

## Features

- Standard E.I.A. package compatible with automatic placement equipment
- Compliant leads to reduce solder joint fatiguing
- Tape and reel packaging standard
- Marking on contrasting background for permanent identification
- Standard electrical schematics: isolated, bussed, dual terminator
- Custom circuits are available
- Now available with improved tolerance to  $\pm 0.5\%$

## 4400P Series - Thick Film Surface Mounted Wide Body

### Product Characteristics

Resistance Range .....10 ohms to 2.2 megohms  
 Maximum Operating Voltage.....50 V  
 Temperature Coefficient of Resistance  
 50 ohms and above..... $\pm 100$  ppm/ $^{\circ}\text{C}$   
 below 50 ohms..... $\pm 250$  ppm/ $^{\circ}\text{C}$   
 TCR Tracking  
 .....50 ppm/ $^{\circ}\text{C}$  max.; equal values  
 Operating Temperature  
 .....-55  $^{\circ}\text{C}$  to +125  $^{\circ}\text{C}$   
 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..... $\Delta R$  MAX.  
 Short Time Overload..... $\pm 0.25\%$   
 Load Life ..... $\pm 1.00\%$   
 Moisture Resistance ..... $\pm 0.50\%$   
 Resistance to Soldering Heat .... $\pm 0.25\%$   
 Thermal Shock..... $\pm 0.25\%$

### Physical Characteristics

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

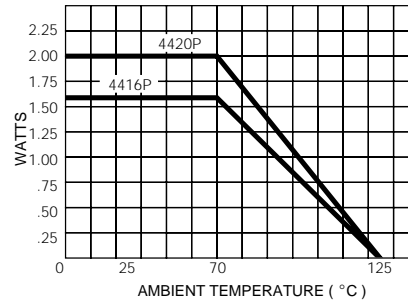
### How To Order

44 20 P - 1 - 103

Model \_\_\_\_\_  
 (44 = SMD SOL 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.  
 Resistance Tolerance \_\_\_\_\_  
 • Blank =  $\pm 2\%$  (see "Resistance Tolerance" on next page for resistance range)  
 • F =  $\pm 1\%$  (100  $\Omega$  - 1 M $\Omega$ )  
 • D =  $\pm 0.5\%$  (100  $\Omega$  - 1 M $\Omega$ )

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

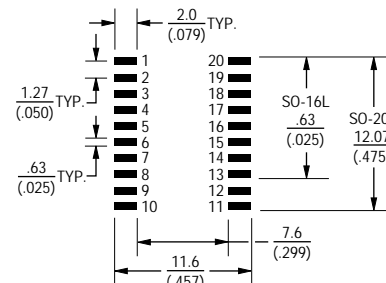
### Package Power Temp. Derating Curve



### Package Power Rating at 70 $^{\circ}\text{C}$

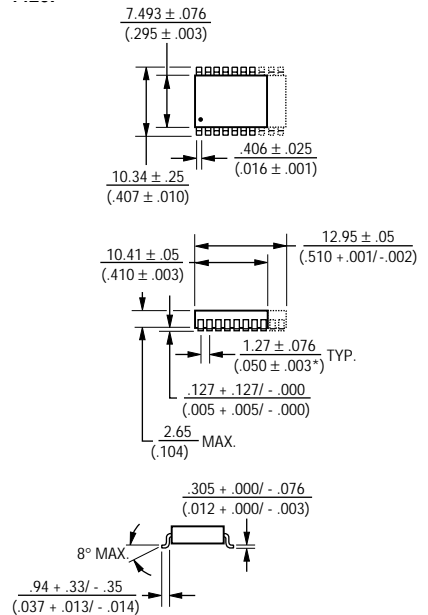
4420P.....2.00 watts  
 4416P.....1.60 watts

### 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.

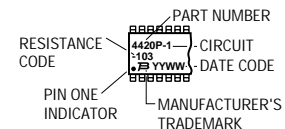
### Product Dimensions



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.

### Typical Part Marking



For information on specific applications,  
download Bourns' application notes:

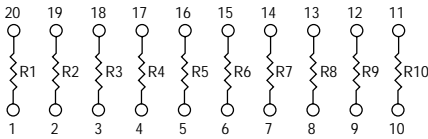
- DRAM Applications
- Dual Terminator Resistor Networks
- R/2R Ladder Networks
- SCSI Applications

# 4400P Series - Thick Film Surface Mounted Wide Body

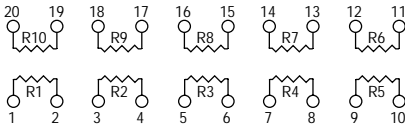


## Isolated Resistors (1 And 4 Circuits)

Model 4416P-1  
Model 4420P-1 (Shown)



Model 4416P-4  
Model 4420P-4 (Shown)



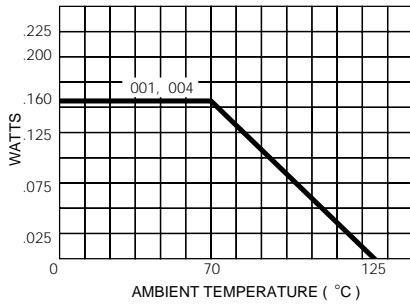
### Resistance Tolerance

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

### Power Rating per Resistor

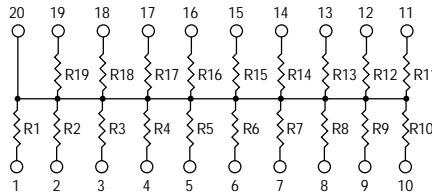
1 Circuit at 70 °C .....0.160 watt  
4 Circuit at 70 °C .....0.160 watt

### Resistor Power Temp. Derating Curve



## Bussed Resistors (2 Circuit)

Model 4416P-2  
Model 4420P-2 (Shown)



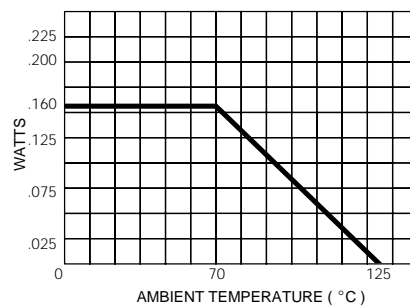
### Resistance Tolerance

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

### Power Rating per Resistor

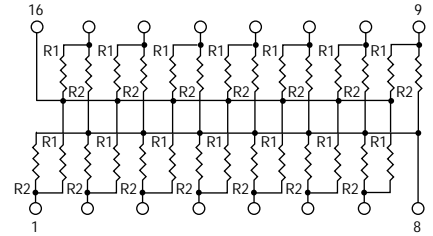
2 Circuit at 70 °C .....0.160 watt

### Resistor Power Temp. Derating Curve



## Dual Terminator (3 Circuit)

Model 4416P-3  
Model 4420P-3 (Shown)



4420P-3 terminates 16 lines,  
convenient for a 16-bit computer bus.

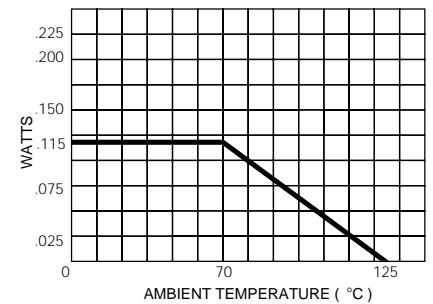
### Resistance Tolerance

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

### Power Rating per Resistor

3 Circuit at 70 °C .....0.115 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  |

\* ADD "F" AFTER RESISTANCE CODE FOR ±1 % TOLERANCE AVAILABLE FROM 100 Ω THROUGH 1 MΩ, OR ADD "D" AFTER RESISTANCE CODE FOR ±0.5 % TOLERANCE AVAILABLE FROM 100 Ω THROUGH 1 MΩ.

PART NUMBER SUFFIX EXAMPLES: -103 = 10 KΩ, ±2 %    -103F = 10 KΩ, ±1 %    -103D = 10 KΩ, ±0.5 %

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

REV. 06/03

Specifications are subject to change without notice.  
Customers should verify actual device performance in their specific applications.

### 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            |