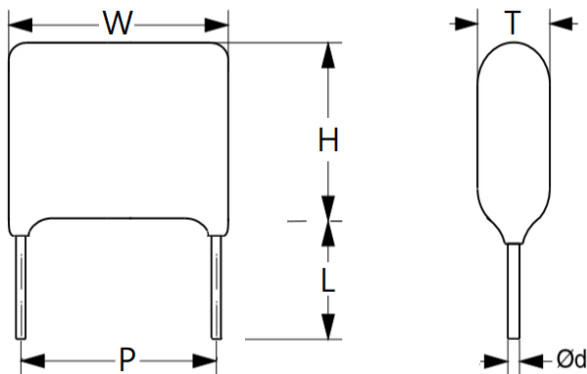


SPPN series

■ Outline Drawing



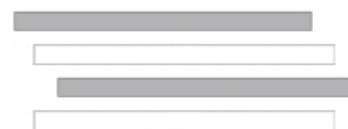
■ Typical Applications

Widely used in high frequency, DC, AC and pulse circuits

■ Features

- Polypropylene film/Aluminum foil
- non-inductive wound construction
- Excellent frequency and temperature characteristics
- Very small loss even at high frequency
- Flame retardant epoxy resin powder coating (UL94V-0)

■ Construction



■ Specifications

Reference Standard	GB/T 10188 (IEC 60384-13)			
Climatic Category	40/105/21			
Rated Temperature	85°C			
Operating Temperature Range	-40°C~+105°C (+85°C to +105°C: decreasing factor 1.25% per °C for UR)			
Capacitance Range	0.001μF ~ 0.1μF			
Rated (DC) Voltage	100V	250V	400V	630V
Capacitance Tolerance	±5%(J) 、 ±10%(K)			
Voltage Proof	1.5UR (60s)			
Dissipation Factor	≤ 0.1% (20°C, 1kHz)			
Insulation Resistance	UR	≤	C _R ≤ 0.33uF IR ≥ 15,000MΩ	
	100V		C _R >0.33uF IR ≥ 5,000s	

SPPN series

■ Product code system

SPPN	I	103	K	0250	D	B	10	23
Type	Internal use	Capacitance	Tolerance	Rated Voltage	Voltage	Lead forming	Lead Pitch	Lead Length
SPPN= Polypropylene Film/Foil Capacitor (Dipped)	--	103 =10000pF =10nF =0.01μF	J=±5% K=±10%	0100=100V 0250=250V 0400=400V 0630=630V	D=DC	Shown as Table I	07=6.5mm 08=7.5mm 10=10mm 13=13mm 19=19mm	04=3.5mm 15=15mm 23=23mm

■ Table I

Code	B (Straight 23mm)	K (Short)	R (Inside Kink)
Lead Forming			
Code	U (Vertical Kink)	T (Taping)	--
Lead Forming			

SPPN series

■ Specifications

Test items	Performance	Test Method
Withstand voltage (Between Terminals)	Shall be no abnormality	150% of rated voltage, 60sec
Between terminal and Enclosure	Shall be no abnormality	UR×200%+1000Vac, 60sec.
Insulation resistance (Between Terminals)	$C_R \leq 0.33\mu F$, IR $\geq 15000M\Omega$ $C_R > 0.33\mu F$, IR $\geq 5000s$	Measured at 100±15Vdc, For 60sec / 25°C
Capacitance	Within the tolerance specified	1KHz, 1Vrms Max. at 25°C
Dissipation Factor	0.001 (0.1%) Max.	1Vrms Max. at 25°C
Tense Strength of Terminal	No wire breakage and no damage of capacitor	1. Load Force : 1.0 Kg 2. Holding Time : 10 ± 1sec
Bending Strength of Terminal	No wire breakage and no damage of capacitor	1. Load Force : 0.5 Kg 2. Bending Time : 4 x 90° in 5sec
Solderability	(1) Appearance : No visible damage (2) Covering an area of > solder 95%	1. Solder Temperature : 240±5°C 2. Solder Time : 3±0.5 sec
Heat Shock test	(1) Appearance : No visible damage (2) $\Delta C/C$: $\leq 3\%$ of the initial value (3) DF (tan δ) : Growth less than ≤ 0.004	The terminal of capacitor shall be immersed in the melting solder. a. Solder Temperature: 260±5°C b. Solder Time: 10±1sec
Cold Resistance	(1) Appearance : No visible damage (2) $\Delta C/C$: $\leq 5\%$ of the initial value	a. Test Temperature: -40°C b. Test Times: 2Hrs
Dry Heat Resistance	(3) DF (tan δ) : Growth less than ≤ 0.005 (4) IR : $\geq 50\%$ of clause shall be satisfied	a. Test Temperature: 85°C b. Test Times: 16Hrs

SPPN series

■ Dimensions (mm)

100Vdc						
Cap. μF	W	H	T	P	d	Part number
0.0010	9	8.5	4.5	6.5	0.6	SPPN_102+0100D*07**
0.0015	9	9.5	5.5	6.5	0.6	SPPN_152+0100D*07**
0.0018	9	9.5	5.5	6.5	0.6	SPPN_182+0100D*07**
0.0022	9	9.5	5.5	6.5	0.6	SPPN_222+0100D*07**
0.0027	9	9	5	6.5	0.6	SPPN_272+0100D*07**
0.0033	9	9	5.5	6.5	0.6	SPPN_332+0100D*07**
0.0039	9	9.5	5.5	6.5	0.6	SPPN_392+0100D*07**
0.0047	9	9	5	6.5	0.6	SPPN_472+0100D*07**
0.0056	9	9.5	5.5	6.5	0.6	SPPN_562+0100D*07**
0.0068	9	10	6	6.5	0.6	SPPN_682+0100D*07**
0.0075	10	9.5	6	7.5	0.6	SPPN_752+0100D*08**
0.0082	10	10	6	7.5	0.6	SPPN_822+0100D*08**
0.0091	10	10	6	7.5	0.6	SPPN_912+0100D*08**
0.010	10	10.5	6.5	7.5	0.6	SPPN_103+0100D*08**
0.012	10	11	7	7.5	0.6	SPPN_123+0100D*08**
0.015	12	10.5	6.5	8.5	0.6	SPPN_153+0100D*09**
0.018	12	10.5	7	8.5	0.6	SPPN_183+0100D*09**
0.022	12	11	7.5	8.5	0.6	SPPN_223+0100D*09**
0.027	12	12	8	8.5	0.6	SPPN_273+0100D*09**
0.033	13.5	11.5	7	10	0.6	SPPN_333+0100D*10**
0.039	13.5	12	7.5	10	0.6	SPPN_393+0100D*10**
0.047	13.5	12.5	8	10	0.6	SPPN_473+0100D*10**
0.056	13.5	13	8.5	10	0.6	SPPN_563+0100D*10**
0.068	17	13	7.5	13	0.6	SPPN_683+0100D*10**
0.082	17	13.5	8	13	0.6	SPPN_823+0100D*10**
0.10	17	14	8.5	13	0.6	SPPN_104+0100D*10**

250Vdc						
Cap. μF	W	H	T	P	d	Part number
0.0010	12	9.5	5.5	8.5	0.6	SPPN_102+0250D*09**
0.0015	12	10	6.5	8.5	0.6	SPPN_152+0250D*09**
0.0018	12	10.5	6.5	8.5	0.6	SPPN_182+0250D*09**
0.0022	12	9.5	5.5	8.5	0.6	SPPN_222+0250D*09**
0.0027	12	10	6	8.5	0.6	SPPN_272+0250D*09**
0.0033	12	10	6	8.5	0.6	SPPN_332+0250D*09**
0.0039	12	10.5	6.5	8.5	0.6	SPPN_392+0250D*09**
0.0047	12	10	6	8.5	0.6	SPPN_472+0250D*09**
0.0056	12	10.5	6.5	8.5	0.6	SPPN_562+0250D*09**
0.0068	12	10.5	7	8.5	0.6	SPPN_682+0250D*09**
0.0075	13.5	10.5	6.5	10	0.6	SPPN_752+0250D*10**
0.0082	13.5	10.5	6.5	10	0.6	SPPN_822+0250D*10**
0.0091	13.5	10.5	6.5	10	0.6	SPPN_912+0250D*10**
0.010	13.5	11	7	10	0.6	SPPN_103+0250D*10**
0.012	18	11	6	14	0.6	SPPN_123+0250D*14**
0.015	18	11.5	6	14	0.6	SPPN_153+0250D*14**
0.018	18	11.5	6.5	14	0.6	SPPN_183+0250D*14**
0.022	18	12	7	14	0.6	SPPN_223+0250D*14**
0.027	18	13.5	7	14	0.6	SPPN_273+0250D*14**
0.033	18	14	7.5	14	0.6	SPPN_333+0250D*14**
0.039	18	14.5	8	14	0.6	SPPN_393+0250D*14**
0.047	18	15.5	8.5	14	0.6	SPPN_473+0250D*14**
0.056	22.5	16	8	19	0.8	SPPN_563+0250D*19**
0.068	22.5	16.5	8.5	19	0.8	SPPN_683+0250D*19**
0.082	22.5	17	9.5	19	0.8	SPPN_823+0250D*19**
0.10	22.5	18	10	19	0.8	SPPN_104+0250D*19**

+ = Capacitance tolerance: K=±10%, J=±5%

* = Lead forming

** = Lead length

SPPN series

■ Dimensions (mm)

400Vdc						
Cap. μ F	W	H	T	P	d	Part number
0.0010	13.5	10	6	10	0.6	SPPN_102+0400D*10**
0.0012	13.5	10.5	6.5	10	0.6	SPPN_122+0400D*10**
0.0015	13.5	10.5	6.5	10	0.6	SPPN_152+0400D*10**
0.0016	13.5	10	6	10	0.6	SPPN_162+0400D*10**
0.0018	13.5	10.5	6.5	10	0.6	SPPN_182+0400D*10**
0.002	13.5	9	5.5	10	0.6	SPPN_202+0400D*10**
0.0022	13.5	9.5	5.5	10	0.6	SPPN_222+0400D*10**
0.0024	13.5	9.5	5.5	10	0.6	SPPN_242+0400D*10**
0.0027	13.5	9.5	5.5	10	0.6	SPPN_272+0400D*10**
0.0030	13.5	9.5	6	10	0.6	SPPN_302+0400D*10**
0.0033	13.5	9.5	6	10	0.6	SPPN_332+0400D*10**
0.0036	15	11	5.5	11	0.6	SPPN_362+0400D*11**
0.0039	15	11	6	11	0.6	SPPN_392+0400D*11**
0.0043	15	11	6	11	0.6	SPPN_432+0400D*11**
0.0047	15	11.5	6	11	0.6	SPPN_472+0400D*11**
0.0051	15	11.5	6.5	11	0.6	SPPN_512+0400D*11**
0.0056	15	11.5	6.5	11	0.6	SPPN_562+0400D*11**
0.0062	15	12	6.5	11	0.6	SPPN_622+0400D*11**
0.0068	15	12	7	11	0.6	SPPN_682+0400D*11**
0.0075	15	12	7	11	0.6	SPPN_752+0400D*11**
0.0082	15	12.5	7	11	0.6	SPPN_822+0400D*11**
0.0091	15	12.5	7.5	11	0.6	SPPN_912+0400D*11**
0.010	15	13	8	11	0.6	SPPN_103+0400D*11**

630Vdc						
Cap. μ F	W	H	T	P	d	Part number
0.0010	15	10	6	11	0.6	SPPN_102+0630D*11**
0.0012	15	10.5	6.5	11	0.6	SPPN_122+0630D*11**
0.0015	15	10.5	6.5	11	0.6	SPPN_152+0630D*11**
0.0016	15	10.5	6	11	0.6	SPPN_162+0630D*11**
0.0018	15	11	6	11	0.6	SPPN_182+0630D*11**
0.002	15	11	6.5	11	0.6	SPPN_202+0630D*11**
0.0022	15	11	6.5	11	0.6	SPPN_222+0630D*11**
0.0024	15	11.5	6.5	11	0.6	SPPN_242+0630D*11**
0.0027	15	11.5	7	11	0.6	SPPN_272+0630D*11**
0.0030	15	11.5	7	11	0.6	SPPN_302+0630D*11**
0.0033	15	12	7	11	0.6	SPPN_332+0630D*11**
0.0036	15	12	7.5	11	0.6	SPPN_362+0630D*11**
0.0039	15	12.5	7.5	11	0.6	SPPN_392+0630D*11**
0.0043	15	12.5	8	11	0.6	SPPN_432+0630D*11**
0.0047	15	13	8	11	0.6	SPPN_472+0630D*11**
0.0051	18	11.5	6.5	14	0.6	SPPN_512+0630D*14**
0.0056	18	12	6.5	14	0.6	SPPN_562+0630D*14**
0.0062	18	12	7	14	0.6	SPPN_622+0630D*14**
0.0068	18	12.5	7	14	0.6	SPPN_682+0630D*14**
0.0075	18	12.5	7.5	14	0.6	SPPN_752+0630D*14**
0.0082	18	13	7.5	14	0.6	SPPN_822+0630D*14**
0.0091	18	14	7.5	14	0.6	SPPN_912+0630D*14**
0.010	18	14.5	7.5	14	0.6	SPPN_103+0630D*14**

- + = Capacitance tolerance: K=±10%, J=±5%
- * = Lead forming
- ** = Lead length

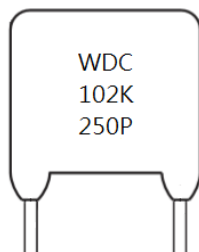
SPPN series

Test items	Performance	Test Method
Humidity Resistance	(1) Appearance : No visible damage (2) $\Delta C/C$: $\leq 5\%$ of the initial value (3) DF (tan δ) : Growth less than ≤ 0.002 (4) IR : $\geq 50\%$ of clause shall be satisfied	a. Test Temperature: 40°C \pm 2°C b. Relative Humidity: 90 ~ 95% c. Test Times: 500 \pm 8Hrs d. Applied voltage: R.V Then recovery at ordinary condition at least 6Hrs
Charge & Discharge	(1) Appearance : No visible damage (2) $\Delta C/C$: $\leq 5\%$ of the initial value (3) DF (tan δ) : Growth less than ≤ 0.005 (4) IR : $\geq 50\%$ of clause shall be satisfied	a. Test Voltage : Rated voltage charge for 0.5 sec. Discharge for 0.5 sec. b. Repeated for 10000 cycles
High Temp Loading test (Continuous)	(1) Appearance : No visible damage (2) DF (tan δ) : Growth less than ≤ 0.004 (3) $\Delta C/C$: $\leq 5\%$ of the initial value (4) IR : $\geq 50\%$ of clause shall be satisfied	a. Test Temperature: 85°C \pm 2°C b. Test Times: 1000 \pm 24Hrs c. Apply 125% of the rated voltage Then recovery at ordinary condition at least 6Hrs
Flame Test (IEC 695-2-2)	V (mm \times mm \times mm)	Exposure time (S)
	≤ 250	5
	250 < V ≤ 500	10
	500 < V ≤ 1750	20
	V > 1750	30

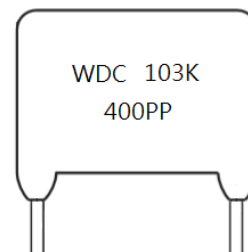
■ Mark

Example: 103 indicates 10000pF or 0.01 μ F, Capacitors Tolerance. Example: K= $\pm 10\%$

Marking



Pitch < 10mm



Pitch ≥ 10 mm

Note : P or PP for Polypropylene film/foil

SPPN series

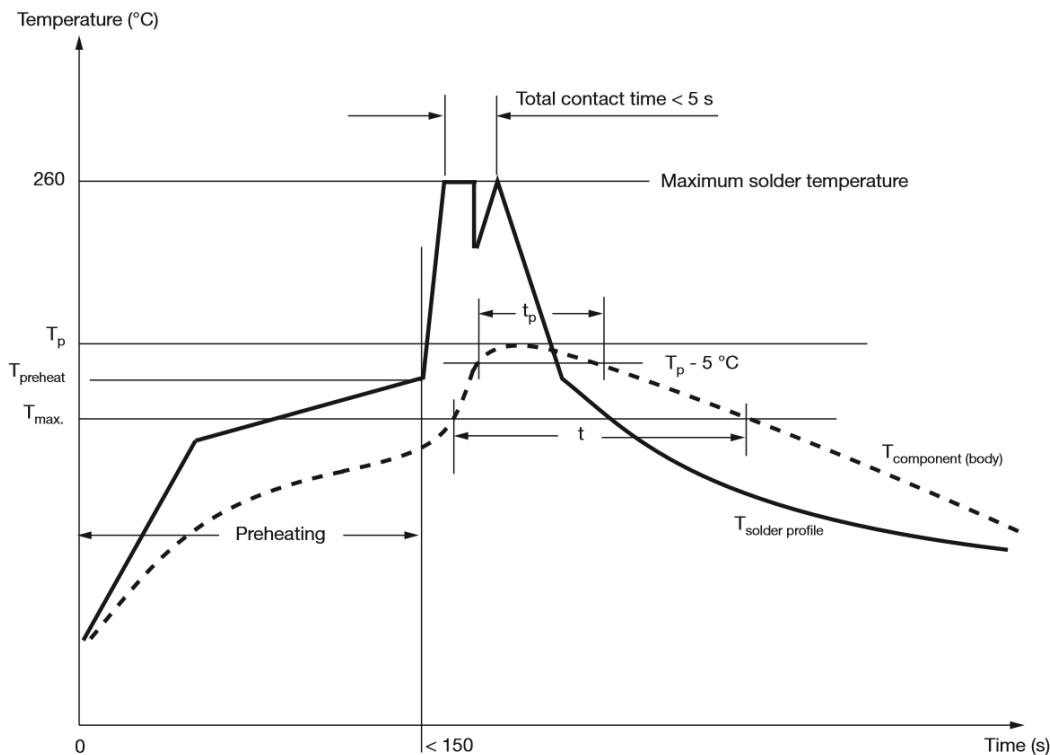
■ Soldering Guidelines for Film Capacitors

WDC recommends that users observe the following guidelines for soldering our film capacitors. Adherence to these recommendations will help to safeguard product specifications and reliability while preventing damage to the capacitors during soldering.

SOLDERING GUIDELINES AND RECOMMENDED WAVE SOLDERING PROFILE

With regard to the resistance to soldering heat and the solderability, our products comply with “IEC 60384-1” and the additional type specifications. The recommended wave soldering profile for our leaded components is defined as follows:

■ Wave Soldering Recommendations



T_p : Peak temperature of the component body (top)

T_{max} : Maximum application temperature of the component

The PSL (Process Sensitivity Level) is classified according JEDEC standard J-STD-075 “Classification of Non-IC Electronic Components for Assembly Processes” and summarized in following tables per product family and pitch size of the component:

SERIES	PRODUCT PITCH SIZE							
	6.5 mm	7.5 mm	8.5 mm	10 mm	11 mm	12.5/13	14/15 mm	19 mm
SPPN	(3),(5)	(3),(5)	(3),(5)	(2),(5)	(2),(5)	(2),(5)	(1),(6)	(1),(6)

(1) No risk

During soldering: $T_p \leq 110^\circ\text{C}$, $t_p \leq 20\text{ s}$, $t \leq 30\text{ s}$

(2) Risk for parameter change if PSL is not strictly followed

(5) Temperature is measured at the body top and must be kept as follows:

(3) Risk for product damage if PSL is not strictly followed

During preheating: $T_{max} \leq 110^\circ\text{C}$

(4) Temperature is measured at the body top and must be kept as follows:

During soldering: $T_p \leq 120^\circ\text{C}$, $t_p \leq 20\text{ s}$, $t \leq 30\text{ s}$

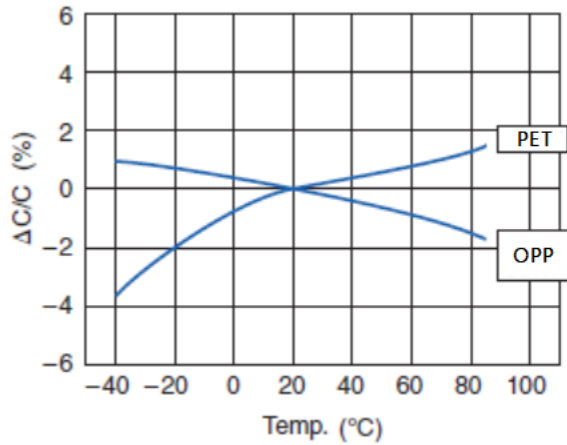
During preheating: $T_{max} \leq 100^\circ\text{C}$

(6) The component has a preheat limitation of 150°C

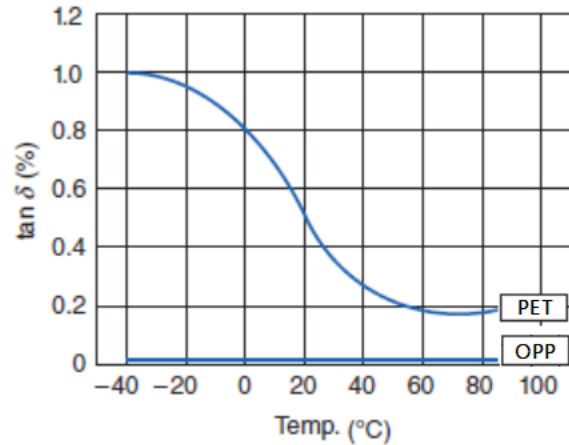
SPPN series

■ Typical graphs

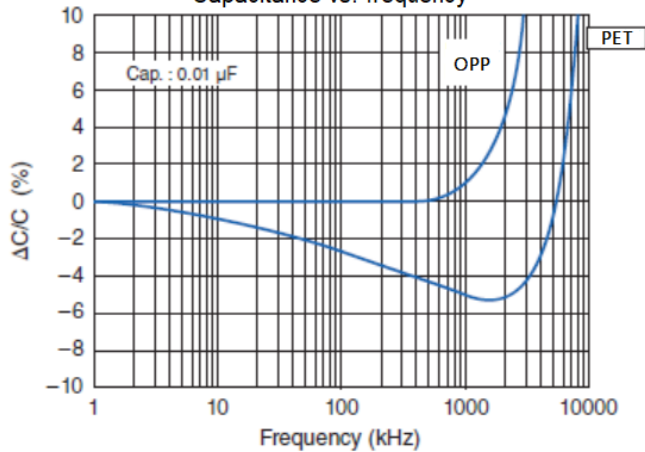
Capacitance vs. temperature at 1kHz



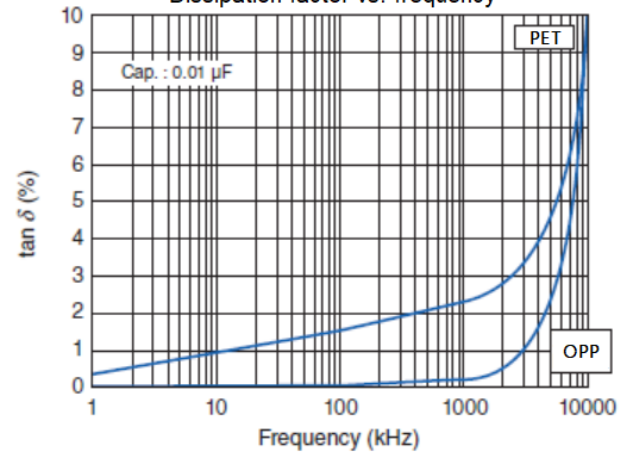
Dissipation factor vs. temperature at 1kHz



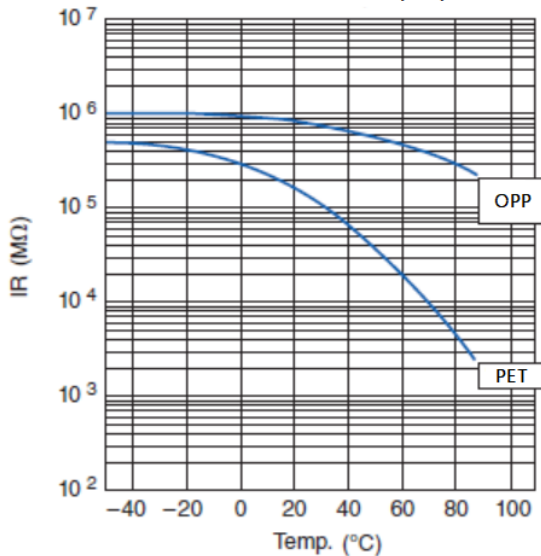
Capacitance vs. frequency



Dissipation factor vs. frequency



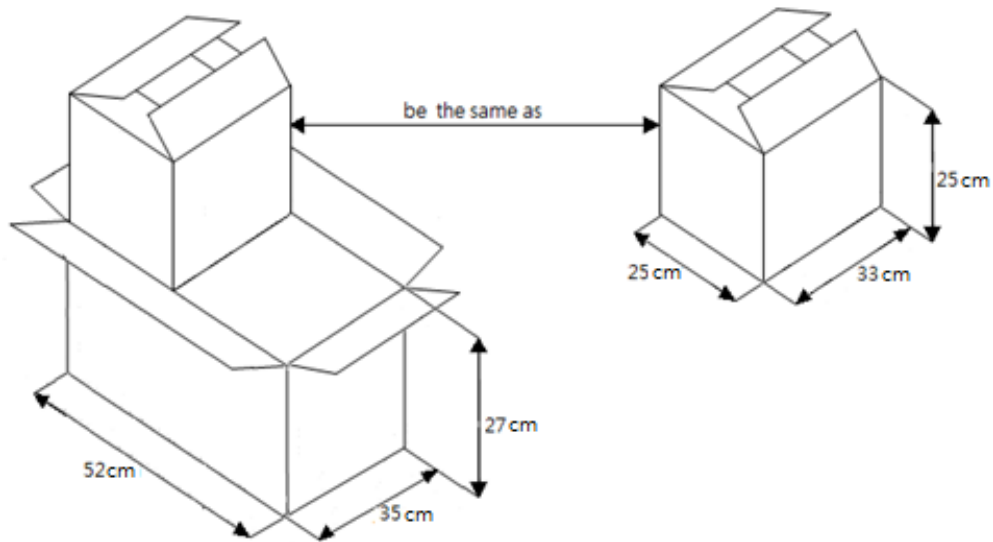
Insulation resistance (MΩ)



PET :	Metallized Polyester film capacitor
OPP :	Metallized Polypropylene film capacitor

SPPN series

■ Packaging



Pitch (mm)	Pcs / Bag	Pcs / Inner carton (L33:cm XH:25cm X T:25cm)	Pcs / Out box (L52:cm XH:27cm X T:35cm)
5~10	1000	10000	20000
15	500	5000	10000
20	500	5000	10000
22.5	300	3000	6000
27.5	200	2000	4000
≥27.5	100	1000	2000

■ Storage conditions and duration

Packaged capacitors should be kept in clean, ventilated, dry coffers, not near the heat source, not subject to direct sunlight, is strictly prohibited and chemical reagents, acid and harmful gas storage together.

Capacitor at a temperature within the range 20 ~ 25 °C, humidity less than 50% of the state of storage for one year.