

**Features:**

- High-frequency circuits.
- Temperature compensating.
- High stability.
- Space saving.

**Applications:**

In a great variety of electronic circuits, e.g. in filters and tuning circuits where high stability and/or temperature compensation are a requirement. Because of their small size the capacitors are suitable for use in circuitry with high component density.

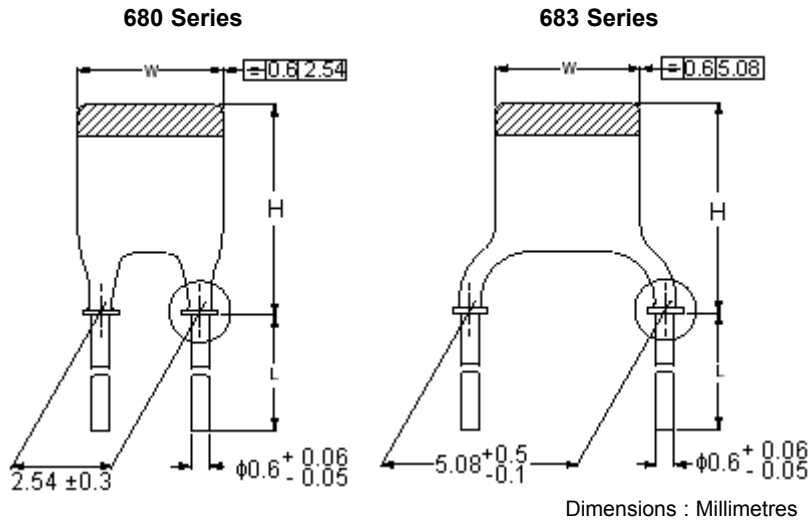
**Description:**

The capacitors consist of a thin rectangular ceramic plate, both sides of which are metallized, and tinned connecting leads are secured using a high melting point solder. The capacitors are encapsulated in epoxy lacquer, which is resistant to all commonly used cleaning solvents. They have small dimensions and narrow tolerances on the lead spacing. The leads are provided with a flange, which guarantees that the leads are free of lacquer, and its shape allows soldering gasses to escape freely, ensuring excellent solderability. This makes the capacitors suitable for both hand-mounting and automatic insertion. The electrical properties are characterized by low losses, a narrow tolerance on capacitance ( $\pm 0.25\text{pF}$  or 2%), high stability and, owing to the absence of silver, an extremely good DC behaviour.

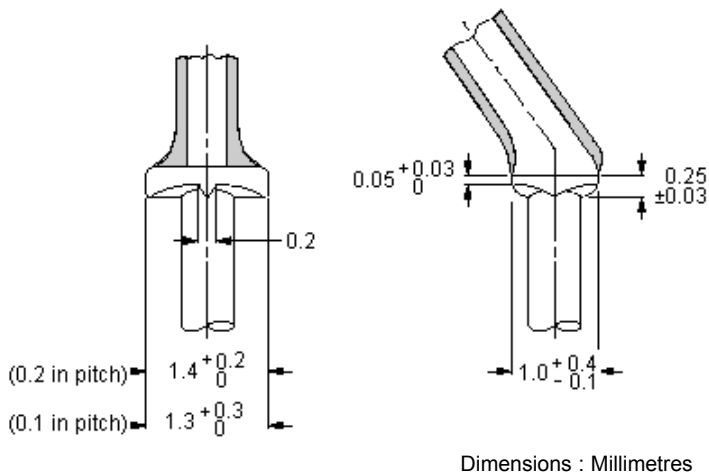
**Quick Reference Data**

Description	Value
Capacitance range (E12 series)	0.56 to 680pF
Rated DC voltage	100V
Tolerance on capacitance	$\pm 2\%$ or $\pm 0.25\text{pF}$
Temperature coefficients	P100, NP0, N150, N750 and N1500
Sectional specification	IEC 60384-8
Climatic category (IEC 60068)	55/085/21 (N150, N750); 55/125/56 (P100, NP0, N1500)

## Mechanical Data:



### Detail of Flange



## Physical Dimensions

### Capacitor Dimensions

Size	W (1)	H (1)	
		680 Series	683 Series
I	3.6 (-1.1)	5.0 (-1.5)	6.3 (-1.8)
IIA	3.9 (-1.4)	5.3 (-1.7)	6.7 (-2.0)
IIB	4.5 (-1.8)	6.0 (-2.1)	7.3 (-2.4)
III	5.3 (-1.8)	6.8 (-2.3)	8.1 (-2.6)
IV	6.2 (-2.0)	7.7 (-2.4)	9.0 (-2.7)
V		10.3 (-2.8)	11.2 (-3.1)
VI	6.5 (-2.3)	12.3 (-3.5)	13.2 (-3.8)

Dimensions : Millimetres

**Notes:** 1. Tolerances are given between parentheses.

**Marking:**

The temperature coefficient is indicated by a colour code in accordance with IEC and EIA recommendations. Capacitance value is indicated by a marking code in a contrasting colour on the body.

**Mounting:**

When bending, cutting or flattening, the leads should be relieved of the applied load by supporting them at the capacitor body.

**Soldering conditions:**

Maximum 265°C, maximum 10s.

The capacitors are suitable for mounting on printed-circuit boards (hand-mounting or automatic insertion).

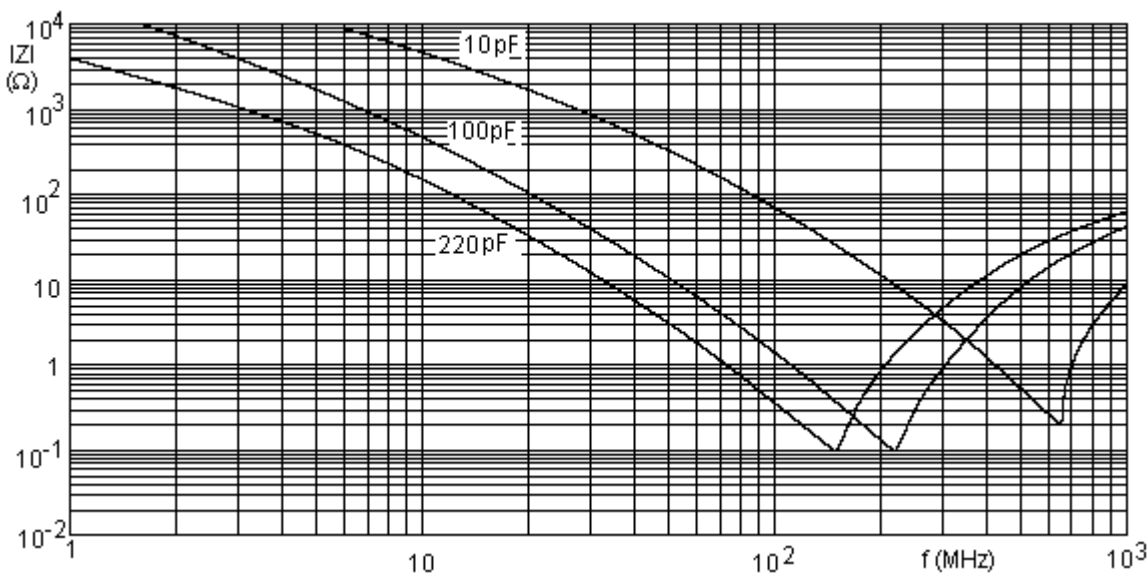
**Electrical Characteristics**

The capacitors meet the essential requirements of "IEC 60384-8". Unless stated otherwise all electrical values apply at an ambient temperature of  $20 \pm 1^\circ\text{C}$ , an atmospheric pressure of 86 to 106kPa and a relative humidity of 63 to 67%.

Description	Value
Rated DC voltage	100V
DC test voltage; duration 1 minute	300V
DC test voltage of coating; duration 1 minute	300V
Insulation resistance at 100V dc after 1 minute	$\geq 10,000\text{M}\Omega$
Tan $\delta$ (note 1) measured at 1MHz, $\leq 5\text{V}$ : C $\leq 50\text{pF}$ C $> 50\text{pF}$	$\leq 15 (15/\text{C} + 0.7) \times 10^{-4}$ ; $< 55 \times 10^{-4}$ $\leq 15 \times 10^{-4}$
Category temperature range	-55 to +85°C (N150, N750); -55 to +125°C (P100, NP0, N1500)

**Note:** 1. Including 2mm per connecting lead.

Typical Impedance  $|Z|$  as a Function of Frequency



**Conditions for Capacitors with Temperature Coefficient NP0 (C0G), Rated Voltage 100V dc**

Description	Value
Capacitance range	1.8 to 330pF (E12 series)
Temperature coefficient of the capacitance ( $\Delta C/C\Delta T$ )	$0 \times 10^{-6}/K$
Tolerance on the temperature coefficient	$\pm 30 \times 10^{-6}/K$
Marking colour of the temperature coefficient	Black
Climatic category (IEC 60068)	55/125/56

**Preferred Capacitance Range, Temperature Coefficient NP0 (C0G)**

Capacitance Value (pF)	Voltage (V)	Tolerance	Size (See Table 1)	Pitch (P)	Lead Diameter (d)	Length	Marking	Part Number
1.8	100	$\pm 0.25pF$	1 (1)	2.54 (0.1)	0.6 (0.024)	$\geq 13$ (0.051)	1p8	2222 680 09188.
				5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 09188.
2.2			2.54 (0.1)	$\geq 13$ (0.051)		2p2	2222 680 09228.	
				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	2222 683 09228.
2.7			2.54 (0.1)	$\geq 13$ (0.051)		2p7	2222 680 09278.	
3.3				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	3p3
			3.9			2.54 (0.1)		
4.7				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	4p7
			5.6			2.54 (0.1)		
6.8				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	6p8
			8.2			2.54 (0.1)		
10.0				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	10p
		12.0	2.54 (0.1)			$\geq 13$ (0.051)		
15.0				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	15p
		18.0	2.54 (0.1)			$\geq 13$ (0.051)		
				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	
			2.54 (0.1)			$\geq 13$ (0.051)		
				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	
			2.54 (0.1)			$\geq 13$ (0.051)		
				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	
			2.54 (0.1)			$\geq 13$ (0.051)		
				5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)	

**Notes :**

1. Maximum thickness 2.5mm.

Dimensions : Millimetres (Inches)

**Conditions for Capacitors with Temperature Coefficient N150 (P2G), Rated Voltage 100V dc**

Description	Value
Capacitance range	3.9 to 330pF (E12 series)
Temperature coefficient of the capacitance ( $\Delta C/C\Delta T$ )	$-150 \times 10^{-6}/K$
Tolerance on the temperature coefficient	$\pm 30 \times 10^{-6}/K$
Marking colour of the temperature coefficient	Orange
Climatic category (IEC 60068)	55/085/21

**Preferred Capacitance Range, Temperature Coefficient N150 (P2G)**

Capacitance Value (pF)	Voltage (V)	Tolerance	Size (See Table 1)	Pitch (P)	Lead Diameter (d)	Length	Marking	Part Number			
100	100	$\pm 2\%$	III	2.54 (0.1)	0.6 (0.024)	$\geq 13$ (0.051)	n10	2222 680 34101.			
				5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34101.			
120			IV	2.54 (0.1)		$\geq 13$ (0.051)	n12	2222 680 34121.			
				5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34121.			
150			IV	2.54 (0.1)		$\geq 13$ (0.051)	n15	2222 680 34151.			
				5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34151.			
22			100	$\pm 2\%$		I	2.54 (0.1)	0.6 (0.024)	$\geq 13$ (0.051)	22p	2222 680 34229.
							5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34229.
27						I	2.54 (0.1)		$\geq 13$ (0.051)	27p	2222 680 34279.
							5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34279.
33						I	2.54 (0.1)		$\geq 13$ (0.051)	33p	2222 680 34339.
							5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34339.
39						IIA	2.54 (0.1)		$\geq 13$ (0.051)	39p	2222 680 34399.
							5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34399.
47						IIA	2.54 (0.1)		$\geq 13$ (0.051)	47p	2222 680 34479.
							5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34479.
56						IIB	2.54 (0.1)		$\geq 13$ (0.051)	56p	2222 680 34479.
							5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34479.
68	IIB	2.54 (0.1)			$\geq 13$ (0.051)	68p	2222 680 34689.				
		5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34689.				
82	III	2.54 (0.1)			$\geq 13$ (0.051)	82p	2222 680 34829.				
		5.08 (0.2)			$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 34829.				

Dimensions : Millimetres (Inches)

### Conditions for Capacitors with Temperature Coefficient N750 (U2J), Rated Voltage 100V dc

Description	Value
Capacitance range	3.9 to 330pF (E12 series)
Temperature coefficient of the capacitance ( $\Delta C/C\Delta T$ )	$-750 \times 10^{-6}/K$
Tolerance on the temperature coefficient	$\pm 120 \times 10^{-6}/K$
Marking colour of the temperature coefficient	Violet
Climatic category (IEC 60068)	55/085/21

### Preferred Capacitance Range, Temperature Coefficient N750 (U2J)

Capacitance Value (pF)	Voltage (V)	Tolerance	Size (See Table 1)	Pitch (P)	Lead Diameter (d)	Length	Marking	Part Number
180	100	$\pm 2\%$	IV	2.54 (0.1)	0.6 (0.024)	$\geq 13$ (0.051)	n18	2222 680 58181.
				5.08 (0.2)		$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 58181.
2.54 (0.1)				$\geq 13$ (0.051)		n22	2222 680 58221.	
5.08 (0.2)				$4 \pm 0.5$ (0.015 $\pm$ 0.001)			2222 683 58221.	
270			V	2.54 (0.1)		$\geq 13$ (0.051)	n27	2222 680 58271.
5.08 (0.2)				$4 \pm 0.5$ (0.015 $\pm$ 0.001)		2222 683 58271.		
330			2.54 (0.1)	$\geq 13$ (0.051)		n33	2222 680 58331.	
			5.08 (0.2)	$4 \pm 0.5$ (0.015 $\pm$ 0.001)			2222 683 58331.	

Dimensions : Millimetres (Inches)

### Conditions for Capacitors with Temperature Coefficient N1500 (P3K), Rated Voltage 100V dc

Description	Value
Capacitance range	18 to 680pF (E12 series)
Temperature coefficient of the capacitance ( $\Delta C/C\Delta T$ )	$-1500 \times 10^{-6}/K$
Tolerance on the temperature coefficient	(0 to +500) $\times 10^{-6}/K$
Marking colour of the temperature coefficient	Orange/orange
Climatic category (IEC 60068)	55/125/56

### Preferred Capacitance Range, Temperature Coefficient N1500 (P3K)

Capacitance Value (pF)	Voltage (V)	Tolerance	Size (See Table 1)	Pitch (P)	Lead Diameter (d)	Length	Marking	Part Number
470	100	$\pm 2\%$	V	5.08 (0.2)	0.6 (0.024)	$4 \pm 0.5$ (0.015 $\pm$ 0.001)	n47	2222 683 70471.

Dimensions : Millimetres (Inches)

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