

# MKP-X2-PV SERIES

## SMALL SIZE ▲ X2 ▲ RFI CAPACITOR

### METALLIZED POLYPROPYLENE CAPACITOR ▲ THT type

In accordance with UL, CUL ENEC, CQC safety regulations

Flame retardant plastic case, epoxy resin sealed, UL 94V-0

Self-healing property

Radio Frequency Interference RFI capacitor ▲ Safety class X2

For standard across the line applications





## SPECIFICATION

Item		Characteristics				
Related Documents		UL 60384–14:2014, IEC60384–14:2013, EN60384–14:2013, GB/T 6346.14–2015				
Rated Temperature Range		-40°C to +110°C				
Capacitance Range	C <sub>R</sub>	0.0047μF to 2.2μF				
Capacitance Tolerance	ΔC	±10% ▲ ±20%				
Rated Voltage	V <sub>R AC</sub>	250V <sub>AC</sub> to 310V <sub>AC</sub>				
Insulation Resistance	R <sub>INS</sub>	Terminal to Terminal		Terminal to Enclosure		
		≥ 15GΩ at 100V <sub>DC</sub> (C <sub>R</sub> ≤ 0.33μF)		≥ 30GΩ at 100V <sub>DC</sub>		
		≥ 5GΩ × μF at 100V <sub>DC</sub> (C <sub>R</sub> > 0.33μF)		≥ 0.5GΩ at 500V <sub>DC</sub>		
Dissipation Factor <sup>Note 1</sup>	tan δ	0.1% or less				
Permissible DC Voltage	V <sub>DC</sub>	560V <sub>DC</sub>				
Withstand Voltage	V <sub>W</sub>	Between Terminal			1500V <sub>DC</sub> for 3 sec	
		Between Terminal and Enclosure			2050V <sub>AC</sub> for 1 min	
		Nothing abnormal shall be found				
Maximum Pulse Rise Slope dV/dt	Pitch (mm)	7.5mm	10.0mm	15.0mm	22.5mm	27.5mm
	560V <sub>DC</sub>	500V/μs	400V/μs	300V/μs	180V/μs	120V/μs

Note:

1: Measured at 1kHz, 20±5°C

## APPLICATIONS

Across the Line Filter	Antenna Coupling	Indoor Applications	Interference Suppressors
			

## ELECTRICAL CHARACTERISTICS

$V_{RAC}$	$C_R$ ( $\mu F$ )	Dimensions (mm)					$\tan\delta$ (%) <sup>Note 1</sup>	Part Number <sup>Note 2</sup>
		W	H	T	P	$\phi d$		
310V <sub>AC</sub>	0.0047	10	8	4	7.5	0.6	0.10	MKP-472□0310AB107□-PV
	0.0056	10	8	4	7.5	0.6	0.10	MKP-562□0310AB107□-PV
	0.0068	10	8	4	7.5	0.6	0.10	MKP-682□0310AB107□-PV
	0.0082	10	8	4	7.5	0.6	0.10	MKP-822□0310AB107□-PV
	0.01	10	8	4	7.5	0.6	0.10	MKP-103□0310AB107□-PV
	0.015	10	8	4	7.5	0.6	0.10	MKP-153□0310AB107□-PV
	0.022	10	9	4	7.5	0.6	0.10	MKP-223□0310AB107□-PV
	0.033	10	9	5	7.5	0.6	0.10	MKP-333□0310AB107□-PV
	0.047	10	10	5	7.5	0.6	0.10	MKP-473□0310AB107□-PV
	0.056	10	11	5	7.5	0.6	0.10	MKP-563□0310AB107□-PV
	0.068	10	12	6	7.5	0.6	0.10	MKP-683□0310AB107□-PV
	0.082	10	12	6	7.5	0.6	0.10	MKP-823□0310AB107□-PV
	0.1	10	13	7	7.5	0.6	0.10	MKP-104□0310AB107□-PV
	0.0047	13	8	4	10	0.6	0.10	MKP-472□0310AB110□-PV
	0.0056	13	9	4	10	0.6	0.10	MKP-562□0310AB110□-PV
	0.0068	13	9	4	10	0.6	0.10	MKP-682□0310AB110□-PV
	0.0082	13	9	4	10	0.6	0.10	MKP-822□0310AB110□-PV
	0.01	13	9	4	10	0.6	0.10	MKP-103□0310AB110□-PV
	0.015	13	9	4	10	0.6	0.10	MKP-153□0310AB110□-PV
	0.022	13	9	4	10	0.6	0.10	MKP-223□0310AB110□-PV
	0.033	13	9	4	10	0.6	0.10	MKP-333□0310AB110□-PV
	0.047	13	9	4	10	0.6	0.10	MKP-473□0310AB110□-PV
	0.056	13	9.5	4.5	10	0.6	0.10	MKP-563□0310AB110□-PV
	0.068	13	10	5	10	0.6	0.10	MKP-683□0310AB110□-PV
	0.082	13	11	5	10	0.6	0.10	MKP-823□0310AB110□-PV
	0.1	13	11	5	10	0.6	0.10	MKP-104□0310AB110□-PV
	0.12	13	12	6	10	0.6	0.10	MKP-124□0310AB110□-PV
	0.15	13	12	7	10	0.6	0.10	MKP-154□0310AB110□-PV
	0.22	13	14	8	10	0.6	0.10	MKP-224□0310AB110□-PV
	0.15	15	11.5	6	12.5	0.6	0.10	MKP-154□0310AB112□-PV
	0.22	15	12.5	7	12.5	0.6	0.10	MKP-224□0310AB112□-PV
	0.33	15	14	8.5	12.5	0.6	0.10	MKP-334□0310AB112□-PV
	0.39	15	15	9	12.5	0.6	0.10	MKP-394□0310AB112□-PV
	0.47	15	16	10	12.5	0.6	0.10	MKP-474□0310AB112□-PV
	0.56	15	17	11	12.5	0.6	0.10	MKP-564□0310AB112□-PV
	0.01	18	8	4	15	0.6	0.10	MKP-103□0310AB115□-PV
	0.015	18	8	4	15	0.6	0.10	MKP-153□0310AB115□-PV
	0.022	18	9	4	15	0.6	0.10	MKP-223□0310AB115□-PV
	0.033	18	9	4	15	0.6	0.10	MKP-333□0310AB115□-PV
	0.047	18	9	4	15	0.6	0.10	MKP-473□0310AB115□-PV
	0.056	18	9	4	15	0.6	0.10	MKP-563□0310AB115□-PV
	0.068	18	10	4	15	0.6	0.10	MKP-683□0310AB115□-PV
	0.082	18	10	5	15	0.8	0.10	MKP-823□0310AB115□-PV
	0.1	18	10	5	15	0.8	0.10	MKP-104□0310AB115□-PV

### Notes

- 1 Measured at 1kHz, 20°C
- 2 Enter the appropriate tolerance and lead length code □ from the product code table

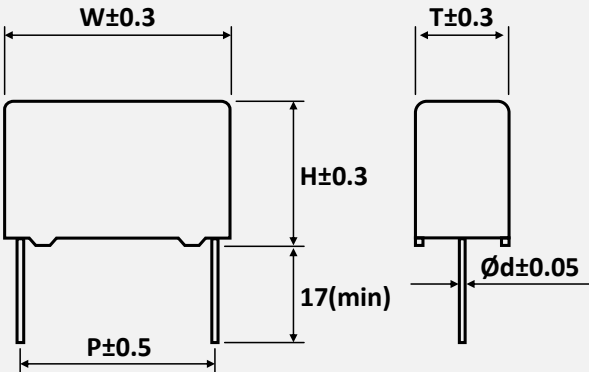
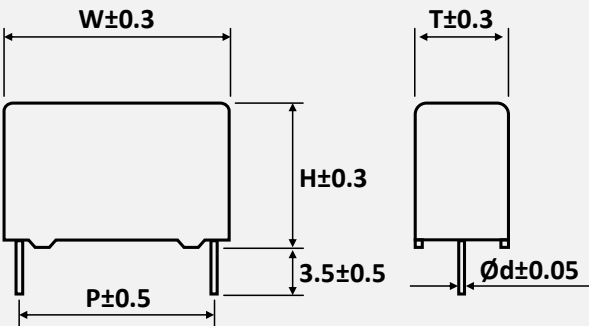
## ELECTRICAL CHARACTERISTICS

$V_{RAC}$	$C_R$ ( $\mu F$ )	Dimensions (mm)					$\tan\delta$ (%) <sup>Note 1</sup>	Part Number <sup>Note 2</sup>
		W	H	T	P	$\phi d$		
310V <sub>AC</sub>	0.15	26	11	5	22.5	0.8	0.10	MKP-154□0310AB122□-PV
	0.22	26	11	5	22.5	0.8	0.10	MKP-224□0310AB122□-PV
	0.33	26	12	6	22.5	0.8	0.10	MKP-334□0310AB122□-PV
	0.39	26	12	6	22.5	0.8	0.10	MKP-394□0310AB122□-PV
	0.47	26	14	6	22.5	0.8	0.10	MKP-474□0310AB122□-PV
	0.56	26	14	7	22.5	0.8	0.10	MKP-564□0310AB122□-PV
	0.68	26	15	7.5	22.5	0.8	0.10	MKP-684□0310AB122□-PV
	0.82	26	16	8	22.5	0.8	0.10	MKP-824□0310AB122□-PV
	1	26	17	9	22.5	0.8	0.10	MKP-105□0310AB122□-PV
	1.2	26	19.5	9	22.5	0.8	0.10	MKP-125□0310AB122□-PV
	1.5	26	21	10	22.5	0.8	0.10	MKP-155□0310AB122□-PV
	1.8	26	23	12.5	22.5	0.8	0.10	MKP-185□0310AB122□-PV
	2.2	26	24	13.5	22.5	0.8	0.10	MKP-225□0310AB122□-PV
	2.2	26	22	15	22.5	0.8	0.10	MKP-225□0310AB122□-PV
	0.47	31	13.5	6	27.5	0.8	0.10	MKP-474□0310AB127□-PV
	0.56	31	14	6.5	27.5	0.8	0.10	MKP-564□0310AB127□-PV
	0.68	31	15.5	6.5	27.5	0.8	0.10	MKP-684□0310AB127□-PV
	0.82	31	16	7.5	27.5	0.8	0.10	MKP-824□0310AB127□-PV
	1	31	17	8	27.5	0.8	0.10	MKP-105□0310AB127□-PV
	1.2	31	17.5	9	27.5	0.8	0.10	MKP-125□0310AB127□-PV
	1.5	31	18.5	10	27.5	0.8	0.10	MKP-155□0310AB127□-PV
	1.8	31	20.5	12	27.5	0.8	0.10	MKP-185□0310AB127□-PV
	2.2	31	22	13	27.5	0.8	0.10	MKP-225□0310AB127□-PV

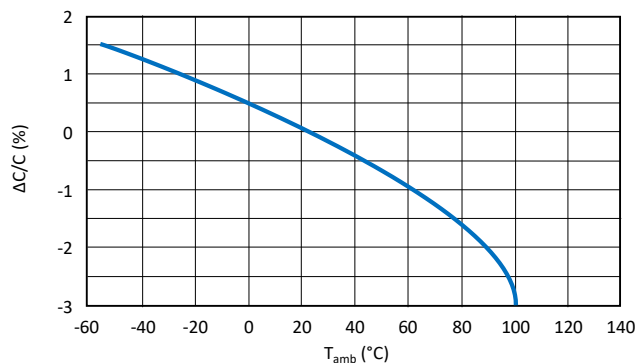
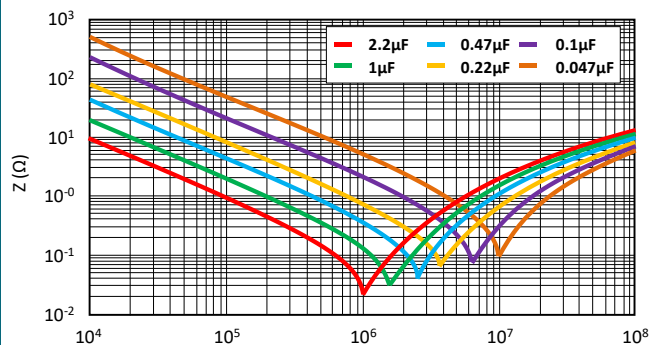
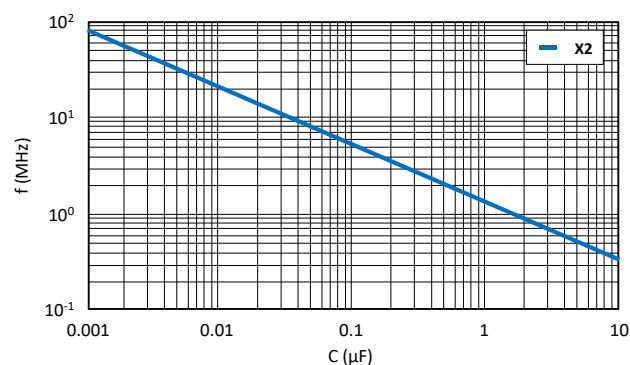
### Notes

- 1 Measured at 1kHz, 20°C
- 2 Enter the appropriate tolerance and lead length code □ from the product code table

## PACKAGE OUTLINE ▲ All dimensions in mm

Long Leads	Short Leads
 <p>Diagram showing dimensions for Long Leads package: W±0.3, T±0.3, H±0.3, 17(min), P±0.5, and <math>\phi d \pm 0.05</math>.</p>	 <p>Diagram showing dimensions for Short Leads package: W±0.3, T±0.3, H±0.3, 3.5±0.5, P±0.5, and <math>\phi d \pm 0.05</math>.</p>

## REFERENCE DATA

**Fig. 1 • Capacitance Drift vs. Ambient Temperature**

**Fig. 2 • Impedance vs. Frequency •  $V_{RAC} = 310V$** 

**Fig. 3 • Resonant Frequency vs. Capacitance**


## PRODUCT CODE

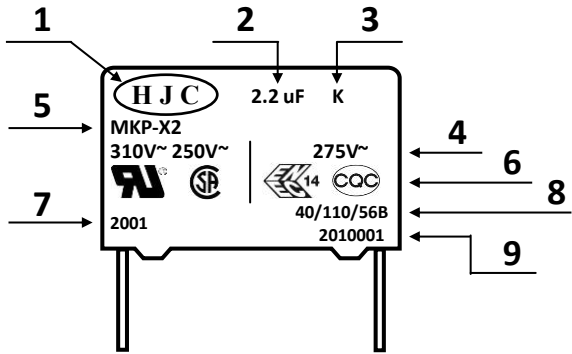
Example: MKP-X2-PV (small size) series ▲ 0.1 $\mu$ F ▲ 310V<sub>AC</sub> ▲  $\pm 10\%$  ▲ P=10mm ▲ Bulk ▲ Straight leads ▲ 17mm lead length

MKP-		104		K		0310		A		B		1		10		1		-PV			
Series		Capacitance Code <sup>Note 1</sup> (pF)		Capacitance Tolerance (%)		Rated Voltage (V <sub>AC</sub> )		Voltage Type		Packaging Type		Lead Configuration <sup>Note 2</sup>		Pitch (mm)		Lead Length (mm) <sup>Note 3</sup>		Special Remark <sup>Note 4</sup>			
Code	Series	Code	μF	Code	Tol.	Code	VAC	Code	Type	Code	Type	Code	Style	Code	mm	Code	mm	Code	Type		
MKP	MKP	562	0.0056	K	±10	0310	310	A	AC	B	Bulk	1	SL	07	7.5	1	17.0	-PV	See Note 4		
		473	0.047	M	±20									10	10.0					2	3.5
		224	0.22											12	12.5						
		105	1.0											15	15.0						
		225	2.2											22	22.5						
														27	27.5						

Notes:

- Capacitance code expressed in pF. The first two digits represent significant figures. The last digit specifies the total number of zeros to be added.
- SL = Straight leads, for other lead configuration consult MGT please.
- For other lead length consult MGT please.
- PV = Small size version

## PRODUCT MARKING

Marking	Details
	<b>No.</b>
	<b>Description</b>
	1 Manufacturer Logo
	2 Nominal capacitance in $\mu\text{F}$
	3 Capacitance tolerance
	4 AC rated voltage
	5 Series name
	6 Safety standard approvals
	7 Date code
	8 Application category
	9 Lot number

## DATE CODE & APPLICATION CATEGORY

Example:

### Date code

2001: 2001 = 1<sup>st</sup> week of 2020

### Application category

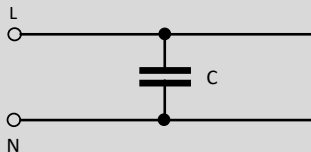
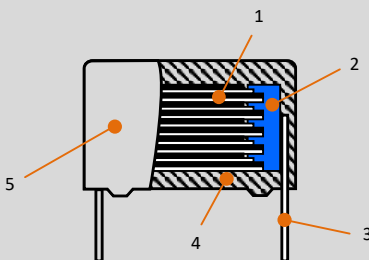
40/110/56B: 40 = Minimum temperature ( $-40^{\circ}\text{C}$ )  
110 = Maximum temperature ( $+110^{\circ}\text{C}$ )  
56 = Days of damp heat test  
B = Category of passive flammability

### Lot number

2010001: 20 = Year, here 2020  
1 = Month, here January  
0001 to XXXX = Serial number

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

## TECHNICAL SPECIFICATION

No.	Category	Specification										
1	Scope	<p>This specification covers the requirement for metallized polypropylene dielectric fixed capacitor.</p> <p>Typical applications: Interference suppression and &lt;&lt; across-the-line &gt;&gt; applications</p> <p>Reference standards : IEC60384-14</p> <div></div> <p>If used in the 3-Phase circuits, Please contact our technical engineer or our FAE for more details.</p>										
2	Product Name	Metallized polypropylene film capacitor, Type MKP										
3	Product Range	<table><tr><td>Operating temperature range:</td><td>-40°C to +110°C (including temperature rise on unit surface)</td></tr><tr><td>Rated AC voltage (50/60Hz)</td><td>250V<sub>AC</sub> to 310V<sub>AC</sub> (560V<sub>DC</sub> max.)</td></tr><tr><td>Capacitance range:</td><td>Refer to the individual drawing</td></tr><tr><td>Capacitance tolerance:</td><td>Refer to the individual drawing</td></tr></table>	Operating temperature range:	-40°C to +110°C (including temperature rise on unit surface)	Rated AC voltage (50/60Hz)	250V <sub>AC</sub> to 310V <sub>AC</sub> (560V <sub>DC</sub> max.)	Capacitance range:	Refer to the individual drawing	Capacitance tolerance:	Refer to the individual drawing		
Operating temperature range:	-40°C to +110°C (including temperature rise on unit surface)											
Rated AC voltage (50/60Hz)	250V <sub>AC</sub> to 310V <sub>AC</sub> (560V <sub>DC</sub> max.)											
Capacitance range:	Refer to the individual drawing											
Capacitance tolerance:	Refer to the individual drawing											
4	Appearance	<table><tr><td>1. Marking shall be legible in the right place.</td></tr><tr><td>2. Plating of lead wire shall be perfect without rust.</td></tr><tr><td>3. Coating shall be without any crack, rent, pinhole etc.</td></tr></table>	1. Marking shall be legible in the right place.	2. Plating of lead wire shall be perfect without rust.	3. Coating shall be without any crack, rent, pinhole etc.							
1. Marking shall be legible in the right place.												
2. Plating of lead wire shall be perfect without rust.												
3. Coating shall be without any crack, rent, pinhole etc.												
5	Construction	<p>The capacitor has a non-inductive construction, wound with metallized polypropylene film dielectric. The capacitor is enclosed in flame retardation plastic case, filled with flame retardation filling resin, and has two leads.</p> <div></div> <table><tr><td>1 = Element</td><td>Metallized Polypropylene film</td></tr><tr><td>2 = Metal spray</td><td>Special solder. (Lead Free) compliant to RoHS directive</td></tr><tr><td>3 = Lead wire</td><td>Tinned wire. (Lead Free) compliant to RoHS directive</td></tr><tr><td>4 = Inner coating</td><td>Epoxy resin filled. (UL-94V-0 Standard)</td></tr><tr><td>5 = Outer coating</td><td>Plastic case. (UL-94V-0 Standard)</td></tr></table>	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)
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4 = Inner coating	Epoxy resin filled. (UL-94V-0 Standard)											
5 = Outer coating	Plastic case. (UL-94V-0 Standard)											
6	Dimensions	As specified in the individual drawing.										
7	Conditional Standard Test	<p>The test shall be conducted at a temperature of from 15°C to 35°C, a humidity of from 45% to 75%.</p> <p>However, the test shall be conducted at a temperature of 20±5°C, a humidity of 65±5% when doubt is entertained about judgement.</p>										

## TECHNICAL SPECIFICATION

No.	Category	Specification			
8	Character	Test Item	Conditions		Performance
		Voltage proof (IEC60384-14, 4.2.1)	Between terminals		Nothing abnormal shall be found.
			Applied voltage	1500V <sub>DC</sub> for 3sec	
			Cut-off current	10mA DC	
			Ramp / rise time	C ≤ 2.2μF: 5sec	
				2.2 < C ≤ 10μF: 10sec	
			Between terminals and enclosure		
			Applied voltage	2050V <sub>AC</sub> for 1min	
			The capacitor shall be applied the voltage through a resistor of 2kΩ or more when charge and discharge.		
		Insulation resistance (IEC60384-14, 4.2.5)	Between terminals		Within the limits stated under conditions.
			15GΩ or more	When C ≤ 0.33μF at 100V <sub>DC</sub>	
			5GΩ × μF or more	When C > 0.33μF at 100V <sub>DC</sub>	
			2GΩ × μF or more	When C > 0.33μF at 500V <sub>DC</sub>	
			Between terminals and enclosure		
			30GΩ or more	at 100V <sub>DC</sub>	
			0.5GΩ or more	at 500V <sub>DC</sub>	
			When the reading of measuring instrument becomes steady at a value after a voltage of 100±15V <sub>DC</sub> or 500±50V <sub>DC</sub> is applied for 1 minute ±5 seconds. Ambient temperature at 20°C.		
		Capacitance (IEC60384-14, 4.2.2)	Measured at a frequency of 1 ± 0.2kHz, at 20 °C, 1V <sub>RMS</sub> .		Within a range of specified value
		Dissipation factor (IEC60384-14, 4.2.3)	Measured at a frequency of 1 ± 0.2kHz, at 20 °C, 1V <sub>RMS</sub> .		0.1% or less.
		Termination strength (IEC60384-14, 4.3)	Tensile strength		After the test, no breaking or loosening of the terminal shall be found.
			The load specified below shall be applied to the terminal in its draw-out direction gradually up to the specified value and held thus for 10±1se.c		
			Lead wire diameter:	Over 0.5 to 0.8 mm	
			Tensile force:	10N	
			Bending strength		
			While the load specified below is 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.		
			Lead wire diameter:	Over 0.5 to 0.8 mm	
			Bending force:	5N	

## TECHNICAL SPECIFICATION

No.	Category	Specification		
		Test Item	Conditions	Performance
8	Character	Vibration proof (IEC60384-14, 4.7)	The frequency shall be varied 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.	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.
		Solderability (IEC60384-14, 4.5)	The lead wire shall be immersed into soldering bath at 245±5°C for 2.5±0.5sec up to the depth of 1.5±0.5/-0mm from the bottom of the body.	At least 95% of the circumferential face of lead wire up to immersed level shall be covered with new solder.
		Soldering heat resistance (IEC60384-14, 4.4)	The lead wire shall be immersed into soldering bath and its depth of dipping shall be up to 1.5 +0.5/-0mm from the root of terminals by using a heat shielding plate.  Temperature and duration of soldering shall be 350±10°C for 3.5±0.5sec or 260±5°C for 10±1sec.  After the immersion is finished, the capacitor shall be let alone at ordinary temperature and humidity for 1±0.5hours.	Appearance: No remarkable change.  Withstand voltage: Nothing abnormal shall be found, when a voltage specified in item "voltage- proof" is applied for 1 minute.  Insulation resistance: Insulation resistance shall conform to Item "insulation resistance".  Change rate of capacitance: $\Delta C/C \leq \pm 3\%$ of the value before the test.
		Cold resistance (IEC60384-14, 4.11.4)	The capacitor shall be placed in the testing chamber at -40±3°C for 2+1/-0 hours. After the test, the capacitor shall be let alone at the ordinary condition for 1.5±0.5 hours and shall be satisfied with the performance in the performance column.	Change rate of capacitance: $\Delta C/C \leq \pm 5\%$ of the value before the test.
		Dry heat resistance (IEC60384-14, 4.11.2)	The capacitor shall be placed in the testing oven at +110±2°C for 2+1/-0 hours. After the test, the capacitor shall be let alone at the ordinary condition for 1.5±0.5 hours and shall be satisfied with the performance in the performance column.	Insulation resistance: ≥ 50% of the initial specified value.  Change rate of capacitance: $\Delta C/C \leq \pm 5\%$ of the value before the test.



## TECHNICAL SPECIFICATION

No.	Category	Specification		
		Test Item	Conditions	Performance
8	Character	Damp heat steady state (IEC60384-14, 4.12)	<p>The capacitor under test shall be put in the testing oven and kept at condition of the temperature <math>+40\pm 2^{\circ}\text{C}</math> and the humidity at 90 to 95% for 56 days and then shall be let alone at ordinary condition for <math>1.5\pm 0.5</math> hours.</p> <p>After the test, the capacitor shall be satisfied with the performance in the performance column.</p>	<p>Appearance: No remarkable change.</p> <p>Withstand voltage: [between terminals and enclosure] Nothing abnormal shall be found when a voltage of <math>2050V_{AC}</math> is applied for 1 minute.</p> <p>Insulation resistance: [between terminals] <math>7.5G\Omega</math> or more (when <math>C \leq 0.33\mu\text{F}</math>) at <math>100V_{DC}</math> <math>2.5G\Omega \times \mu\text{F}</math> or more (when <math>C &gt; 0.33\mu\text{F}</math>) at <math>100V_{DC}</math> [between terminals and enclosure] <math>15G\Omega</math> or more at <math>100V_{DC}</math></p> <p>Change rate of capacitance: <math>\Delta C/C \leq \pm 5\%</math> of the value before the test.</p> <p>Dissipation factor: <math>\leq 0.15\%</math> at 1kHz.</p>
		Rapid change of temperature (IEC60384-14, 4.6)	<p>The capacitor under the test shall be kept in the testing oven and kept at condition of the temperature of <math>-40\pm 3^{\circ}\text{C}</math> for <math>30\pm 3</math> minutes.</p> <p>After this, the capacitor shall be let alone at the ordinary temperature for 3minutes or less.</p> <p>After this, the capacitor under the test shall be kept in the testing oven and kept at condition of the temperature of <math>+110\pm 2^{\circ}\text{C}</math> for <math>30\pm 3</math> minutes.</p> <p>Then the capacitor shall be let alone at the ordinary temperature for 3 minutes or less. This operation shall be counted as 1 cycle, and it shall be repeated for 5 cycles successively.</p> <p>After the test, the capacitor shall be let alone at the ordinary condition for <math>1.5\pm 0.5</math> hours and shall be satisfied with the performance in the performance column.</p>	<p>Appearance: No remarkable change.</p> <p>Insulation resistance: <math>\geq 50\%</math> of the initial specified value.</p> <p>Change rate of capacitance: <math>\Delta C/C \leq \pm 10\%</math> of the value before the test.</p> <p>Dissipation factor: <math>\leq 0.12\%</math> at 1kHz.</p>

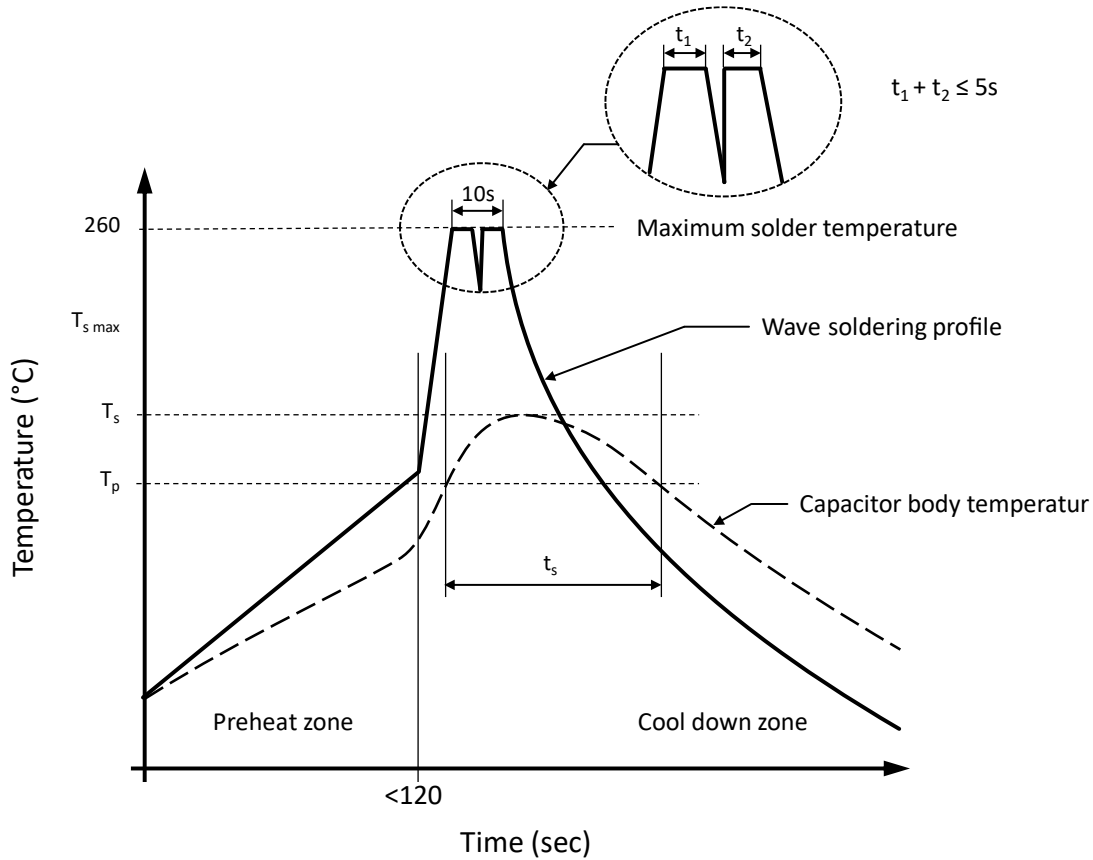
## TECHNICAL SPECIFICATION

No.	Category	Specification				
8	Character	Test Item	Conditions		Performance	
		Endurance (IEC60384-14, 4.14)	The capacitor shall be submitted to an endurance of 1000h at 110°C at a 125% of rated voltage and that once every hour the voltage shall be increased to 1000V <sub>RMS</sub> for 0.1 second. After the test, the capacitor shall be satisfied with the following performance.		Appearance: No remarkable change.	
					Withstand voltage:  [between terminals] Nothing abnormal shall be found when a voltage of $4.3 \times V_R = 1333V_{DC}$ is applied for 1 minute.	
					[between terminals and enclosure] Nothing abnormal shall be found when a voltage of 2050V <sub>AC</sub> is applied for 1 minute.	
					Change rate of capacitance: Within $\Delta C/C \leq \pm 10\%$ of the value before the test.	
Insulation resistance:  [between terminals] 7.5GΩ or more (When C ≤ 0.33μF) at 100V <sub>DC</sub> 2.5GΩ × μF or more (When C > 0.33 μF) at 100V <sub>DC</sub>						
[between terminals and enclosure] 3GΩ or more at 100V <sub>DC</sub>						
Dissipation factor: ≤ 0.15% at 1kHz.						
Impulse voltage (IEC60384-14, 4.13)	The capacitor shall be subjected to a maximum of 24 impulses of the same polarity. If any three successive impulses are shown by the monitor to have had a waveform indicating that no self-healing breakdowns have occurred, then the capacitor shall be no more subjected to impulses.		Appearance: No remarkable change.			
					Others: There shall be no permanent breakdown or flashover. After impulse voltage, the capacitor shall be subjected to high temperature loading (item rapid change of temperature).	
Impulse voltage X2						
C ≤ 1.0μF	$V_P = 2.5kV$					
C > 1.0μF	$V_P = \frac{2.5kV}{\sqrt{C}}$					

## TECHNICAL SPECIFICATION

No.	Category	Specification					
9	Approved Standard	Agency	Country	Conditions			File Number
		UL	USA	UL60384-14 MKP 0.0047~10.0μF 250~310V <sub>AC</sub> , 40/110/56/B			E149075-20120803
		CSA	Canada	CAN/CSA-E 60384-14 MKP 0.0047~10.0μF 250~310V <sub>AC</sub> , 40/110/56/B			2294211
		ENEC	Semko	EN 60384-14 MKP 0.0047~10.0μF 250~310V <sub>AC</sub> , 40/110/56/B			SE-ENEC-2002895
		CB	Semko	IEC 60384-14 MKP 0.0047~10.0μF 250~310V <sub>AC</sub> , 40/110/56/B			SE-103415
		CQC	China	GB/T6346.14-2015 MKP 0.0047~10.0μF 250~310V <sub>AC</sub> , 40/110/56/B			CQC09001029854
		The <b>ENEC</b> mark was accepted in all European countries					
10	Rated Voltage Pulse Slope dV/dt at 560V <sub>DC</sub>	Pitch	7.5mm	10mm	15mm	22.5mm	27.5mm
		dV/dt	500V/μs	400V/μs	300V/μs	180V/μs	120V/μs
11	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 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.					

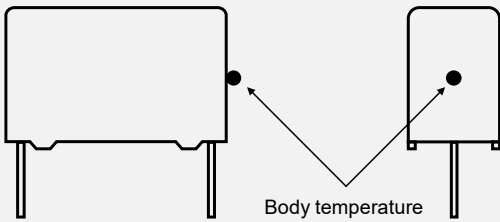
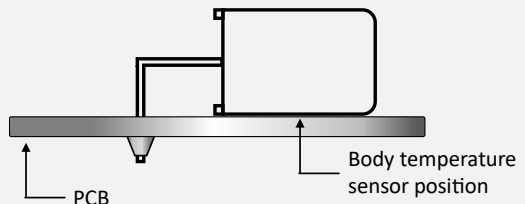
## RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Capacitor body temperature should follow the description below:

Profile Features		Polypropylene Film Capacitor	Polyester Film Capacitor
Capacitor body maximum temperature at preheating	$T_p$	$\leq 110^\circ\text{C} / 120 \text{ seconds}$	$\leq 125^\circ\text{C} / 120 \text{ seconds}$
Capacitor body maximum temperature at wave soldering	$T_s$	$\leq 120^\circ\text{C} / t_s \leq 45 \text{ seconds}$	$\leq 150^\circ\text{C} / t_s \leq 45 \text{ seconds}$

## DETERMINING THE CAPACITOR BODY TEMPERATURE

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

## 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:  $\leq 350^{\circ}\text{C}$
- b.) Soldering time:  $\leq 3\text{sec}$

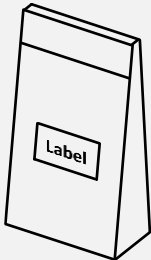
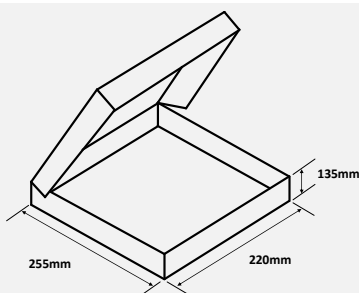
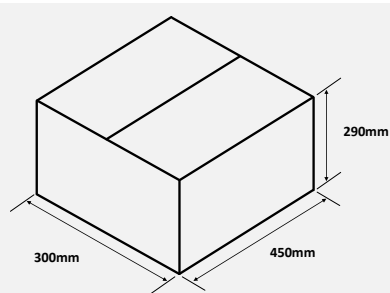
If re-work or dipping twice in necessary, it should be done after the capacitor returned to the normal temperature. Suggestion time is 24 hours.

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.

To ensure proper conditions for manual or selective soldering, the body (surface) temperature of the film capacitor ( $T_s$ ) must be  $\leq 120^{\circ}\text{C}$ .

## PACKAGING

Bag	Container	Carton
		
<p>Label with</p> <ol style="list-style-type: none"> <li>1. Manufacturer name</li> <li>2. Capacitor type</li> <li>3. Part number</li> <li>4. Quantity</li> <li>5. Package</li> </ol>	<p>4 containers per carton</p>	<p>Outside details of the carton</p> <ol style="list-style-type: none"> <li>1. Customer name</li> <li>2. Capacitor type</li> <li>3. Capacitor specification</li> <li>4. Part number</li> <li>5. Quantity</li> </ol>

## REVISION TABLE

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

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