

**Application**

NPO : Temperature compensation type, have little or no change in capacitance with variation in temperature. Hence, they are used in radio-frequency oscillators, precision timing circuits, ultra stable amplifiers, etc.

X7R/X5R : Temperature stable type for by-pass and decoupling in radio and television receivers, computers servo systems. Audio tone, and coupling, etc., where moderate capacitance variations are permissible and dissipation factor is not critical.

Z5U/Y5V : General type for by-pass and filtering applications.

**Construction**



**Part Number Designation:**

<u>R15</u>	<u>Z</u>	<u>104</u>	<u>M</u>	<u>1H</u>	<u>L</u>	<u>5</u>	<u>L</u>
SIZE	T.C	Capacitance-Code	Tolerance	Voltage	Lead shape	Lead space	Package-Lead-length
R15	N=NPO	Two significant digits	B=±0.10PF	F=±1%	0J=6.3V	L=Straight	R=Tape/Reel
R20	W=X7R	+ No. of zeros.	C=±0.25PF	G=±2%	1A=10V	Y=Inside	B=Tape/Box
R25	X=X5R	Example	D=±0.50PF	J=±5%	1C=16V	Crimp	6=6±1mm
	Z=Z5U	102=1000pf		K=±10%	1E=25V	H=High seated	L=25.4mm(min)
	Y=Y5V	223=22000pf		M=±20%	1H=50V	X=Outside Crimp	
		104=100000pf		Z=+80/-20%	1J=63V		
					2A=100V		

**1. LEAD SHAPE :**

<b>R15 L</b>	<b>R20 Y</b>	<b>R25 L</b>
<b>R15 H</b>	<b>R20 H</b>	<b>R15 X</b>

## 2. LEAD SPACE (F)

CODE	LEAD SPACE (mm/inch)	
2	2.54±0.8	0.1±0.032
5	5.08±0.8	0.2±0.032

## 3. LEAD LENGTH (L)

CODE	LEAD LENGTH	REMARK
6	6mm±1mm	Specified lead length upon request.
L	25mm (min)	

## 4. BODY SIZE & DIMENSION

Size code	Lead style available	Capacitance Range					Dimensions (mm)				
		NPO	X7R	Z5U	Y5V	X5R	W max	H max	T max.	d±0.05	F±0.8
R15	L	50V: 1.0pF -10nF	50V: 220pF-0.33uF	50V: 1.0nF-0.22uF	50V: 1.0nF-0.22uF	16V 1.0uF-10.0uF	4.5	5.5	3.0	0.5	2.54
	X	100V: 0.47-3900pF	100V: 220pF-0.1uF			25V 1.0uF-4.7uF	4.5	7.0	3.0	0.5	2.54
	H						4.5	7.0	3.0	0.5	5.08
R20	Y	25V: 22nF -100nF	25V: 1.0uF -10.0uF	50V: 0.22uF-1.0uF	50V: 0.22uF-2.2uF	6.3V 22.0uF-100uF	5.5	7.0	4.0	0.5	2.54
		50V: 10nF -100nF	50V: 0.1uF -4.7uF			16V 3.3uF-47.0uF					
	H	100V: 1.0nF -10nF	100V: 0.1uF -1.0uF			25V 3.3uF-22.0uF 50V 1.0uF-10.0uF	5.5	7.0	4.0	0.5	5.08
R25	L	50V: 150nF -220nF 100V: 12nF - 27nF	50V: 6.8uF -22uF 100V: 1.2uF - 2.2uF	50V: 1.0uF-4.7uF	50V: 1.0uF-4.7uF	6.3V 47.0uF-100uF 16V 10.0uF-22.0uF	7.5	8.0	4.5	0.5	5.08

## Typical Performance Characteristics

### Specifications

#### Temperature coefficient

- NPO: ± 30PPM/°C, -55°C to +125°C
- X7R: ± 15%, -55°C to +125°C
- X5R: ± 15%, -55°C to +85°C
- Z5U: +22%,-56%, +10°C to +85°C
- Y5V: +22%, -82%, -30°C to +85°C

#### Dielectric strength 25°C (Flash Test)

- NPO, X7R, X5R: 300% rated voltage for 5 seconds with 50 mA. max charging current.
- Z5U and Y5V: 250% rated voltage for 5 seconds with 50 mA. max charging current

#### Capacitance test 25°C

- NPO: 1 VRMS max at 1 KHz (1 MHz for 100pF or less)
- X7R: 1 VRMS max at 1 KHz
- X5R: 1 VRMS max at 1 KHz
- Z5U: 1 VRMS max at 1 KHz
- Y5V: 1 VRMS max at 1 KHz

#### Life Test :

#### (1000 hrs at max temp. applied with Flash test voltage Recovery for 24± 2 hrs )

- NPO: ≤ ± 3% at 200% rated voltage, 125°C
- X7R: ≤ ± 3% at 200% rated voltage, 125°C
- X5R: ≤ ± 3% at 200% rated voltage, 125°C
- Z5U: ≤ ± 3% at 200% rated voltage, 85°C
- Y5V: ≤ ± 3% at 200% rated voltage, 85°C

#### Dissipation Factor 25°C

NPO: 0.15% max at 1KHz, 1VRMS max (1 MHz for 1000pF or less)	
Z5U: 5% max (at 1KHz, 1VRMS max)	
X7R/X5R: (at 1KHz, 1VRMS max) Y5V: (at 1KHz, 1VRMS max)	
Max Rated voltage	Max Rated voltage
2.5% ≥50V	5% ≥50V
3.5% 25V & 16V	7% 25V & 16V
5.0% 10V & 6.3V	10% 10V & 6.3V

#### Insulation Resistance after 60 sec., charging at rated voltage, 25°C, 55% R.H. max

- NPO: 100GΩ or 1000MΩ-uF whichever is less
- X7R : 10GΩ or 100MΩ-uF whichever is less
- X5R : 10GΩ or 100MΩ-uF whichever is less
- Z5U : 10GΩ or 100MΩ-uF whichever is less
- Y5V : 10GΩ or 1000MΩ-uF whichever is less