





## Specification of MMPA Series

### Soldering suggestions

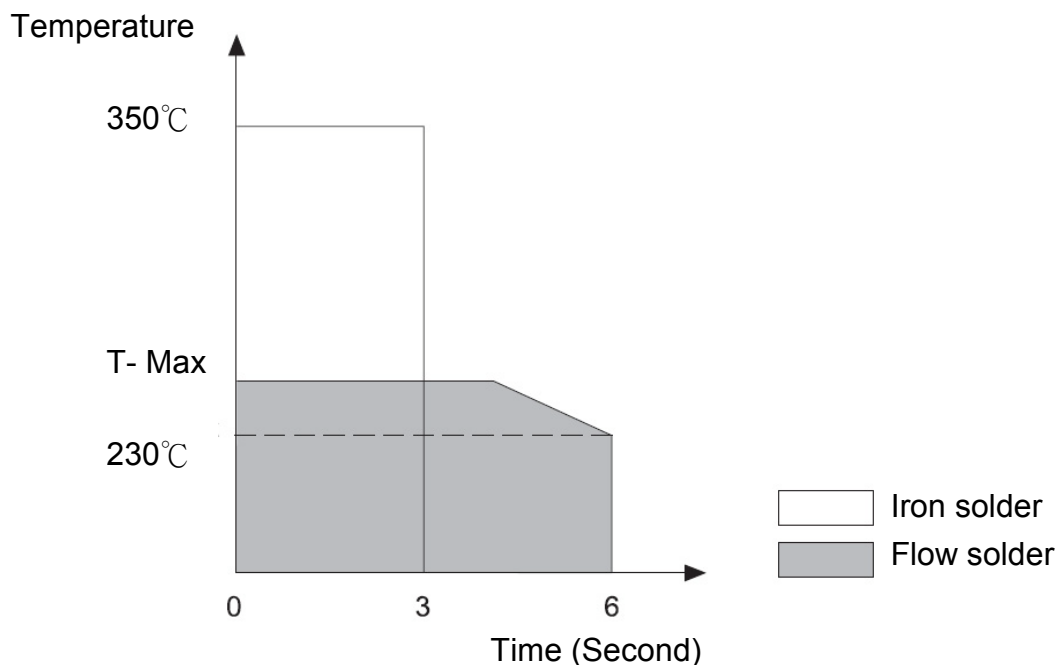
#### 1. Max soldering temperature:

Max temperature (T-Max) for MKT (Pitch  $\geq 7.5\text{mm}$ ):  $265 \pm 5^\circ\text{C}$  for 4 seconds

Max temperature (T-Max) for MKT (Pitch 5mm):  $260^\circ\text{C}$  for 4 seconds

Max temperature (T-Max) for MKP:  $260^\circ\text{C}$  for 4 seconds.

Pre-Heating:	Temperature	Time
	$110^\circ\text{C}$	1 min
	$100^\circ\text{C}$	1 min for KP & MKP $\leq$ Pitch 7.5mm



#### 2. Additional condition:

If two time soldering are needed, please apply a recovery time until the temperature on the surface of capacitor is below  $50^\circ\text{C}$ .

Avoid applying the reflow soldering with both leaded parts and SMD parts.

### Storage suggestions:

In order to keep the electrical characteristic of capacitor in line with the specification, please store the capacitors in the following condition:

Storage duration:  $\leq 12$  months from the date which showed on the label.

Temperature:  $-40^\circ\text{C}$  to  $80^\circ\text{C}$ .

Humidity:  $\leq 70\%$ .



## **Specification of MMPA Series**

### **Marking:**

The marking on each capacitor should contain Capacitance, Tolerance and Rated voltage.

### **Packing:**

For Bulk type, small inner cardboard box / PVC bag with desiccants and label packed in one standard export carton.