MEA SERIES

AXIAL GENERAL PURPOSE CAPACITOR

RoHS compliant
REACH COMPLIANT
HALOGEN FREE

METALLIZED POLYESTER CAPACITOR ▲ Axial flat type
High reliability
Flame retardant plastic case, epoxy resin sealed, UL 94V-0
Self-healing property
High insulation resistance
High stability of capacitance and dissipation factor

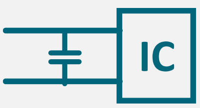
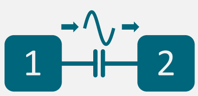
SPECIFICATION

Item		Characteristics			
Related Documents		IEC 60384-2			
Rated Temperature Range		-40°C to +85°C			
Usable Temperature Range Note 1		-40°C to +110°C			
Capacitance Range	C_R	0.1µF to 10µF			
Capacitance Tolerance	ΔC	±2% ▲ ±5% ▲ ±10%			
Rated DC Voltage	$V_{R\ DC}$	$100V_{DC}$ ▲ $250V_{DC}$ ▲ $400V_{DC}$ ▲ $630V_{DC}$			
Rated AC Voltage	$V_{R\ AC}$	$63V_{AC}$ ▲ $160V_{AC}$ ▲ $200V_{AC}$ ▲ $220V_{AC}$			
Dissipation Factor	tan δ	f (kHz)	0.1µF < C ≤ 10µF		
		1	≤ 1%		
		10	≤ 1.5%		
Insulation Resistance Note 2	R_{INS}		C_R ≤ 0.33µF	C_R > 0.33µF	
		V_R ≤ $100V_{DC}$	≥ 10GΩ	≥ 1GΩ x µF	
		V_R > $100V_{DC}$	≥ 30GΩ	≥ 10GΩ x µF	
Withstand Voltage Note 3	V_W	1.6 x V_R applied for 2 sec. (cut off current 10mA)			
Maximum Pulse Rise Slope dV/dt	Length (mm)	$100V_{DC}$	$250V_{DC}$	$400V_{DC}$	$630V_{DC}$
	≤ 14	6V/µs	10V/µs	14V/µs	20V/µs
	19	3V/µs	7V/µs	10V/µs	15V/µs
	27	2V/µs	4V/µs	6.5V/µs	10V/µs
	33	1.5V/µs	2.5V/µs	4V/µs	6V/µs
	38	1V/µs	2V/µs	3V/µs	4V/µs
	44	-	1V/µs	2V/µs	-
	48	-	1V/µs	1V/µs	-

Notes:

1:	**Derating ratio of rated voltage +85°C to +110°**	**1.25% per °C for rated DC voltage**
2:	**Terminal to terminal at 20°C ± 5°C**	**Voltage charge time: 1minute; Voltage charge: $100V_{DC}$**
3:	**Terminal to terminal at 20°C ± 5°C**	**Slow-up voltage speed: C ≤ 10µF: 5sec / C > 10µF: 10sec**

APPLICATIONS

Bypassing	Coupling	Filter Circuits	Timing Circuits
			

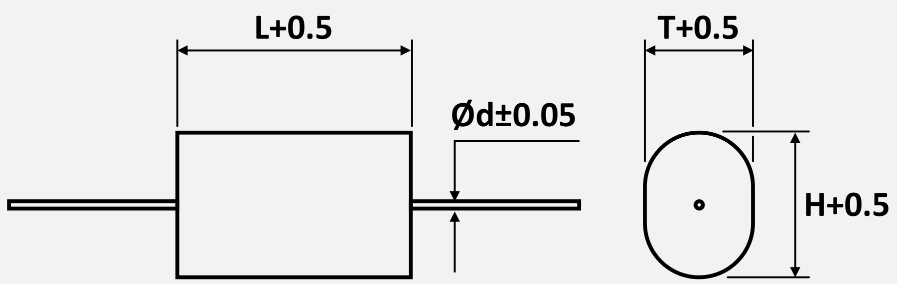
ELECTRICAL CHARACTERISTICS

V_R	C_R (µF)	Dimensions (mm)			Ød ± 0.05 (mm)	Part Number Note
		L + 0.5	H + 0.5	T + 0.5		
100V_{DC} ▲ 63V_{AC}	2.2	27	14	8	0.6	MEA–225□0100DB0000
	3.3	27	16	10	0.8	MEA–335□0100DB0000
	4.7	33	18	10.5	0.8	MEA–475□0100DB0000
	6.8	33	20	12	0.8	MEA–685□0100DB0000
	10	33	23.5	15	0.8	MEA–106□0100DB0000
250V_{DC} ▲ 160V_{AC}	1	27	13	8	0.6	MEA–105□0250DB0000
	1.5	33	15	8.5	0.8	MEA–155□0250DB0000
	2.2	33	17.5	9.5	0.8	MEA–225□0250DB0000
	3.3	33	21	12.5	0.8	MEA–335□0250DB0000
	4.7	38	21	12	0.8	MEA–475□0250DB0000
	6.8	38	26	13	0.8	MEA–685□0250DB0000
	10	48	30	18	0.8	MEA–106□0250DB0000
400V_{DC} ▲ 200V_{AC}	0.33	27	13	7.5	0.6	MEA–334□0400DB0000
	0.47	27	17	8.5	0.8	MEA–474□0400DB0000
	0.68	33	16.5	8.5	0.8	MEA–684□0400DB0000
	1	33	19	9	0.8	MEA–105□0400DB0000
	1.5	38	20	13	0.8	MEA–155□0400DB0000
	2.2	44	24	16	0.8	MEA–225□0400DB0000
	3.3	44	26	16	0.8	MEA–335□0400DB0000
	4.7	48	28	18	0.8	MEA–475□0400DB0000
630V_{DC} ▲ 220V_{AC}	0.1	19	12	8	0.6	MEA–104□0630DB0000
	0.15	27	14	8	0.6	MEA–154□0630DB0000
	0.22	27	15	9	0.8	MEA–224□0630DB0000
	0.33	33	15	10	0.8	MEA–334□0630DB0000
	0.47	33	19	11.5	0.8	MEA–474□0630DB0000
	0.68	38	20	13	0.8	MEA–684□0630DB0000
	1	38	23	16	0.8	MEA–105□0630DB0000
	1.5	38	28	20	0.8	MEA–155□0630DB0000
	2.2	38	30	22	0.8	MEA–225□0630DB0000

Note: **Enter the appropriate tolerance code □ from the product code table**

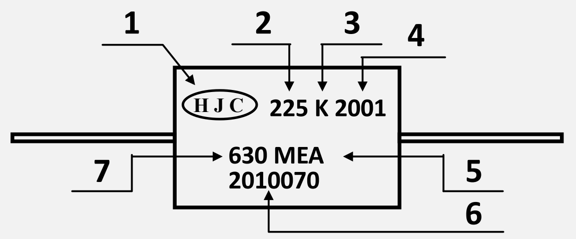
PACKAGE OUTLINE ▲ All dimensions in mm

Axial Flat Package



PRODUCT MARKING

Marking



L ≤ 10.5mm	H	L 13 to 33mm	H	L > 33mm	HJC

Details

No.	Description
1	Manufacturer Logo *
2	Nominal capacitance in µF
3	Capacitance tolerance
4	Date code
5	Series name
6	Production no.
7	DC rated voltage

DATE CODE & APPLICATION CATEGORY

Example:

Date code

2001: 2001 = 1st week of 2020

Lot number

2010070: 20 = Year, here 2020

1 = Month, here January

0001 to XXXX = Serial number

20		01	
Year		Week	
19	2019	01	1st
20	2020	02	2nd
21	2021	03	3rd
22	2022	04	4th
23	2023	05	5th
…	…	…	…
30	2030	53	53rd

PRODUCT CODE

Example: MEA series ▲ 2.2µF ▲ 630V_{DC} ▲ ±10% ▲ Axial ▲ W x H x T =38 x 30 x 22mm ▲ Bulk

MEA-		225		K		0630		D		B		0		00		0	
Series		Capacitance Code Note1 (pF)		Capacitance Tolerance (%)		Rated Voltage (V_{DC})		Voltage Type		Packaging Type		Lead Configuration		Pitch (mm)		Lead Length (mm)	
Code	Series	Code	µF	Code	Tol.	Code	VDC	Code	Type	Code	Type	Code	Style	Code	mm	Code	mm
MEA-	MEA-	104 474 105 225 106	0.1 0.47 1 2.2 10	G J K	±2 ±5 ±10	0100 0250 0400 0630	100 250 400 630	D	DC	B	Bulk	0	Axial	00	Axial	0	Axial

Note:

1 **Capacitance code expressed in pF. The first two digits represent significant figures. The last digit specifies the total number of zeros to be added.**

REFERENCE DATA

Fig. 1 ▪ Capacitance Drift vs. Ambient Temperature

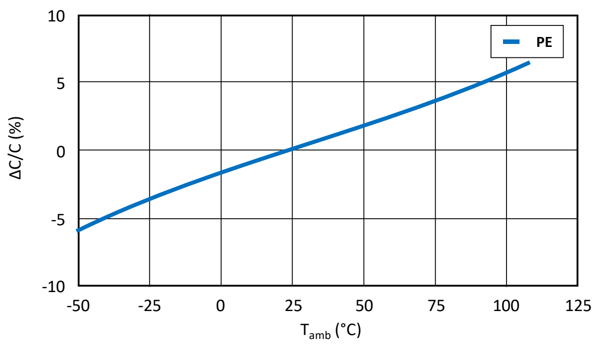


Fig. 2 ▪ Insulation Resistance vs. Ambient Temperature

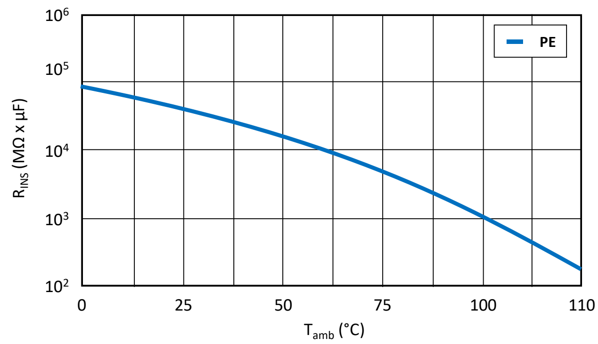


Fig. 3 ▪ Dissipation Factor vs. Ambient Temperature

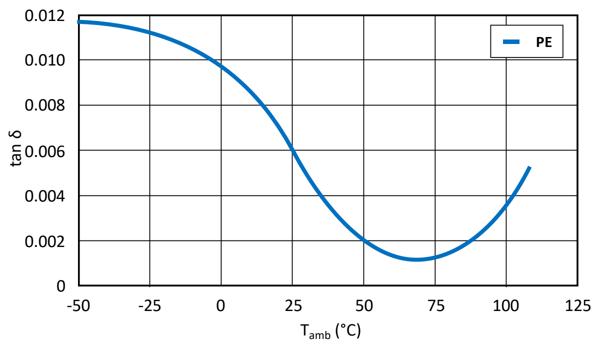


Fig. 4 ▪ Dissipation Factor vs. Frequency

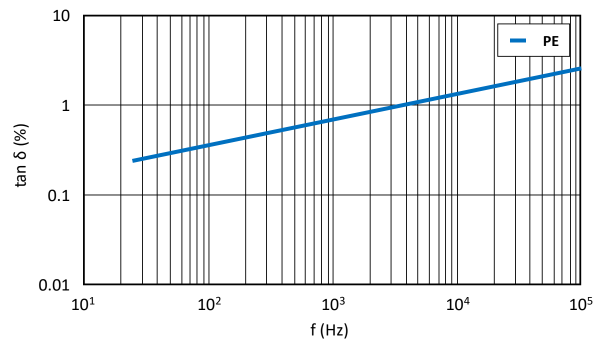


Fig. 5 ▪ Capacitance Drift vs. Frequency

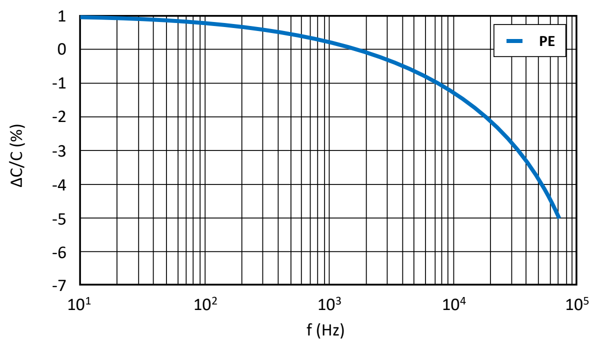


Fig. 6 ▪ Impedance vs. Frequency ▪ Typical Curve

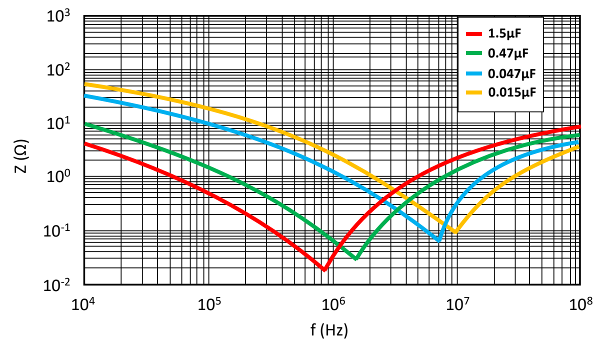


Fig. 7 ▪ Max. RMS Voltage vs. Frequency ▪ $100V_{DC}/63V_{AC}$

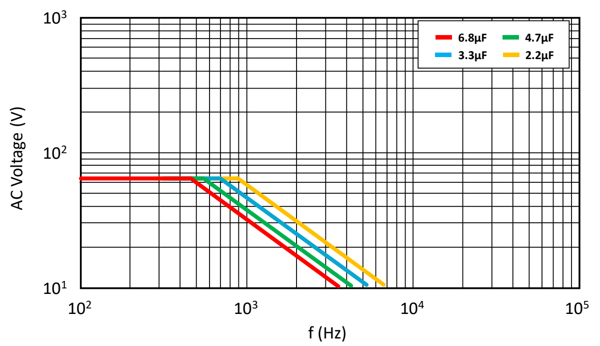
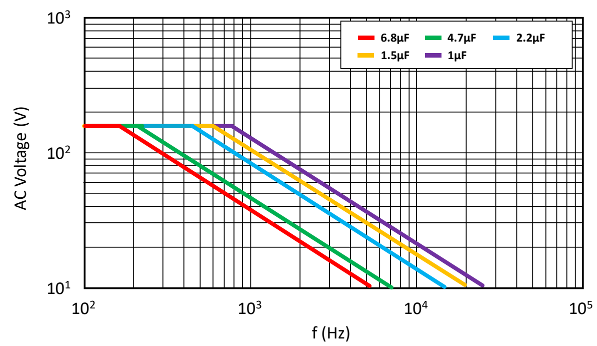


Fig. 8 ▪ Max. RMS Voltage vs. Frequency ▪ $250V_{DC}/160V_{AC}$



REFERENCE DATA

Fig. 9 ▪ Max. RMS Voltage vs. Frequency ▪ $400V_{DC}/200V_{AC}$

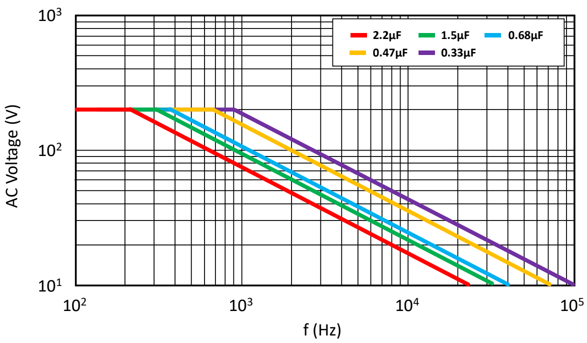


Fig. 10 ▪ Max. RMS Voltage vs. Frequency ▪ $630V_{DC}/220V_{AC}$

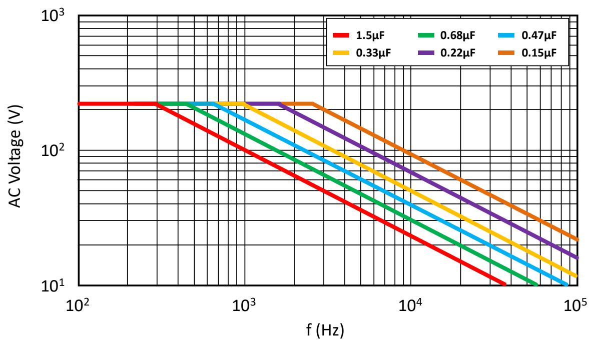


Fig. 11 ▪ Max. DC Voltage vs. Temperature

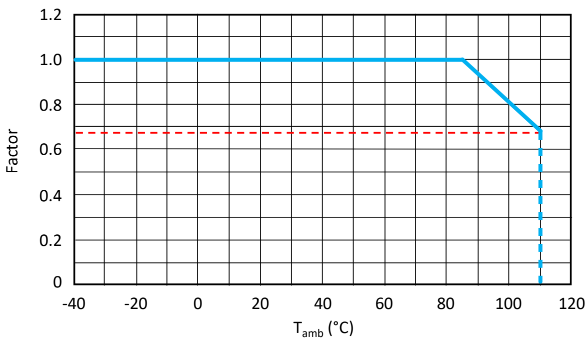
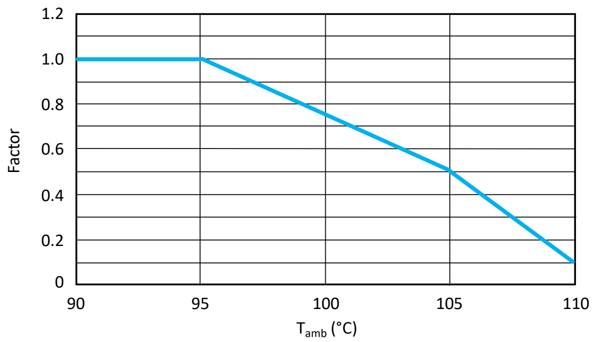


Fig. 12 ▪ Permissible Current Derating vs. Temperature



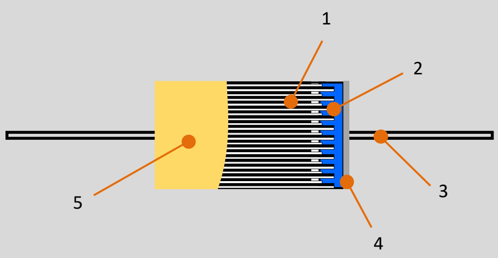
MAXIMUM RMS CURRENT

V_R	C_R (µF)	L x H x T (mm)	I_{RMS} (A) at f					
			15.75kHz	35kHz	45kHz	65kHz	80kHz	100kHz
$100V_{DC}$ ▲ $63V_{AC}$	2.2	27 x 14 x 8	1.60	1.88	1.95	2.10	2.20	2.30
	3.3	27 x 16 x10	2.00	2.30	2.40	2.55	2.65	2.65
	4.7	33 x 18 x 10.5	2.30	2.70	2.90	3.05	3.15	3.15
	6.8	33 x 20 x 12	2.90	3.30	3.49	3.65	3.70	3.70
	10	33 x 23.5 x 15	4.28	5.11	5.36	5.74	6.04	6.04
$250V_{DC}$ ▲ $160V_{AC}$	1	27 x 13 x 8	1.53	1.85	1.94	2.07	2.19	2.35
	1.5	33 x 15 x 8.5	1.80	2.20	2.40	2.60	2.80	2.95
	2.2	33 x 17.5 x 9.5	2.24	2.72	2.84	2.88	2.89	2.90
	3.3	33 x 21 x 12.5	2.44	2.88	3.04	3.12	3.20	3.20
	4.7	38 x 21 x 12	2.60	3.04	3.20	3.32	3.44	3.44
	6.8	38 x 26 x 13	3.10	3.60	3.76	4.08	4.16	4.16
	10	48 x 30 x 18	4.54	5.43	5.69	6.10	6.41	6.41
$400V_{DC}$ ▲ $200V_{AC}$	0.33	27 x 13 x 7.5	1.00	1.32	1.45	1.70	1.80	2.00
	0.47	27 x 17 x 8.5	1.20	1.60	1.80	2.00	2.20	2.40
	0.68	33 x 16.5 x 8.5	1.18	1.61	1.77	2.00	2.18	2.36
	1	33 x 19 x 9	1.80	2.45	2.60	3.00	3.30	3.50
	1.5	38 x 20 x 13	2.25	3.20	3.50	3.40	3.30	3.20
	2.2	44 x 24 x 16	2.70	3.65	4.00	3.90	3.75	3.60
	3.3	44 x 26 x 16	3.10	4.05	4.40	4.35	4.15	4.00
	4.7	48 x 28 x 18	3.50	4.45	4.80	4.75	4.55	4.40
$630V_{DC}$ ▲ $220V_{AC}$	0.15	27 x 14 x 8	1.02	1.36	1.51	1.70	1.85	2.03
	0.22	27 x 15 x 9	1.08	1.44	1.60	1.80	1.96	2.15
	0.33	33 x 15 x 10	1.19	1.59	1.77	2.00	2.17	2.38
	0.47	33 x 19 x 11.5	1.32	1.75	1.92	2.21	2.38	2.64
	0.68	38 x 20 x 13	1.49	2.04	2.21	2.51	2.72	2.94
	1	38 x 23 x 16	2.04	2.72	2.98	3.40	3.74	4.08
	1.5	38 x 28 x 20	2.55	3.50	3.80	3.70	3.60	3.50
	2.2	38 x 30 x 22	3.00	3.95	4.30	4.20	4.05	3.90

Note: **Maximum capacitor surface temperature $T_S \leq 110°C$; Maximum body temperature rise $\Delta T \leq 10°C$**

$$I_{RMS} = \frac{I_{p-p}}{2 \cdot \sqrt{2}}$$

TECHNICAL SPECIFICATION

No.	Category	Specification					
1	Scope	This specification applies to capacitors for general electronics applications. Reference standards: IEC 60384-2					
2	Product Name	Metallized polyester film capacitor, Type MEA					
3	Construction	Dimensions:	Refer to dimensions drawing				
							
		1 = Element	Metallized Polyester film				
		2 = Metal spray	Special solder. (Lead Free) compliant to RoHS directive				
		3 = Lead wire	Tinned wire (Cu wire) or tinned copper clad-steel wire (CP wire). (Lead Free) compliant to RoHS directive				
		4 = Inner coating	Epoxy resin filled. (UL-94V-0 Standard)				
		5 = Outer coating	Polyester tape wrapping. (UL-510)				
4	Atmospheric and Temperature Characteristics	**Standard atmospheric conditions.** 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°C ± 5°C				
		Relative humidity:	60 to 70%				
		Operating temperature range					
		Lowest operating temperature:	-40°C				
		Maximum operating temperature:	+110°C (case-temperature) with specified voltage-derating				
		The capacitor can be operated up to 110°C case-temperature (according to the power to be dissipated). Derating ratio of rated voltage +85°C to +110°C: 1.25% per °C for V_{RDC} The temperature is measured at the hottest point of the case when the capacitor has reached its thermal equilibrium.					
		Rated temperature range	-40°C to +85°C				
		Rated temperature range is the range of ambient temperature for which the capacitor can be operated continuously at rated voltage.					
5	Electrical Characteristics	Rated voltage:	V_R at 85°C	$100V_{DC}$	$250V_{DC}$	$400V_{DC}$	$630V_{DC}$
		Category voltage:	Up to 85°C $V_C = V_R$				
		Rated upper limit temperature:	+85°C				
		Usable upper limit temperature:	+110°C				
		Capacitance range:	0.1µF to 10µF				
		Capacitance tolerance:	±2% (G), ±5% (J), ±10% (K)	Measured at 1kHz, 1V			

TECHNICAL SPECIFICATION

No.	Category	Specification
5	Electrical Characteristics	(see below)

Dissipation factor tanδ (%): LCR meter: HP-4284A, at 20°C ± 5°C

f (kHz)	0.15µF < C ≤ 10µF
1	≤ 1.00%
10	≤ 1.50%

Insulation resistance between terminals

Test conditions:			
Temperature:	20°C ± 5°C		
Voltage charge:	$100V_{DC}$		
Performance:		C ≤ 0.33µF	C > 0.33µF
	$V_R \le 100V_{DC}$	After voltage charge 1 minute ≥ 10GΩ	After voltage charge 1 minute ≥ 1GΩ x µF
	$V_R > 100V_{DC}$	After voltage charge 1 minute ≥ 30GΩ	After voltage charge 1 minute ≥ 10GΩ x µF

Test voltage between terminals

1.6 × V_{RDC} applied for 2 sec, at 20°C ±5°C		
Cut off current:	10mA	
Ramp/rise time:	C ≤ 10µF: 5 sec	C > 10µF: 10 sec
Performance:	There shall be no dielectric breakdown or other damage	

Dielectric strength between terminal and enclosure

Apply 200% of rated voltage between terminals and enclosure for 2 to 5 sec. Foil method

Method of the test described as below

A metal foil shall be closely wrapped around the body of the capacitor to a distance of 2mm form the terminations as shown in fig 1.

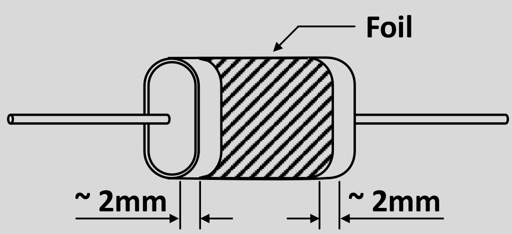


Fig. 1

Performance:	There shall be no dielectric breakdown or other damage			
Test Item	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			
	Conditions			**Performance**
Rapid change of temperature (IEC68-2-14 Na)	Step	Temperature	Time	
	1	-40 ± 3°C	30 ± 3 min	Capacitance change |ΔC/C| ≤ ± 10% tan δ change ≤ 0.5% at 1kHz R insulation ≥ 50 % of limit value
	2	Ordinary	3 min or less	
	3	+110 ± 2°C	30 ± 3 min	
	4	Ordinary	3 min or less	

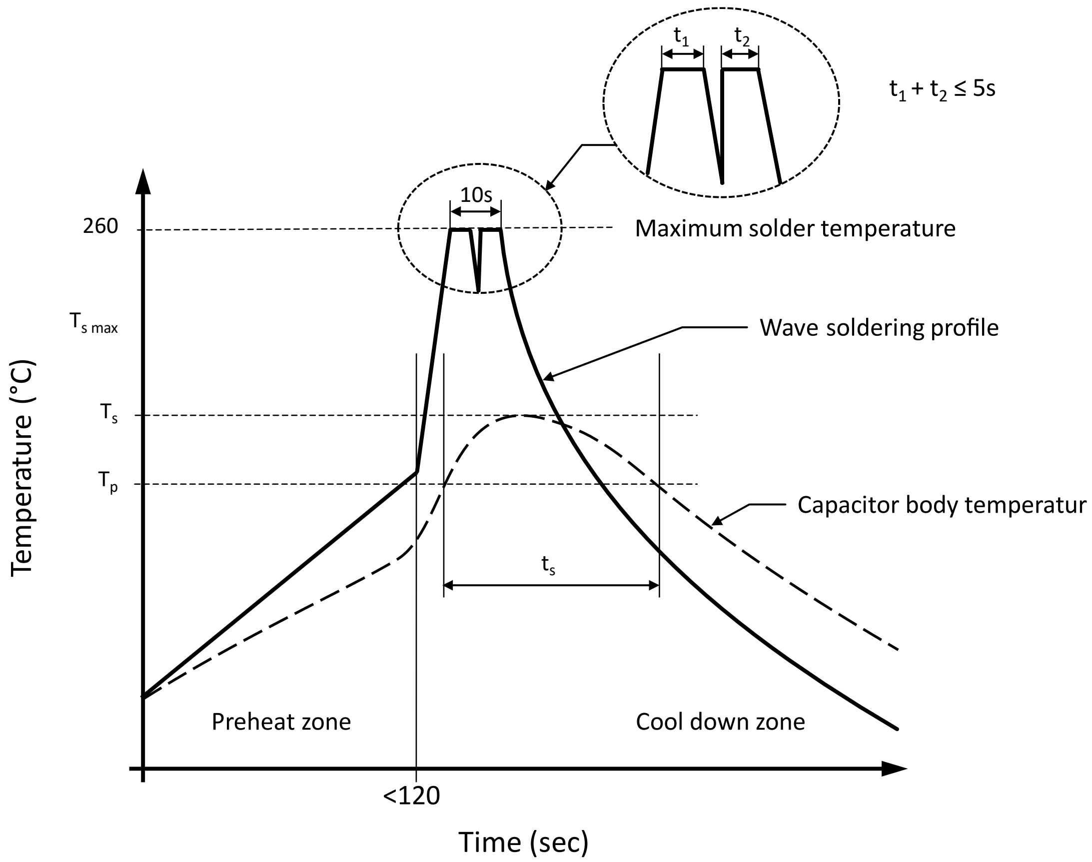
TECHNICAL SPECIFICATION

No.	Category	Specification		
		Test Item	**Conditions**	**Performance**
6	**Mechanical Characteristics**	Robustness of terminations (IEC68-2-21)	Tensile Ua1 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 Ub methode 1 While a load of 500g applied to the lead wire, the body of the capacitor shall be bent 90° and returned to the original position. This operation shall be conducted in a few seconds. Then the body shall be bent 90° at the same speed in the opposite direction and returned to the original position	There shall be no such mechanical damage as terminal damage etc.
7	**Endurance Characteristics**	Solderability (IEC68-2-20 Ta)	Solder bath: 245°C ± 5°C Immersion time:2.5±0.5sec Visual examination	At least 95% of the circumferential face of lead wire up to immersed level shall be covered with new solder
		Resistance to soldering heat (IEC 68-2-20 Tb)	Solder bath: 260 °C ± 5 °C Immersion time:10±1sec Thickness of heat shunt (Printed wiring board): 1.6mm Capacitance at 1kHz tan δ at 1kHz	Capacitance change |ΔC/C| ≤ ± 2% tan δ change ≤ 0.5% at 1kHz
		Vibration proof (IEC68-2-6 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-circuit and interruption	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.
		Damp heat steady state (IEC68-2-3 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	Capacitance change |ΔC/C| ≤ ± 5% tan δ change ≤ 0.5% at 1kHz R insulation ≥ 50 % of limit value
		Electrical endurance (IEC 60384-2)	125% of category voltage shall be applied to the capacitor at a temperature of 110 ± 2°C for 1000 hours. 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.	Capacitance change |ΔC/C| ≤ ± 10% tan δ change ≤ 0.5% at 1kHz R insulation ≥ 50 % of limit value

TECHNICAL SPECIFICATION

No.	Category	Specification
8	**Storage conditions**	It should be noted that the solderability of the terminals may be deteriorated when stored barely in an atmosphere for a long period.
		It should not be located in particularly high temperature and high humidity, it must submit to the following conditions (Keeping in the original package) Temperature: 5°C to 35°C Relative humidity: ≤ 70% Storage period: ≤ 12 months (Following the manufacturing date marked on the label in package bag)
		Avoid wetting the capacitor by water, oil, salt and/or poisonous gas.
		If used the capacitor that overdue the storage time, it should be test, the characteristics of the capacitor or contact with our technical engineer.

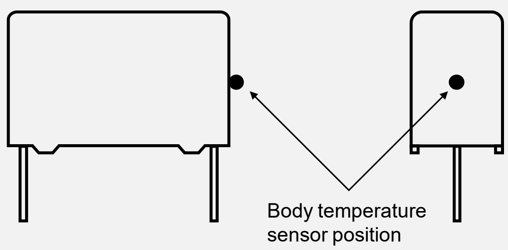
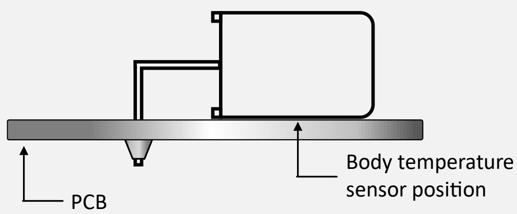
RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Capacitor body temperature should follow the description below:

Profile Features		Polypropylene Film Capacitor	Polyester Film Capacitor
Capacitor body maximum temperature at preheating	T_P	≤ 110°C / 120 seconds	≤ 125°C / 120 seconds
Capacitor body maximum temperature at wave soldering	T_S	≤ 120°C / t_s ≤ 45 seconds	≤ 150°C / t_s ≤ 45 seconds

DETERMINING THE CAPACITOR BODY TEMPERATURE

Vertical Mounting	Horizontal Mounting
	
The body temperature sensor position is defined as the highest temperature point around the capacitor body.	If there is 90 degree bending product, the sensor position shall between product and PCB

SOLDERING SUGGESTIONS

When solder a capacitor, heat in soldering is conducted to the element of the capacitor from wire lead and an enclosure, and hence it should be noted that soldering under high temperature and a long period may cause deterioration of breakdown of capacitors. Be sure to solder within the recommended temperature condition range.

HAND SOLDERING

a.) Soldering iron top temperature: ≤ 350°C
b.) Soldering time: ≤ 3sec

If re-work or dipping twice in necessary, it should be done after the capacitor returned to the normal temperature. Suggestion time is 24 hours.

THT film capacitors are not suitable for reflow soldering.

When SMD components are used together with film capacitor, the film capacitor should not pass into the SMD adhesive curing oven. The film capacitor should be assembled after the SMD process.

In order to ensure proper conditions for manual or selective soldering, the body (surface) temperature of the film capacitor (T_s) must be ≤ 120°C.

REVISION TABLE

Revision	Date	Status	Notes
001	01/10/2021	Initial release	Initial publication

DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any MGT product.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.