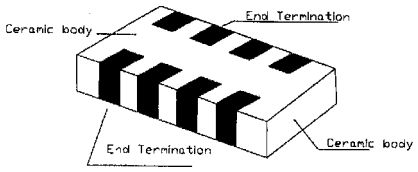
CAPACITOR ARRAY

WPCA4 Series



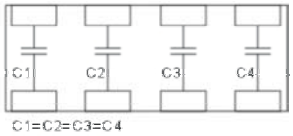
Explanation of Part Number

Example Part Number:

WPCA4 - N 104 J 050 T
(1) (2) (3) (4) (5) (6)

(1) Product Type
Capacitor Array

(2) Temperature Coefficient
N: NPO
X: X7R
Y: Y5V



(3) Capacitance Value
Examples- 104 = 100000pF
471 = 470pF

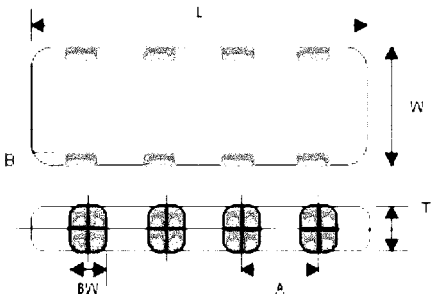
(4) Capacitance Tolerance
J: ± 5%
K: ± 10%
M: ± 20%
Z: +80%, -20%

(5) Rated Voltage
050: 50V
025: 25V

(6) Package Type
T = Reeled
B = Bulk

Structure and Dimension

L (mm)	W (mm)	T (mm)	BW (mm)	B (mm)	A (mm)
3.2 ± 0.15	1.6 ± 0.15	0.8 ± 0.2	0.4 ± 0.1	0.4 ± 0.1	0.8 typ.



Capacitance Range

Temperature Characteristics

Capacitance (pF)	NPO	X7R	Y5V
	50 volts	50 volts	25 volts
100	X		
150	X		
220	X		
330	X		
470	X		
680	X		
101	X		
151	X		
181	X	X	
221	X	X	
331	X	X	

Capacitance (pF)	NPO	X7R	Y5V
	50 volts	50 volts	25 volts
471	X	X	
681	X	X	
102	X	X	
152		X	
222		X	
332		X	
472		X	
682		X	
103		X	
104			X

Operation Temperature Range

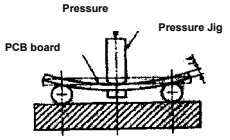
(25°C)

Characteristic	Temperature Range
NPO	-55°C~ + 125°C
X7R	-55°C ~ + 125°C
Y5V	-30°C ~ + 85°C

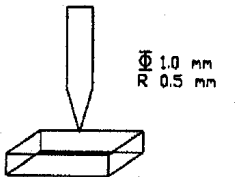
Storage Conditions

Storage Temperature: 5 to 40°C
Relative Humidity: 20 to 70%
Storage Time: 6 months

Performance

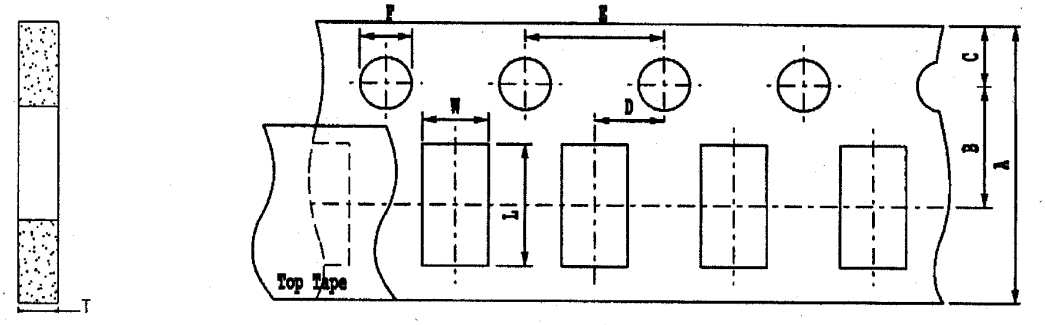
<table>
<tr><th>Item</th><th colspan="4">Specification</th><th colspan="3">Test Condition</th></tr>
<tr><td rowspan="3">Capacitance Dissipation Factor (DF) and Q factor</td><td colspan="4" rowspan="3">The capacitance/DF shall be measured at 25°C at the frequency and voltage shown below.
Cp: Within the specified tolerance
NPO: Cp ≥ 30pF Q > 1000 Cp < 30pf Q = 400+20C (C in pf)
X7R: < 2.5%
Y5V: < 8%</td><td>Capacitance</td><td>Frequency</td><td>Voltage</td></tr>
<tr><td>NPO</td><td>1MHz ± 10%</td><td>0.5 ~ 5Vrms</td></tr>
<tr><td>X7R
Y5V</td><td>1KHz ± 10%</td><td>1.0 ± 0.2Vrms</td></tr>
<tr><td rowspan="4">Insulation Resistance</td><td colspan="2">Characteristic</td><td colspan="2">Specification</td><td colspan="3" rowspan="4">Rated voltage measurement time: 60 seconds</td></tr>
<tr><td colspan="2">NPO</td><td colspan="2">R ≥ 10GΩ</td></tr>
<tr><td colspan="2">X7R</td><td colspan="2">C ≤ 25nF => R ≥ 4GΩ</td></tr>
<tr><td colspan="2">Y5V</td><td colspan="2">C > 25nF => RC ≥ 100s</td></tr>
<tr><td rowspan="4">Capacitance Temperature Characteristic</td><td colspan="2">Characteristic</td><td colspan="2">Temperature Coefficient</td><td colspan="3" rowspan="4">Symmetrical tolerance applies to two point temperature coefficient measurement.
25°C and at 85°C (C1-C2)/C1
C1: Capacitance at 25°C
C2: Capacitance at 85°C</td></tr>
<tr><td colspan="2">NPO</td><td colspan="2">0 ± 30 (ppm/°C)</td></tr>
<tr><td colspan="2">X7R</td><td colspan="2">±15%</td></tr>
<tr><td colspan="2">Y5V</td><td colspan="2">+22% ~ -85%</td></tr>
<tr><td>Solderability</td><td colspan="4">95% of the terminal surface must be covered.</td><td colspan="3">Solder temperature: 230 ± 5°C
Dipping: 10 to 15 mm Depth
Dip Time: 2 ± 0.5 seconds
Solder: H63A
Flux: Rosin
Preheat: At 80 ~ 120°C for 10 ~ 30 seconds</td></tr>
<tr><td>Resistance to PCB bending</td><td colspan="4">Mount the capacitor to PCB. Apply force in the direction show in Figure 3. The bending stroke shall be 1mm. Pressure is applied at the rate of 1mm/s. Once specified bend is reached, hold this pressure for 5 ± 1 seconds. No cracking or marking defects shall occur.</td><td colspan="3">Figure 3 Unit: mm
 
</td></tr>
<tr><td rowspan="8">Resistance to soldering heat</td><td colspan="4">(a) 95% of the terminations are to be soldered evenly and continuously.</td><td colspan="3">(a) The capacitors are dipped into the solder bath at 260 ± 5°C for 30 ± 1 seconds. Measurement is then performed.</td></tr>
<tr><td colspan="4">(b)</td><td colspan="3" rowspan="7">(b) Dip the capacitor into the solder bath at 270 ± 5°C for 10 ± 0.5 seconds. Keep at room temperature for 48 ± 4 hours before performing initial measurement.

*Initial heat treatment for X7R and Y5V is 150 ± 10°C for one hour and then keep at room temperature for 48 ± 4 hours. Perform the initial measurement.</td></tr>
<tr><td>Dielectric</td><td>NPO</td><td>X7R</td><td>Y5V</td></tr>
<tr><td>Appearance</td><td colspan="3">No defect</td></tr>
<tr><td>Capacitance Change</td><td>< ± 2.5% or ± 0.25 pF</td><td>± 7.5%</td><td>± 20%</td></tr>
<tr><td>DF</td><td>0.1% max</td><td>2.5% max</td><td>10% max</td></tr>
<tr><td>IR</td><td colspan="3">Within specification</td></tr>
<tr><td>Dielectric Strength</td><td colspan="3">No failure</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specification</th><th>Test Condition</th></tr>
<tr><td>Temperature cycle</td><td>Capacitor shall be subjected to four cycles as specified below.
<table>
<tr><th>Step</th><th>Temp.(ºC)</th><th>Time(min)</th></tr>
<tr><td>1</td><td>Min. Rated Temp. +0/-3</td><td>30</td></tr>
<tr><td>2</td><td>25</td><td>3</td></tr>
<tr><td>3</td><td>Max Rated Temp. +3/-0</td><td>30</td></tr>
<tr><td>4</td><td>25</td><td>3</td></tr>
</table>
Measure NPO at room temperature after cooling for 24 ± 2 hours, Y5V and X7R for 48 ± 4 hours.
<table>
<tr><th>Dieletric</th><th>Temperature Range</th><th>Capacitance Change</th></tr>
<tr><td>NPO</td><td>-50°C ~ 125°C</td><td>0 ± 30ppm/°C</td></tr>
<tr><td>X7R</td><td>-50°C ~ 125°C</td><td>Within 15%</td></tr>
<tr><td>Y5V</td><td>-30°C ~ 85°C</td><td>Within +22% ~ -85%</td></tr>
</table></td><td>The temperature coefficient is determined using the capacitance measured in step 3 as a reference. When cycling the temperature sequentially from step 1 through 5. The capacitance shall be within specified temperature coefficient.
<table>
<tr><th>Step</th><th>Temperature°C</th></tr>
<tr><td>1</td><td>25 ± 2°C</td></tr>
<tr><td>2</td><td>-55 ± 3°C</td></tr>
<tr><td>3</td><td>25 ± 2°C</td></tr>
<tr><td>4</td><td>125 ± 3°C</td></tr>
<tr><td>5</td><td>25 ± 2°C</td></tr>
</table></td></tr>
<tr><td>Appearance</td><td>X8 magnification glass.</td><td>No defect or abnormalities.</td></tr>
<tr><td>Solderability</td><td>95% of the termination surface must be covered.</td><td>The capacitors are dipped into a solder bath at 215 ± 5°C for 2 ± 0.5 seconds, then measurement is performed.</td></tr>
<tr><td>Dimension</td><td>Within the specified dimension.</td><td>Using calipers.</td></tr>
<tr><td>Breakdown Voltage</td><td>The DC voltage is applied between the terminations until the leakage current is more than 10mA.</td><td>BDV > 700% rated voltage (Vr ≤ 50V)</td></tr>
<tr><td>High Temperature Resistance</td><td>
<table>
<tr><td>Appearance</td><td colspan="2">No mechanical damage</td></tr>
<tr><td rowspan="4">Cp</td><td>Characteristic</td><td>Cap. Change</td></tr>
<tr><td>NPO</td><td>Within ±3.0% or ± 0.3 pF Which is larger</td></tr>
<tr><td>X7R</td><td>Within ± 12.5%</td></tr>
<tr><td>Y5V</td><td>Within ± 30%</td></tr>
<tr><td>Q(NPO)</td><td colspan="2">NPO: Cp≥30pf Q> 1000 Cp< 30pf Q+ 400+20C (C in pf)</td></tr>
<tr><td rowspan="3">DF (X7R, Y5V)</td><td>25V, 50V (max)</td><td>16V (max)</td></tr>
<tr><td>0.050</td><td>0.050</td></tr>
<tr><td>0.075</td><td>0.085</td></tr>
<tr><td>IR</td><td colspan="2">Minimum insulation Resistance: 1,000M Ω or 50MΩ μF Product whichever is smaller</td></tr>
</table></td><td>Applied Voltage: 200% of rated voltage
Test Time: 1000 + 48 hours.
Current Applied: 50mA max.
<table>
<tr><th>Characteristic</th><th>Temperature</th></tr>
<tr><td>NPO</td><td>125 ± 3 °C</td></tr>
<tr><td>X7R</td><td>125 ± 3°C</td></tr>
<tr><td>Y5V</td><td>85 ± 3 °C</td></tr>
</table>
(Initial Value Measurement) For Class II Capacitors, 200% of rated voltage shall be applied for 1 hour at the maximum operation temperature. Then capacitor is kept at room temperature for 48 ± 4 hours.</td></tr>
<tr><td>Chip Break Strength</td><td>Place the capacitor on an iron plate. Gradually apply a load on the center of the chip until it breaks. Tip of push pull gauge is shown in the drawing to the right.</td><td>The load is 2kgf at least.
 
</td></tr>
</table>

Tape Dimension and Label Marking

Products shall be heat-sealed in the chip pocket, spacing pitch 4mm of paper/plastic carrier tape with cover tape, and the carrier tape shall be reeled to the reel. The label specified as follows shall be put on the side of reel: Part no., Quantity, Lot no. Part No. and quantity shall be marked on outer packaging.



Type/Symbol	A	B	C	D	E	F	W	T	L
Dimension	8.0 ± 0.3	3.5 ± 0.005	1.75 ± 0.1	2.0 ± 0.05	4.0 ± 0.1	1.5 ± 0.1	1.9 ± 0.2	0.95 ± 0.05	3.5 ± 0.2

Taping

Standard packing quantity per reel (∅178)
Cardboard paper type: 4000 pcs.

A	178.0 ± 2.0
B	2.0 ± 0.5
C	13.0 ± 0.5
D	21.0 ± 0.8
E	60.0 ± 1.0
F	9.0 ± 0.5
G	12.0 ± 0.2