

- Features:
- 1, 3 and 5 watts
 - $\pm 1\%$, $\pm 2\%$ or $\pm 5\%$ tolerance
 - ± 20 ppm/ $^{\circ}\text{C}$ element wire
 - ± 200 ppm/ $^{\circ}\text{C}$ at lead stops
 - All welded construction
 - Flameproof
 - Non-inductive (10nH max)
 - High current handling to 70 amps
 - RoHS compliant / lead-free



- Applications:
- Current sensing
 - Feedback
 - Low inductance
 - Surge and pulse

Electrical Specifications		
Type / Code	Power Rating (Watts) at 85 $^{\circ}\text{C}$	Ohmic Range (Ω) and Tolerance ⁽¹⁾
		1%, 2%, 5%
BR1	1W	0.005 - 0.1
BR3	3W	
BR5	5W	0.005 - 0.05

(1) Contact factory for resistance values below 0.005 Ω .

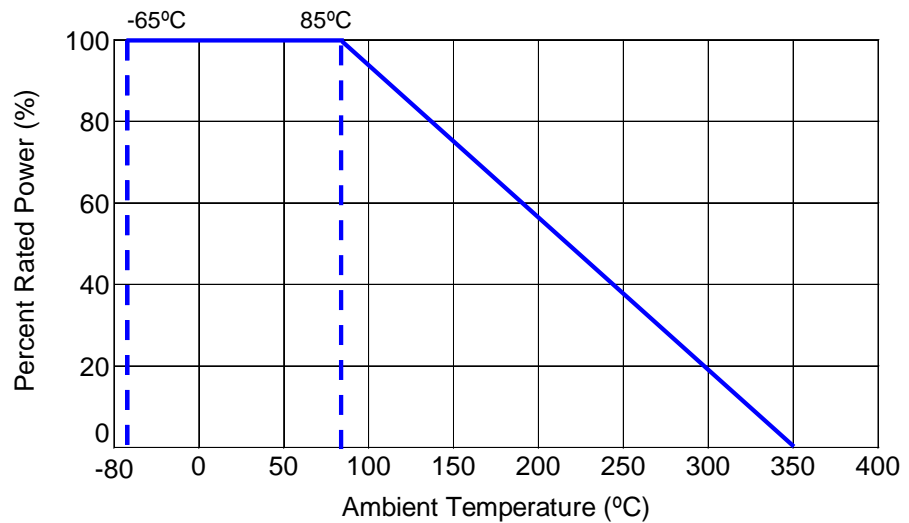
Product photo shown above is typical. Actual components may vary depending on element wire size and amount of trim adjusting required to meet desired resistance value.

Please refer to the High Power Resistor Application Note (page 3) for more information on designing and implementing high power resistor types.

Mechanical Specifications						
Element width varies depending on resistance value.						
Type / Code	A	B	C	D	E	Unit
BR1	0.450 + 0.040 / -0.020	0.200 \pm 0.100	0.125 \pm 0.030	0.065 + 0.010 / - 0.005	0.04 \pm 0.002	inches
	11.43 + 1.02 / -0.51	5.08 \pm 2.54	3.18 \pm 0.76	1.65 + 0.25 / - 0.13	1.02 \pm 0.05	mm
BR3	0.602 + 0.040 / -0.020	0.602 Typ - 1.000 Max	0.125 \pm 0.030	0.065 + 0.010 / - 0.005	0.04 \pm 0.002	inches
	15.30 + 1.02 / -0.51	15.30 Typ - 25.40 Max	3.18 \pm 0.76	1.65 + 0.25 / - 0.13	1.02 \pm 0.05	mm
BR5	0.800 + 0.040 / -0.020	0.602 Typ - 1.000 Max	0.125 \pm 0.030	0.065 + 0.010 / - 0.005	0.04 \pm 0.002	inches
	20.32 + 1.02 / -0.51	15.30 Typ - 25.40 Max	3.18 \pm 0.76	1.65 + 0.25 / - 0.13	1.02 \pm 0.05	mm

Performance Characteristics	
Test	Test Results
Moisture Resistance	±1%
Load Life @ 25°C - 1,000 hrs.	±2%, + 0.0005Ω
Temperature Cycle @ -40°C & +125°C (1,000 cyc)	±1%

Power Derating Curve:



Note: Maximum recommended solder joint/lead stop temperature = +105°C

How to Order

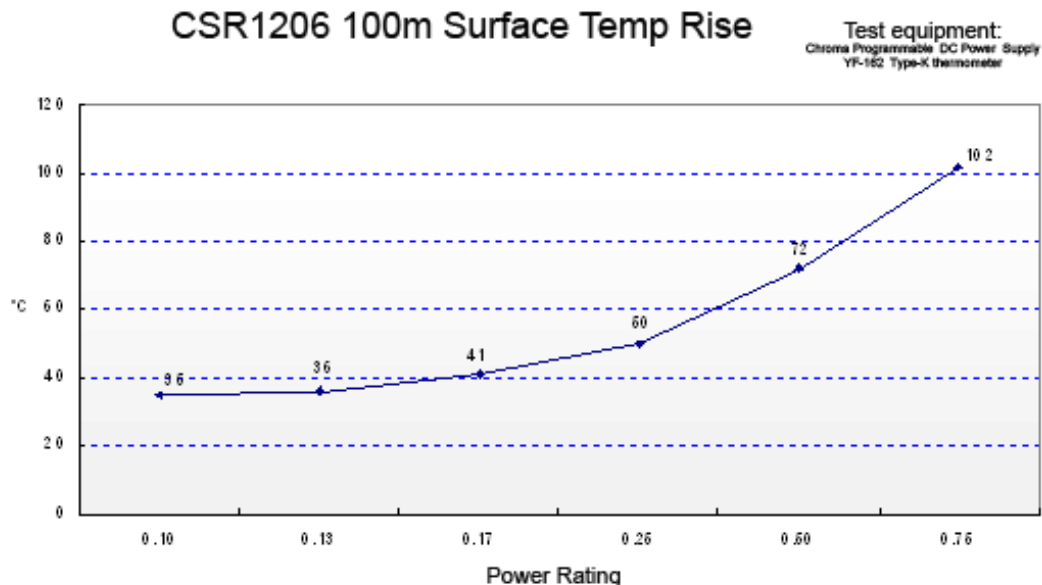
1	2	3	4	5	6	7	8	9
B	R	1	F	B	1	0	L	0

Product Series		Size	Power	Tolerance		Packaging				Resistance Value
BR	Current Sense	1	1W	Code	Tol	Code	Description	Size	Quantity	Four characters with the multiplier used as the decimal holder. "L" used as multiplier of 10 ⁻³ for any value under 0.1 ohm. 0.005 ohm = 5L00 0.05 ohm = 50L0 0.1 ohm = R100
		3	3W	F	1%	B	Bulk	All Sizes	1,000	
		5	5W	G	2%					
				J	5%					

High Power Chip Resistors and Thermal Management

Stackpole has developed several surface mount resistor series in addition to our current sense resistors, which have had higher power ratings than standard resistor chips. This has caused some uncertainty and even confusion by users as to how to reliably use these resistors at the higher power ratings in their designs.

The data sheets for the RHC, RMCP, RNCP, CSR, CSRN, CSRF, CSS, and CSSH state that the rated power assumes an ambient temperature of no more than 100 degrees C for the CSS / CSSH series and 70 degrees C for all other high power resistor series. In addition, IPC and UL best practices dictate that the combined temperature on any resistor due to power dissipated and ambient air shall be no more than 105C. At first glance this wouldn't seem too difficult, however the graph below shows typical heat rise for the CSR 1/2 100 milliohm at full rated power. The heat rise for the RMCP and RNCP would be similar. The RHC with its unique materials, design, and processes would have less heat rise and therefore would be easier to implement for any given customer.



The 102 degrees C heat rise shown here would indicate there will be additional thermal reduction techniques needed to keep this part under 105C total hot spot temperature if this part is to be used at 0.75 watts of power. However, this same part at the usual power rating for this size would have a heat rise of around 72 degrees C. This additional heat rise may be dealt with using wider conductor traces, larger solder pads and land patterns under the solder mask, heavier copper in the conductors, vias through PCB, air movement, and heat sinks, among many other techniques. Because of the variety of methods customers can use to lower the effective heat rise of the circuit, resistor manufacturers simply specify power ratings with the limitations on ambient air temperature and total hot spot temperatures and leave the details of how to best accomplish this to the design engineers. Design guidelines for products in various market segments can vary widely so it would be unnecessarily constraining for a resistor manufacturer to recommend the use of any of these methods over another.

Note: The final resistance value can be affected by the board layout and assembly process, especially the size of the mounting pads and the amount of solder used. This is especially notable for resistance values ≤ 50 m Ω . This should be taken into account when designing.