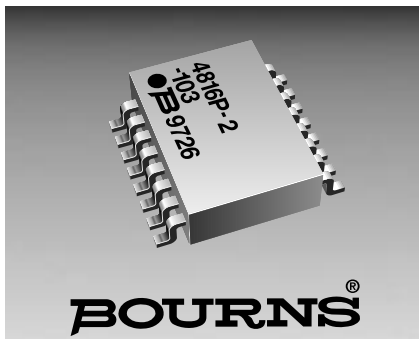




## Features

- Standard E.I.A. package compatible with automatic placement equipment
- Tape and reel packaging standard (see page 304 for dimensions)
- For ordering guidelines, see page 304
- Marking on contrasting background for permanent identification

- Compliant leads to reduce solder joint fatiguing
- Standard electrical schematics: isolated, bussed, dual terminator
- Custom circuits are available

## 4800P Series - Thick Film Surface Mounted Medium Body

### Product Characteristics

Resistance Range .....10 ohms to 2.2 megohms  
 Maximum Operating Voltage .....50V  
 Temperature Coefficient of Resistance  
 50Ω and above .....±100ppm/°C  
 below 50Ω .....±250ppm/°C  
 TCR Tracking  
 .....50ppm/°C max.; equal values  
 100ppm/°C 50W and above  
 Operating Temperature  
 .....-55°C to +125°C  
 Insulation Resistance  
 .....10,000 megohms min.  
 Dielectric Withstanding Voltage  
 .....200 VRMS  
 Lead Solderability  
 .....Meet requirements of MIL-STD-202  
 Method 208

### Environmental Characteristics

TESTS PER MIL-STD-202 .....ΔR MAX.  
 Short Time Overload .....±0.25%  
 Load Life .....±1.00%  
 Moisture Resistance .....±0.50%  
 Resistance to Soldering Heat .....±0.25%  
 Thermal Shock .....±0.25%

### Physical Characteristics

Flammability .....Conforms to UL94V-0  
 Lead Frame Material  
 .....Copper, solder coated  
 Body Material .....Novolac epoxy

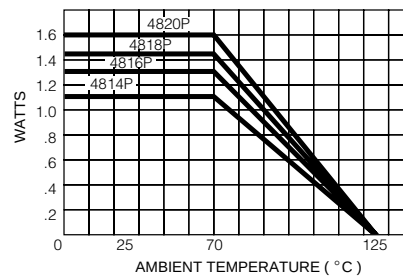
### How To Order

48 16 P - 1 - 103

Model \_\_\_\_\_  
 (48 = SOM Pkg)  
 Number of Pins \_\_\_\_\_  
 Electrical Configuration \_\_\_\_\_  
 • 1 or 4 = Isolated\*  
 • 2 = Bussed\*  
 • 3 = Dual Terminator\*  
 Resistance Code \_\_\_\_\_  
 • First 2 digits are significant  
 • Third digit represents the  
 number of zeros to follow.

\*For tube packaging, use T01, T02, T03 or T04.  
 Consult factory for other available options.

### Package Power Temp. Derating Curve

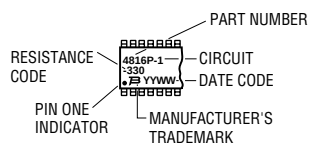


### Package Power Rating at 70°C

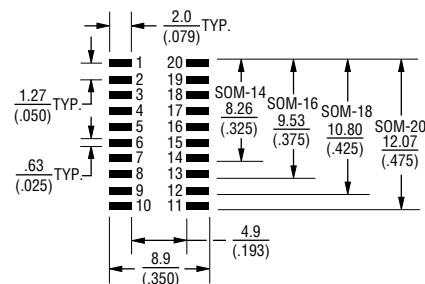
4814P .....1.12 watts  
 4816P .....1.28 watts  
 4818P .....1.44 watts  
 4820P .....1.60 watts

### Typical Part Marking

Represents total content. Layout may vary.

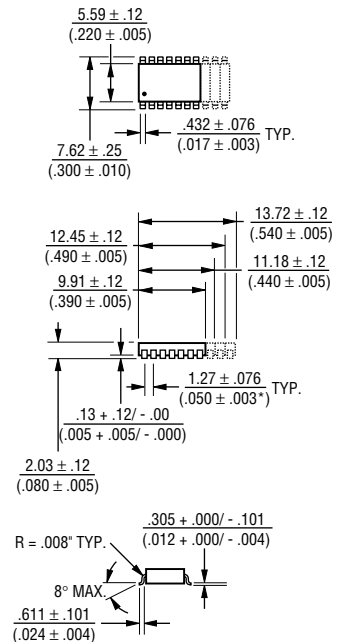


### Recommended Land Pattern



NOTE: Land pattern dimensions are based on design rules established by the Institute for Interconnecting and Packaging Electronic Circuits in IPC-SM-782.

### Product Dimensions



Lead coplanarity .102mm (.004 inch) max. at mounting surface.

Governing dimensions are in metric. Dimensions in parentheses are inches and are approximate.

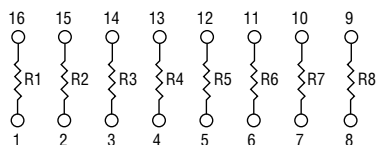
\*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

# 4800P Series - Thick Film Surface Mounted Medium Body

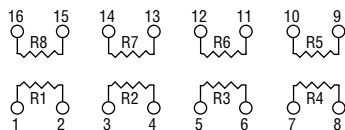
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## Isolated Resistors (1 And 4 Circuits)

Model 4814P-1  
Model 4816P-1 (Shown)  
Model 4818P-1  
Model 4820P-1



Model 4816P-4 (Shown)  
Model 4820P-4



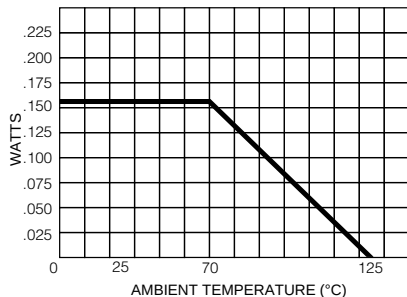
## Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm  
50 ohms to 2.2 megohms.....±2%\*

## Power Rating per Resistor

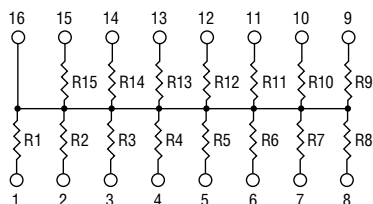
1 Circuit at 70°C .....0.160 watt  
4 Circuit at 70°C .....0.160 watt

## Resistor Power Temp. Derating Curve



## Bussed Resistors (2 Circuit)

Model 4814P-2  
Model 4816P-2 (Shown)  
Model 4818P-2  
Model 4820P-2



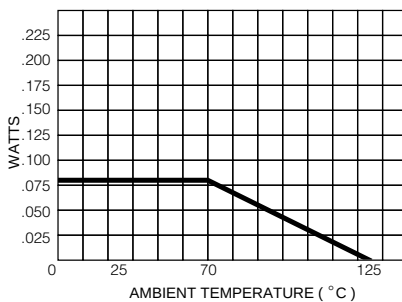
## Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm  
50 ohms to 2.2 megohms .....±2%\*

## Power Rating per Resistor

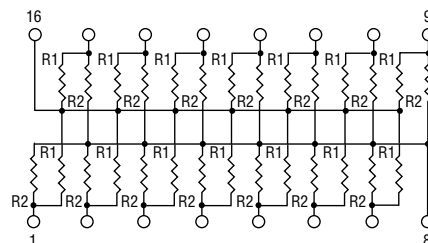
2 Circuit at 70°C .....0.080 watt

## Resistor Power Temp. Derating Curve



## Dual Terminator (3 Circuit)

Model 4814P-3  
Model 4816P-3 (Shown)  
Model 4818P-3  
Model 4820P-3



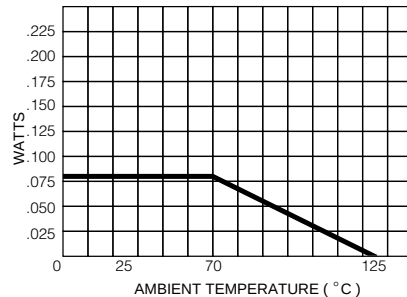
## Resistance Tolerance

Below 100 ohms .....±2 ohms  
100 ohms to 2.2 megohms .....±2%\*

## Power Rating per Resistor

3 Circuit at 70°C .....0.080 watt

## Resistor Power Temp. Derating Curve



## Popular Resistance Values (1, 4, And 2 Circuits)\*\*

| Ohms | Code | Ohms  | Code | Ohms   | Code | Ohms    | Code | Ohms      | Code |
|------|------|-------|------|--------|------|---------|------|-----------|------|
| 10   | 100  | 180   | 181  | 1,800  | 182  | 15,000  | 153  | 120,000   | 124  |
| 22   | 220  | 220   | 221  | 2,000  | 202  | 18,000  | 183  | 150,000   | 154  |
| 27   | 270  | 270   | 271  | 2,200  | 222  | 20,000  | 203  | 180,000   | 184  |
| 33   | 330  | 330   | 331  | 2,700  | 272  | 22,000  | 223  | 220,000   | 224  |
| 39   | 390  | 390   | 391  | 3,300  | 332  | 27,000  | 273  | 270,000   | 274  |
| 47   | 470  | 470   | 471  | 3,900  | 392  | 33,000  | 333  | 330,000   | 334  |
| 56   | 560  | 560   | 561  | 4,700  | 472  | 39,000  | 393  | 390,000   | 394  |
| 68   | 680  | 680   | 681  | 5,600  | 562  | 47,000  | 473  | 470,000   | 474  |
| 82   | 820  | 820   | 821  | 6,800  | 682  | 56,000  | 563  | 560,000   | 564  |
| 100  | 101  | 1,000 | 102  | 8,200  | 822  | 68,000  | 683  | 680,000   | 684  |
| 120  | 121  | 1,200 | 122  | 10,000 | 103  | 82,000  | 823  | 820,000   | 824  |
| 150  | 151  | 1,500 | 152  | 12,000 | 123  | 100,000 | 104  | 1,000,000 | 105  |

\* ±1% TOLERANCE IS AVAILABLE BY ADDING SUFFIX CODE "F" AFTER THE RESISTANCE CODE.

\*\*NON-STANDARD VALUES AVAILABLE, WITHIN RESISTANCE RANGE.

Specifications are subject to change without notice.

## Popular Resistance Values (3 Circuit)\*\*

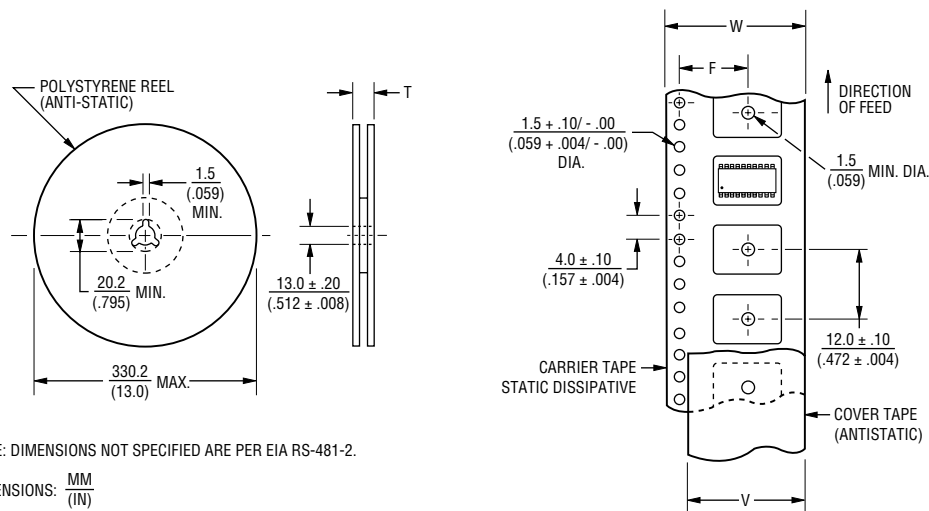
| Resistance     |                |                |                |
|----------------|----------------|----------------|----------------|
| (Ohms)         |                | Code           |                |
| R <sub>1</sub> | R <sub>2</sub> | R <sub>1</sub> | R <sub>2</sub> |
| 160            | 240            | 161            | 241            |
| 180            | 390            | 181            | 391            |
| 220            | 270            | 221            | 271            |
| 220            | 330            | 221            | 331            |
| 330            | 390            | 331            | 391            |
| 330            | 470            | 331            | 471            |
| 3,000          | 6,200          | 302            | 622            |

# Surface Mounted Ordering Guide

**BOURNS®**

| Electrical Configuration | *Circuit Codes |       | Examples                                |
|--------------------------|----------------|-------|-----------------------------------------|
|                          | Tape & Reel    | Tubes |                                         |
| Isolated                 | 1              | T01   | 4816P-1-101                             |
| Bussed                   | 2              | T02   | Isolated Circuit in Tape & Reel Package |
| Dual Terminated          | 3              | T03   | 4816P-T01-101                           |
| Adj. Isolated            | 4              | T04   | Isolated Circuit in Slide Tube Package  |

\*4816P-X-RC: To specify package type, replace "X" with appropriate "Circuit Code".



| Model | Standard Quantity<br>Per Reel | Carrier Tape<br>Width (W)              | Cover Tape<br>Width (V)    | Reel Width<br>(T)           | Pocket Center<br>(F)                   |
|-------|-------------------------------|----------------------------------------|----------------------------|-----------------------------|----------------------------------------|
| 4416P | 1,500                         | $\frac{24.0 \pm .30}{(.945 \pm .012)}$ | $\frac{21.0}{(.827)}$ NOM. | $\frac{30.4}{(1.197)}$ MAX. | $\frac{11.5 \pm .10}{(.453 \pm .004)}$ |
| 4420P | 1,500                         |                                        |                            |                             |                                        |
| 4814P | 2,000                         |                                        |                            |                             |                                        |
| 4816P |                               |                                        |                            |                             |                                        |
| 4818P |                               |                                        |                            |                             |                                        |
| 4820P |                               |                                        |                            |                             |                                        |
| 4908P | 2,500                         | 12mm                                   | Contact<br>Factory         | Contact<br>Factory          | 8mm                                    |
| 4914P |                               | 12mm                                   |                            |                             | 8mm                                    |
| 4916P |                               | 16mm                                   |                            |                             | 8mm                                    |

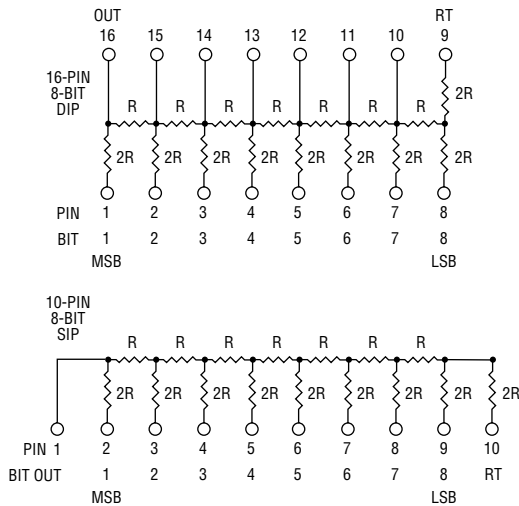
Leader Length = 500 min.  
Trailer Length = 500mm min.

} Empty Component Pockets  
Sealed with Cover Tape

# R/2R Ladder Networks

**BOURNS®**

R/2R Ladder Networks are available in both DIP and SIP (Molded or Conformal) configurations.



The R/2R Ladder Network is commonly used for Digital to Analog (D/A) conversions and Analog to Digital (A/D) conversion by successive approximations. The bits of the ladder are the points at which input signals are presented to the ladder and the output terminal (OUT) is the point at which the output is

taken from the R/2R ladder. This terminal (OUT) is commonly used to drive an operational amplifier.  $R_T$  (the terminating resistor) is always connected to ground.

Standard R/2R Ladder Networks have a resistance tolerance of  $\pm 2.0\%$  ( $\pm 1.0\%$  available on all but low profile SIPs).

## Standard R/2R Ladder Networks

Availability is as follows:

| DIP/SMD        | SIP-CONFORMAL   | SIP MOLDED     |
|----------------|-----------------|----------------|
| 14 Pin - 7 Bit | 6 Pin - 4 Bit   | 6 Pin - 4 Bit  |
| 16 Pin - 8 Bit | 7 Pin - 5 Bit   | 8 Pin - 6 Bit  |
|                | 8 Pin - 6 Bit   | 10 Pin - 8 Bit |
|                | 9 Pin - 7 Bit   |                |
|                | 10 Pin - 8 Bit  |                |
|                | 11 Pin - 9 Bit  |                |
|                | 12 Pin - 10 Bit |                |
|                | 14 Pin - 12 Bit |                |

## Resistor Power Ratings @ 70° C

|                       |       |
|-----------------------|-------|
| Low Profile SIP & DIP | .125W |
| Medium Profile SIP    | .170W |
| High Profile SIP      | .200W |

## How To Order R/2R Ladder Networks

**41 16 R - R2R - 503**

Model

- (41 = Molded DIP)
- (43 = Molded SIP)
- (44 = Wide Body SMD)
- (46 = Conformal SIP)
- (48 = SMD)

Number of Pins

Physical Configuration

- (R = Low Profile - Molded)
- (X = Low Profile - Conformal)
- (M = Medium Profile)
- (H = High Profile)
- (P = Medium Body SOIC)

Resistance/Capacitance Code

(For value of R). 2R is double this value.

- First 2 digits are significant.
- Third digit represents the number of zeros to follow.

Electrical Configuration

- R2R = R/2R Ladder Network