

# CAR Series

Thin Film Precision Chip Resistor



- Resistances from 1 Ohm to 3M Ohms
- Power Rating 0.06 to 0.75 Watt
- Resistance Tolerances to  $\pm 0.01\%$
- TCR's to  $\pm 1$  ppm/ $^{\circ}\text{C}$
- Sizes: 0402 / 0603 / 0805 / 1206 / 2010 / 2512
- Operating Temperature:  $-55^{\circ}\text{C}$  to  $155^{\circ}\text{C}$



SPECIFICATIONS - STANDARD / HIGH POWER (HP)											
Package Size	Power Rating (W) at 70°C	MAX Operating Voltage <sup>1</sup>	MAX Overload Voltage <sup>2</sup>	Resistance Range (E24/E96)*					TCR PPM/ $^{\circ}\text{C}$		
				$\pm 0.01\%$	$\pm 0.05\%$	$\pm 0.1\%$	$\pm 0.25\%$	$\pm 0.5\%$		$\pm 1\%$	
0402	0.0625	25V	50V	49.9 $\Omega$ - 4.99K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				49.9 $\Omega$ - 20K $\Omega$					$\pm 5$		
				49.9 $\Omega$ - 20K $\Omega$		49.9 $\Omega$ - 100K $\Omega$			$\pm 10$		
						49.9 $\Omega$ - 69.8K $\Omega$			$\pm 15$		
				-	49.9 $\Omega$ - 12K $\Omega$	10 $\Omega$ - 511K $\Omega$	4.7 $\Omega$ - 511K $\Omega$		$\pm 25, \pm 50$		
0603	0.0625	50V	100V	24.9 $\Omega$ - 15K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				24.9 $\Omega$ - 60K $\Omega$					$\pm 5$		
				24.9 $\Omega$ - 100K $\Omega$	4.7 $\Omega$ - 332K $\Omega$		4.7 $\Omega$ - 511K $\Omega$			$\pm 10, \pm 15$	
				-	4.7 $\Omega$ - 1M $\Omega$		1 $\Omega$ - 1M $\Omega$		$\pm 25, \pm 50$		
0603 HP	0.100	75V	150V	24.9 $\Omega$ - 15K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				24.9 $\Omega$ - 15K $\Omega$					$\pm 5$		
				24.9 $\Omega$ - 100K $\Omega$	4.7 $\Omega$ - 332K $\Omega$		4.7 $\Omega$ - 332K $\Omega$			$\pm 10, \pm 15$	
						4.7 $\Omega$ - 1M $\Omega$		4.7 $\Omega$ - 1M $\Omega$		$\pm 25, \pm 50$	
0805	0.100	100V	200V	24.9 $\Omega$ - 30K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				24.9 $\Omega$ - 150K $\Omega$					$\pm 5$		
				24.9 $\Omega$ - 200K $\Omega$	4.7 $\Omega$ - 1M $\Omega$			$\pm 10, \pm 15$			
				-	4.7 $\Omega$ - 1M $\Omega$	4.7 $\Omega$ - 2M $\Omega$	1 $\Omega$ - 2M $\Omega$		$\pm 25, \pm 50$		
0805 HP	0.125	150V	300V	24.9 $\Omega$ - 30K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				24.9 $\Omega$ - 30K $\Omega$					$\pm 5$		
				24.9 $\Omega$ - 200K $\Omega$		4.7 $\Omega$ - 511K $\Omega$		4.7 $\Omega$ - 511K $\Omega$			$\pm 10$
						4.7 $\Omega$ - 1M $\Omega$		4.7 $\Omega$ - 1M $\Omega$			$\pm 15$
						4.7 $\Omega$ - 1M $\Omega$		1 $\Omega$ - 1M $\Omega$		$\pm 25, \pm 50$	
1206	0.125	150V	300V	24.9 $\Omega$ - 49.9K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				24.9 $\Omega$ - 300K $\Omega$					$\pm 5$		
				24.9 $\Omega$ - 499K $\Omega$	4.7 $\Omega$ - 1.5M $\Omega$			$\pm 10, \pm 15$			
				-	4.7 $\Omega$ - 1M $\Omega$	4.7 $\Omega$ - 2.49M $\Omega$	1 $\Omega$ - 2.49M $\Omega$		$\pm 25, \pm 50$		
1206 HP	0.250	200V	400V	24.9 $\Omega$ - 49.9K $\Omega$			-		$\pm 1, \pm 2, \pm 3$		
				24.9 $\Omega$ - 49.9K $\Omega$					$\pm 5$		
				24.9 $\Omega$ - 499K $\Omega$	4.7 $\Omega$ - 1M $\Omega$			$\pm 10, \pm 15, \pm 25, \pm 50$			

<sup>1</sup> Operating Voltage =  $\sqrt{P \cdot R}$  or MAX Listed, whichever is lower. | <sup>2</sup> Overload Voltage =  $2.5 \cdot \sqrt{P \cdot R}$  or MAX Listed, whichever is lower. | \* E24/E96 Consult Factory for available values

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SPECIFICATIONS - STANDARD / HIGH POWER (HP) continued										
Package Size	Power Rating (W) at 70°C	MAX Operating Voltage <sup>1</sup>	MAX Overload Voltage <sup>2</sup>	Resistance Range (E24/E96)*					TCR PPM/°C	
				±0.01%	±0.05%	±0.1%	±0.25%	±0.5%		±1%
2010	0.250	150V	300V	24.9Ω - 100KΩ			-		±1, ±2, ±3	
				24.9Ω - 300KΩ					±5	
				24.9Ω - 499KΩ	4.7Ω - 1MΩ			±10, ±15		
				-	4.7Ω - 1MΩ	4.7Ω - 3MΩ	1Ω - 3MΩ		±25, ±50	
2010 HP	0.333	200V	400V	24.9Ω - 49.9KΩ			-		±1, ±2, ±3	
				24.9Ω - 49.9KΩ					±5	
				24.9Ω - 499KΩ	4.7Ω - 1MΩ			±10, ±15, ±25, ±50		
2512	0.500	150V	300V	24.9Ω - 100KΩ			-		±1, ±2, ±3	
				24.9Ω - 300KΩ					±5	
				24.9Ω - 499KΩ	4.7Ω - 1MΩ			±10, ±15		
				-	4.7Ω - 1MΩ	4.7Ω - 3MΩ	1Ω - 3MΩ		±25, ±50	
2512 HP	0.750	200V	400V	24.9Ω - 2KΩ	4.7Ω - 2KΩ		1Ω - 2KΩ		±10, ±15, ±25, ±50	

<sup>1</sup> Operating Voltage =  $\sqrt{P \cdot R}$  or MAX Listed, whichever is lower. | <sup>2</sup> Overload Voltage =  $2.5 \cdot \sqrt{P \cdot R}$  or MAX Listed, whichever is lower. | \* E24/E96 Consult Factory for available values

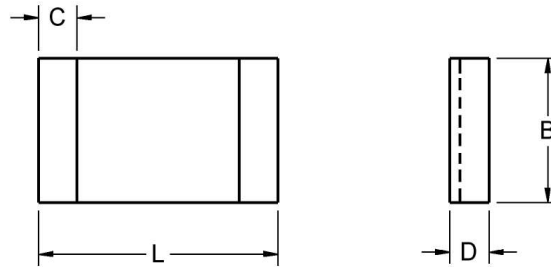
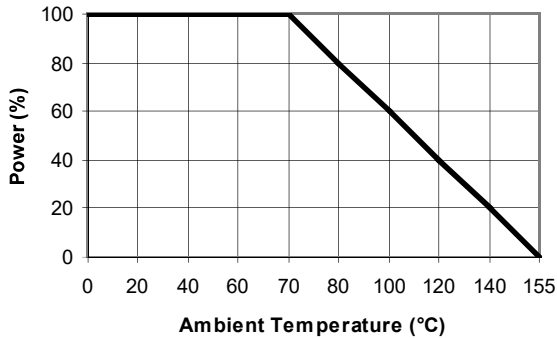
Environmental Characteristics			
Test	Requirement		Conditions
	Tol. <0.05%	Tol. >0.05%	
TCR	As Spec.		+25/-55/+25/+125/+25°C
Short Time Overload	ΔR±0.05%	ΔR±0.2%	RCWV*2.5 or Max. overload voltage for 5 seconds
	ΔR±0.2% for high power rating		
Insulation Resistance	>1000 MΩ		Apply 100VDC for 1 minute
Load Life	ΔR±0.05%	ΔR±0.2%	70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "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 for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	ΔR±0.5% for high power rating		
Bending Strength	ΔR±0.05%	ΔR±0.2%	Bending amplitude 3 mm for 10 seconds
Solderability Terminal Finish = Nickel Tin	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
Thermal Shock	ΔR±0.05%	ΔR±0.25%	-55°C~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		
Terminal Finish	Tin/Nickel		

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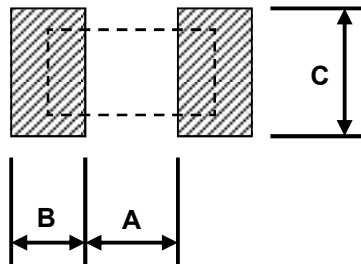


Power Derating Curve



Dimensions (mm)					
Type	L	B	D	C	Mass (grams/1k)
CAR0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.54
CAR0603	1.55 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	1.83
CAR0805	2.00 ± 0.15	1.25 ± 0.15	0.55 ± 0.10	0.30 ± 0.20	4.71
CAR1206	3.05 ± 0.15	1.55 ± 0.15	0.55 ± 0.10	0.42 ± 0.20	9.02
CAR2010	4.90 ± 0.15	2.40 ± 0.15	0.55 ± 0.10	0.60 ± 0.30	23.61
CAR2512	6.30 ± 0.15	3.10 ± 0.15	0.55 ± 0.10	0.6 ± 0.30	38.06

Recommended Land Pattern (mm)



Type	A	B	C
CAR0402	0.50	0.50	0.60 ± 0.2
CAR0603	0.80	0.80	0.90 ± 0.2
CAR0805	1.00	1.00	1.35 ± 0.2
CAR1206	2.00	1.15	1.70 ± 0.2
CAR2010	3.60	1.40	2.50 ± 0.2
CAR2512	4.90	1.60	3.10 ± 0.2

## Ordering Information

Part Description: Part Type - Package Size- Resistance - Tolerance - TCR - HP option

Example: CAR0402 50 Ohms 0.05% 25ppm HP

(Note: if no TCR is specified: The highest value will be supplied)