

# APC Precision Chip Resistor



- Precision Thin Film Technology
- Wide Resistance Range 1R - 3M
- Precision tolerance down to  $\pm 0.01\%$
- TCR as low as  $\pm 2\text{ppm}/^\circ\text{C}$
- Tape & Reel packaging



- Standard Electrical Specifications
- Tolerance (Code):  $\pm 0.05\%$  (A),  $\pm 0.1\%$  (B),  $\pm 0.25\%$  (C),  $\pm 0.5\%$  (D),  $\pm 1\%$  (F)
- TCR (Code):  $\pm 25\text{ppm}$  (E),  $\pm 50\text{ppm}$  (F)

| Type    | Power Rating at 70°C | Operating Temp Range | Max Operating Voltage | Max Overload Voltage | Tolerance / Resistance Range |                |               |                 |     | TCR (PPM°C) |
|---------|----------------------|----------------------|-----------------------|----------------------|------------------------------|----------------|---------------|-----------------|-----|-------------|
|         |                      |                      |                       |                      | ±0.05%                       | ±0.1%          | ±0.25%        | ±0.5%           | ±1% |             |
| APC0201 | 1/32W                | -55 to +155°C        | 15V                   | 30V                  | N/A                          |                |               | 49.9Ω to 4.99KΩ |     | ±25         |
|         |                      |                      |                       |                      |                              |                |               | 49.9Ω to 33KΩ   |     | ±50         |
| APC0402 | 1/16W                | -55 to +155°C        | 25V                   | 50V                  | 49.9Ω to 12KΩ                | 10Ω to 255KΩ   | 4.7Ω to 511KΩ |                 |     | ±25         |
|         |                      |                      |                       |                      |                              |                |               | ±50             |     |             |
| APC0603 | 1/16W                | -55 to +155°C        | 50V                   | 100V                 | 4.7Ω to 332KΩ                | 4.7Ω to 1MΩ    | 1Ω to 1MΩ     |                 |     | ±25         |
|         |                      |                      |                       |                      |                              |                |               | ±50             |     |             |
| APC0805 | 1/10W                | -55 to +155°C        | 100V                  | 200V                 | 4.7Ω to 1MΩ                  | 4.7Ω to 2MΩ    | 1Ω to 2MΩ     |                 |     | ±25         |
|         |                      |                      |                       |                      |                              |                |               | ±50             |     |             |
| APC1206 | 1/8W                 | -55 to +155°C        | 150V                  | 300V                 | 4.7Ω to 1MΩ                  | 4.7Ω to 2.49MΩ | 1Ω to 2.49MΩ  |                 |     | ±25         |
| APC1210 | 1/4W                 |                      |                       |                      |                              |                |               |                 |     | ±50         |
| APC2010 | 1/4W                 | -55 to +155°C        | 150V                  | 300V                 | 4.7Ω to 1MΩ                  | 4.7Ω to 3MΩ    | 1Ω to 3MΩ     |                 |     | ±25         |
| APC2512 | 1/2W                 |                      |                       |                      |                              |                |               |                 |     | ±50         |

- Special Electrical Specifications
- Tolerance (Code):  $\pm 0.01\%$  (T),  $\pm 0.05\%$  (A),  $\pm 0.1\%$  (B),  $\pm 0.25\%$  (C),  $\pm 0.5\%$  (D),  $\pm 1\%$  (F)
- TCR (Code):  $\pm 2\text{ppm}$  (X),  $\pm 3\text{ppm}$  (Y),  $\pm 5\text{ppm}$  (Z),  $\pm 10\text{ppm}$  (B),  $\pm 15\text{ppm}$  (A)

| Type    | Power Rating at 70°C | Operating Temp Range | Max Operating Voltage | Max Overload Voltage | Resistance Range |               |                 |        |          |          | TCR (PPM°C) |
|---------|----------------------|----------------------|-----------------------|----------------------|------------------|---------------|-----------------|--------|----------|----------|-------------|
|         |                      |                      |                       |                      | ±0.01%           | ±0.05%        | ±0.1%           | ±0.25% | ±0.5%    | ±1%      |             |
| APC0402 | 1/16W                | -55 to +155°C        | 25V                   | 50V                  | 49.9Ω to 4.99KΩ  |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 49.9Ω to 4.99KΩ  |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 49.9Ω to 12KΩ    |               | 49.9Ω to 60KΩ   |        |          | ±10      |             |
|         |                      |                      |                       |                      |                  |               | 49.9Ω to 69.8KΩ |        |          | ±15      |             |
| APC0603 | 1/16W                | -55 to +155°C        | 50V                   | 100V                 | 24.9Ω to 15KΩ    |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 24.9Ω to 15KΩ    |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 24.9Ω to 100KΩ   | 4.7Ω to 332KΩ | 4.7Ω to 511KΩ   |        |          | ±10, ±15 |             |
| APC0805 | 1/10W                | -55 to +155°C        | 100V                  | 200V                 | 24.9Ω to 30KΩ    |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 24.9Ω to 30KΩ    |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 24.9Ω to 200KΩ   | 4.7Ω to 1MΩ   |                 |        |          | ±10, ±15 |             |
| APC1206 | 1/8W                 | -55 to +155°C        | 150V                  | 300V                 | 24.9Ω to 49.9KΩ  |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 24.9Ω to 49.9KΩ  |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 24.9Ω to 499KΩ   | 4.7Ω to 1MΩ   |                 |        | ±10, ±15 |          |             |
| APC1210 | 1/4W                 | -55 to +155°C        | 150V                  | 300V                 | 24.9Ω to 49.9KΩ  |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 24.9Ω to 49.9KΩ  |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 24.9Ω to 499KΩ   | 4.7Ω to 1MΩ   |                 |        | ±10, ±15 |          |             |
| APC2010 | 1/4W                 | -55 to +155°C        | 150V                  | 300V                 | 24.9Ω to 100KΩ   |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 24.9Ω to 100KΩ   |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 24.9Ω to 499KΩ   | 4.7Ω to 1MΩ   |                 |        | ±10, ±15 |          |             |
| APC2512 | 1/2W                 | -55 to +155°C        | 150V                  | 300V                 | 24.9Ω to 100KΩ   |               |                 | N/A    |          |          | ±2, ±3      |
|         |                      |                      |                       |                      | 24.9Ω to 100KΩ   |               |                 |        |          |          | ±5          |
|         |                      |                      |                       |                      | 24.9Ω to 499KΩ   | 4.7Ω to 1MΩ   |                 |        | ±10, ±15 |          |             |

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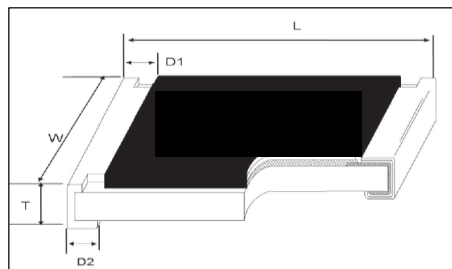
## Characteristics

| Item                  | Tol. $\leq 0.05\%$       | Tol. $> 0.05\%$        | Method                                                                       |
|-----------------------|--------------------------|------------------------|------------------------------------------------------------------------------|
| Short Time Overload   | $\Delta R \pm 0.05\%$    | $\Delta R \pm 0.02\%$  | RCWV*2.5 or Max. Overload Voltage - whichever is lower for 5 secs.           |
| Insulation Resistance | $> 1000 \text{ M}\Omega$ |                        | Apply 100V dc for 1 minute                                                   |
| Endurance             | $\Delta R \pm 0.05\%$    | $\Delta R \pm 0.02\%$  | 70 $\pm 2^\circ\text{C}$ RCWV for 1000 hours with 1.5 hrs ON and 0.5 hrs OFF |
| Thermal Shock         | $\Delta R \pm 0.05\%$    | $\Delta R \pm 0.025\%$ | -55 to +155 $^\circ\text{C}$ , 100 Cycles                                    |
| Low Temp Operation    | $\Delta R \pm 0.05\%$    | $\Delta R \pm 0.2\%$   | 1 hour, -65 $^\circ\text{C}$ followed by 45 mins of RCWV                     |

\*RCWV (Rated Continuous Working Voltage) =  $V(P \cdot R)$  or Max. Operating Voltage - whichever is lower

## Dimensions (mm)

| Type    | L               | W               | T               | D1              | D2              |
|---------|-----------------|-----------------|-----------------|-----------------|-----------------|
| APC0201 | 0.58 $\pm 0.05$ | 0.29 $\pm 0.05$ | 0.23 $\pm 0.05$ | 0.12 $\pm 0.05$ | 0.15 $\pm 0.05$ |
| APC0402 | 1.00 $\pm 0.05$ | 0.50 $\pm 0.05$ | 0.30 $\pm 0.05$ | 0.20 $\pm 0.05$ | 0.20 $\pm 0.05$ |
| APC0603 | 1.55 $\pm 0.10$ | 0.80 $\pm 0.10$ | 0.45 $\pm 0.10$ | 0.30 $\pm 0.20$ | 0.30 $\pm 0.20$ |
| APC0805 | 2.00 $\pm 0.15$ | 1.25 $\pm 0.15$ | 0.55 $\pm 0.10$ | 0.30 $\pm 0.20$ | 0.40 $\pm 0.20$ |
| APC1206 | 3.05 $\pm 0.15$ | 1.55 $\pm 0.15$ | 0.55 $\pm 0.10$ | 0.42 $\pm 0.20$ | 0.35 $\pm 0.25$ |
| APC1210 | 3.10 $\pm 0.15$ | 2.40 $\pm 0.15$ | 0.55 $\pm 0.10$ | 0.40 $\pm 0.20$ | 0.55 $\pm 0.25$ |
| APC2010 | 4.90 $\pm 0.15$ | 2.40 $\pm 0.15$ | 0.55 $\pm 0.10$ | 0.60 $\pm 0.30$ | 0.50 $\pm 0.25$ |
| APC2512 | 6.30 $\pm 0.15$ | 3.10 $\pm 0.15$ | 0.55 $\pm 0.10$ | 0.60 $\pm 0.30$ | 0.50 $\pm 0.25$ |

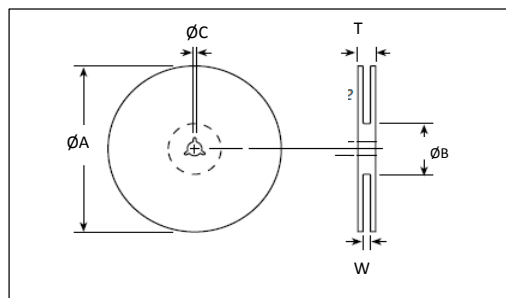


## Reel Dimensions (mm)

| Size   | $\phi A$      | $\phi B$     | $\phi C$       | W              | T              | Qty Per Reel |
|--------|---------------|--------------|----------------|----------------|----------------|--------------|
| 0201*  | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 9.5 $\pm 1.0$  | 11.5 $\pm 1.0$ | 10,000       |
| 0402*  | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 9.5 $\pm 1.0$  | 11.5 $\pm 1.0$ | 10,000       |
| 0603*  | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 9.5 $\pm 1.0$  | 11.5 $\pm 1.0$ | 5,000        |
| 0805*  | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 9.5 $\pm 1.0$  | 11.5 $\pm 1.0$ | 5,000        |
| 1206*  | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 9.5 $\pm 1.0$  | 11.5 $\pm 1.0$ | 5,000        |
| 1210*  | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 9.5 $\pm 1.0$  | 11.5 $\pm 1.0$ | 5,000        |
| 2010** | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 13.5 $\pm 1.0$ | 15.5 $\pm 1.0$ | 4,000        |
| 2512** | 178 $\pm 1.0$ | 60 $\pm 1.0$ | 13.5 $\pm 0.7$ | 13.5 $\pm 1.0$ | 15.5 $\pm 1.0$ | 4,000        |

\* Paper Tape

\*\* Plastic Embossed Tape



## Ordering Procedure

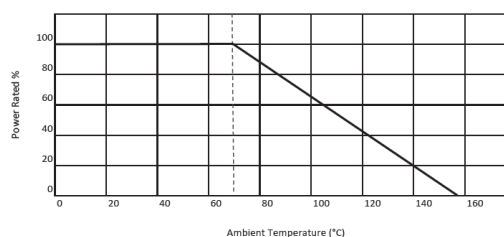
Standard Resistor: Series, Size, Tol Code, Resistance Value, TCR Code

Eg: APC0603A100RB  
 100 $\Omega$   
 $\pm 0.05\%$   
 1/16 watt  
 (0603 size)

Tol:  $\pm 0.01\%$  (T),  $\pm 0.05\%$  (A),  $\pm 0.1\%$  (B),  $\pm 0.25\%$  (C),  $\pm 0.5\%$  (D),  $\pm 1\%$  (F)

TCR:  $\pm 2\text{ppm}$  (X),  $\pm 3\text{ppm}$  (Y),  $\pm 5\text{ppm}$  (Z),  $\pm 10\text{ppm}$  (B),  $\pm 15\text{ppm}$  (A),  $\pm 25\text{ppm}$  (E),  $\pm 50\text{ppm}$  (F)

## Derating Curve



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