



# MULTILAYER CERAMIC CAPACITORS

## General Specifications

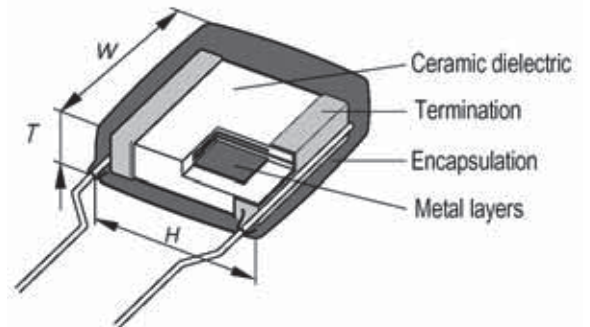
### Application

**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

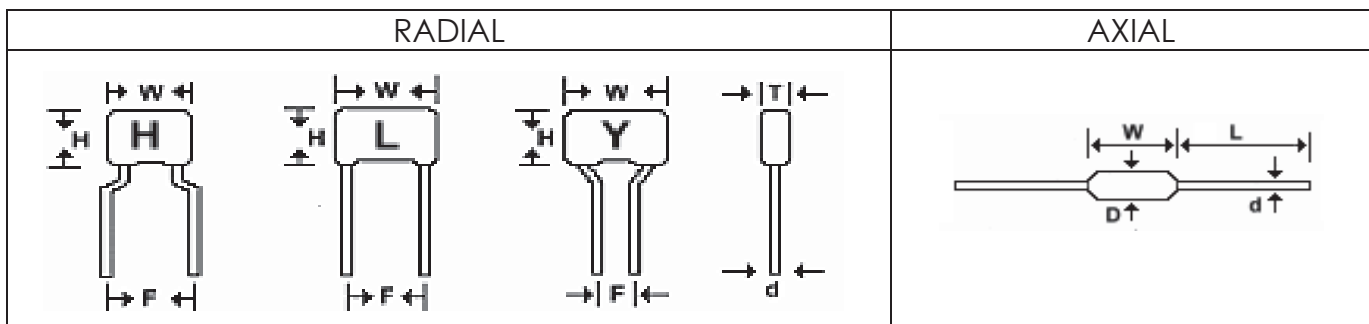


## Part Number Designation:

### HOW TO ORDER

R	D	2	0	W	1	0	2	K	3	A	H	5	L
SERIES SIZE CODE				DIELECTRIC	CAPACITANCE			TOLERANCE	VOLTAGE		LEAD STYLE	PITCH	LEAD LENGTH
Radial RD15 RD20 RD30  Axial AX15				N=NPO W=X7R Z=Z5U F=Y5V	1R0=1PF 100=10PF 101=100PF 102=1000PF =1NF 103=10000PF =10NF =0.01UF 104=100000PF =100NF =0.1UF			C=±0.25PF D=±0.50PF J=±5% K=±10% M=±20% Z=+80/20%	1E=25V 1H=50V 2A=100V 3A=1KV		H= High seated L= Straight Y= Kink	2=2.54 5=5.08	6=6±1mm 9=9±1mm L=25mm T= Ammo Pack R= Reel

### 1. LEAD STYLE :





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### 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 ±0.08	P
R15	L	50V: 0.47-4700pF	50V: 220pF-0.1uF	50V: 0.01uF-0.22uF	50V: 0.01-0.33uF	3.8	3.8	2.5	0.5	2.54	---
	H	100V: 0.47-2700pF	100V: 220pF-0.1uF		25V: 0.47-1.0uF	3.8	3.8	2.5	0.5	5.08	2.0
R20	Y	25V: 0.12-0.47uF	25V: 1.0-2.2uF	50V: 0.22uF-1.0uF	16V: 10-22uF	5.0	6.0	3.0	0.5	2.54	2.0
		50V: 5.6nF-0.01uF	50V: 0.1-1.0uF		25V: 2.2-4.7uF						
	H	100V: 2.7nF-6.8nF	100V: 0.1-0.15uF		50V: 0.47-2.2uF	5.0	6.0	3.0	0.5	5.08	2.0
R30	H	25V: 0.1uF	100V: 0.18-0.47uF	100V: 0.47uF-1.5uF	16V: 47uF	6.5	6.5	4.0	0.5	5.08	---
		50V & 100V 0.12-0.022uF			25V: 22uF						
		F			50V: 10uF						

## 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 100pF 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

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

Z5U: 5% max (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



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### HIGH VOLTAGE 250V-3KV

#### 4. BODY SIZE & DIMENSION

Size code	Lead style available	Capacitance Range			Dimensions (mm)					
		NPO	X7R	Y5V	H max	W max	T max.	d±0.05	F±0.08	P
R15	H	250V: 10pF – 1.5nF	250V: 100pF – 47nF	---	3.8	3.8	2.5	0.5	5.08	2.0
		500V: 10pF – 560pF	500V: 100pF – 22nF							
R20	H	250V: 2.2nF – 10nF	250V: 68nF – 47nF	---	5.0	6.0	3.0	0.5	5.08	2.0
		500V: 680pF – 4.7nF	500V: 22nF-100nF							
		1KV: 10pF – 2.2nF	1KV: 220pF – 47nF							
		2KV: 10pF – 1nF	2KV: 220pF – 3.9nF							
R30	L	250V: 12nF– 33nF	250V: 47nF– 1.0uF	250V: 0.1-0.47uF	6.5	7.5	4.5	0.5	5.08	---
		500V: 5.6nF – 22nF	500V: 12nF – 0.22 uF							
		1KV: 2.7nF – 4.7nF	1KV: 10nF – 0.56 uF							
		2KV: 1nF– 3.3nF	2KV: 4.7nF – 10nF							
		3KV: 270pF – 1nF	3KV: 100pF – 4.7nF							

### 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 100pF or less)
- X7R: 1 VRMS max at 1 KHz
- Z5U: 1 VRMS max at 1 KHz

##### Dissipation Factor 25°C

- NPO: 0.15% max at 1KHz, 1 Vrms max.(1MHz for 1000pF or less)
- X7R: 2.5% max at 1KHz, 1 Vrms max
- Z5U: 5 % max at 1 KHz, 1 Vrms max.

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

- NPO: 250V-2.0 X Vrated, 500V-1.5 X Vrated, ≥1KV-1.2 X Vrated
- X7R: 250V-2.0 X Vrated, 500V-1.5 X Vrated, ≥1KV-1.2 X Vrated
- Z5U: 2.0 X Vrated

##### 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	X7R	Z5U
ΔC/C	≤ ± 3%	≤ ± 20%	≤ ± 20%
D.F.	≤ 2 x initial	≤ ± 7%	≤ 2 x initial
I.R.		≥ 0.25 x initial	

##### Insulation Resistance after 60 secs, 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



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### TEMPERATURE CHARACTERISTICS SPECIFICATIONS

