Product Approval Sheet

DRAFT

Customer : Ropla

Issued no : 2019.05.08
Revision no : 1

- **Product description :** Metallized Polypropylene film capacitors
- **Product code :** P226L30475KAS2
- **Application :**

CUSTOMER			
PILKOR	Checked	Confirmed	Approved

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* Please returned to us this sheet before the order.

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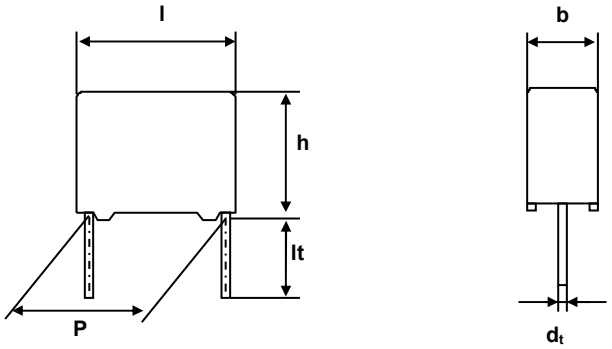
(Test Requirements)

****Soldering guidelines***

****Construction***

Capacitor as P226..... acc. to Type spec. QSN-075-86



DRAFT

dt = 0.8+0.08/-0.08mm

Voltage Vdc	Cap. µF	Code	C-tol.	Dimensions b ×h ×l mm	P mm	Lt mm
300V	4.7	P226L30475KAS2	±10 %	13.0 x 23.0 x 31.0	27.5±0.4	5.0±1.0

SAME AS P226L25475KAS2

< BUT >

- Voltage : 300Vdc

- Marking :

4u7 K 300V PILKOR
PCPW 226 MKP WK....

Marking on the top or side

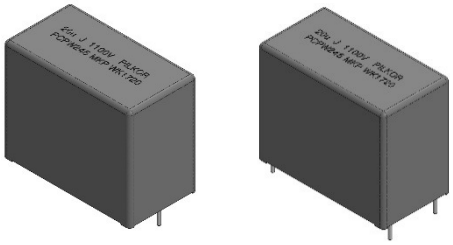
- Packing Method (Arrange):

Packing method	Sponge	SPQ (Inner box)	PQ (Outer box)
8242 450 40096	8242 456 30071	100 (8204 116 60123)	500 (8242 451 30701)

Metallized Polypropylene film capacitors (Switching Application) PCPW226

CONSTRUCTION

・Dielectric	:	Metallized Polypropylene film
・Case	:	PBT (UL94 V-0)
・Filling	:	Epoxy resin (UL94 V-0)
・Terminals	:	Tinned copper wire (2-pin / 4-pin)



FEATURE

. Self-Healing
. Low contact resistance
. Low loss dielectric
. High ripple current

APPLICATION

. Switching applications.
. High frequency, high current applications
. Industrial and motor speed control
. induction heater

QUICK REFERENCE DATA

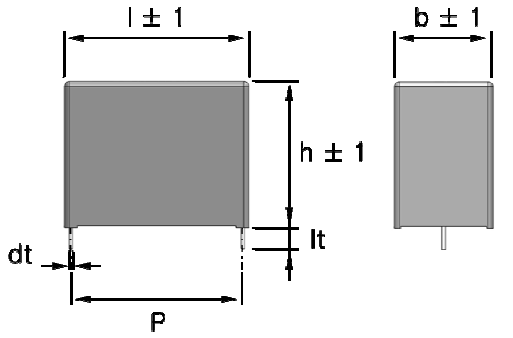
Capacitance range	1.0 to 30 ㎌
Capacitance tolerance	±5%, ±10%
Rated voltage (VRdc)	250, 450, 630, 850
Max. repetitive peak voltage (Vpkr)	1.15 x VR (max. 30min. within one day)
Max. non-repetitive peak current (Ipkr)	1.5 x Ipk
IEC Climatic category	40/ 105 / 56
Temperature range	-40℃ ~ +105℃
Life time expectancy	100,000 hours at VR, 70℃
	40,000 hours at VR, 85℃
Reference	IEC 60384-16 / IEC61071
Potting & Encapsulation material	Qualified in accordance with UL94V-0

- **Please refer to caution and warning at http://www.pilkor.co.kr/download/Introductions.pdf** before using these products.

Metallized Polypropylene film capacitors (Switching Application) PCPW226

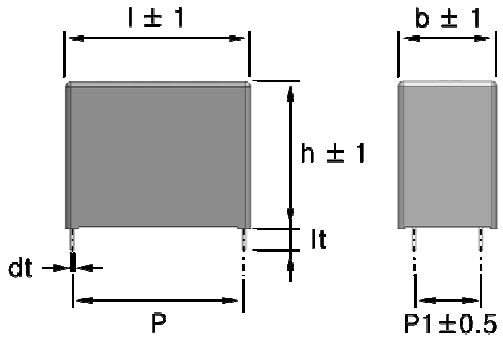
ORDERING INFORMATION

2-PINS



P(mm)	dt (mm)
27.5 (±0.4)	Ø0.8 (±0.08)
37.5 (±0.7)	Ø1.0 (±0.10)

4-PINS



P(mm)	dt (mm)
37.5 (±0.7)	Ø1.2 (±0.12)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
P	**2**	**2**	**6**	**L**	**4**	**5**	**1**	**0**	**5**	**K**	**A**	**S**	**2**

Digits 1~4	
Code	Series name
P226	PCPW226

Digits 5	
Code	Pitch
L	27.5 mm
Q	37.5 mm

Digits 6~7	
Code	Voltage
25	250V
45	450V
63	630V
85	850V

Digits 8~10	
Code	Capacitance
105	1uF
106	10uF

Digits 11	
Code	Cap. tolerance
J	5%
K	10%

Digits 12	
Code	Revision
A	Standard
M	Automotive
L	Low profile
B	Mini- Ⅰ

Digits 13	
Code	Lead length
L	25.0±1.0
S	5.0±1.0
F	4.0±0.5
8	3.8±0.5(0.3)*
7	3.7±0.5(0.3)*
5	3.5±0.5(0.3)*
4	3.4±0.5(0.3)*
2	3.2±0.5(0.3)*
T	3.0±0.5(0.3)*

* dt(mm) = Ø0.8, ±0.3

Digits 14		
Code	Lead type	Packing
L	2-PIN	Loose in box
2	2-PIN	Arrange
4	4-PIN	Arrange

Metallized Polypropylene film capacitors (Switching Application) PCPW226

ELECTRICAL DATA AND ORDERING CODE

V_{Rdc} = 250V

CAP. (uF)	Dimension (mm)			P (mm)	P1 (mm)	dv/dt (V/us)	Ipk (A)	Irms(1) (A)		ESR(2) (mΩ)		Ordering Code
	b	h	l					2P	4P	2P	4P	
1.0	11	21	31	27.5		55	55	4.4	-	10.1		P226L25105KA**
2.2	11	21	31	27.5		55	121	5.3	-	7.1		P226L25225KA**
3.3	11	21	31	27.5		55	182	5.5	-	8.0		P226L25335KA**
4.7	13	23	31	27.5		55	259	5.8	-	6.6		P226L25475KA**
5.0	13	23	31	27.5		55	275	6	-	6.3		P226L25505KA**
5.6	15	25	31	27.5		55	308	6.3	-	5.8		P226L25565KA**
6.8	15	25	31	27.5		55	374	7	-	5.0		P226L25685KA**
8.0	18	28	31	27.5		55	440	7.6	-	4.4		P226L25805KA**
10	18	28	31	27.5		55	550	8.6		3.4		P226L25106KA**
13	20	35	42	37.5	10.2	22	286	606	7.1	7.0	6.5	P226Q25136KA**
16	24	39	42	37.5	10.2	22	352	6.9	7.5	6.6	6.0	P226Q25166KA**
23	28	43	42	37.5	10.2	22	506	7.9	8.4	5.6	5.1	P226Q25236KA**
30	30	45	42	37.5	20.3	22	660	8.7	8.2	4.7	4.2	P226Q25306KA**

V_{Rdc} = 450V

CAP. (uF)	Dimension (mm)			P (mm)	P1 (mm)	dv/dt (V/us)	Ipk (A)	Irms(1) (A)		ESR(2) (mΩ)		Ordering Code
	b	h	l					2P	4P	2P	4P	
1.0	11	21	31	27.5	-	70	70	4.4	-	10.1	-	P226L45105KA**
2.2	11	21	31	27.5	-	70	154	5.3	-	7.1	-	P226L45225KA**
3.3	13	23	31	27.5	-	70	231	6.5	-	5.8	-	P226L45335KA**
3.9	13	23	31	27.5	-	70	273	5.6	-	6.5		P226L45395KB**
3.9	15	25	31	27.5	-	70	273	7.0	-	5.2	-	P226L45395KA**
4.7	15	25	31	27.5	-	70	329	6.2	-	5.7	-	P226L45475KB**
4.7	18	28	31	27.5	-	70	329	7.7	-	4.6	-	P226L45475KA**
5.0	18	28	31	27.5	-	70	350	7.8	-	4.3	-	P226L45505KA**
5.6	18	28	31	27.5	-	70	392	8.3	-	4.1	-	P226L45565KA**
6.8	18	28	31	27.5	-	70	476	7.1	-	4.3	-	P226L45685KB**
6.8	21	31	31	27.5	-	70	476	8.9	-	3.4	-	P226L45685KA**
8.0	21	31	31	27.5	-	70	560	9.2	-	2.9	-	P226L45805KA**
10	21	31	31	27.5	-	70	700	10	-	2.2	-	P226L45106KB**
3.3	24	17	42	37.5	-	54	178	4.1	4.6	3.8	3.3	P226Q45335KL**
6.0	28	20	42	37.5	-	54	324	5.5	6.2	5.2	4.6	P226Q45605KL**
8.5	20	35	42	37.5	10.2	54	432	6.8	7.5	6.5	5.8	P226Q45855KA**
10	24	39	42	37.5	10.2	54	540	7.6	8.3	5.7	5.2	P226Q45106KA**
14	28	43	42	37.5	10.2	54	756	8.5	9.2	4.8	4.2	P226Q45146KA**
19	30	45	42	37.5	20.3	54	1026	9.0	9.6	4.6	4.1	P226Q45196KA**

(1) Maximum RMS current at +85 100KHz, Δ T=+10

(2) Typical ESR values at 100KHz, 20℃
(Maximum ESR value : less than 2.5 x typical ESR value)

Metallized Polypropylene film capacitors (Switching Application) PCPW226

V_{Rdc} = 630V

CAP. (uF)	Dimension (mm)			P (mm)	P1 (mm)	dv/dt (V/us)	Ipk (A)	Irms(1) (A)		ESR(2) (mΩ)		Ordering Code
	b	h	l					2P	4P	2P	4P	
1.0	11	21	31	27.5	-	90	90	4.4	-	10.1	-	P226L63105KA**
2.2	15	25	31	27.5	-	90	198	6.0	-	6.9	-	P226L63225KA**
3.3	18	28	31	27.5	-	90	297	7.2	-	5.2	-	P226L63335KA**
3.9	21	31	31	27.5	-	90	351	7.8	-	4.5	-	P226L63395KA**
5.0	18	33	42	37.5	-	73	365	5.9	6.4	7.8	7.2	P226Q63505KA**
6.5	20	35	42	37.5	-	73	438	7.1	7.6	6.3	5.8	P226Q63655KA**
7.0	24	39	42	37.5	10.2	73	511	7.6	8.0	5.8	5.2	P226Q63705KA**
8.0	24	39	42	37.5	10.2	73	584	8.0	8.5	5.3	4.8	P226Q63805KA**
10	28	43	42	37.5	10.2	73	730	8.5	8.9	4.8	4.2	P226Q63106KA**
13	30	45	42	37.5	20.3	73	949	8.9	9.3	4.6	4.1	P226Q63136KA**

V_{Rdc} = 850V

CAP. (uF)	Dimension (mm)			P (mm)	P1 (mm)	dv/dt (V/us)	Ipk (A)	Irms(1) (A)		ESR(2) (mΩ)		Ordering Code
	b	h	l					2P	4P	2P	4P	
1.0	13	25	31	27.5	-	120	1210	5.0	-	9.2	-	P226L85105KA**
1.5	18	28	31	27.5	-	120	180	6.2	-	7.1	-	P226L85155KA**
2.0	21	31	31	27.5	-	120	240	7.5	-	4.9	-	P226L85205KA**
3.3	20	35	42	37.5	10.2	100	330	5.0	5.7	9.9	9.4	P226Q85335KA**
4.0	24	39	42	37.5	10.2	100	400	5.6	6.2	9.0	8.5	P226Q85405KA**
5.6	28	43	42	37.5	10.2	100	560	6.8	7.3	7.2	6.6	P226Q85565KA**
7.5	30	45	42	37.5	20.3	100	750	7.1	7.8	6.9	6.3	P226Q85755KA**

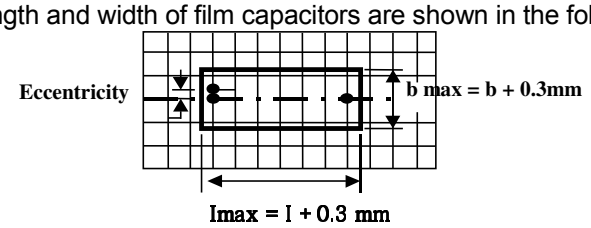
(1) Maximum RMS current at +85 100KHz, Δ T=+10

(2) Typical ESR values at 100KHz, 20℃
(Maximum ESR value : less than 2.5 x typical ESR value)

Metallized Polypropylene film capacitors (Switching Application) PCPW226

SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

The maximum length and width of film capacitors are shown in the following drawing ;



- Eccentricity as in drawing

  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.

- Product height with seating plane as given by IEC 60717 as reference : $h_{max} \leq$ h+0.3mm

CHARACTERISTICS

● **Test Voltage**

. Test Voltage (between terminations) : 1.6 x V_{Rdc}, 1min

. Test Voltage (between leads and case) : 2KV- 50Hz(or 60Hz) for 10 seconds

● **Dissipation Factor**

Pitch	Dissipation factor (x 10^{-4})
	1 kHz
27.5mm	≤ 10
37.5mm	≤ 15

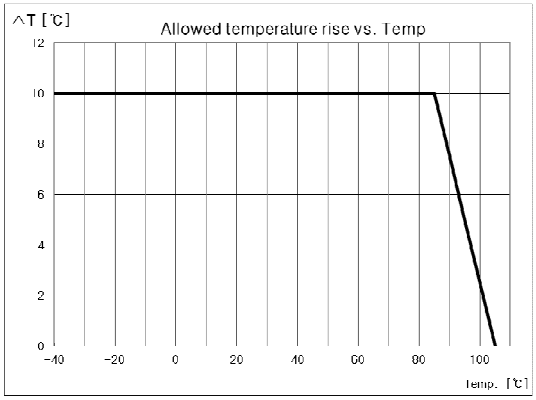
● **Insulation Resistance**

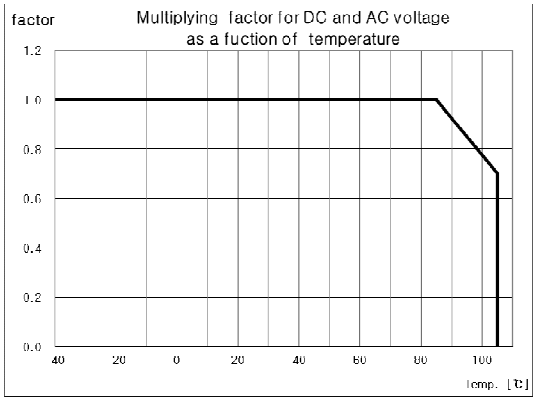
. The insulation resistance is measured for 1min.±5s, at 100V for V_{Rdc}<500V, at 500V for $V_{Rdc} \geq$ 500V

Minimum RC	Minimum Insulation Resistance
Capacitance > 0.33uF	**Capacitance ≤ 0.33uF**
> 15,000s	> 45GΩ

(R = insulation resistance between the terminations[Ω] , C= capacitance[Farad])

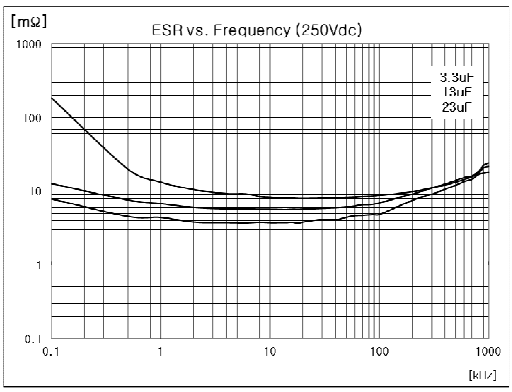
● Self heating temperature ; Max 10℃

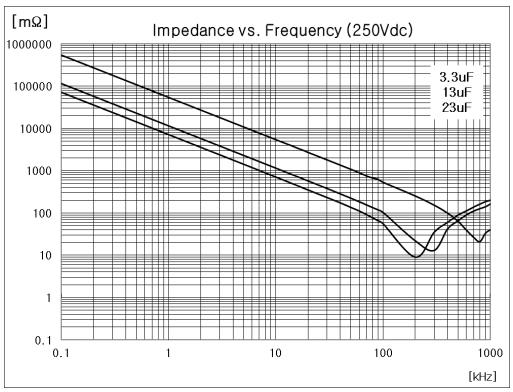


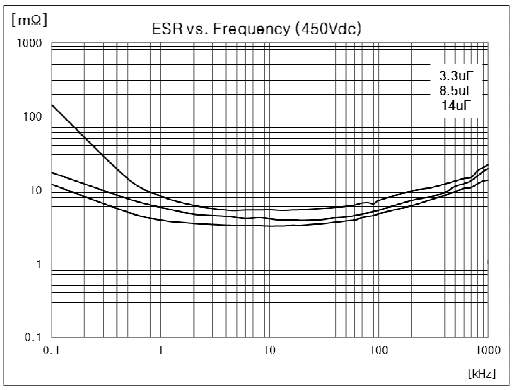


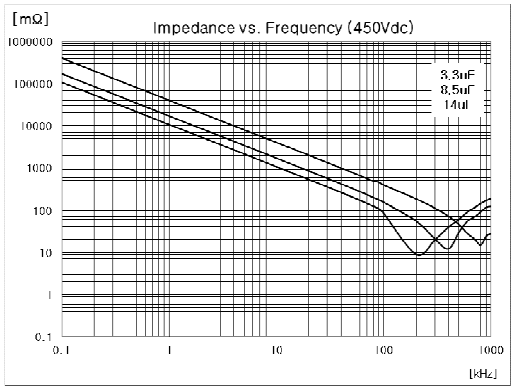
Metallized Polypropylene film capacitors (Switching Application) PCPW226

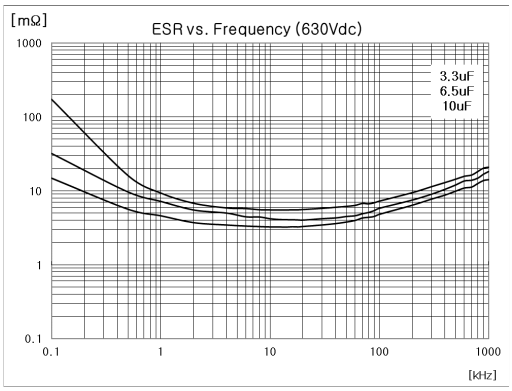
THE GRAPHS OF CHARACTERISTICS

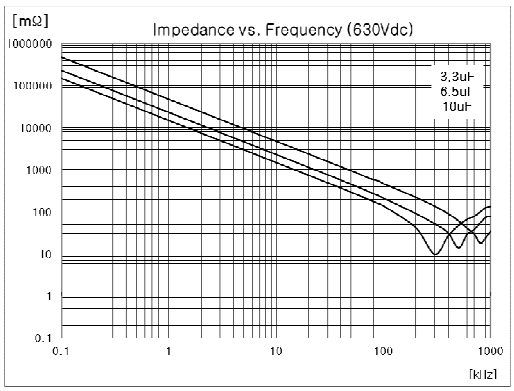


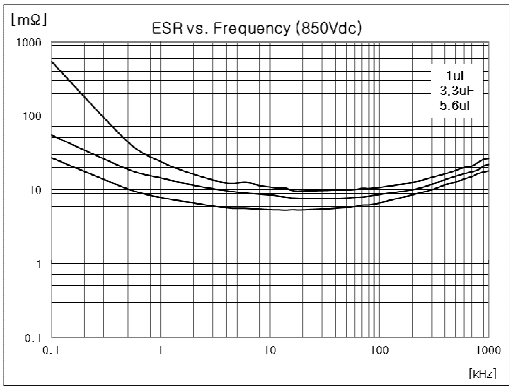


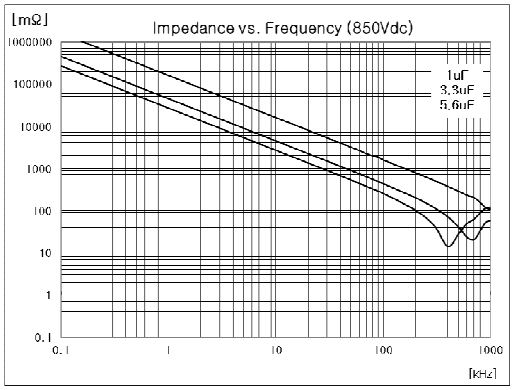






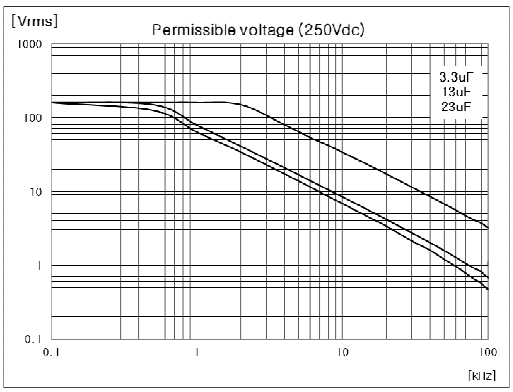


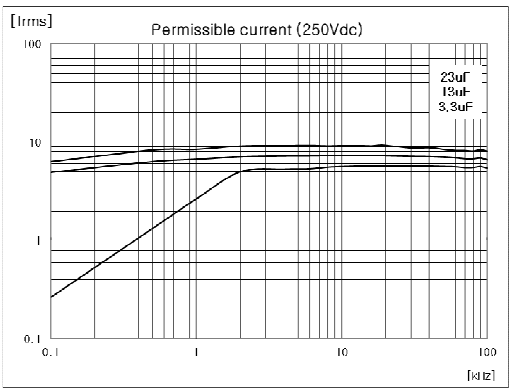


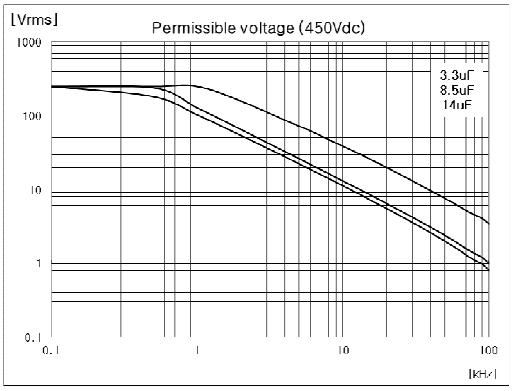


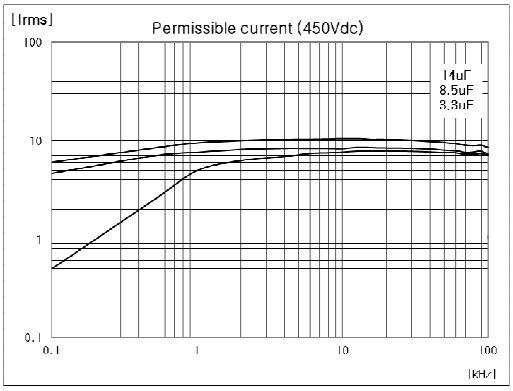
Metallized Polypropylene film capacitors (Switching Application) PCPW226

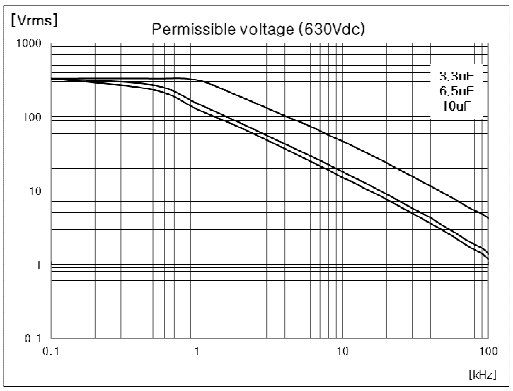
PERMISSIBLE VOLTAGE AND CURRENT AS A FUNCTION OF FREQUENCY

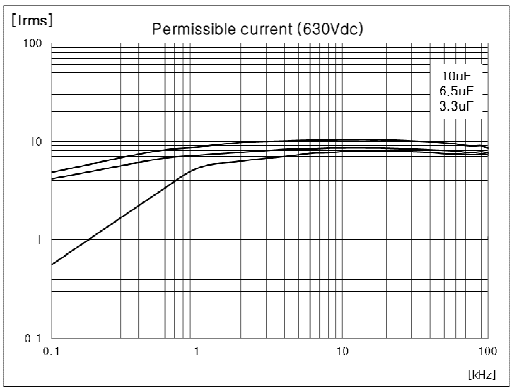


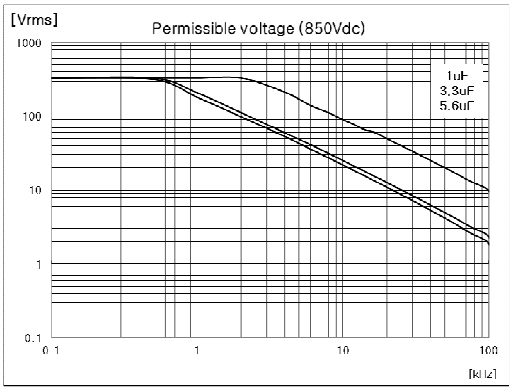


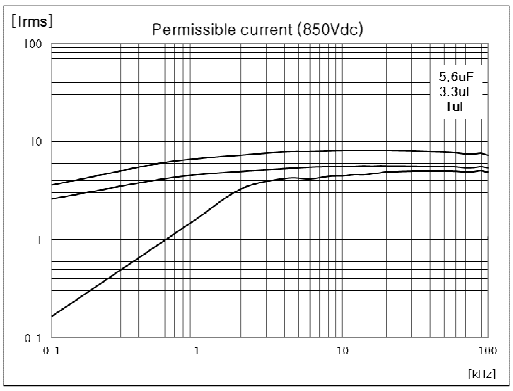












Metallized Polypropylene film capacitors (Switching Application) PCPW226

PRODUCT MARKING

Capacitors are marked with the following information :

. Rated capacitance code in accordance with IEC 60062

. Tolerance on rated capacitance : J : ± 5 % K : ± 10 %

. Rated (DC) Voltage (e.g. 400 V)

. Code for dielectric material (MKP)

. Manufacturer's type designation (PCPW 226)

. Manufacturer's name (PILKOR)

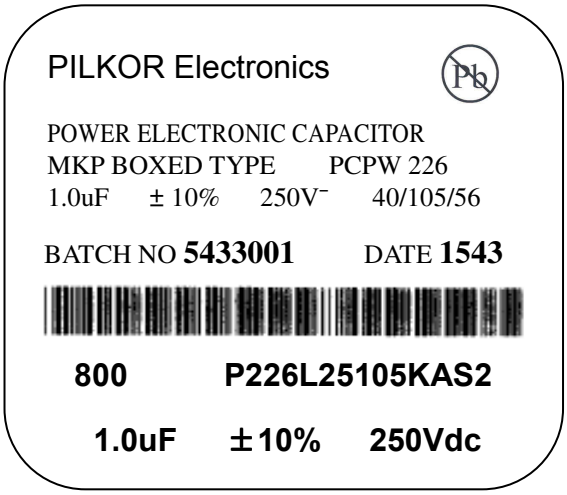
. White or black color

Example of marking

3u3 K 450V PILKOR PCPW 226 MKP WK....	or	3u3 K 450V 226 MKP .... PILKOR	or	3u3 K 450V PCPW 226 MKP	PILKOR WK.....
Marking on the top or side		Marking on the top		Marking on the top or side	

PACKAGE MARKING

The package containing the capacitors is marked as shown.



LINE MARKING EXPLANATION

1 Manufacturer`s name

2 Sub – family

3. Pb free marking(JEDEC-STD-97)

4 Type description & Series name

5 Capacitance value, tolerance,
Voltage and climatic category (IEC)

6 Batch no. & production period
year and week code

7 Quantity and Product code

8 Capacitance, tolerance and voltage

Metallized Polypropylene film capacitors (Switching Application) PCPW226

TEST REQUIREMENTS

No	ITEM	TEST Conditions	REQUIREMENTS
1	Capacitance	1) Temperature : 25 ±2℃ 2) Frequency : 1㎑ ±200㎐ 3) Test voltage : 5Vrms Max.	Shall be with in prescribed tolerance range
2	Dissipation factor	1) Temperature : 25 ±2℃ 2) Frequency : 1㎑ ±200㎐ 3) Test voltage : 5Vrms Max.	Pitch 27.5mm < 10 Pitch 37.5mm < 15
3	Dielectric strength	Lead-lead : 1.6 x V_{Rdc}, 1min Lead-case : 2KV(50~60Hz), 10s	no breakdown, flash over (cut-off current 10mA)
4	Insulation Resistance	at 100V for V_{Rdc} < 500V at 500V for V_{Rdc} ≥ 500V	RC (Ω • F) > 15,000 s
5	Damp heat steady state	40±2℃, 90~95%RH, 56days	ΔC/C < ±3% at 1KHz ΔDF < 0.0010 at 1KHz IR < 50% of specified limit
6	Endurance	85±2℃ : 1.25 x V_{Rdc}, 1000hrs 105±2℃ : 1.0 x V_{Rdc}, 1000hrs	ΔC/C < ±5% at 1KHz ΔDF < 0.0010 at 1KHz IR < 50% of specified limit
7	Rapid change of temperature	-40±2℃ = lower category temp. +105±2℃ = upper category temp. Duration t= 30min Five cycles	Visual : No abnormality ΔC/C < ±3% at 1KHz ΔDF < 0.0010 at 1KHz IR < 50% of specified limit
8	Robustness of termination	1)【Lead pull test】 Dia.(㎜) / Load (N) / Time (sec) 0.5<d≤1.2 / 10 / 10 ±1(s) 2)【Lead bend test(2cycle)】 Dia.(㎜) / Load (N) / Time (sec) 0.5<d≤1.2 / 5 / 0.51(s)	No abnormality such as cutting, slack of termination
9	Solderability	Non-activated colophony flux 501 Solder bath temp. : 245 ± 5℃ Immerse time : 2 ± 0.5s	Good tinning as evidenced by free flowing of the solder with wetting of the terminations (>95%)
10	Resistance to soldering heat	Solder bath temp. : 260 ± 5℃ Immerse time : 10 ± 0.5s	Visual : No abnormality ΔC/C < ±3% at 1KHz ΔDF < 0.0010 at 1KHz IR < 50% of specified limit
11	Vibration	10Hz to 55Hz Amplitude : 0.75mm or acceleration 98m/s² 6hrs	Visual : No abnormality ΔC/C < ±3% at 1KHz ΔDF < 0.0010 at 1KHz IR < 50% of specified limit
12	Climatic sequence	Dry heat Tb/16h Damp heat cyclic, 1st cycle +55℃/24h/95%...100% RH Cold Ta/2h Damp heat cyclic, 5cycle +55℃/24h/95%...100% RH	Visual : No abnormality ΔC/C < ±3% at 1KHz ΔDF < 0.0010 at 1KHz IR < 50% of specified limit

Soldering guidelines

The resistance to soldering heat and the solderability, our products to comply with the “IEC 60384-1” and the additional specifications.

General notes on soldering

Permissible heat exposure loads on film capacitors are primarily characterized by the upper category temperature Tmax. Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus change irreversibly a capacitor's electrical characteristics. For short exposures (as in practical soldering processes) the heat load (and thus the possible effects on a capacitor) will also depend on other factors like:

• Pre-heating temperature and time

• Forced cooling immediately after soldering

• Terminal characteristics: diameter, length, thermal resistance, special configurations (e.g. crimping)

• Height of capacitor above solder bath

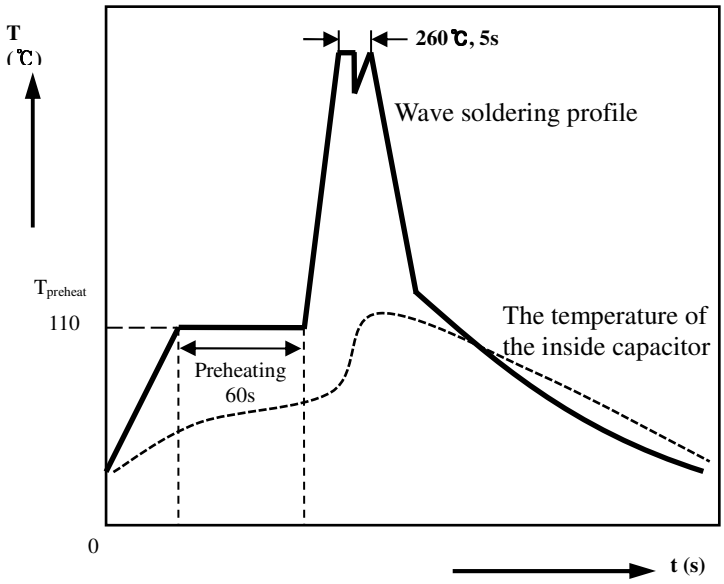
• Shadowing by neighboring components

• Additional heating due to heat dissipation by neighboring components

• Use of solder-resist coatings

The overheating associated with some of these factors can usually be reduced by suitable countermeasures. For example, if a pre-heating step cannot be avoided, an additional or reinforced cooling process may possibly have to be included.

Recommended wave soldering profile

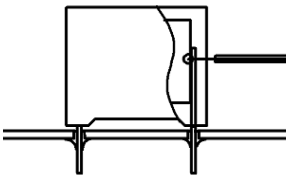


1. The maximum set-up temperature of the soldering process

Maximum preheat temperature	Maximum peak soldering temperature
110℃	260℃

2. The maximum temperature of the inside capacitor:
   Set the temperature so that inside the element the maximum temperature is below the limit:-

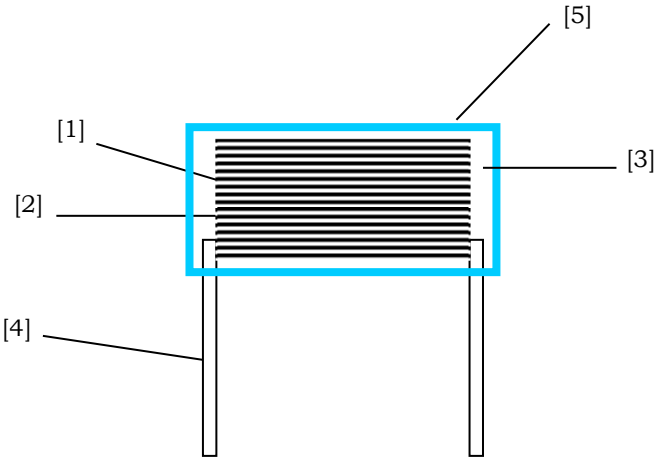
Maximum temperature measured inside the element
110℃

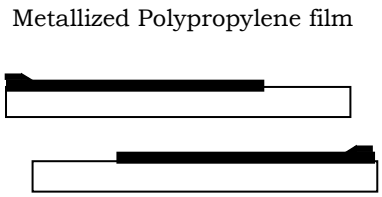


MATERIAL LIST

- Product type ; Metallized Polypropylene film capacitors
- Model name ; P226XXXXXXXXXX

e3





	Description	Material
1	MKP Film	Metallized polypropylene film
2	Metal Spray	Tin-Zinc
3	Epoxy	UL94V-0
4	Lead Wire	Tin plated Copper wire 0.6/0.8/1.0/1.2mm [Sn100%:10 ㎛]
5	Case	Flame retardant Plastic case UL94-V0