# Type CPF Series

## Key Features

- Thin film precision resistors with TC's of 15ppm, 25ppm and 50ppm and tolerances to 0.1%. Applications in measurement, telemetry and for sensing circuits.
- Wide range of case sizes from 0201 to 2512
- CPF chip resistors are suitable for all applications where close accuracy and stability are essential
- Terminal finish - electro-plated 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.

## Characteristics - Electrical

| | 0201 | | | | 0402 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rated Power @ 70°C:** | 0.03125W | | | | 0.063W | | | | | | | | |
| **Resistance Range (Ohms) Min:** | 49R9 | 49R9 | 49R9 | 49R9 | 49R9 | 10R | 10R | 49R9 | 10R | 1R0 | 49R9 | 10R | 1R0 |
| **Max:** | 5K0 | 33K | 5K0 | 33K | 70K | 255K | 205K | 70K | 255K | 205K | 70K | 255K | 205K |
| **Tolerance (%):** | 0.5 | | 1 | | 0.1 | | | 0.5 | | | 1 | | |
| **Code letter:** | D | | F | | B | | | D | | | F | | |
| **Selection Series:** | E24 & E96 | | | | E24 & E96 | | | | | | | | |
| **Temp. Coefficient (ppm/°C):** | 25 | 50 | 25 | 50 | 15 | 25 | 50 | 15 | 25 | 50 | 15 | 25 | 50 |
| **Code Letter:** | E | C | E | C | D | E | C | D | E | C | D | E | C |
| **Limiting Element Voltage:** | 15V | | | | 25V | | | | | | | | |
| **Max. Overload Voltage:** | 30V | | | | 50V | | | | | | | | |
| **Operating Temp. Range:** | -55 to +155°C | | | | -55 to +155°C | | | | | | | | |
| **Climatic Category (°C):** | 55/125/55 | | | | 55/125/55 | | | | | | | | |
| **Insulation Resistance Dry Min:** | 1000MΩ | | | | 1000MΩ | | | | | | | | |
| **Stability:** | 0.5% | | | | 0.5% | | | | | | | | |

| | 0603 | | | | | | | | | 0805 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rated Power @ 70°C:** | 0.063W | | | | | | | | | 0.1W | | | | | | | | |
| **Resistance Range (Ohms) Min:** | 4R7 | 4R7 | | 4R7 | 2R0 | | 4R7 | 2R0 | | 4R3 | 4R7 | | 4R3 | 1R0 | | 4R3 | 1R0 | |
| **Max:** | 332K | 1M0 | | 332K | 1M0 | | 332K | 1M0 | | 511K | 2M0 | | 511K | 2M0 | | 511K | 2M0 | |
| **Tolerance (%):** | 0.1 | | | 0.5 | | | 1 | | | 0.1 | | | 0.5 | | | 1 | | |
| **Code letter:** | B | | | D | | | F | | | B | | | D | | | F | | |
| **Selection Series:** | E24 & E96 | | | | | | | | | E24 & E96 | | | | | | | | |
| **Temp. Coefficient (ppm/°C):** | 15 | 25 | 50 | 15 | 25 | 50 | 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 | D | E | C | D | E | C |
| **Limiting Element Voltage:** | 50V | | | | | | | | | 100V | | | | | | | | |
| **Max. Overload Voltage:** | 100V | | | | | | | | | 200V | | | | | | | | |
| **Operating Temp. Range:** | -55 to +155°C | | | | | | | | | -55 to +155°C | | | | | | | | |
| **Climatic Category (°C):** | 55/125/55 | | | | | | | | | 55/125/55 | | | | | | | | |
| **Insulation Resistance Dry Min:** | 1000MΩ | | | | | | | | | 1000MΩ | | | | | | | | |
| **Stability:** | 0.5% | | | | | | | | | 0.5% | | | | | | | | |



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# Type CPF Series

| | | 1206 | | | | | | | | | 1210 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rated Power @ 70°C:** | | 0.125W | | | | | | | | | 0.2W | | | | | | | | |
| **Resistance Range (Ohms)** | **Min:** | 4R7 | 4R7 | | 4R7 | 1R0 | | 4R7 | 1R0 | | 4R7 | 4R7 | | 4R7 | 1R0 | | 4R7 | 1R0 | |
| | **Max:** | 1M0 | 2M5 | | 1M0 | 2M5 | | 1M0 | 2M5 | | 1M0 | 2M5 | | 1M0 | 2M5 | | 1M0 | 2M5 | |
| **Tolerance (%):** | | 0.1 | | | 0.5 | | | 1 | | | 0.1 | | | 0.5 | | | 1 | | |
| **Code letter:** | | B | | | D | | | F | | | B | | | D | | | F | | |
| **Selection Series:** | | E24 & E96 | | | | | | | | | E24 & E96 | | | | | | | | |
| **Temp. Coefficient (ppm/°C):** | | 15 | 25 | 50 | 15 | 25 | 50 | 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 | D | E | C | D | E | C |
| **Limiting Element Voltage:** | | 150V | | | | | | | | | 150V | | | | | | | | |
| **Max. Overload Voltage:** | | 300V | | | | | | | | | 300V | | | | | | | | |
| **Operating Temp. Range:** | | -55 to +155°C | | | | | | | | | -55 to +155°C | | | | | | | | |
| **Climatic Category (°C):** | | 55/125/55 | | | | | | | | | 55/125/55 | | | | | | | | |
| **Insulation Resistance Dry Min:** | | 1000MΩ | | | | | | | | | 1000MΩ | | | | | | | | |
| **Stability:** | | 0.5% | | | | | | | | | 0.5% | | | | | | | | |

| | | 2010 | | | | | | | | | 2512 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rated Power @ 70°C:** | | 0.25W | | | | | | | | | 0.5W | | | | | | | | |
| **Resistance Range (Ohms)** | **Min:** | 4R7 | 4R7 | | 4R7 | 1R0 | | 4R7 | 1R0 | | 4R7 | 4R7 | | 4R7 | 1R0 | | 4R7 | 1R0 | |
| | **Max:** | 1M0 | 3M0 | | 1M0 | 3M0 | | 1M0 | 3M0 | | 1M0 | 3M0 | | 1M0 | 3M0 | | 1M0 | 3M0 | |
| **Tolerance (%):** | | 0.1 | | | 0.5 | | | 1 | | | 0.1 | | | 0.5 | | | 1 | | |
| **Code letter:** | | B | | | D | | | F | | | B | | | D | | | F | | |
| **Selection Series:** | | E24 & E96 | | | | | | | | | E24 & E96 | | | | | | | | |
| **Temp. Coefficient (ppm/°C):** | | 15 | 25 | 50 | 15 | 25 | 50 | 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 | D | E | C | D | E | C |
| **Limiting Element Voltage:** | | 150V | | | | | | | | | 150V | | | | | | | | |
| **Max. Overload Voltage:** | | 300V | | | | | | | | | 300V | | | | | | | | |
| **Operating Temp. Range:** | | -55 to +155°C | | | | | | | | | -55 to +155°C | | | | | | | | |
| **Climatic Category (°C):** | | 55/125/55 | | | | | | | | | 55/125/55 | | | | | | | | |
| **Insulation Resistance Dry Min:** | | 1000MΩ | | | | | | | | | 1000MΩ | | | | | | | | |
| **Stability:** | | 0.5% | | | | | | | | | 0.5% | | | | | | | | |

## Characteristics - Environmental

| Item | Requirement | | Test Method |
|---|---|---|---|
| | **Tol. ≤ 0.05%** | **Tol. > 0.05%** | |
| **Temperature Coefficient of Resistance (TCR):** | AS per TCRs specified in value range table on page 1 | | +25/-55/+25/+125/+25°C |
| **Short Time Overload:** | ΔR ±0.05% | ΔR ±0.2% | RCWV* 2.5 or max. overload voltage for 5 seconds |
| | ΔR ±0.2% for high power rating | | |
| **Insulation Resistance:** | >1000MΩ | | Apply 100VDC for 1 minute |
| **Endurance:** | ΔR ±0.05% | ΔR ±0.2% | 70 ±2°C, max. working voltage for 1000hrs with 1.5hrs "ON" and 0.5 hrs "OFF" |
| | >7kΩ ΔR ±0.5% | | |
| | ΔR ±0.5% for high power rating | | |
| **Damp Heat with Load:** | ΔR ±0.05% | ΔR ±0.3% | 40 ±2°C, 90 - 95% R.H. max. working voltage hrs with 1.5hrs "ON" and 0.5hrs "OFF" |
| | ΔR ±0.5% for high power rating | | |
| **Bending Strength:** | ΔR ±0.05% | ΔR ±0.2% | Bending amplitude 3mm for 10 seconds |
| **Solderability:** | 95% min. coverage | | 245 ±5°C for 3 seconds |
| **Resistance to Soldering Heat:** | ΔR ±0.05% | ΔR ±0.2% | 260 ±5°C for 10 seconds |
| **Dielectric Withstand Voltage:** | By Type | | Max. overload voltage for 1 minute |
| **Thermal Shock:** | ΔR ±0.05% | ΔR ±0.25% | -55°C to +150°C, 100 cycles |
| **Low Temperature Operation:** | ΔR ±0.05% | ΔR ±0.2% | 1 hour, -65°C, followed by 45 minutes of RCWV |
| | ΔR ±0.5% for high power rating | | |

**Reference Standards: MIL-STD-202, JIS-C 5201-1**

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



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# Type CPF Series

## Marking Codes - Case Sizes 0805 to 2512

### IEC 4 Digit Marking

| | | | | | |
|---|---|---|---|---|---|
| **Resistance:** | 100Ω | 2.2KΩ | 10KΩ | 49.9KΩ | 100KΩ |
| **Marking Code:** | 1000 | 2201 | 1002 | 4992 | 1003 |

## Case Sizes 0603

### E24 3 Digit Marking - Example: 101=100Ω 102=1KΩ

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |

### E96 3 Digit Marking - Examples: 14C=13K7Ω, 13C=13K3Ω, 68B=4K99Ω, 68X=49.9Ω


### 0603 E96 Marking Code Table

| 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 | $10^0$ | $10^1$ | $10^2$ | $10^3$ | $10^4$ | $10^5$ | $10^6$ | $10^7$ | $10^{-1}$ | $10^{-2}$ | $10^{-3}$ |



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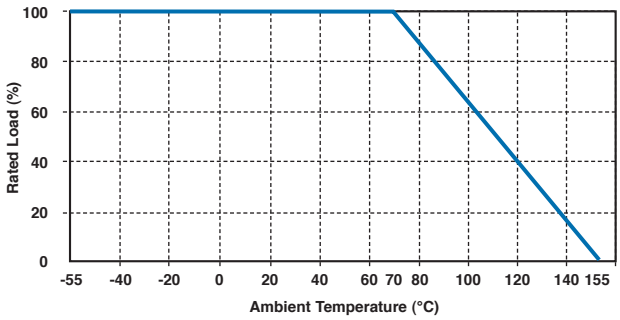
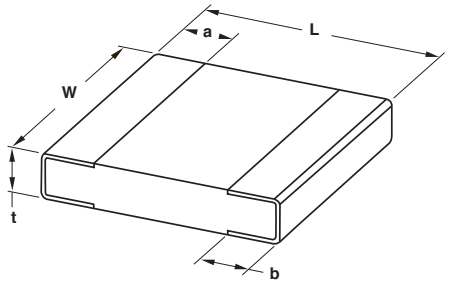
# Type CPF Series

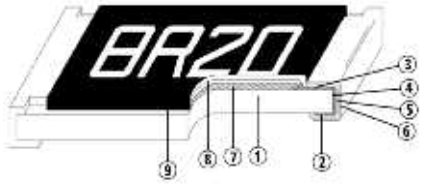
## Power Derating Curve




For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with this curve.

## Dimensions

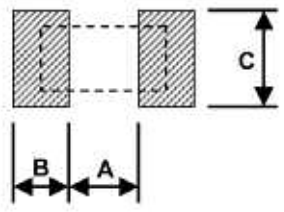



| | | |
|---|---|---|
| 1. Alumina Substrate | 4. Edge Electrode (NiCr) | 7. Resistor Layer (NiCr) |
| 2. Bottom Electrode (Ag) | 5. Barrier Layer (Ni) | 8. Overcoat (Epoxy) |
| 3. Top Electrode (Ag-Pd) | 6. External Electrode (Sn) | 9. Marking |

| Part Number | L | W | H | a | b | Weight (g) 1000 pieces |
|---|---|---|---|---|---|---|
| **CPF0201** | 0.58 ±0.05 | 0.29 ±0.05 | 0.23 ±0.05 | 0.12 ±0.05 | 0.15 ±0.05 | 0.14 |
| **CPF0402** | 1.00 ±0.05 | 0.50 ±0.05 | 0.30 ±0.05 | 0.20 ±0.10 | 0.20 ±0.10 | 0.54 |
| **CPF0603** | 1.55 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.30 ±0.20 | 0.30 ±0.20 | 1.83 |
| **CPF0805** | 2.00 ±0.15 | 1.25 ±0.15 | 0.55 ±0.10 | 0.30 ±0.20 | 0.40 ±0.25 | 4.71 |
| **CPF1206** | 3.05 ±0.15 | 1.55 ±0.15 | 0.55 ±0.10 | 0.42 ±0.20 | 0.35 ±0.25 | 9.02 |
| **CPF1210** | 3.10 ±0.15 | 2.40 ±0.15 | 0.55 ±0.10 | 0.40 ±0.20 | 0.55 ±0.25 | 10.00 |
| **CPF2010** | 4.90 ±0.15 | 2.40 ±0.15 | 0.55 ±0.10 | 0.60 ±0.30 | 0.50 ±0.25 | 23.61 |
| **CPF2512** | 6.30 ±0.15 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.30 | 0.50 ±0.25 | 38.08 |

## Recommend Land Pattern




| Type | A | B | C |
|---|---|---|---|
| **CPF0201** | 0.25 | 0.3 | 0.40 ±0.2 |
| **CPF0402** | 0.5 | 0.5 | 0.60 ±0.2 |
| **CPF0603** | 0.8 | 1.0 | 0.90 ±0.2 |
| **CPF0805** | 1.0 | 1.0 | 1.35 ±0.2 |
| **CPF1206** | 2.0 | 1.15 | 1.70 ±0.2 |
| **CPF1210** | 2.0 | 1.15 | 2.50 ±0.2 |
| **CPF2010** | 3.6 | 1.4 | 2.50 ±0.2 |
| **CPF2512** | 4.9 | 1.6 | 3.10 ±0.2 |



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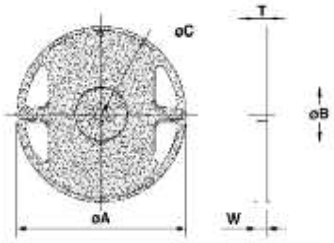
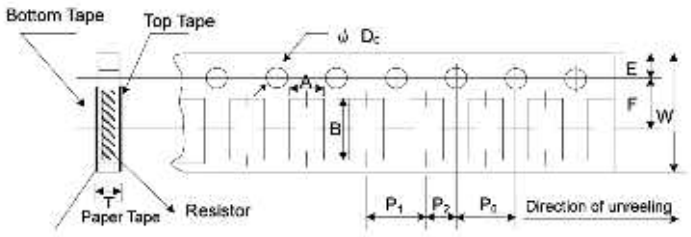
# Type CPF Series

## Packaging Quantity & Reel Specifications




| Type | øA | øB | øC | W | T | Paper Tape (EA) | Embossed Plastic Tape (EA) |
|---|---|---|---|---|---|---|---|
| **CPF0201** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 / 5000 | - |
| **CPF0402** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 / 5000 | - |
| **CPF0603** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 / 5000 | - |
| **CPF0805** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 / 5000 | - |
| **CPF1206** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 / 5000 | - |
| **CPF1210** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 / 5000 | - |
| **CPF2010** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 13.5 ±1.0 | 15.5 ±1.0 | - | 4000 |
| **CPF2512** | 178.0 ±1.0 | 60.0 +1.0 | 13.5 ±0.7 | 13.5 ±1.0 | 15.5 ±1.0 | - | 4000 |

## Paper Tape Specification




| Type | A | B | W | E | F | $P_0$ | $P_1$ | $P_2$ | ø$D_0$ | T |
|---|---|---|---|---|---|---|---|---|---|---|
| **CPF0201** | 0.40 ±0.05 | 0.70 ±0.05 | 8.00 ±0.10 | 1.75 ±0.05 | 3.5 ±0.05 | 4.00 ±0.10 | 2.00 ±0.05 | 2.00 ±0.05 | 1.55 ±0.03 | 0.42 ±0.02 |
| **CPF0402** | 0.70 ±0.05 | 1.16 ±0.05 | 8.00 ±0.10 | 1.75 ±0.05 | 3.5 ±0.05 | 4.00 ±0.10 | 2.00 ±0.05 | 2.00 ±0.05 | 1.55 ±0.05 | 0.40 ±0.03 |
| **CPF0603** | 1.10 ±0.05 | 1.90 ±0.05 | 8.00 ±0.10 | 1.75 ±0.05 | 3.5 ±0.05 | 4.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.05 | 1.55 ±0.05 | 0.60 ±0.03 |
| **CPF0805** | 1.60 ±0.05 | 2.37 ±0.05 | 8.00 ±0.10 | 1.75 ±0.05 | 3.5 ±0.05 | 4.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.05 | 1.55 ±0.05 | 0.75 ±0.05 |
| **CPF1206** | 2.00 ±0.05 | 3.55 ±0.05 | 8.00 ±0.10 | 1.75 ±0.05 | 3.5 ±0.05 | 4.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.05 | 1.55 ±0.05 | 0.75 ±0.05 |
| **CPF1210** | 2.75 ±0.05 | 3.40 ±0.05 | 8.00 ±0.10 | 1.75 ±0.05 | 3.5 ±0.05 | 4.00 ±0.05 | 4.00 ±0.10 | 2.00 ±0.05 | 1.60 ±0.10 | 0.75 ±0.05 |



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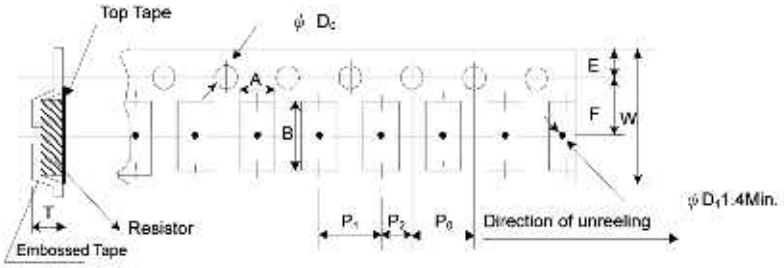
# Type CPF Series

## Embossed Plastic Tape Specifications




| Type | A | B | W | E | F | $P_0$ | $P_1$ | $P_2$ | ø$D_0$ | T |
|---|---|---|---|---|---|---|---|---|---|---|
| **CPF2010** | 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 |
| **CPF2512** | 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 |

## How to Order

| CPF | 0603 | B | 100R | E | 1 |
|---|---|---|---|---|---|
| **Common Part** | **Package Size** | **Tolerance** | **Value** | **TCR** | **Packaging** |
| CPF - Chip precision film resistor | 0201 1206<br>0402 1210<br>0603 2010<br>0805 2512 | B - ± 0.1%<br>D - ±0.5%<br>F - ± 1% | 100R (100 Ohms)<br>1K0 (1000 Ohms)<br>100K (100,000 Ohms) | D - 15ppm<br>E - 25ppm<br>C - 50ppm | 1 - 1K REEL<br>Blank - 5K REEL |

# OCEAN CHIPS
## Океан Электроники
## Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

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ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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