

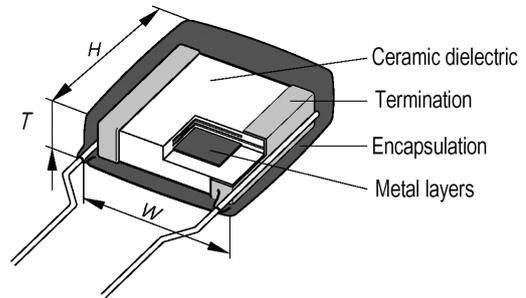
### Application

**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** : 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.

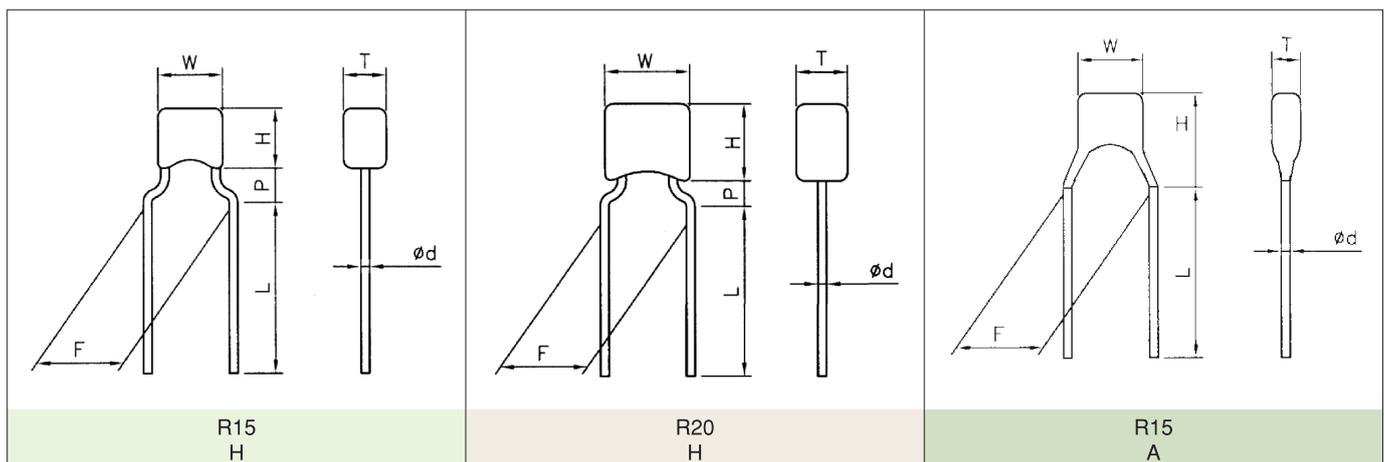
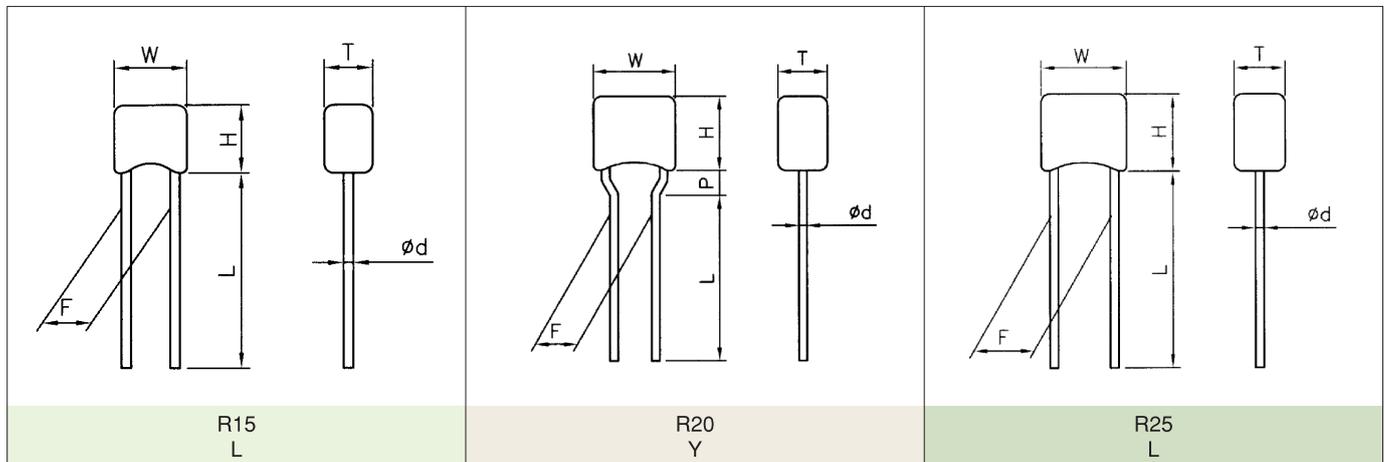
### Construction



### Part No. Designation

R15	Z	104	M		1H		L	5	L
SIZE	T.C	Capacitance-Code	Tolerance		Voltage		Lead shape	Lead space	Package-Lead-length
R15	N=NPO	Two significant digits	A=±0.05PF	F=±1%	1C=16V	1E=25V	L=Straight	2=2.54±0.8	R=Tape/Reel
R20	W=X7R	+NO. of zeros.	B=±0.10PF	G=±2%	1H=50V	1J=63V	Y=Inside	5=5.08±0.8	B=Tape/Box
R25	Z=Z5U	Example	C=±0.25PF	J=±5%	2A=100V		Crimp	(mm)	6=6±1mm
	Y=Y5V	102=1000pf	D=±0.50PF	K=±10%			H=High seated		L=25.4mm(min)
		223=22000pf	Z=+80/-20%				A=Slope		
		104=100000pf							

#### 1. Lead Shape:



## 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
L	25.4mm (min)	upon request.

## 4. Body Size & Dimension

Size code	Lead style available	Capacitance Range				Dimensions (mm)					
		NPO	X7R	Z5U	Y5V	H max	W max	T max.	d±0.05	F±0.8	P
R15	L	50V: 0.47-4700pF	50V: 220pF-0.33uF	50V: 0.01uF - 0.22uF	50V: 0.01-0.33uF	4.3	4.3	3.0	0.5	2.54	---
	H,A	100V: 0.47-3900pF	100V: 220pF-0.1uF	100V: 220uF - 1uF	25V: 0.47-1.0uF	4.3	H=4.3 A=5.0	3.0	0.5	5.08	2.0
R20	Y	25V: 12 - 47nF	25V: 1.0-10uF	50V: 0.22uF - 1.0uF	16V: 10-22uF	6.0	6.0	4.0	0.5	2.54	2.0
	H	50V: 2200pF-0.01uF	50V: 0.1-2.2uF	100V: 0.01uF - 0.22uF	25V: 2.2-4.7uF	6.0	6.0	4.0	0.5	5.08	2.0
R25	L	25V: 0.1uF 50V & 100V 0.012-0.033uF	100V: 0.22 - 2.2uF	100V: 0.47uF - 2.2uF	16V: 47uF 25V: 22uF 50V: 10uF	6.5	6.5	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
- Z5U: +22%, -56%, +10°C to +85°C
- Y5V: +22%, -82%, -30°C to +85°C

#### Capacitance test 25°C

- NPO: 1 VRMS max at 1 KHz (1 MHz for 1000pF or less)
- X7R: 1 VRMS max at 1 KHz
- Z5U: 1 VRMS max at 1 KHz
- Y5V: 1 VRMS max at 1 KHz

#### Dissipation Factor 25°C (see exception at last page)

NPO: 0.15% max at 1KHz, 1VRMS max  
(1 MHz for 1000pF or less)

Z5U: 5% max (at 1KHz, 1VRMS max)

X7R: (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

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

- NPO and X7R: 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

#### LifeTest :

(1000 hrs at max temp. applied with Flash test voltage  
Recovery: 6-24 hrs for NPO and 24± 2 hrs for X7R & Z5U )

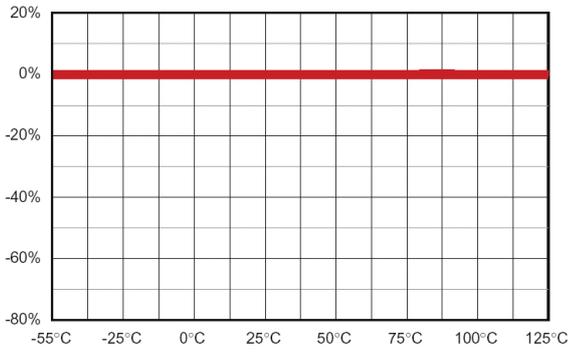
- NPO: ≤ ±3% at 200% rated voltage, 125°C
- X7R: ≤ ±3% at 200% rated voltage, 125°C
- Z5U: ≤ ±3% at 200% rated voltage, 85°C
- Y5V: ≤ ±3% at 200% rated voltage, 85°C

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

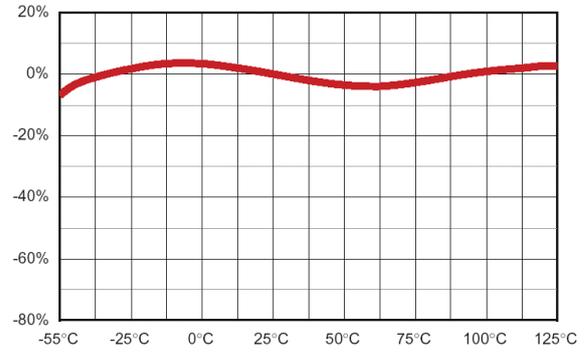
- NPO: 100GΩ or 1000MΩ-uF whichever is less
- X7R : 10GΩ or 100MΩ-uF whichever is less
- Z5U : 10GΩ or 100MΩ-uF whichever is less
- Y5V : 10GΩ or 1000MΩ-uF whichever is less

Temperature Charactersitics Specifications

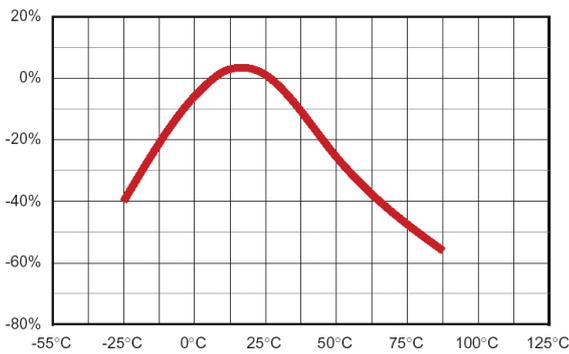
**NPO CAP. VS TEMPERATURE**



**X7R CAP. VS TEMPERATURE**



**Z5U CAP. VS TEMPERATURE**



**Y5V CAP. VS TEMPERATURE**

