

Features:

- Tolerance down to 0.01%
- TCR down to 5ppm/°C
- High reliability
- Superior moisture performance
- Non-standard values available
- High stability metal film
- Matched sets available

OBSOLETE

CAR7 ONLY



All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

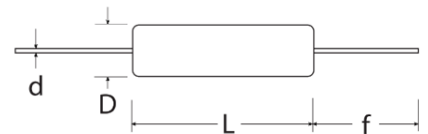
| | | CAR5 | CAR6 | CAR7 |
|-----------------------------------|--------|-------------------------------------|-----------|-----------|
| Power rating @70°C | W | 0.25 | 0.33 | 0.5 |
| Power rating @85°C | W | 0.125 | 0.25 | 0.33 |
| Resistance range | ohms | 10R – 3M0 | 10R – 5M0 | 10R – 10M |
| Limiting element voltage | V | 250 | 350 | 500 |
| TCR (20 – 70°C) ¹ | ppm/°C | 5, 10, 15, 25, 50 | | |
| Resistance tolerance ¹ | % | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | | |
| Standard values ² | | E24 & E96 preferred | | |
| Thermal impedance | °C/W | 110 | 70 | 60 |
| Ambient temperature range | °C | -55 to 155 | | |

Note 1: See table of resistance restrictions

Note 2: Non-standard values may be requested

Physical Data

| Dimensions in mm and weight in g | | | | | | | |
|----------------------------------|-------|-------|--------------------|-------|----------------------|------------------|---------|
| Type | L max | D max | f min ¹ | d nom | PCB mounting centres | Min. bend radius | Wt. nom |
| CAR5 | 7.2 | 2.5 | 30 | 0.6 | 10.2 | 0.6 | 0.24 |
| CAR6 | 10 | 3.7 | 30 | 0.6 | 12.7 | 0.6 | 0.4 |
| CAR7 | 15.5 | 5.5 | 30 | 0.8 | 18.4 | 1.2 | 1.15 |



Note 1: Dimension relates only to bulk packed products

Construction

A metal film is deposited onto a high quality ceramic rod. Nickel-plated steel caps are force fitted to the rod and termination wires are welded to the caps. The resistor is adjusted to value by a helical cut in the film and the body is protected with a specially formulated epoxy coating.

Marking

Type reference, TCR code, resistance value and tolerance code are legend marked. The resistance values conform to IEC 62.

Terminations

- Material** Copper wire with Sn or SnPb finish.
- Strength** The terminations meet the requirements of IEC 68.2.21.
- Solderability** The terminations meet the requirements of IEC 115-1, clause 4.17.3.2.

Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuit boards.

Performance Data (CAR7 ONLY)

| | | Values ≤250K | | Values >250K | |
|--|-------|--------------|---------|--------------|---------|
| | | Maximum | Typical | Maximum | Typical |
| Load at rated power: Load, 1000 hours at 70°C / 85°C | ±ΔR% | 0.05 | 0.02 | 0.25 | 0.05 |
| Load at rated power: Load, 8000 hours at 70°C / 85°C | ±ΔR% | 0.1 | 0.04 | 0.5 | 0.1 |
| Dry heat: No load, 1000 hours at 155°C | ±ΔR% | 0.15 | 0.08 | 1 | 0.2 |
| Shelf life test: 12 months at room temperature | ±ΔR% | 0.01 | 0.003 | 0.04 | 0.02 |
| Derating from rated power at 70°C / 85°C | | Zero @155°C | | | |
| Short term overload: Lesser of 6.25xPr or 2.5xLEV for 5s | ±ΔR% | 0.01 | 0.001 | 0.08 | 0.01 |
| Climatic | ±ΔR% | 0.05 | 0.02 | 0.2 | 0.05 |
| Climatic category | | 55/155/56 | | | |
| Long term damp heat | ±ΔR% | 0.05 | 0.02 | 0.2 | 0.05 |
| Temperature rapid change | ±ΔR% | 0.04 | 0.02 | 0.25 | 0.05 |
| Resistance to solder heat | ±ΔR% | 0.02 | 0.003 | 0.05 | 0.005 |
| Vibration | ±ΔR% | 0.02 | 0.002 | 0.06 | 0.02 |
| Bump | ±ΔR% | 0.02 | 0.002 | 0.06 | 0.02 |
| Noise in a decade of frequency | μV/V | 0.2 | 0.03 | 1 | 0.1 |
| Voltage coefficient of resistance | ppm/V | 0.3 | <0.05 | 0.2 | <0.05 |

Table of Resistance Restrictions

| TCR ppm/°C | Tolerance % | | | | | | | | |
|----------------|-------------|-------------|------------|-------------|-------------|------------|-------------|-------------|------------|
| | CAR5 | | | CAR6 | | | CAR7 | | |
| | 0.01 – 0.02 | 0.05 | 0.1 - 1 | 0.01 – 0.02 | 0.05 | 0.1 - 1 | 0.01 – 0.02 | 0.05 | 0.1 - 1 |
| 5 ¹ | 50R to 300K | 10R to 500K | | 50R to 500K | 10R to 500K | | 50R to 750K | 10R to 750K | |
| 10 | | 10R to 1M0 | 10R to 1M0 | | 10R to 1M0 | 10R to 1M0 | | 10R to 1M0 | 10R to 1M5 |
| 15 | | | 10R to 1M5 | | | 10R to 3M0 | | | 10R to 3M5 |
| 25 | | | 10R to 3M0 | | | 10R to 5M0 | | | 10R to 5M0 |
| 50 | | | 10R to 10M | | | | | | |

Note 1: Based on sampling. 100% screened product is available.

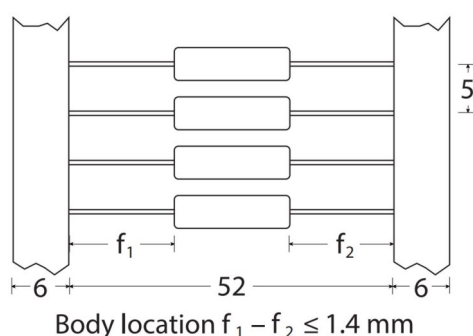
Application Notes

Matched Sets

TT Electronics has many years' experience in the supply of matched sets of precision resistors. Resistors can be supplied matched for tolerance and TCR down to ±0.005% and ±1ppm/°C.

Packaging

CAR5 and CAR6 standard packing is in tape, as shown below, whilst CAR7 is bulk packed.



Ordering Procedure

(CAR7 ONLY)

Global Part Number Example: **CAR5V-31K6PI** (CAR5 with TCR $\pm 5\text{ppm}/^\circ\text{C}$ at 31.6 kilohms $\pm 0.02\%$, Pb-free)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|--|
| C | A | R | 5 | V | - | 3 | 1 | K | 6 | P | I | |
| 1 | 2 | 3 | 4 | 5 | | | | | | | | |

| 1 | 2 | 3 | 4 | 5 | | | |
|------|--------------|--|------------|-------------------------------|---------------------------------------|----------------|--|
| Type | TCR (ppm/°C) | Value | Tolerance | Finish, Screening & Packing | | | |
| CAR5 | V = ±5 | E24 = 3/4 characters E96 = 3/4 characters Custom values may use more than 4 characters R = ohms K = kilohms M = megohms | L = ±0.01% | I | Pb-free (RoHS) | | |
| CAR6 | T = ±10 | | P = ±0.02% | SC | Pb-free with screened TCR (5ppm only) | | |
| CAR7 | Y = ±15 | | W = ±0.05% | PB | Sn(95)Pb(5) finish | | |
| | D = ±25 | | B = ±0.1% | All above in Standard Packing | | | |
| | C = ±50 | | C = ±0.25% | CAR5 | Ammo | Up to 5000/box | |
| | | | D = ±0.5% | CAR6 | | Up to 2500/box | |
| | | | F = ±1% | CAR7 | Bulk | 250/box | |

Legacy Part Numbers

This product has a legacy part number format. This is still available for ordering, but for new designs use of the Global Part Number is recommended.

Legacy Part Number Example: **CAR5LFV3162PA** (CAR5 with TCR $\pm 5\text{ppm}/^\circ\text{C}$ at 31.6 kilohms $\pm 0.02\%$, Pb-free)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | A | R | 5 | L | F | V | 3 | 1 | 6 | 2 | P | A |
| 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | |

| 1 Type | 2 Termination | 3 TCR (ppm/ $^\circ\text{C}$) | 4 Value | 5 Tolerance | 6 Packing | | |
|-----------|-------------------------|-----------------------------------|----------------------------------|------------------|--------------|------|----------------------|
| CAR5 | Omit for Sn(95)Pb(5) | V = ± 5 | 3 digits + multiplier | L = $\pm 0.01\%$ | A | CAR5 | Ammo, up to 5000/box |
| CAR6 | | T = ± 10 | R = ohms for values <100 ohms | P = $\pm 0.02\%$ | | CAR6 | Ammo, up to 2500/box |
| CAR7 | LF = Pb-free | Y = ± 15 | | W = $\pm 0.05\%$ | B | CAR7 | Bulk, 250/box |
| | | D = ± 25 | | B = $\pm 0.1\%$ | | | |
| | | C = ± 50 | | C = $\pm 0.25\%$ | | | |
| | | | | D = $\pm 0.5\%$ | | | |
| | | | | F = $\pm 1\%$ | | | |