

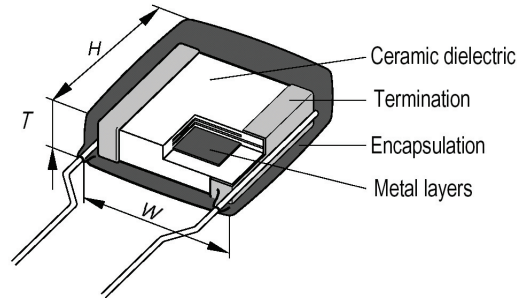
Application

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.

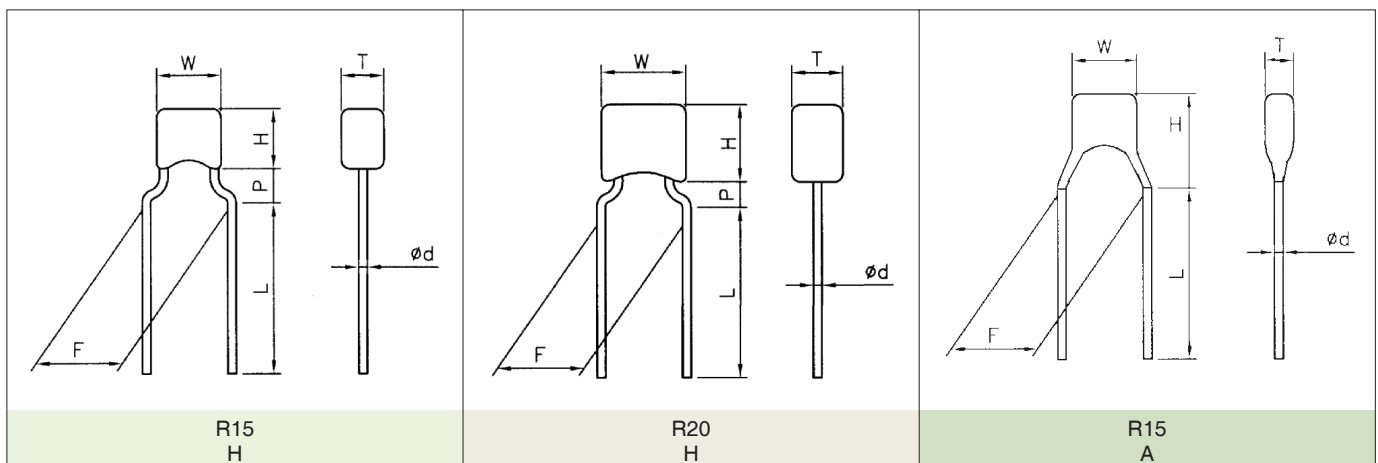
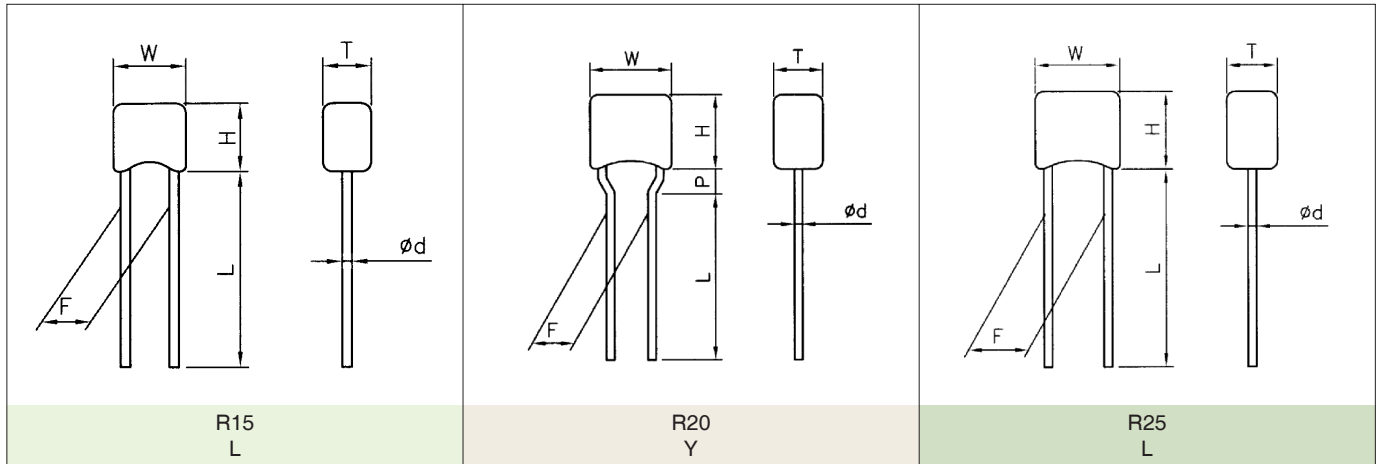
Construction



Part No. Designation

| R15 | Z | 104 | M | | 1H | | L | 5 | L |
|------|-------|---|------------|--------|---------|--------|----------------|------------|---------------------|
| SIZE | T.C | Capacitance-Code | Tolerance | | Voltage | | Lead shape | Lead shape | 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 223=22000pf 104=100000pf | D=±0.50PF | K=±10% | | | H= High seated | | L=25.4mm(min) |
| | | | Z=+80/-20% | | | | A= Slope | | |

1. Lead Shape:



Multilayer Ceramic Capacitors EPOXY COATED RADIAL TYPE



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 | Capacitance Range | | | | Lead style available | Dimensions (mm) | | | | | |
|-----------|-----------------------------|-----------------------|-------------------------|---------------------|----------------------|-----------------|----------------|--------|--------|--------|-----|
| | NPO | X7R | Z5U | Y5V | | H max | W max | T max. | d±0.05 | F±0.08 | P |
| R15 | 50V: 0.47-4700pF | 50V: 220pF-0.33uF | 50V: 0.01uF - 0.22uF | 50V: 0.01-0.33uF | L | 3.8 | 3.8 | 2.5 | 0.5 | 2.54 | --- |
| | 100V: 0.47-3900pF | 100V: 220pF-0.1uF | | 25V: 0.47-1.0uF | H,A | 3.8 | H=3.8 A=5.0 | 2.5 | 0.5 | 5.08 | 2.0 |
| R20 | 25V: 12 – 47nF | 25V: 1.0-10uF | 50V: 0.22uF - 1.0uF | 16V: 10-22uF | Y | 5.0 | 6.0 | 3.0 | 0.5 | 2.54 | 2.0 |
| | 50V: 2200pF-0.01uF | 50V: 0.1-2.2uF | | 25V: 2.2-4.7uF | H | 5.0 | 6.0 | 3.0 | 0.5 | 5.08 | 2.0 |
| | 100V: 1nF – 0.01uF | 100V: 0.1-1.0uF | | 50V: 0.47-2.2uF | | | | | | | |
| R25 | 25V: 0.1uF | 100V: 0.22 – 2.2uF | 100V: 0.47uF – 2.2uF | 16V: 47uF | L | 6.5 | 6.5 | 4.0 | 0.5 | 5.08 | --- |
| | 50V & 100V 0.012-0.033uF | | | 25V: 22uF | | | | | | | |
| | | | | 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 (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)

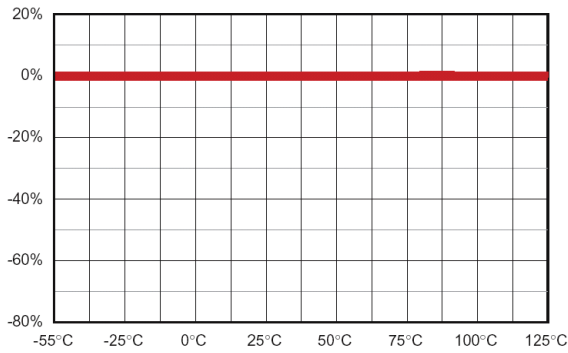
- NPO: ≤ ±3% at 200% rated voltage, 125°C
- X7R: ≤ ±3% at 200% rated voltage, 125°C
- Z5U: ≤ ±3% at 200% rated voltage, 85°C
- Y5V: ≤ ±3% at 200% rated voltage, 85°C

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

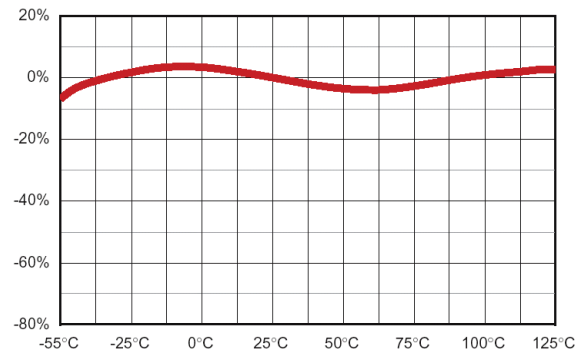
- NPO: 100GΩ or 1000MΩ-uF whichever is less
- X7R : 10GΩ or 100MΩ-uF whichever is less
- Z5U : 10GΩ or 100MΩ-uF whichever is less
- Y5V : 10GΩ or 1000MΩ-uF whichever is less

Temperature Charactersitics Specifications

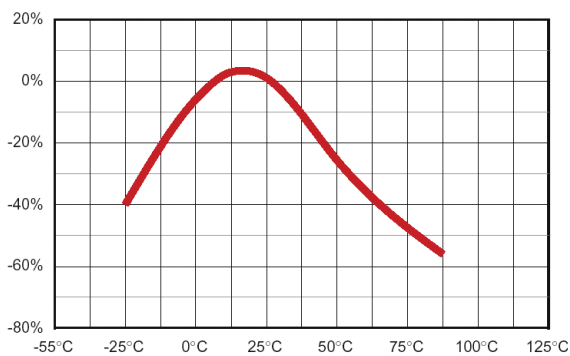
NPO CAP. VS TEMPERATURE



X7R CAP. VS TEMPERATURE



Z5U CAP. VS TEMPERATURE



Y5V CAP. VS TEMPERATURE

