MPIS SERIES

MKP SNUBBER CAPACITOR

DOUBLE METALLIZED POLYPROPYLENE CAPACITOR ▲ THT type
Low inductive winding
AEC-Q200 on request, contact MGT for more details
Tinned copper lugs for screw fixing
High voltage and high ripple current
Double side metallized film with internal series connection

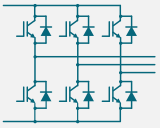
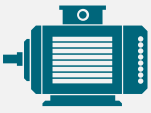
SPECIFICATION

Item		Characteristics				
Related Documents		IEC 61071 / 60068				
Rated Temperature Range		-40°C to +85°C				
Usable Temperature Range Note 1		-40°C to +105°C				
Capacitance Range	C_R	0.1µF to 2.5µF				
Capacitance Tolerance	ΔC	±5% ▲ ±10%				
Nominal (Rated) DC Voltage at 85°C	$V_{N\,DC}$	850V_{DC}	1000V_{DC}	1200V_{DC}	1600V_{DC}	2000V_{DC}
Rated AC Voltage at 85°C	$V_{R\,AC}$	500V_{AC}	550V_{AC}	630V_{AC}	650V_{AC}	700V_{AC}
Dissipation Factor Note 2	tan δ	≤ 0.005%				
Peak Current	I_{PEAK}	160A to 2125A				
RMS Current Note 3	I_{RMS}	8A to 27A				
Equivalent Series Resistance Note 4	ESR	4.5mΩ to 20mΩ				
Insulation Resistance	R_{INS}	Terminal to Terminal: (at 20°C ± 5°C) Voltage charge time: 1 minute. Voltage: 100V_{DC} ≥ 100GΩ (C_R ≤ 0.33µF) ≥ 30GΩ (C_R > 0.33µF)				
Withstand Voltage	V_W	Terminal to Terminal: (at 20°C ± 5°C) 1.6 × V_{NDC} applied for 10sec 2 × V_{NDC} applied for 2sec				
Maximum Pulse Rise Slope dV/dt		850V_{DC}	1000V_{DC}	1200V_{DC}	1600V_{DC}	2000V_{DC}
		750V/µs	850V/µs	1000V/µs	1200V/µs	1600V/µs

Note:

1: **With specified voltage derating**
2: **Measured at 1kHz**
3: **Measured at 100kHz**
4: **Measured at 100kHz**

APPLICATIONS

Frequency Converter	Direct mount on IGBT Modules	Industrial	Motors & Drives	Photovoltaic Inverter	Wind Inverter
					

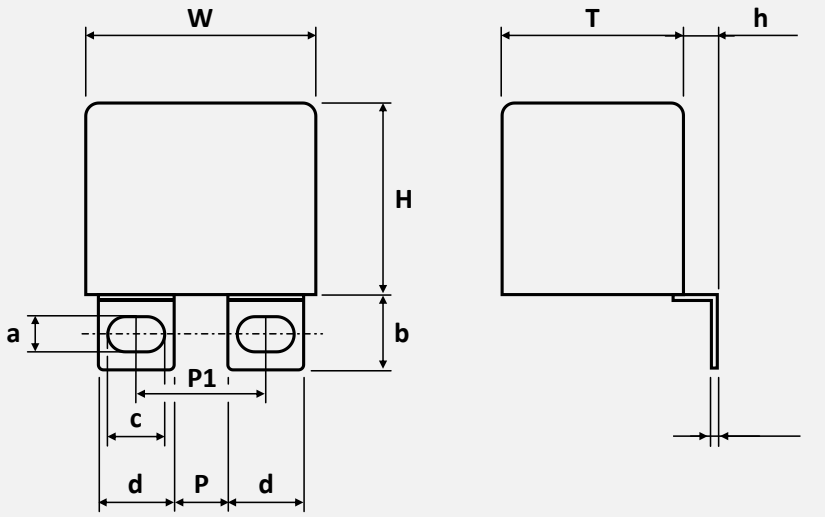
ELECTRICAL CHARACTERISTICS

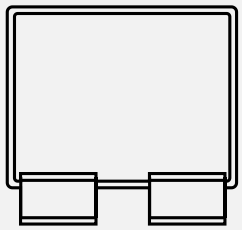
$V_{N\,DC}$ at 85°C	C_R (µF)	Dimensions (mm)				dV/dt (V/µs)	I_{PEAK} (A)	ESR at 100kHz (mΩ)	I_{RMS} at 100kHz (A)	Part Number Note
		W	H	T	P1					
850V_{DC}	0.82	42.5	27.5	24.5	24	750	615	7	15	MPIS824□0850DB20814-A
	1.0	42.5	27.5	24.5	24	750	750	6.5	17	MPIS105□0850DB20814-A
	1.5	42.5	35.5	33.5	24	750	1125	5.5	22	MPIS155□0850DB20814-A
	2.0	42.5	45	33	24	750	1500	5.5	26	MPIS205□0850DB20814-A
	2.5	42.5	45	33	24	750	1875	5	27	MPIS255□0850DB20814-A
1000V_{DC}	0.47	42.5	27.5	24.5	24	850	400	7.5	14	MPIS474□1000DB20814-A
	0.68	42.5	27.5	24.5	24	850	578	6	16	MPIS684□1000DB20814-A
	0.82	42.5	27.5	24.5	24	850	697	6	18	MPIS824□1000DB20814-A
	1.0	42.5	35.5	33.5	24	850	850	5.5	19	MPIS105□1000DB20814-A
	1.2	42.5	35.5	33.5	24	850	1020	5	21	MPIS125□1000DB20814-A
	1.5	42.5	35.5	33.5	24	850	1275	5	22	MPIS155□1000DB20814-A
	2.0	42.5	45	33	24	850	1700	5	23	MPIS205□1000DB20814-A
	2.2	42.5	45	33	24	850	1870	5	23	MPIS225□1000DB20814-A
	2.5	42.5	45	33	24	850	2125	4.5	24	MPIS255□1000DB20814-A
1200V_{DC}	0.33	42.5	27.5	24.5	24	1000	330	8	12	MPIS334□1200DB20814-A
	0.47	42.5	27.5	24.5	24	1000	470	7	14	MPIS474□1200DB20814-A
	0.68	42.5	35.5	33.5	24	1000	680	6	18	MPIS684□1200DB20814-A
	0.82	42.5	35.5	33.5	24	1000	820	5.5	20	MPIS824□1200DB20814-A
	1.0	42.5	35.5	33.5	24	1000	1000	5	21	MPIS105□1200DB20814-A
	1.2	42.5	35.5	33.5	24	1000	1200	5	22	MPIS125□1200DB20814-A
	1.5	42.5	45	33	24	1000	1500	4.5	26	MPIS155□1200DB20814-A
1600V_{DC}	0.33	42.5	27.5	24.5	24	1200	396	8	13	MPIS334□1600DB20814-A
	0.47	42.5	27.5	24.5	24	1200	564	7	15	MPIS474□1600DB20814-A
	0.68	42.5	35.5	33.5	24	1200	816	6	18	MPIS684□1600DB20814-A
	0.82	42.5	35.5	33.5	24	1200	984	5.5	20	MPIS824□1600DB20814-A
	1.0	42.5	45	33	24	1200	1200	5	22	MPIS105□1600DB20814-A
2000V_{DC}	0.1	42.5	27.5	24.5	24	1600	160	20	8	MPIS104□2000DB20814-A
	0.15	42.5	27.5	24.5	24	1600	240	15	10	MPIS154□2000DB20814-A
	0.22	42.5	27.5	24.5	24	1600	352	10	12	MPIS224□2000DB20814-A
	0.33	42.5	27.5	24.5	24	1600	528	8	13	MPIS334□2000DB20814-A
	0.47	42.5	35.5	33.5	24	1600	752	7	16	MPIS474□2000DB20814-A
	0.68	42.5	35.5	33.5	24	1600	1088	6	18	MPIS684□2000DB20814-A
	0.82	42.5	45	33	24	1600	1312	5.5	21	MPIS824□2000DB20814-A
	1.0	42.5	45	33	24	1600	1600	5	22	MPIS105□2000DB20814-A

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

PACKAGE OUTLINE ▲ All dimensions in mm

Screwable Plate Version	Bottom View



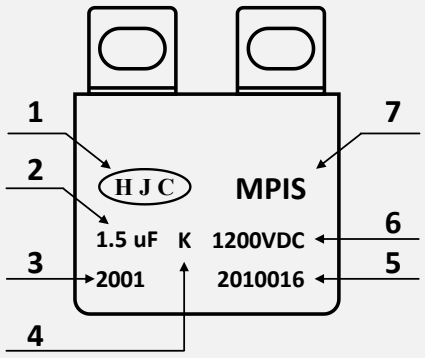


ELECTRICAL CHARACTERISTICS

Dimensions (mm)	W	H	T	P1	a	b	c	d	e	h	P
Tolerance (mm)	±1	±1	±1	±3	±0.5	±0.5	±0.5	±0.5	±0.1	±1	±1
MPIS	42.5	27.5	24.5	24	6.5	14	10.5	14	0.8	6	9
	42.5	35.5	33.5	24	6.5	14	10.5	14	0.8	6	9
	42.5	45	33	24	6.5	14	10.5	14	0.8	6	9

PRODUCT MARKING

Marking	Details



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

DATE CODE & APPLICATION CATEGORY

Example:

Date code

2001: 2001 = 1st week of 2020

Lot number

2010016: 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: MPIS series ▲ 1µF ▲ 1000V_{DC} ▲ ±5% ▲ Dimension 42.5 x 35.5 x 33.5 mm

MPIS		105		J		1000		D		B		2		08		14		-A	
Series		Capacitance Code Note1 (pF)		Capacitance Tolerance (%)		Rated Voltage (V_{DC})		Voltage Type		Packaging Type		Lead Configuration Note2		Terminal distance P (mm)		Terminal Length L1 (mm)		Special Terminal	
Code	Series	Code	µF	Code	Tol.	Code	VDC	Code	Type	Code	Type	Code	Style	Code	mm	Code	mm	Code	Type
MPIS	MPIS	104	0.1	J	±5	0850	850	D	DC	B	Bulk	2	TT	08	8	14	14	-A	See Note 3
		334	0.33	K	±10	1000	1000												
		824	0.82			1200	1200												
		105	1.0			1600	1600												
		225	2.2			2000	2000												

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.**

2 **TT = Tinned terminal**

3 **A = Screwable plate connections**

HEAT CONDUCTIVITY

In order not to exceed the maximum allowed case temperature rise (ΔT), the formula used to calculate the maximum power that may be dissipated by the capacitor is:

Rise of the case temperature in °C:

$$\Delta T = T_{CASE} - T_{AMBIENT}$$

$$\Delta T = \frac{P}{G}$$

With G, the heat conductivity of the capacitor in mW/°C.

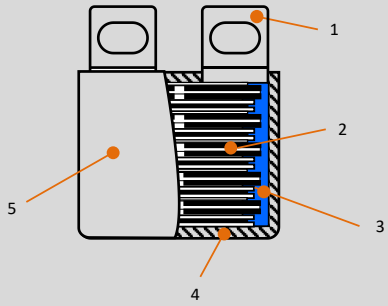
Maximum power that may be dissipated by the capacitor in mW:

$$P = I_{RMS}{}^2 \cdot ESR$$

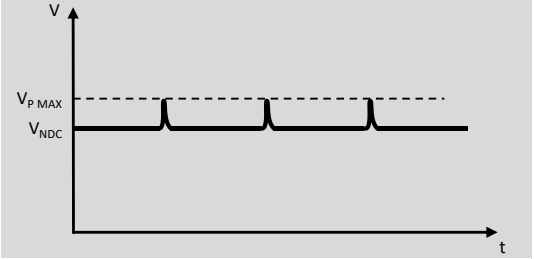
The power-dissipation must be limited so that the case-temperature in the application never exceeds 105°C (observing voltage-derating).

Dimensions (mm)			G (mW/°C)
W	H	T	
31	18	9	31
31	20	9	36
31	22	11	41
31	24.5	15	46
31	28	18	54
31	33	18	58
31	30.5	20	59
31	31	22	62
31	37	22	68
41.5	35	20	63
41.5	35.5	20.5	68
41.5	39	24	73
41.5	41	27.5	85
41.5	38	28	83
41.5	45	30	93
41.5	45	32	95
58	45	30	95
58	50	35	108
58	53	38	115

TECHNICAL SPECIFICATION

No.	Category	Specification					
1	Scope	This specification applies to capacitors for power electronics applications. Reference standards: IEC 61071 / IEC 60068					
2	Product Name	Metallized polypropylene film capacitor, Type MPIS					
3	Construction	Dimensions:	Refer to dimensions drawing				
							
		1 = Lugs for screw mounting	Tinned copper lugs. (Lead Free) compliant to RoHS directive				
		2 = Element	Double side Metallized Polypropylene Film				
		3 = Metal spray	Special solder. (Lead Free) compliant to RoHS directive				
		4 = Inner coating	Epoxy resin filled. (UL-94V-0 Standard)				
		5 = Outer coating	Plastic case. (UL-94V-0 Standard)				
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	25% to 75%				
		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:	Below 50%				
		Operating temperature range					
		Lowest operating temperature:	-40°C				
		Maximum operating temperature:	+105°C (case-temperature) with specified voltage-derating				
		The capacitor can be operated up to 105°C case-temperature (according to the power to be dissipated). The temperature is measured at the hottest point of the case when the capacitor has reached its thermal equilibrium.					
5	Electrical Characteristics	**All data given at an ambient temperature of 23°C ± 1°C and a relative humidity of 50% ± 2%%, unless otherwise specified.**					
		Rated temperature:	+85°C				
		Nominal voltage (V_{NDC} at 85°C):	850V	1000V	1200V	1600V	2000V
		Derating ratio of V_{NDC} (85° to 105°C)	1.5% per °C for V_{NDC}				
		Capacitance range:	0.33µF to 2.5µF				
		Capacitance tolerance:	±5% (J), ±10% (K)		Measured at 1kHz, 1V		
		Dissipation factor:	≤ 0.0005		At 1kHz		
		Self-inductance (L_S):	< 1nH per mm of lead spacing				

TECHNICAL SPECIFICATION

No.	Category	Specification		
5	Electrical Characteristics	**Insulation resistance between terminals**		
		Test conditions:		
		Temperature:	20°C ± 5°C	
		Relative humidity:	60% ± 5%	
		Voltage charge:	100V_{DC}	
		Performance:	After voltage charge 1 minute	
			≥ 100GΩ	For C_R ≤ 0.33μF
			≥ 300GΩ	For C_R > 0.33μF
		Test voltage between terminals		
		1.5 × V_{NDC} applied for 10 sec, at 20°C ±5°C		
		Cut off current:	10mA, slow up voltage speed: 100V/sec	
		Current limiting resistance of 1Ω/V shall be connected to the test circuit		
		Performance:	There shall be no dielectric breakdown or other damage	
		Test voltage between terminal and case		
		2000V_{AC} (50Hz) applied for 10 sec		
		Performance:	There shall be no flashover or other damage	
		Maximum repetitive peak voltages		
		Repetitive surge voltage (V_P)	Maximum duration within one day	
		1.1 × V_{NDC}	30% on load duration	
		1.15 × V_{NDC}	30 minutes	
		1.2 × V_{NDC}	5 minutes	
		1.3 × V_{NDC}	1 minute	
		1.5 × V_{NDC}	100 ms	
		Life time expectancy		
		Operating life:	> 100000h at V_{OPDC} and 70°C	

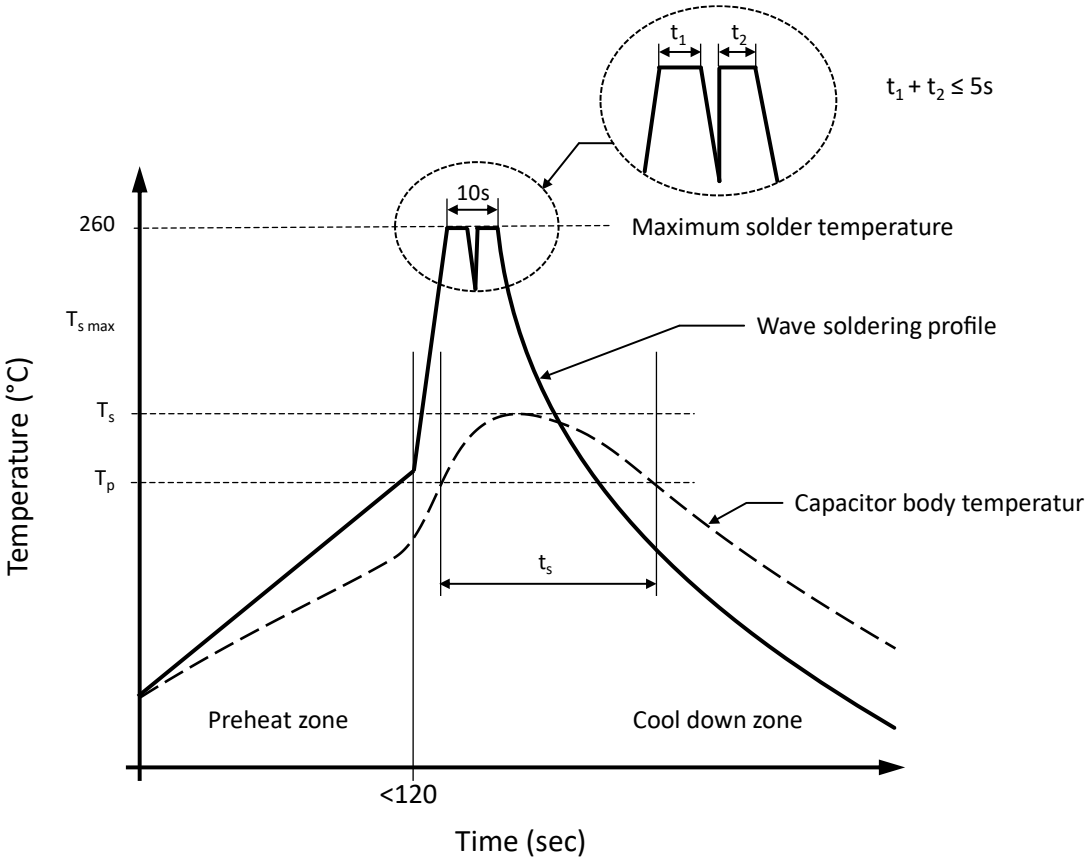
TECHNICAL SPECIFICATION

No.	Category	Specification		
6	Mechanical Characteristics	**Test Item**	**Conditions**	**Performance**
		Vibration proof (IEC68-2-6)	10Hz to 55Hz: amplitude ± 0.35mm or acceleration 98m/s^2 Test duration: 10 frequency cycles, 3 axes offset from each other by 90° 1 octave/min Visual examination	No visible damage
7	Endurance Characteristics	Voltage test between terminal	1.5 × V_{NDC} at ambient temperature. Duration 60sec Capacitance at 1kHz tan δ at 10kHz	|ΔC/C| ≤ 0.5% Increase of tan δ ≤ 1.2 initial tanδ_0 + 1×10^{-4} R insulation ≥ 50 % of specified values
		Surge discharge test	1.1 × V_{NDC} Number of discharges: 5 Time lapse: every 2 min (10min total). Within 5 min after the surge discharge test, the units shall be subjected to a voltage test between terminals Duration 60sec 1.5 × V_{NDC} at ambient temperature. Capacitance at 1kHz tan δ at 10kHz	|ΔC/C| ≤ 1% tan δ ≤ 1.2 initial tan δ_0 + 1 × 10^{-4}
		Change of temperature (IEC68-2-14) Test Nb	Test Nb T_{MAX} = 85°C T_{MIN} = - 40°C Transition time: 1 h, equivalent to 1°C/min 5 cycles Capacitance at 1kHz tan δ at 10kHz	|ΔC/C| ≤ 2 % Increase of tan δ ≤ 150 × 10^{-4}
		Damp heat steady state (IEC68-2-78)	Test Ca T_{MAX} = 40 ± 2°C RH = 93 ± 3 % Duration 56 days 1.5 × V_{NDC} at ambient temperature Duration 60sec Visual examination Capacitance at 1kHz tan δ at 10kHz	No puncturing or flashover Self-healing punctures are permitted. |ΔC/C| ≤ 2.0% Increase of tan δ ≤ 150 × 10^{-4}
		Self-healing test	1.5 × V_{NDC} Duration 10sec Number of clearings ≤ 5 Clearing = voltage drop of 5 % increase the voltage at 100 V/s till 5 clearings occur with a max. of 2.5 × V_{NDC} for a duration of 10sec. Capacitance at 1kHz tan δ at 10kHz	|ΔC/C| ≤ 0.5% tan δ ≤ 1.2 x initial tan δ_0 + 1 × 10^{-4}

TECHNICAL SPECIFICATION

No.	Category	Specification		
7	Endurance Characteristics	**Test Item**	**Conditions**	**Performance**
		Thermal stability test under overload conditions	Natural cooling T_{AMB} ± 5°C 1.21 × P_{MAX} 1.1 × I_{MAX} (I_{MAX} see specific reference data) Test duration 48h. Measure the temperature every 1.5h during the last 6 h. Capacitance at 1kHz tan δ at 10kHz	Temperature rise < 1°C |ΔC/C| ≤ 2% Increase of tan δ ≤ 1.2 initial tan δ_0 +150 × 10^{-4}
		Endurance test between terminals	Sequence 1.4 × V_{NDC} at T_{MAX} = 85 °C Duration 250 h 1000 × discharge at 1.4 × I (maximum repetitive peak current in continuous operation) 1.4 × V_{NDC} at T_{MAX} = 85 °C Duration 250h Capacitance at 1kHz tan δ at 10kHz	|ΔC/C| ≤ 3% Increase of tan δ ≤ 150 × 10^{-4}
		Destruction test sequence	At T_{MAX} = 85°C	No puncturing or flashover Self-healing punctures are permitted
		High DC voltage test	Switch to high DC voltage = 2 × V_{NDC} Duration 5sec	
		High AC voltage test	Switch to high AC voltage = V_{NDC} / 2√2 Duration 5min	
			Repeat destruction sequence 3 times. Visual examination	
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.		

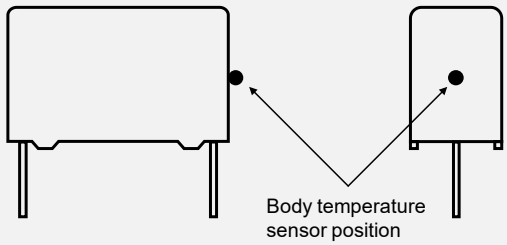
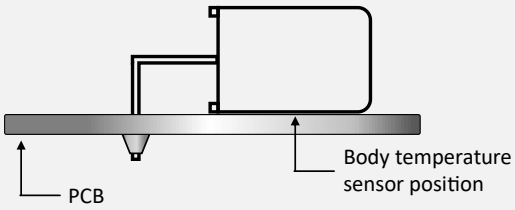
RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



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.