

## CAR Series

### 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



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

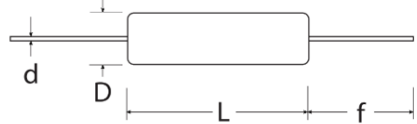
## Electrical Data

		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) <sup>1</sup>	ppm/°C	5, 10, 15, 25, 50		
Resistance tolerance <sup>1</sup>	%	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1		
Standard values <sup>2</sup>		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 <sup>1</sup>	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

		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 <sup>1</sup>	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			10R to 10M

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

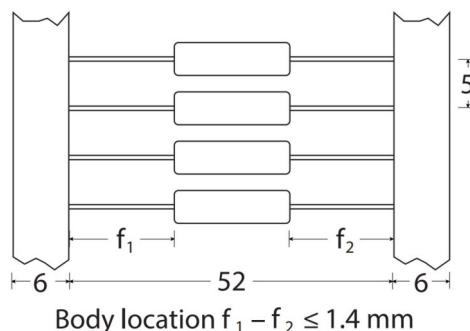
### Application Notes

#### 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.

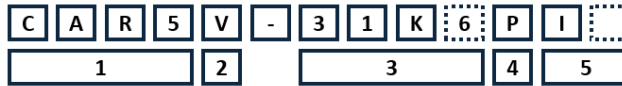


## CAR Series

### Ordering Procedure

This product has two valid part numbers:

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



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

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



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