

## Type CPF Series

### Key Features

Thin film precision resistors with TC's to 15ppm and tolerances to 0.05%.

Wide range of case sizes from 0201 to 2512

Suitable for all applications where close accuracy and stability are essential

Terminal finish – electroplated 100% matte Sn

### Applications

Communications

Industrial Controls

Instrumentation

Medical



The CPF series is a high stability precision chip resistor range offering various power dissipations relating to a wide range of chip sizes. The CPF series offers TCR's down to 15ppm/°C and resistance tolerances to 0.1%. Standard values are within the IEC 63 E96 and E24 value grids. The CPF has accurate and uniform physical dimensions to facilitate placement

### Electrical Characteristics

|                                |              |      |      |      |      |
|--------------------------------|--------------|------|------|------|------|
| Chip Size                      | 0201         |      |      |      |      |
| Rated Power @70°C              | 0.03125W     |      |      |      |      |
| Resistance Range Ω             | Min.         | 49R9 | 49R9 | 49R9 | 49R9 |
|                                | Max          | 4K99 | 33K  | 4K99 | 33K  |
| Tolerance                      | 0.5          |      |      | 1    |      |
| Code Letter                    | D            |      |      | F    |      |
| Selection series               | E24 & E96    |      |      |      |      |
| Temp. Coefficient (ppm/°C)     | 25           | 50   | 25   | 50   |      |
| Code Letter                    | E            | C    | E    | C    |      |
| Operating Voltage (Max)        | 15V          |      |      |      |      |
| Max. Overload Voltage          | 30V          |      |      |      |      |
| Operating Temp. Range          | -55 ~ +155°C |      |      |      |      |
| Insulation Resistance dry min. | >1000MΩ      |      |      |      |      |
| Stability                      | 0.5%         |      |      |      |      |

|                       |              |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
|-----------------------|--------------|------|----|-----|------|----|-----|------|----|----|------|----|--|------|--|--|------|--|--|------|--|--|
| Chip Size             | 0402         |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| Rated Power @70°C     | 0.063W       |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| Resistance Range Ω    | Min.         | 49R9 |    |     | 49R9 |    |     | 10R  |    |    | 49R9 |    |  | 4R7  |  |  | 49R9 |  |  | 4R7  |  |  |
|                       | Max          | 20K  |    |     | 69K8 |    |     | 255K |    |    | 69K8 |    |  | 511K |  |  | 69K8 |  |  | 511K |  |  |
| Tolerance (%)         | 0.05         |      |    | 0.1 |      |    | 0.5 |      |    | 1  |      |    |  |      |  |  |      |  |  |      |  |  |
| Code Letter           | A            |      |    | B   |      |    | D   |      |    | F  |      |    |  |      |  |  |      |  |  |      |  |  |
| Selection series      | E24 & E96    |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| T.C.R. (ppm/°C)       | 15           | 25   | 50 | 15  | 25   | 50 | 15  | 25   | 50 | 15 | 25   | 50 |  |      |  |  |      |  |  |      |  |  |
| Code Letter           | D            | E    | C  | D   | E    | C  | D   | E    | C  | D  | E    | C  |  |      |  |  |      |  |  |      |  |  |
| Max Operating Volt.   | 25V          |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| Max. Overload Volt.   | 50V          |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| Op. Temp. Range       | -55 ~ +155°C |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| Insulation Resistance | >1000MΩ      |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |
| Stability             | 0.5%         |      |    |     |      |    |     |      |    |    |      |    |  |      |  |  |      |  |  |      |  |  |

|                       |              |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
|-----------------------|--------------|------|----|-----|------|----|-----|-----|----|----|------|----|--|-----|--|--|------|--|--|-----|--|
| Chip Size             | 0603         |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| Rated Power @70°C     | 0.063W       |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| Resistance Range Ω    | Min.         | 4R7  |    |     | 4R7  |    |     | 4R7 |    |    | 1R0  |    |  | 4R7 |  |  | 1R0  |  |  |     |  |
|                       | Max          | 332K |    |     | 511K |    |     | 1M0 |    |    | 511K |    |  | 1M0 |  |  | 511K |  |  | 1M0 |  |
| Tolerance (%)         | 0.05         |      |    | 0.1 |      |    | 0.5 |     |    | 1  |      |    |  |     |  |  |      |  |  |     |  |
| Code Letter           | A            |      |    | B   |      |    | D   |     |    | F  |      |    |  |     |  |  |      |  |  |     |  |
| Selection series      | E24 & E96    |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| T.C.R. (ppm/°C)       | 15           | 25   | 50 | 15  | 25   | 50 | 15  | 25  | 50 | 15 | 25   | 50 |  |     |  |  |      |  |  |     |  |
| Code Letter           | D            | E    | C  | D   | E    | C  | D   | E   | C  | D  | E    | C  |  |     |  |  |      |  |  |     |  |
| Max Operating Volt.   | 50V          |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| Max. Overload Volt.   | 100V         |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| Op. Temp. Range       | -55 ~ +155°C |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| Insulation Resistance | >1000MΩ      |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |
| Stability             | 0.5%         |      |    |     |      |    |     |     |    |    |      |    |  |     |  |  |      |  |  |     |  |

|                       |              |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
|-----------------------|--------------|-----|----|-----|-----|----|-----|-----|----|----|-----|----|--|-----|--|--|-----|--|--|-----|--|--|
| Chip Size             | 0805         |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| Rated Power @70°C     | 0.1W         |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| Resistance Range Ω    | Min.         | 4R7 |    |     | 4R7 |    |     | 4R7 |    |    | 4R7 |    |  | 1R0 |  |  | 4R7 |  |  | 1R0 |  |  |
|                       | Max          | 1M0 |    |     | 1M0 |    |     | 2M0 |    |    | 1M0 |    |  | 2M0 |  |  | 1M0 |  |  | 2M0 |  |  |
| Tolerance (%)         | 0.05         |     |    | 0.1 |     |    | 0.5 |     |    | 1  |     |    |  |     |  |  |     |  |  |     |  |  |
| Code Letter           | A            |     |    | B   |     |    | D   |     |    | F  |     |    |  |     |  |  |     |  |  |     |  |  |
| Selection series      | E24 & E96    |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| T.C.R. (ppm/°C)       | 15           | 25  | 50 | 15  | 25  | 50 | 15  | 25  | 50 | 15 | 25  | 50 |  |     |  |  |     |  |  |     |  |  |
| Code Letter           | D            | E   | C  | D   | E   | C  | D   | E   | C  | D  | E   | C  |  |     |  |  |     |  |  |     |  |  |
| Max Operating Volt.   | 100V         |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| Max. Overload Volt.   | 200V         |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| Op. Temp. Range       | -55 ~ +155°C |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| Insulation Resistance | >1000MΩ      |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |
| Stability             | 0.5%         |     |    |     |     |    |     |     |    |    |     |    |  |     |  |  |     |  |  |     |  |  |

|                       |              |     |    |     |     |    |     |      |    |    |     |    |  |
|-----------------------|--------------|-----|----|-----|-----|----|-----|------|----|----|-----|----|--|
| Chip Size             | 1206         |     |    |     |     |    |     |      |    |    |     |    |  |
| Rated Power @70°C     | 0.125W       |     |    |     |     |    |     |      |    |    |     |    |  |
| Resistance Range Ω    | Min.         | 4R7 |    |     | 4R7 |    |     | 4R7  |    |    | 1R0 |    |  |
|                       | Max          | 1M0 |    |     | 1M0 |    |     | 2M49 |    |    | 1M0 |    |  |
| Tolerance (%)         | 0.05         |     |    | 0.1 |     |    | 0.5 |      |    | 1  |     |    |  |
| Code Letter           | A            |     |    | B   |     |    | D   |      |    | F  |     |    |  |
| Selection series      | E24 & E96    |     |    |     |     |    |     |      |    |    |     |    |  |
| T.C.R. (ppm/°C)       | 15           | 25  | 50 | 15  | 25  | 50 | 15  | 25   | 50 | 15 | 25  | 50 |  |
| Code Letter           | D            | E   | C  | D   | E   | C  | D   | E    | C  | D  | E   | C  |  |
| Max Operating Volt.   | 150V         |     |    |     |     |    |     |      |    |    |     |    |  |
| Max. Overload Volt.   | 300V         |     |    |     |     |    |     |      |    |    |     |    |  |
| Op. Temp. Range       | -55 ~ +155°C |     |    |     |     |    |     |      |    |    |     |    |  |
| Insulation Resistance | >1000MΩ      |     |    |     |     |    |     |      |    |    |     |    |  |
| Stability             | 0.5%         |     |    |     |     |    |     |      |    |    |     |    |  |

|                       |              |     |    |     |     |    |     |      |    |    |     |    |  |
|-----------------------|--------------|-----|----|-----|-----|----|-----|------|----|----|-----|----|--|
| Chip Size             | 1210         |     |    |     |     |    |     |      |    |    |     |    |  |
| Rated Power @70°C     | 0.25W        |     |    |     |     |    |     |      |    |    |     |    |  |
| Resistance Range Ω    | Min.         | 4R7 |    |     | 4R7 |    |     | 4R7  |    |    | 1R0 |    |  |
|                       | Max          | 1M0 |    |     | 1M0 |    |     | 2M49 |    |    | 1M0 |    |  |
| Tolerance (%)         | 0.05         |     |    | 0.1 |     |    | 0.5 |      |    | 1  |     |    |  |
| Code Letter           | A            |     |    | B   |     |    | D   |      |    | F  |     |    |  |
| Selection series      | E24 & E96    |     |    |     |     |    |     |      |    |    |     |    |  |
| T.C.R. (ppm/°C)       | 15           | 25  | 50 | 15  | 25  | 50 | 15  | 25   | 50 | 15 | 25  | 50 |  |
| Code Letter           | D            | E   | C  | D   | E   | C  | D   | E    | C  | D  | E   | C  |  |
| Max Operating Volt.   | 150V         |     |    |     |     |    |     |      |    |    |     |    |  |
| Max. Overload Volt.   | 300V         |     |    |     |     |    |     |      |    |    |     |    |  |
| Op. Temp. Range       | -55 ~ +155°C |     |    |     |     |    |     |      |    |    |     |    |  |
| Insulation Resistance | >1000MΩ      |     |    |     |     |    |     |      |    |    |     |    |  |
| Stability             | 0.5%         |     |    |     |     |    |     |      |    |    |     |    |  |

|                       |              |     |    |     |     |    |     |     |    |    |     |    |  |
|-----------------------|--------------|-----|----|-----|-----|----|-----|-----|----|----|-----|----|--|
| Chip Size             | 2010         |     |    |     |     |    |     |     |    |    |     |    |  |
| Rated Power @70°C     | 0.25W        |     |    |     |     |    |     |     |    |    |     |    |  |
| Resistance Range Ω    | Min.         | 4R7 |    |     | 4R7 |    |     | 4R7 |    |    | 1R0 |    |  |
|                       | Max          | 1M0 |    |     | 1M0 |    |     | 3M0 |    |    | 1M0 |    |  |
| Tolerance (%)         | 0.05         |     |    | 0.1 |     |    | 0.5 |     |    | 1  |     |    |  |
| Code Letter           | A            |     |    | B   |     |    | D   |     |    | F  |     |    |  |
| Selection series      | E24 & E96    |     |    |     |     |    |     |     |    |    |     |    |  |
| T.C.R. (ppm/°C)       | 15           | 25  | 50 | 15  | 25  | 50 | 15  | 25  | 50 | 15 | 25  | 50 |  |
| Code Letter           | D            | E   | C  | D   | E   | C  | D   | E   | C  | D  | E   | C  |  |
| Max Operating Volt.   | 150V         |     |    |     |     |    |     |     |    |    |     |    |  |
| Max. Overload Volt.   | 300V         |     |    |     |     |    |     |     |    |    |     |    |  |
| Op. Temp. Range       | -55 ~ +155°C |     |    |     |     |    |     |     |    |    |     |    |  |
| Insulation Resistance | >1000MΩ      |     |    |     |     |    |     |     |    |    |     |    |  |
| Stability             | 0.5%         |     |    |     |     |    |     |     |    |    |     |    |  |

|                       |              |     |    |     |     |    |     |     |    |    |     |    |     |  |
|-----------------------|--------------|-----|----|-----|-----|----|-----|-----|----|----|-----|----|-----|--|
| Chip Size             | 2512         |     |    |     |     |    |     |     |    |    |     |    |     |  |
| Rated Power @70°C     | 0.5W         |     |    |     |     |    |     |     |    |    |     |    |     |  |
| Resistance Range Ω    | Min.         | 4R7 |    |     | 4R7 |    |     | 4R7 |    |    | 1R0 |    | 1R0 |  |
|                       | Max          | 1M0 |    |     | 1M0 |    |     | 3M0 |    |    | 1M0 |    | 3M0 |  |
| Tolerance (%)         | 0.05         |     |    | 0.1 |     |    | 0.5 |     |    | 1  |     |    |     |  |
| Code Letter           | A            |     |    | B   |     |    | D   |     |    | F  |     |    |     |  |
| Selection series      | E24 & E96    |     |    |     |     |    |     |     |    |    |     |    |     |  |
| T.C.R. (ppm/°C)       | 15           | 25  | 50 | 15  | 25  | 50 | 15  | 25  | 50 | 15 | 25  | 50 |     |  |
| Code Letter           | D            | E   | C  | D   | E   | C  | D   | E   | C  | D  | E   | C  |     |  |
| Max Operating Volt.   | 150V         |     |    |     |     |    |     |     |    |    |     |    |     |  |
| Max. Overload Volt.   | 300V         |     |    |     |     |    |     |     |    |    |     |    |     |  |
| Op. Temp. Range       | -55 ~ +155°C |     |    |     |     |    |     |     |    |    |     |    |     |  |
| Insulation Resistance | >1000MΩ      |     |    |     |     |    |     |     |    |    |     |    |     |  |
| Stability             | 0.5%         |     |    |     |     |    |     |     |    |    |     |    |     |  |

### Environmental Characteristics

| Item  | Requirement  |             | Test Method  |
|---|--|-------------|--|
|   | Tol. ≤0.05%  | TOL. >0.05% |  |
| Temperature Coefficient of Resistance (TCR) | As per TCRs specified in Electrical Characteristics tables |             | MIL-STD-202 Method 304<br>+25/-55/+25/+125/+25°C   |
| Short Time Overload                         | ΔR±0.05%   | ΔR±0.2%     | JIS-C-5201-1 5.5<br>RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds               |
| Insulation Resistance                       | >9999 MΩ   |             | MIL-STD-202 Method 302<br>Apply 100VDC for 1 minute  |
| Endurance                                   | ΔR±0.05%   | ΔR±0.2%     | MIL-STD-202 Method 108A<br>70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"             |
|   | >7kΩ ΔR±0.5%   |             |  |
| Damp Heat with Load                         | ΔR±0.05%   | ΔR±0.3%     | MIL-STD-202 Method 103B<br>40±2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Bending Strength                            | ΔR±0.05%   | ΔR±0.1%     | JIS-C-5201-1 6.1.4<br>Bending amplitude 3 mm for 10 seconds  |
| Solderability                               | 95% min. coverage  |             | MIL-STD-202 Method 208H<br>245±5°C for 3 seconds   |
| Resistance to Soldering Heat                | ΔR±0.05%   | ΔR±0.1%     | MIL-STD-202 Method 210E<br>260±5°C for 10 seconds  |
| Dielectric Withstand Voltage                | By Type  |             | MIL-STD-202 Method 301<br>Max. overload voltage for 1 minute   |
| Thermal Shock                               | ΔR±0.05%   | ΔR±0.2%     | MIL-STD-202 Method 107G<br>-55°C ~ 150°C, 100 cycles   |
| Low Temperature Operation                   | ΔR±0.05%   | ΔR±0.2%     | JIS-C-5201-1 7.1<br>1 hour, -65°C, followed by 45 minutes of RCWV                                    |
| High Temperature Exposure                   | ΔR±0.5%  |             | MIL-STD-202 Method 107G<br>At +155°C for 1000 hours  |

RCWV(Rated continuous working voltage)=  $\sqrt{P \cdot R}$  or Max. Operating voltage whichever is lower

Storage Temperature: 25±3°C; Humidity < 80%RH

### Derating Curve



### Construction and dimensions



|                         |                           |                         |
|-------------------------|---------------------------|-------------------------|
| ① Alumina Substrate     | ④ Edge Electrode (NiCr)   | ⑦ Resistor Layer (NiCr) |
| ② Bottom Electrode (Ag) | ⑤ Barrier Layer (Ni)      | ⑧ Overcoat (Epoxy)      |
| ③ Top Electrode (Ag)    | ⑥ External Electrode (Sn) | ⑨ Marking               |

| Size | L (mm)    | W (mm)    | T (mm)    | D1 (mm)   | D2 (mm)   | Weight (g)<br>(1000 Pcs.) |
|------|-----------|-----------|-----------|-----------|-----------|---------------------------|
| 0201 | 0.58±0.05 | 0.29±0.05 | 0.23±0.05 | 0.12±0.05 | 0.15±0.05 | 0.14                      |
| 0402 | 1.00±0.05 | 0.50±0.05 | 0.30±0.05 | 0.20±0.10 | 0.20±0.10 | 0.54                      |
| 0603 | 1.55±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 | 1.83                      |
| 0805 | 2.00±0.15 | 1.25±0.15 | 0.55±0.10 | 0.30±0.20 | 0.40±0.20 | 4.71                      |
| 1206 | 3.05±0.15 | 1.55±0.15 | 0.55±0.10 | 0.42±0.20 | 0.35±0.25 | 9.02                      |
| 1210 | 3.10±0.15 | 2.40±0.15 | 0.55±0.10 | 0.40±0.20 | 0.55±0.25 | 10                        |
| 2010 | 4.90±0.15 | 2.40±0.15 | 0.55±0.10 | 0.60±0.30 | 0.50±0.25 | 23.61                     |
| 2512 | 6.30±0.15 | 3.10±0.15 | 0.55±0.10 | 0.60±0.30 | 0.50±0.25 | 38.06                     |



| Recommended Land Pattern |      |      |          |
|--------------------------|------|------|----------|
| Size                     | A    | B    | C        |
| 0201                     | 0.25 | 0.30 | 0.40±0.2 |
| 0402                     | 0.50 | 0.50 | 0.60±0.2 |
| 0603                     | 0.80 | 1.00 | 0.90±0.2 |
| 0805                     | 1.00 | 1.00 | 1.35±0.2 |
| 1206                     | 2.00 | 1.15 | 1.70±0.2 |
| 1210                     | 2.00 | 1.15 | 2.50±0.2 |
| 2010                     | 3.60 | 1.40 | 2.50±0.2 |
| 2512                     | 4.90 | 1.60 | 3.10±0.2 |

Marking

Case sizes 0805 to 2512 IEC 4 Digit Marking:

|            |             |             |            |              |              |
|------------|-------------|-------------|------------|--------------|--------------|
| Resistance | 100R (100Ω) | 2K2 (2.2kΩ) | 10K (10kΩ) | 499K (499kΩ) | 100K (100kΩ) |
| Code       | 1000        | 2201        | 1002       | 4992         | 1003         |

Case Size 0603 E24 3 digit marking – Example 101 = 100R 102=1K0

|     |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|
| E24 | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 |
|     | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |

Case size 0603 E96 3 digit marking – Examples 14C = 13K7 68B = 4K99 68X = 49R9

| Code | E96 | Code | E96 | Code | E96 | Code | E96 |
|------|-----|------|-----|------|-----|------|-----|
| 01   | 100 | 25   | 178 | 49   | 316 | 73   | 562 |
| 02   | 102 | 26   | 182 | 50   | 324 | 74   | 576 |
| 03   | 105 | 27   | 187 | 51   | 332 | 75   | 590 |
| 04   | 107 | 28   | 191 | 52   | 340 | 76   | 604 |
| 05   | 110 | 29   | 196 | 53   | 348 | 77   | 619 |
| 06   | 113 | 30   | 200 | 54   | 357 | 78   | 634 |
| 07   | 115 | 31   | 205 | 55   | 365 | 79   | 649 |
| 08   | 118 | 32   | 210 | 56   | 374 | 80   | 665 |
| 09   | 121 | 33   | 215 | 57   | 383 | 81   | 681 |
| 10   | 124 | 34   | 221 | 58   | 392 | 82   | 698 |
| 11   | 127 | 35   | 226 | 59   | 402 | 83   | 715 |
| 12   | 130 | 36   | 232 | 60   | 412 | 84   | 732 |
| 13   | 133 | 37   | 237 | 61   | 422 | 85   | 750 |
| 14   | 137 | 38   | 243 | 62   | 432 | 86   | 768 |
| 15   | 140 | 39   | 249 | 63   | 442 | 87   | 787 |
| 16   | 143 | 40   | 255 | 64   | 453 | 88   | 806 |
| 17   | 147 | 41   | 261 | 65   | 464 | 89   | 825 |
| 18   | 150 | 42   | 267 | 66   | 475 | 90   | 845 |
| 19   | 154 | 43   | 274 | 67   | 487 | 91   | 866 |
| 20   | 158 | 44   | 280 | 68   | 499 | 92   | 887 |
| 21   | 162 | 45   | 287 | 69   | 511 | 93   | 909 |
| 22   | 165 | 46   | 294 | 70   | 523 | 94   | 931 |
| 23   | 169 | 47   | 301 | 71   | 536 | 95   | 953 |
| 24   | 174 | 48   | 309 | 72   | 549 | 96   | 976 |

| Code       | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

NB For case size 0603 values other than E24 and E96 resistors will be supplied unmarked.

All resistors smaller than 0603 supplied unmarked.

## Packaging

### Packing Quantity and Reel Specification



| Size | $\varnothing A \pm 1.0$ | $\varnothing B \pm 1.0$ | $\varnothing C \pm 0.7$ | $W \pm 1.0$ | $T \pm 1.0$ | Paper Tape   | Embossed Plastic Tape |
|------|-------------------------|-------------------------|-------------------------|-------------|-------------|--------------|-----------------------|
| 0201 | 178.0                   | 60.0                    | 13.5                    | 9.5         | 11.5        | 1000 / 10000 | N/A                   |
| 0402 |                         |                         |                         |             |             |              |                       |
| 0603 |                         |                         |                         |             |             |              |                       |
| 0805 |                         |                         |                         | 1000 / 5000 |             |              |                       |
| 1206 |                         |                         |                         |             |             |              |                       |
| 2010 |                         |                         |                         | N/A         | 4000        |              |                       |
| 2512 |                         |                         |                         |             |             |              |                       |

### Paper tape Specification



| Size | $A \pm 0.05$ | $B \pm 0.05$ | $W \pm 0.10$ | $E \pm 0.05$ | $F \pm 0.05$ | $P_0$           | $P_1$           | $P_2 \pm 0.05$ | $\varnothing D_0$ | $T$             |
|------|--------------|--------------|--------------|--------------|--------------|-----------------|-----------------|----------------|-------------------|-----------------|
| 0201 | 0.40         | 0.70         | 8.00         | 1.75         | 3.5          | 4.00 $\pm 0.10$ | 2.00 $\pm 0.05$ | 2.00           | 1.55 $\pm 0.03$   | 0.42 $\pm 0.02$ |
| 0402 | 0.70         | 1.16         |              |              |              |                 |                 |                | 1.55 $\pm 0.05$   | 0.40 $\pm 0.03$ |
| 0603 | 1.10         | 1.90         |              |              |              |                 | 1.55 $\pm 0.05$ |                | 0.60 $\pm 0.03$   |                 |
| 0805 | 1.60         | 2.37         |              |              |              | 4.00 $\pm 0.10$ | 0.75 $\pm 0.05$ |                |                   |                 |
| 1206 | 2.00         | 3.55         |              |              |              |                 |                 |                |                   |                 |
| 1210 | 2.75         | 3.40         |              |              |              | 4.00 $\pm 0.05$ | 1.60 $\pm 0.10$ |                |                   |                 |

### Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 8gf to 60gf



### Embossed Plastic Tape Specifications



| Type | A         | B         | W         | E         | F        | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ØD <sub>0</sub> | T         |
|------|-----------|-----------|-----------|-----------|----------|----------------|----------------|----------------|-----------------|-----------|
| 2010 | 2.85±0.10 | 5.45±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.00±0.20 |
| 2512 | 3.40±0.10 | 6.65±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.00±0.20 |

### Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 20gf to 80g





### Reflow Solder Profile



Time of Reflow soldering at maximum temperature point 260°C = 10s

### Wave Solder Profile



Time of Wave soldering at maximum temperature point 260°C = 10s

Time of Soldering Iron at maximum temperature point 410°C = 5s

### How To Order

| CPF                                     | 0603   | B                                 | 100R  | E                                   | 1   |
|---|--|-----------------------------------|---|-------------------------------------|---|
| Common Part                             | Package Size                                     | Tolerance                         | Value                                       | TCR                                 | Packaging   |
| CPF - precision thin film chip resistor | 0201 1206<br>0402 1210<br>0603 2010<br>0805 2512 | B - ±0.1%<br>D - ±0.5%<br>F - ±1% | 100R - 100Ω<br>1K0 - 1000Ω<br>10K - 10,000Ω | D - 15PPM<br>E - 25PPM<br>C - 50PPM | 1 - 1K REEL<br>Blank - standard reel<br>0201 0402 - 10K<br>0603 0805 1206 1210 - 5K<br>2010 2512 - 4K |