EPB-U SERIES

MKP DC-LINK CAPACITOR

METALLIZED POLYPROPYLENE CAPACITOR ▲ THT type
Low inductive winding
AEC-Q200 on request, contact MGT for more details
Especially for high temperature and high humidity applications
High ripple current
Temperature Humidity Bias (THB) 1000 hours tested

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	1.0µF to 60µF			
Capacitance Tolerance	ΔC	±5% ▲ ±10%			
Operating DC Voltage at 70°C	$V_{OP\ DC}$	800V_{DC}	900V_{DC}	1100V_{DC}	1300V_{DC}
Nominal DC Voltage at 85°C	$V_{N\ DC}$	700V_{DC}	800V_{DC}	900V_{DC}	1100V_{DC}
Operating DC Voltage at 105°C	$V_{OP\ DC}$	500V_{DC}	550V_{DC}	600V_{DC}	800V_{DC}
Dissipation Factor Note 2	tan δ	0.08% to 0.25%			
Dissipation Factor Note 3	tan δ	0.45% to 2.4%			
Peak Current	I_{PEAK}	75A to 1500A			
RMS Current Note 4	I_{RMS}	2.5A to 18A			
Equivalent Series Resistance Note 5	ESR	4.5mΩ to 65mΩ			
Maximum Pulse Rise Slope dV/dt	Pitch (mm)	700V_{DC}	800V_{DC}	900V_{DC}	1100V_{DC}
	27.5	75V/µs	80V/µs	80V/µs	100V/µs
	37.5	40V/µs	45V/µs	54V/µs	73V/µs
	52.5	20V/µs	25V/µs	35V/µs	50V/µs
Reliability Test ▲ 85°C / 85%RH / 1000h	Test Method	Temperature:		85°C	
		Relative Humidity:		85%	
		Applied Voltage		V_{NDC}	
		Duration:		1000 hours	

Note:

1: With specified voltage derating
2: Measured at 1kHz
3: Measured at 10kHz
4: Measured at 10kHz
5: Measured at 10kHz

APPLICATIONS

AC/DC Converter	Battery Charger	DC/DC Converter	Industrial	Motors & Drives	Renewable Energy	Welding Inverter

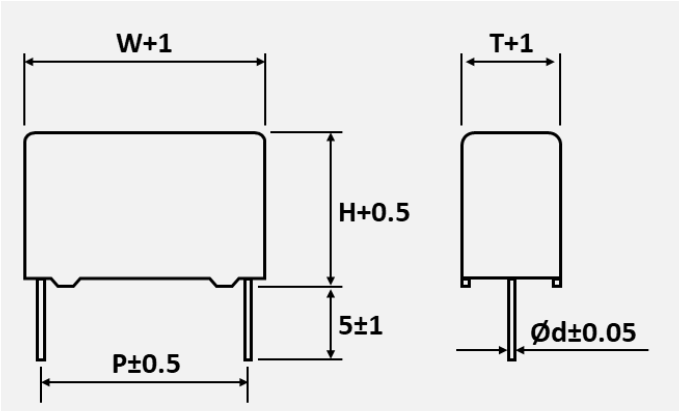
ELECTRICAL CHARACTERISTICS

$V_{N\ DC}$ at 85°C	C_R (µF)	Dimensions (mm) W	H	T	P (mm)	P1 (mm)	Ød (mm)	dV/dt (V/µs)	I_{PEAK} (A)	ESR at 10kHz (mΩ)	I_{RMS} at 10kHz (A)	tanδ at 1kHz (%)	tanδ at 10kHz (%)	SPQ (pcs)	Part Number Note
700V_{DC}	1.0	31	18	9	27.5	-	0.8	75	75	60	2.5	0.09	0.65	252	EPB-105□0700DB127BU
	3.0	31	20	11	27.5	-	0.8	75	225	25	4	0.09	0.65	207	EPB-305□0700DB127BU
	5.0	31	24.5	15	27.5	-	0.8	75	375	17	6	0.09	0.65	153	EPB-505□0700DB127BU
	7.0	31	28	18	27.5	-	0.8	75	525	12	8	0.09	0.65	126	EPB-705□0700DB127BU
	10.0	31	31	22	27.5	-	0.8	75	750	9	10	0.10	0.70	99	EPB-106□0700DB127BU
	12.0	31	37	22	27.5	-	0.8	75	900	7	11.5	0.10	0.70	99	EPB-126□0700DB127BU
	15.0	41.5	35	20	37.5	-	1.0	40	600	10	9	0.15	1.3	84	EPB-156□0700DB137BU
	15.0	41.5	35	20	37.5	10.2	1.2	40	600	9	10	0.13	1.2	84	EPB-156□0700DB137BU-F
	20.0	41.5	39	24	37.5	-	1.0	40	800	8	11	0.15	1.3	70	EPB-206□0700DB137BU
	20.0	41.5	39	24	37.5	10.2	1.2	40	800	7	12	0.13	1.2	70	EPB-206□0700DB137BU-F
	22.0	41.5	38	28	37.5	-	1.0	40	880	6	13	0.15	1.3	56	EPB-226□0700DB137BU
	22.0	41.5	38	28	37.5	10.2	1.2	40	880	6	13.5	0.13	1.2	56	EPB-226□0700DB137B-UF
	25.0	41.5	41	27.5	37.5	-	1.0	40	1000	6	13.5	0.15	1.3	56	EPB-256□0700DB137BU
	25.0	41.5	41	27.5	37.5	10.2	1.2	40	1000	5.5	14.5	0.13	1.2	56	EPB-256□0700DB137BU-F
	30.0	41.5	45	30	37.5	-	1.0	40	1200	5	16	0.15	1.3	56	EPB-306□0700DB137BU
	30.0	41.5	45	30	37.5	20.3	1.2	40	1200	4.5	17	0.13	1.2	56	EPB-306□0700DB137BU-FF
	45.0	58	45	30	52.5	20.3	1.2	20	900	6	15	0.25	2.4	40	EPB-456□0700DB152BU-FF
	50.0	58	50	35	52.5	20.3	1.2	20	1000	5.5	15.5	0.25	2.4	35	EPB-506□0700DB152BU-FF
	55.0	58	50	35	52.5	20.3	1.2	20	1100	5	18	0.25	2.4	35	EPB-556□0700DB152BU-FF
	60.0	58	50	35	52.5	20.3	1.2	20	1200	5	19	0.25	2.4	34	EPB-606□0700DB152BU-FF

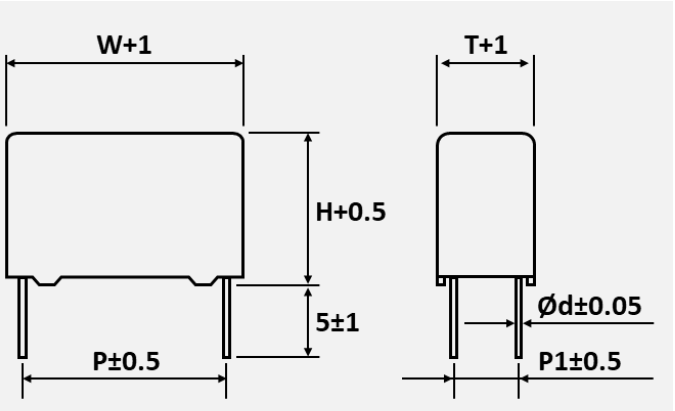
Note: **Enter the appropriate tolerance code □ from the product code table**
SPQ = Standard Pack Quantity in pcs

PACKAGE OUTLINE ▲ All dimensions in mm

2-Pin Version



4-Pin Version



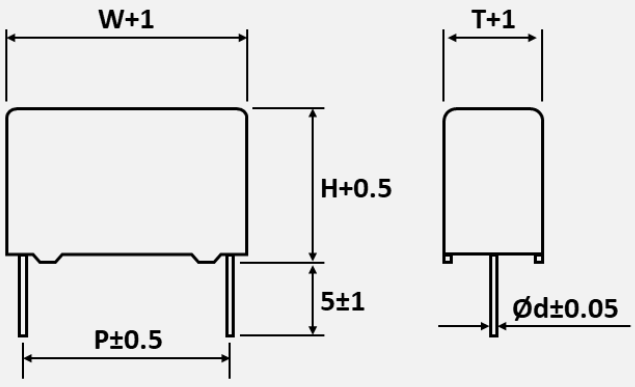
ELECTRICAL CHARACTERISTICS

$V_{N\,DC}$ at 85°C	C_R (µF)	Dimensions (mm) W	H	T	P (mm)	P1 (mm)	Ød (mm)	dV/dt (V/µs)	I_{PEAK} (A)	ESR at 10kHz (mΩ)	I_{RMS} at 10kHz (A)	tanδ at 1kHz (%)	tanδ at 10kHz (%)	SPQ (pcs)	Part Number Note
800V_{DC}	1.0	31	18	9	27.5	-	0.8	80	80	65	2	0.08	0.6	252	EPB-105□0800DB127BU
	2.0	31	20	11	27.5	-	0.8	80	160	35	3.5	0.08	0.6	207	EPB-205□0800DB127BU
	3.0	31	22	13	27.5	-	0.8	80	240	25	4.5	0.08	0.6	171	EPB-305□0800DB127BU
	4.0	31	24.5	15	27.5	-	0.8	80	320	17	5.5	0.08	0.6	153	EPB-405□0800DB127BU
	5.0	31	28	18	27.5	-	0.8	80	400	14	7	0.08	0.6	126	EPB-505□0800DB127BU
	6.0	31	28	18	27.5	-	0.8	80	480	11	7.5	0.10	0.65	126	EPB-605□0800DB127BU
	7.0	31	33	18	27.5	-	0.8	80	560	10	9	0.10	0.65	117	EPB-705□0800DB127BU
	8.0	31	31	22	27.5	-	0.8	80	640	9	9.5	0.10	0.65	99	EPB-805□0800DB127BU
	9.0	31	37	22	27.5	-	0.8	80	720	8.5	10	0.10	0.65	99	EPB-905□0800DB127BU
	10.0	41.5	35	20	37.5	-	1.0	45	450	14	8	0.14	1.2	84	EPB-106□0800DB137BU
	10.0	41.5	35	20	37.5	10.2	1.2	45	450	13	8.5	0.12	1.1	84	EPB-106□0800DB137BU-F
	12.0	41.5	35.5	22.5	37.5	-	1.0	45	540	11	8.5	0.14	1.2	70	EPB-126□0800DB137BU
	12.0	41.5	35.5	22.5	37.5	10.2	1.2	45	540	10	9	0.12	1.1	70	EPB-126□0800DB137BU-F
	15.0	41.5	39	24	37.5	-	1.0	45	675	9	10	0.14	1.2	70	EPB-156□0800DB137BU
	15.0	41.5	39	24	37.5	10.2	1.2	45	675	8	11	0.12	1.1	70	EPB-156□0800DB137BU-F
	20.0	41.5	41	27.5	37.5	-	1.0	45	900	7	13	0.14	1.2	56	EPB-206□0800DB137BU
	20.0	41.5	41	27.5	37.5	10.2	1.2	45	900	6	13.5	0.12	1.1	56	EPB-206□0800DB137BU-F
	22.0	41.5	45	30	37.5	-	1.0	45	990	6	14.5	0.14	1.2	56	EPB-226□0800DB137BU
	22.0	41.5	45	30	37.5	20.3	1.2	45	990	5.5	15.5	0.12	1.1	56	EPB-226□0800DB137BU-FF
	25.0	41.5	45	32	37.5	-	1.0	45	1125	5.5	16	0.14	1.2	49	EPB-256□0800DB137BU
	25.0	41.5	45	32	37.5	20.3	1.2	45	1125	5	16	0.12	1.1	49	EPB-256□0800DB137BU-FF
	30.0	58	45	30	52.5	20.3	1.2	25	750	8	12	0.22	2.2	40	EPB-306□0800DB152BU-FF
	35.0	58	45	30	52.5	20.3	1.2	25	875	7	14.5	0.22	2.2	40	EPB-356□0800DB152BU-FF
	40.0	58	50	35	52.5	20.3	1.2	25	1000	6	15	0.22	2.2	35	EPB-406□0800DB152BU-FF
	45.0	58	50	35	52.5	20.3	1.2	25	1125	5.5	17	0.22	2.2	35	EPB-456□0800DB152BU-FF
	50.0	58	53	38	52.5	20.3	1.2	25	1250	5	18	0.22	2.2	30	EPB-506□0800DB152BU-FF

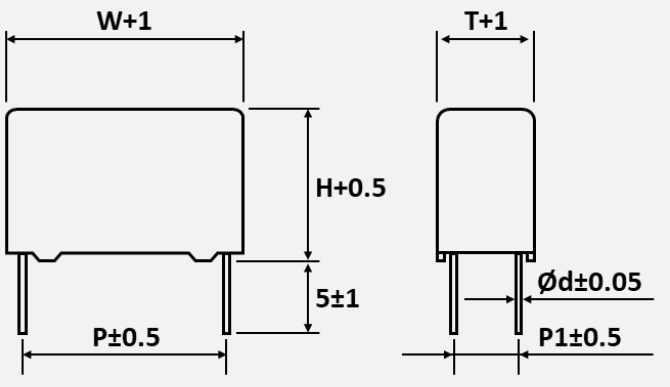
Note: **Enter the appropriate tolerance code □ from the product code table**
SPQ = Standard Pack Quantity in pcs

PACKAGE OUTLINE ▲ All dimensions in mm

2-Pin Version



4-Pin Version



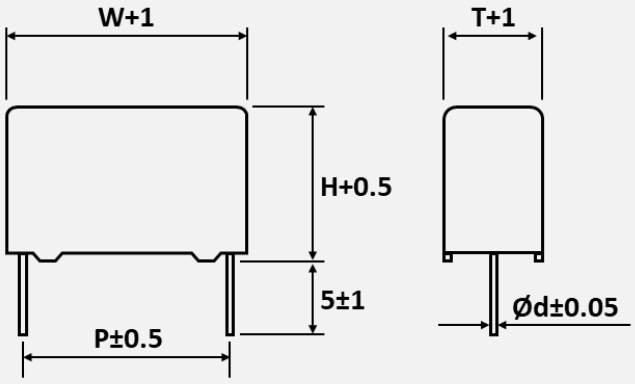
ELECTRICAL CHARACTERISTICS

$V_{N\,DC}$ at 85°C	C_R (µF)	Dimensions (mm) W	H	T	P (mm)	P1 (mm)	Ød (mm)	dV/dt (V/µs)	I_{PEAK} (A)	ESR at 10kHz (mΩ)	I_{RMS} at 10kHz (A)	tanδ at 1kHz (%)	tanδ at 10kHz (%)	SPQ (pcs)	Part Number Note
900V_{DC}	1.0	31	18	9	27.5	-	0.8	80	80	65	2	0.08	0.55	252	EPB-105□0900DB127BU
	2.0	31	22	13	27.5	-	0.8	80	160	30	3.5	0.08	0.55	171	EPB-205□0900DB127BU
	5.0	31	30.5	20	27.5	-	0.8	80	400	15	7.5	0.08	0.55	108	EPB-505□0900DB127BU
	7.0	31	37	22	27.5	-	0.8	80	560	9	9	0.10	0.6	99	EPB-705□0900DB127BU
	10.0	41.5	35.5	22.5	37.5	-	1.0	54	540	15	8.5	0.12	1.0	70	EPB-106□0900DB137BU
	10.0	41.5	35.5	22.5	37.5	10.2	1.2	54	540	12	9	0.11	0.95	70	EPB-106□0900DB137BU-F
	12.0	41.5	39	24	37.5	-	1.0	54	648	11	9.5	0.12	1.0	70	EPB-126□0900DB137BU
	12.0	41.5	39	24	37.5	10.2	1.2	54	648	10.5	10	0.11	0.95	70	EPB-126□0900DB137BU-F
	14.0	41.5	38	28	37.5	-	1.0	54	756	10	10	0.12	1.0	56	EPB-146□0900DB137BU
	14.0	41.5	38	28	37.5	-	1.2	54	756	9	11	0.11	0.95	56	EPB-146□0900DB137BU-F
	16.0	41.5	41	27.5	37.5	-	1.0	54	864	8	11	0.12	1.0	56	EPB-166□0900DB137BU
	16.0	41.5	41	27.5	37.5	10.2	1.2	54	864	7.5	12	0.11	0.95	56	EPB-166□0900DB137BU-F
	20.0	41.5	45	30	37.5	-	1.0	54	1080	6	14	0.12	1.0	56	EPB-206□0900DB137BU
	20.0	41.5	45	30	37.5	20.3	1.2	54	1080	5.5	15.5	0.11	0.95	56	EPB-206□0900DB152BU-FF
	25.0	58	45	30	52.5	20.3	1.2	35	875	9	11.5	0.20	1.9	40	EPB-256□0900DB152BU-FF
	30.0	58	45	30	52.5	20.3	1.2	35	1050	8	13	0.20	1.9	40	EPB-306□0900DB152BU-FF
	35.0	58	50	35	52.5	20.3	1.2	35	1225	7	15.5	0.20	1.9	35	EPB-356□0900DB152BU-FF
	40.0	58	50	35	52.5	20.3	1.2	35	1400	6	17	0.20	1.9	35	EPB-406□0900DB152BU-FF

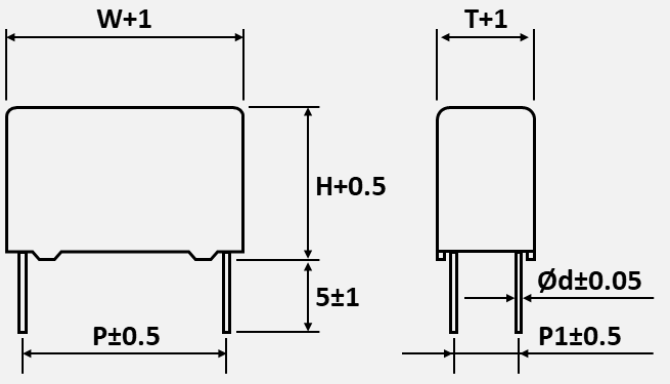
Note: **Enter the appropriate tolerance code □ from the product code table**
SPQ = Standard Pack Quantity in pcs

PACKAGE OUTLINE ▲ All dimensions in mm

2-Pin Version



4-Pin Version



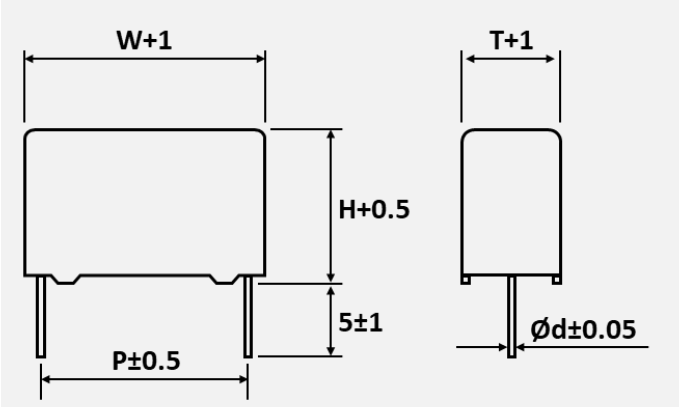
ELECTRICAL CHARACTERISTICS

$V_{N\,DC}$ at 85°C	C_R (µF)	Dimensions (mm) W	H	T	P (mm)	P1 (mm)	Ød (mm)	dV/dt (V/µs)	I_{PEAK} (A)	ESR at 10kHz (mΩ)	I_{RMS} at 10kHz (A)	tanδ at 1kHz (%)	tanδ at 10kHz (%)	SPQ (pcs)	Part Number Note
1100V_{DC}	1.5	31	22	13	27.5	-	0.8	100	15	25	4	0.08	0.45	171	EPB-155□1100DB127BU
	3.0	31	28	18	27.5	-	0.8	100	300	18	6	0.08	0.45	126	EPB-305□1100DB127BU
	5.0	31	37	22	27.5	-	0.8	100	500	10	9	0.08	0.45	99	EPB-505□1100DB127BU
	8.0	41.5	39	24	37.5	-	1.0	73	584	12	9	0.11	0.9	70	EPB-805□1100DB137BU
	8.0	41.5	39	24	37.5	10.2	1.2	73	584	11	9.5	0.10	0.8	70	EPB-805□1100DB137BU-F
	10.0	41.5	38	28	37.5	-	1.0	73	730	1	10.5	0.11	0.9	56	EPB-106□1100DB137BU
	10.0	41.5	38	28	37.5	10.2	1.2	73	730	10	11	0.10	0.8	56	EPB-106□1100DB137BU-F
	12.0	41.5	45	30	37.5	-	1.0	73	876	9	12.5	0.11	0.9	56	EPB-126□1100DB137BU
	12.0	41.5	45	30	37.5	20.3	1.2	73	876	8	13.5	0.10	0.8	56	EPB-126□1100DB137BU-FF
	14.0	41.5	45	30	37.5	-	1.0	73	1022	8	13.5	0.11	0.9	56	EPB-146□1100DB137BU
	14.0	41.5	45	30	37.5	20.3	1.2	73	1022	7	14.5	0.10	0.8	56	EPB-146□1100DB137BU-FF
	15.0	41.5	45	33	37.5	20.3	1.2	73	1095	6.5	15	0.11	0.9	48	EPB-156□1100DB137BU-FF
	20.0	58	45	30	52.5	20.3	1.2	50	1000	10	12.5	0.17	1.6	40	EPB-206□1100DB152BU-FF
	25.0	58	50	30	52.5	20.3	1.2	50	1250	8	15	0.17	1.6	40	EPB-256□1100DB152BU-FF
	27.0	58	50	35	52.5	20.3	1.2	50	1350	7	16	0.17	1.6	35	EPB-276□1100DB152BU-FF
	30.0	58	53	38	52.5	20.3	1.2	50	1500	6	16.5	0.17	1.6	35	EPB-306□1100DB152BU-FF

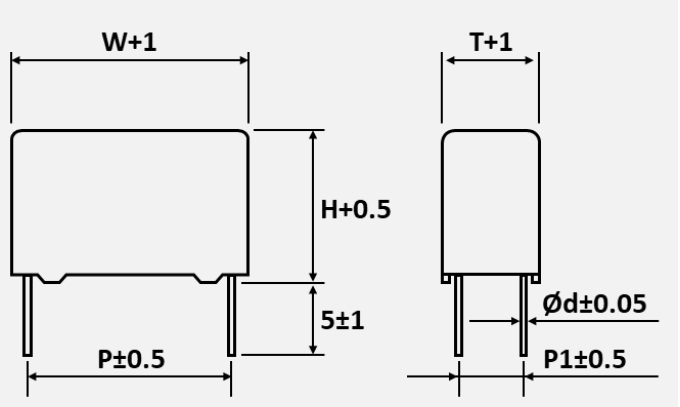
Note: **Enter the appropriate tolerance code □ from the product code table**
SPQ = Standard Pack Quantity in pcs

PACKAGE OUTLINE ▲ All dimensions in mm

2-Pin Version

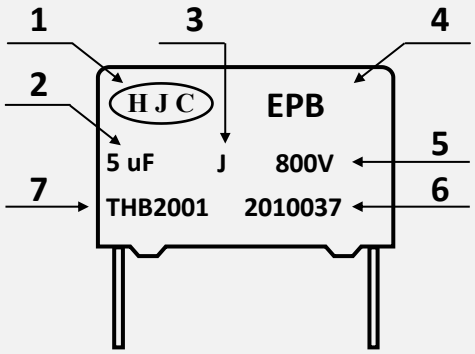


4-Pin Version



PRODUCT MARKING

Marking	Details



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

DATE CODE & APPLICATION CATEGORY

Example:

Date code

THB2001: THB = THB 1000h tested type
2001 = 1st week of 2020

Lot number

2010037: 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: HPB-U **(85/85/1000h)** series ▲ 25µF ▲ 1100V_{DC} ▲ ±10% ▲ P=52.5mm ▲ 4-Pins ▲ P1=20.3mm ▲ Bulk ▲ Straight leads ▲ 5mm lead length

HPB-	256	K	1100	D	B	1	52	B	U	-FF

Series		Capacitance Code Note1 (pF)		Capacitance Tolerance (%)		Rated Voltage (V_{DC})		Voltage Type		Packaging Type		Lead Configuration Note2		Pitch (mm)		Lead Length (mm)		Special Remark Note 3		Special Terminal (4 Pins)	
Code	Series	Code	µF	Code	Tol.	Code	VDC	Code	Type	Code	Type	Code	Style	Code	mm	Code	mm	Code	Type	Code	P1 (mm)
HPB	HPB	105	1.0	J	±5	0700	700	D	DC	B	Bulk	1	SL	27	27.5	B	5.0	U	See	F	10.2
		505	5.0	K	±10	0800	800							37	37.5				Note	2F	12.7
		106	10.0			0900	900							52	52.5				3	FF	20.3
		276	27.0			1100	1100														
		606	60.0																		

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 **SL = Straight leads**

3 **U = High temperature & humidity load type. Temperature Humidity Bias (THB) 1000 hours tested.**

REFERENCE DATA

Fig. 1 ▪ Capacitance Drift vs. Ambient Temperature

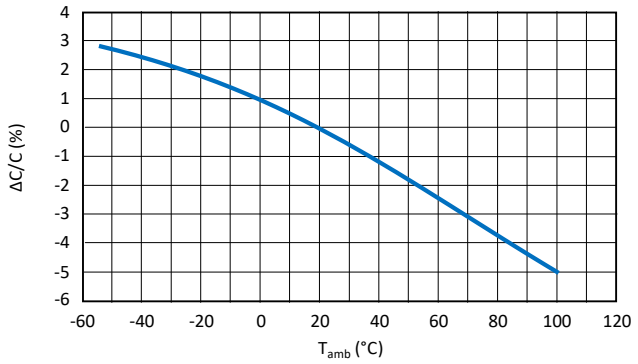


Fig. 2 ▪ Insulation Resistance vs. Ambient Temperature

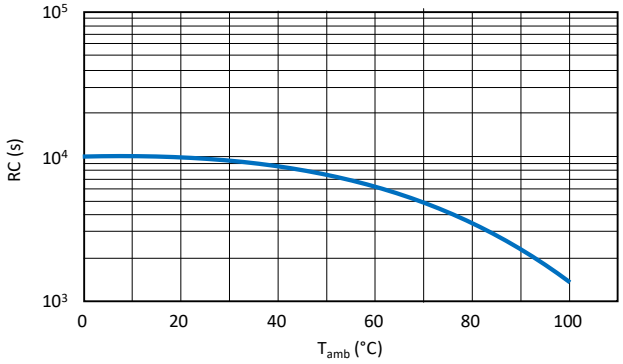


Fig. 3 ▪ Maximum I_{RMS} Current vs. Ambient Temperature

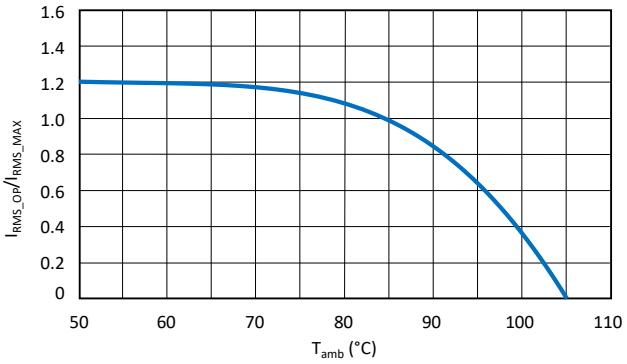


Fig. 4 ▪ Impedance vs. Frequency ▪ V_{NDC} = 700V

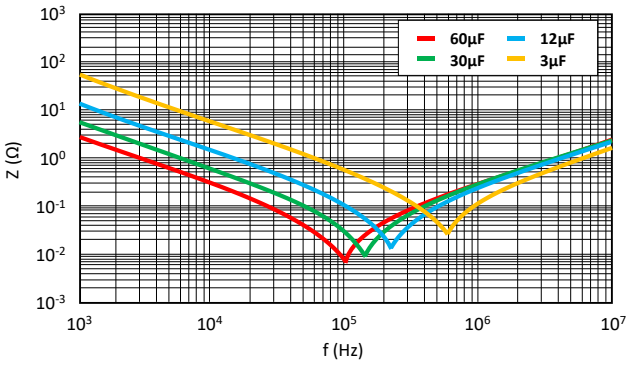


Fig. 5 ▪ Impedance vs. Frequency ▪ V_{NDC} = 800V

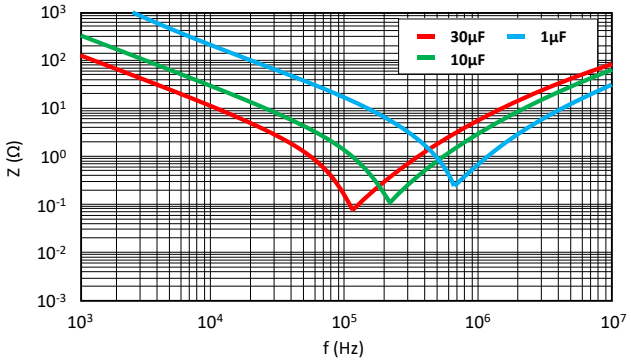
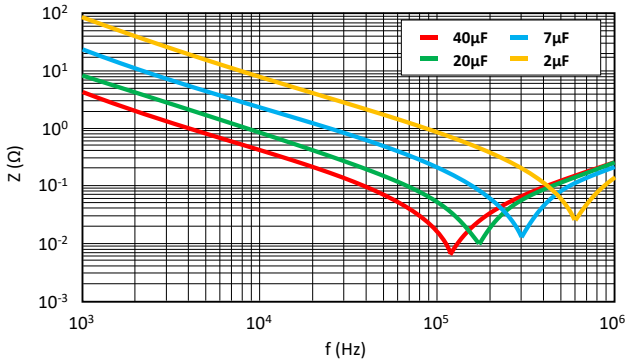


Fig. 6 ▪ Impedance vs. Frequency ▪ V_{NDC} = 900V



REFERENCE DATA

Fig. 7 ▪ Impedance vs. Frequency ▪ V_{NDC} = 1100V

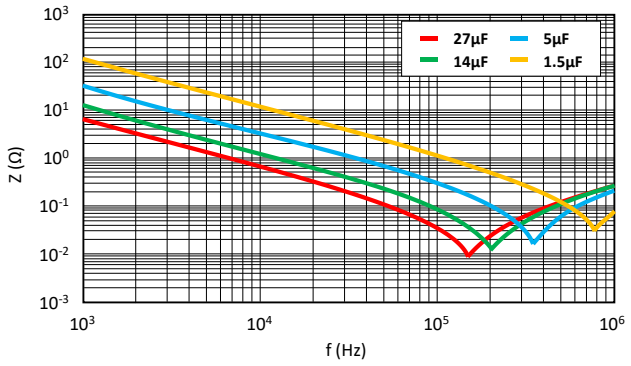
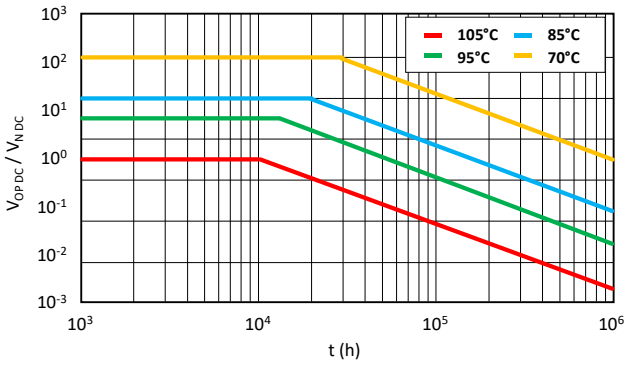


Fig. 8 ▪ Expected Lifetime



Note: **The temperatures-curves are the case-temperatures measured at the hottest point of the capacitor has reached its thermal equilibrium.**

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.

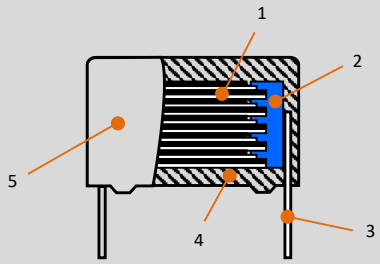
Maximum power that may be dissipated by the capacitor in mW:

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

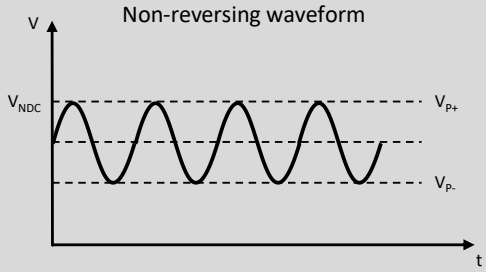
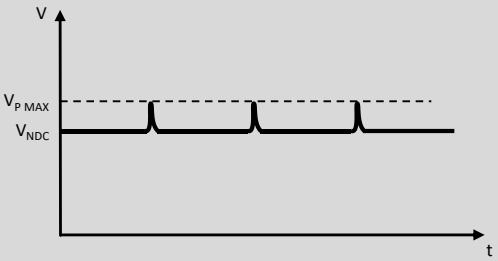
The power-dissipation must be limited so that the case-temperature in the application never exceeds 105°C (observing voltage-derating).

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 EPB					
3	Construction	Dimensions:	Refer to dimensions drawing				
							
		1 = Element	Metallized Polypropylene film				
		2 = Metal spray	Special solder. (Lead Free) compliant to RoHS directive				
		3 = Lead wire	Tinned wire. (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	700V	800V	900V	1100V
		Operating voltage:	V_{OPDC} at 70°C	800V	900V	1100V	1300V
		Operating voltage:	V_{OPDC} at 105°C	500V	550V	650V	800V
		Capacitance range:	1µF to 60µF				
		Capacitance tolerance:	±5% (J), ±10% (K), ±20% (M)	Measured at 1kHz, 1V			
		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
		Voltage charge:	$100V_{DC}$ ($V_{NDC} \leq 500V$)
			$500V_{DC}$ ($V_{NDC} > 500V$)
		Performance:	After voltage charge 1 minute > 10GΩ x μF
		Test voltage between terminals	
		$1.5 \times V_{NDC}$ 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 applicable peak to peak ripple voltage	
		The continuous peak voltage (V_{P+}) shall be ≤ V_{NDC} The peak-to-peak ripple voltage (V_{P-P}) shall be ≤ $0.20 \times V_{NDC}$	
		Maximum repetitive peak voltages	
		Repetitive surge voltage (V_P) / Maximum duration within one day	
		$1.1 \times V_{NDC}$	30% on load duration
		$1.15 \times V_{NDC}$	30 minutes
		$1.2 \times V_{NDC}$	5 minutes
		$1.3 \times V_{NDC}$	1 minute
		$1.5 \times V_{NDC}$	100 ms
			
		Life time expectancy	
		Operating life:	> 100000h at V_{OPDC} and 70°C
		Failure rate:	< 10 FIT (10×10^{-9} /h) at $0.5 \times V_{NDC}$, 40°C

TECHNICAL SPECIFICATION

No.	Category	Specification		
6	Mechanical Characteristics	**Test Item**	**Conditions**	**Performance**
		Robustness of terminations (IEC68-2-21)	Tensile Ua1 Wire diameter / Section / Load ≤ 0.8mm / ≤ 0.5mm² / 10N ≤ 1.25mm / ≤ 1.2mm² / 20N Duration: 10s ± 1s Bending Ub methode 1 Wire diameter / Section / Load ≤ 0.8mm / ≤ 0.5mm³ / 10N ≤ 1.25mm / ≤ 0.019mm³ / 20N 4 × 90°; Duration: 2s to 3 s/bend	There shall be no such mechanical damage as terminal damage etc.
		Vibration proof (IEC68-2-6)	10Hz to 55Hz: amplitude ± 0.35mm or acceleration 98m/s² Test duration: 10 frequency cycles, 3 axes offset from each other by 90° 1 octave/min Visual examination	No visible damage
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 68-2-20Tb)	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 10kHz	|ΔC/C| ≤ 1% Increase of tan δ ≤ 50 × 10^{-4}
		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}

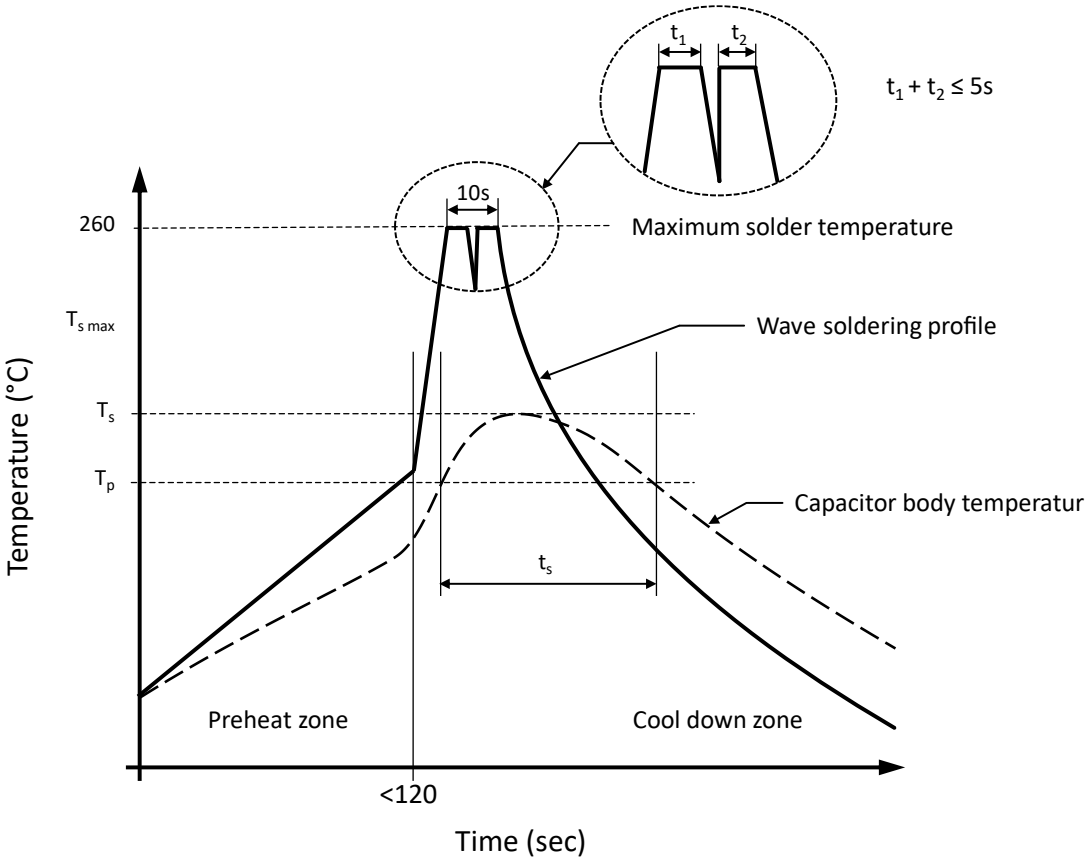
TECHNICAL SPECIFICATION

No.	Category	Specification		
7	Endurance Characteristics	**Test Item**	**Conditions**	**Performance**
		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}
		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	
		Damp heat with load	V_{NDC} (85°C) shall be applied continuously to the capacitor at a temperature of 85°C and a relative humidity of 85% for 1000 hours and then shall be let alone at ordinary condition for 24 hours. After the test, the capacitor shall be satisfied with the performance in the performance column.	Change rate of capacitance: ΔC/C ≤ 10% of the value before the test Increase of tan δ ≤ 350 × 10^{-4} at 10 kHz (C < 100uF) Insulation resistance: ≥50% of specified 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.

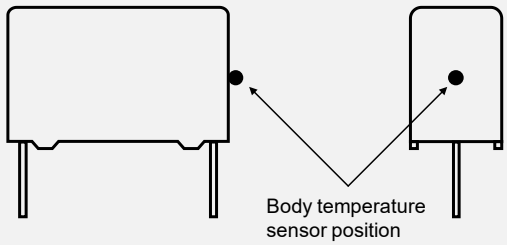
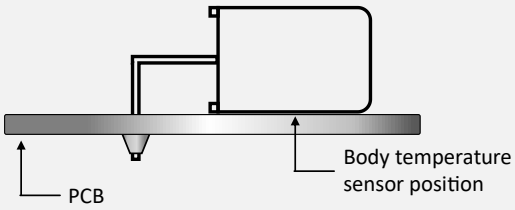
RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



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

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