

**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

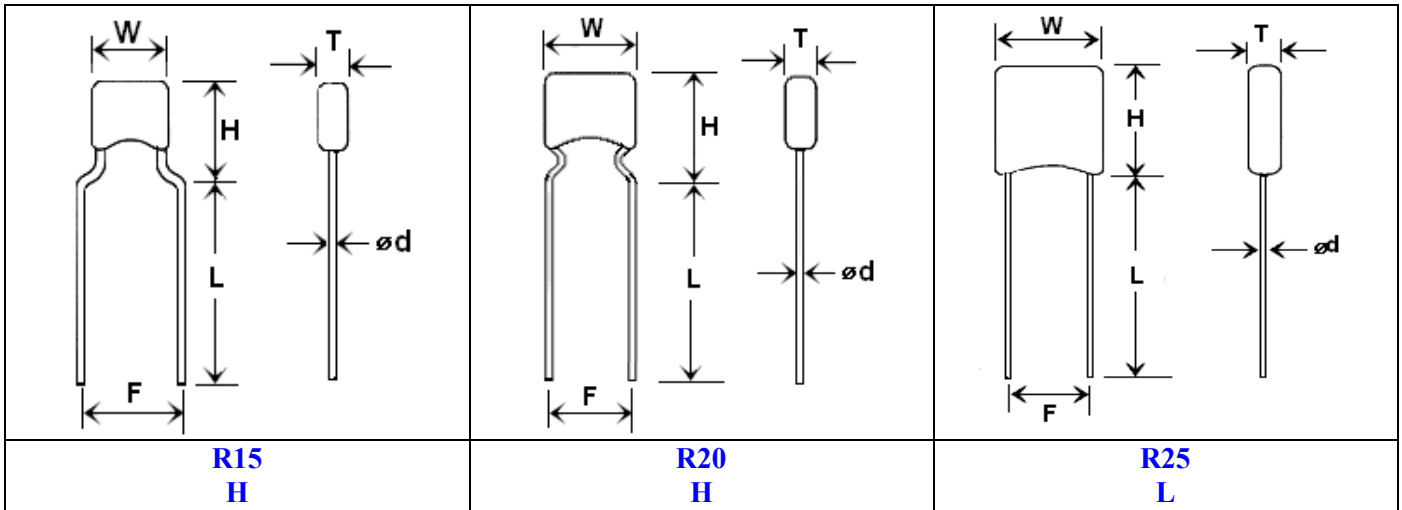
**Construction :**



**Part Number Designation:**

| <u>R15</u> | <u>W</u> | <u>104</u>                             | <u>M</u>     | <u>2H</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 + No. of zeros. | A: ±0.05pF   | 2E=250V   | L=Straight    | 5=5.08±0.8(mm) | R=Tape/Reel         |
| R20        | W=X7R    | example:                               | B: ±0.10pF   | 2H=500V   | H=High seated |                | B=Tape/Box          |
| R25        |          | 102=1000pF                             | C: ±0.25pF   | 3A=1KV    |               |                | 6=6±1mm             |
|            |          | 223=22000pF                            | D: ±0.50pF   | 3D=2KV    |               |                | L=25.4mm(Min)       |
|            |          | 104=100000pF                           | F: ±1%       | 3F=3KV    |               |                |                     |
|            |          |  | G: ±2%       |           |               |                |                     |
|            |          |  | J: ±5%       |           |               |                |                     |
|            |          |  | K: ±10%      |           |               |                |                     |
|            |          |  | M: ±20%      |           |               |                |                     |
|            |          |  | Z: -20%~+80% |           |               |                |                     |

**1. LEAD SHAPE :**



**2. LEAD SPACE (F)**

| CODE | LEAD SPACE (mm/inch) |           |
|------|----------------------|-----------|
| 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                   | W max           | H max | T max. | d±0.05 | F±0.8 |
| R15       | H                    | 250V: 10 – 1500pF     | 250V: 100pF – 0.047uF | 4.5             | 7.0   | 3.0    | 0.5    | 5.08  |
|           |                      | 500V: 10 – 560pF      | 500V: 100pF – 0.022uF |                 |       |        |        |       |
| R20       | H                    | 250V: 2200 – 10,000pF | 250V: 0.068 – 0.47uF  | 5.5             | 7.0   | 4.0    | 0.5    | 5.08  |
|           |                      | 500V: 680 – 4700pF    | 500V: 0.022 – 0.1uF   |                 |       |        |        |       |
|           |                      | 1KV: 10 – 2200pF      | 1KV: 220pF – 0.047uF  |                 |       |        |        |       |
|           |                      | 2KV: 10 – 1000pF      | 2KV: 220pF – 3900F    |                 |       |        |        |       |
|           |                      | 3KV: 10 – 220pF       | 3KV: -----            |                 |       |        |        |       |
| R25       | L                    | 250V: 0.012 – 0.033uF | 250V: 0.047 – 1.0uF   | 7.5             | 8.0   | 5.0    | 0.5    | 5.08  |
|           |                      | 500V: 5600 – 22,000pF | 500V: 0.012 – 0.22uF  |                 |       |        |        |       |
|           |                      | 1KV: 2700 – 4700pF    | 1KV: 0.01uF – 0.056uF |                 |       |        |        |       |
|           |                      | 2KV: 1000 – 3300pF    | 2KV: 4700pF – 0.01uF  |                 |       |        |        |       |
|           |                      | 3KV: 270 – 1000pF     | 3KV: 100 – 4700pF     |                 |       |        |        |       |

**5. SPECIFICATIONS AND TEST METHODS :**

**Test Method :**

**(Capacitance & D.F. shall be measured at 25°C)**

| Type<br>Item | NPO<br>C ≤ 1000pF | NPO/X7R/X5R<br>Z5U/Y5V<br>C ≤ 10uF | NPO/X7R/X5R<br>Z5U/Y5V<br>C > 10uF |
|--------------|-------------------|------------------------------------|------------------------------------|
| Frequency    | 1.0 MHz           | 1.0 KHz                            | 120 Hz                             |
| Voltage      | 1.0 Vrms          | 1.0 Vrms                           | 0.5 Vrms                           |

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

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

**Temperature coefficient**

- NPO: ± 30PPM/°C, -55°C to +125°C
- X7R: ± 15%, -55°C to +125°C

**Life Test :**

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

|       | <u>NPO</u>    | <u>X7R</u>       |
|-------|---------------|------------------|
| ΔC/C  | ≤ ± 3%        | ≤ ± 20%          |
| D.F.  | ≤ 2 x initial | ≤ ± 7%           |
| I .R. |               | ≥ 0.25 x initial |

**Dissipation Factor 25°C**

- NPO: 0.15% Max.
- X7R: 2.5% Max.

**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