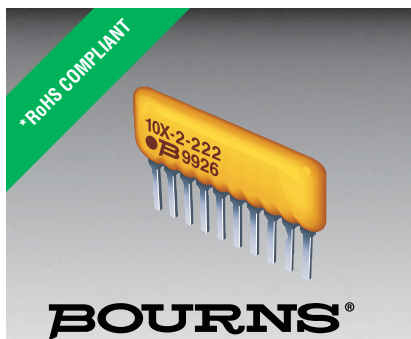




## Features

- RoHS compliant\*
- Low profile is compatible with DIPs
- Wide assortment of pin packages enhances design flexibility
- Ammo-pak packaging available
- Recommended for rosin flux and solvent clean or no clean flux processes

- Marking on contrasting background for permanent identification

## 4600X Series - Thick Film Conformal SIPs

### Product Characteristics

Resistance Range ..... 10 ohms to 10 megohms  
 Maximum Operating Voltage ..... 100 V  
 Temperature Coefficient of Resistance  
   50 Ω to 2.2 megohms ... ±100 ppm/°C  
   below 50 Ω ..... ±250 ppm/°C  
   above 2.2 megohms ..... ±250 ppm/°C  
 TCR Tracking ..... 50 ppm/°C maximum; equal values  
 Resistor Tolerance ..... See circuits  
 Insulation Resistance  
   ..... 10,000 megohms minimum  
 Dielectric Withstanding Voltage  
   ..... 200 VRMS  
 Operating Temperature  
   ..... -55 °C to +125 °C

### 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  
   ..... ±0.50 %  
 Terminal Strength ..... ±0.25 %  
 Thermal Shock ..... ±0.25 %

### Physical Characteristics

Flammability ..... Conforms to UL94V-0  
 Body Material ..... Epoxy resin  
 Standard Packaging  
   ..... Bulk, Ammo-pak available

### How To Order

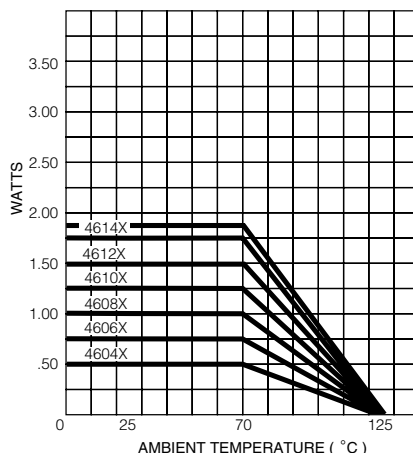
**46 06 X - 101 - 222 LF**

Model \_\_\_\_\_  
 (46 = Conformal SIP)  
 Number of Pins \_\_\_\_\_  
 Physical Configuration \_\_\_\_\_  
 (X = Thick Film Low Profile)  
 Electrical Configuration \_\_\_\_\_  
   • 101 = Bussed  
   • 102 = Isolated  
   • 104 = Dual Terminator  
   • AP1 = Bussed Ammo\*\*  
   • AP2 = Isolated Ammo\*\*  
   • AP4 = Dual Ammo\*\*  
 Resistance Code \_\_\_\_\_  
   • First 2 digits are significant  
   • Third digit represents the number of zeros to follow.  
 Resistance Tolerance \_\_\_\_\_  
   • Blank = ±2 % (see "Resistance Tolerance" on next page for resistance range)  
   • F = ±1 % (100 ohms - 5 megohms)  
 Terminations \_\_\_\_\_  
   • All electrical configurations EXCEPT 104 & AP4:  
     LF = Sn/Ag/Cu-plated (RoHS compliant)  
   • ONLY electrical configurations 104 & AP4:  
     L = Sn/Ag/Cu-plated (RoHS compliant)

Consult factory for other available options.

\*\*Available for packages with 10 pins or less.

### Package Power Temp. Derating Curve



### Package Power Ratings (Watts)

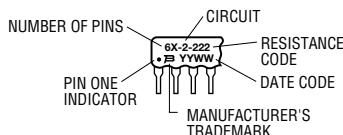
| Pkg.  | Ambient Temp.<br>70 °C | Pkg.  | Ambient Temp.<br>70 °C |
|-------|------------------------|-------|------------------------|
| 4604X | 0.50                   | 4610X | 1.25                   |
| 4605X | 0.63                   | 4611X | 1.38                   |
| 4606X | 0.75                   | 4612X | 1.50                   |
| 4607X | 0.88                   | 4613X | 1.63                   |
| 4608X | 1.00                   | 4614X | 1.75                   |
| 4609X | 1.13                   |       |                        |

### Typical Part Marking

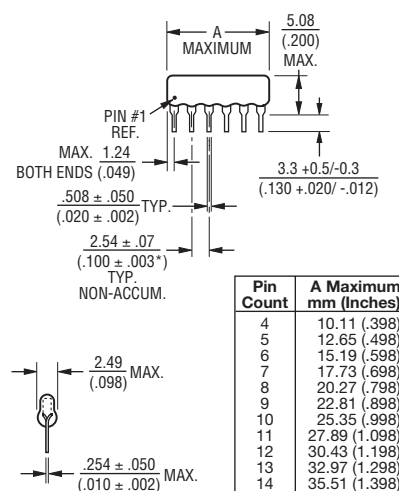
Represents total content. Layout may vary.

| Part Number     | Marking     |
|-----------------|-------------|
| 4606X-101-RC    | 6X-1-RC     |
| 4608X-102-RC    | 8X-2-RC     |
| 4610X-104-RC/RC | 10X-4-RC/RC |

RC = ohmic value, 3-digit resistance code.



### Product Dimensions



Maximum package length is equal to 2.54mm (.100") times the number of pins, less .005mm (.002").

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.

For Standard Values Used in Capacitors, Inductors, and Resistors, [click here](#).

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

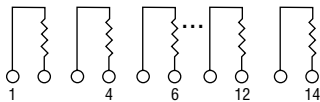
- [DRAM Applications](#)
- [Dual Terminator Resistor Networks](#)
- [R/2R Ladder Networks](#)
- [SCSI Applications](#)

## 4600X Series - Thick Film Conformal SIPs

**BOURNS®**

### Isolated Resistors (102 Circuit)

**Model 4600X-102-RC**  
4, 6, 8, 10, 12, 14 Pin



These models incorporate 2 to 7  
isolated thick-film resistors of equal  
value, each connected between two  
pins.

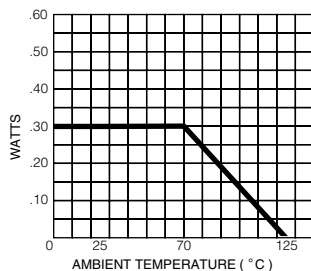
#### Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm  
50 ohms to 5 megohms .....±2 %\*  
Above 5 megohms ..... ±5 %

#### Power Rating per Resistor

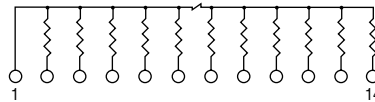
At 70 °C ..... 0.30 watt

#### Power Temperature Derating Curve



### Bussed Resistors (101 Circuit)

**Model 4600X-101-RC**  
4 through 14 Pin



These models incorporate 3 to 13  
thick-film resistors of equal value, each  
connected between a common bus  
(pin 1) and a separate pin.

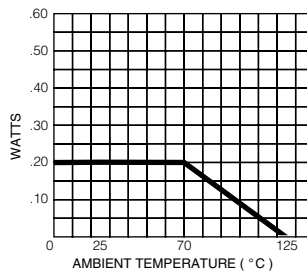
#### Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm  
50 ohms to 5 megohms .....±2 %\*  
Above 5 megohms ..... ±5 %

#### Power Rating per Resistor

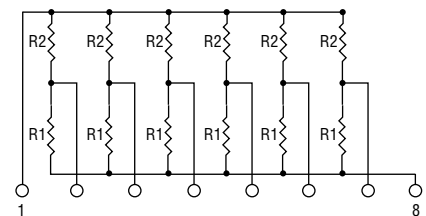
At 70 °C ..... 0.20 watt

#### Power Temperature Derating Curve



### Dual Terminator (104 Circuit)

**Model 4600X-104-R1/R2**  
4 through 14 Pin



The 4608X-104 (shown above) is an 8-  
pin configuration and terminates 6 lines.  
Pins 1 and 8 are common for ground  
and power, respectively. Twelve thick-  
film resistors are paired in series be-  
tween the common lines (pins 1 and 8).

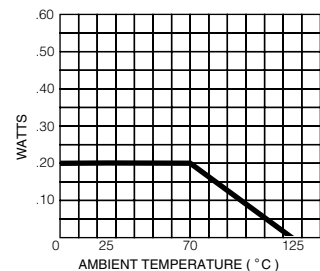
#### Resistance Tolerance

Below 100 ohms.....±2 ohms  
100 ohms to 5 megohms .....±2 %\*  
Above 5 megohms ..... ±5 %

#### Power Rating per Resistor

At 70 °C ..... 0.20 watt

#### Power Temperature Derating Curve



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

### Popular Resistance Values (104 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            |

REV. 04/10

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

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Bourns:

[4613X-101-681LF](#) [4612X-102-274LF](#) [4610X-101-111F](#) [4610X-101-271](#) [4610X-102-563F](#) [4610X-102-564](#) [4610X-R2R-471](#) [4610X-102-151](#) [4610X-102-111](#) [4610X-102-121](#) [4608X-102-184LF](#) [4610X-101-513](#) [4610X-102-101](#) [4610X-102-181](#) [4610X-101-563](#) [4606X-101-562LF](#) [4606X-102-562LF](#) [4608X-101-184LF](#) [4610X-102-161](#) [4610X-101-123](#) [4610X-101-183](#) [4609X-101-394LF](#) [4608X-101-561LF](#) [4608X-102-561LF](#) [4608X-101-101LF](#) [4608X-102-101LF](#) [4605X-101-333LF](#) [4611X-101-332LF](#) [4610X-101-153](#) [4611X-101-392LF](#) [4612X-101-824LF](#) [4608X-102-181LF](#) [4608X-101-181LF](#) [4608X-102-121LF](#) [4612X-102-824LF](#) [4610X-AP1-473](#) [4614X-102-124LF](#) [4608X-101-121LF](#) [4605X-101-393LF](#) [4614X-101-124LF](#) [4610X-AP1-681](#) [4605X-102-393LF](#) [4610X-101-103](#) [4608X-102-151LF](#) [4608X-101-151LF](#) [4610X-101-683LF](#) [4610X-102-683LF](#) [4605X-102-333LF](#) [4614X-102-182LF](#) [4614X-101-182LF](#) [4614X-101-122LF](#) [4614X-102-122LF](#) [4610X-AP1-201](#) [4612X-102-822LF](#) [4610X-AP1-202](#) [4614X-101-152LF](#) [4610X-101-251F](#) [4612X-101-822LF](#) [4614X-102-152LF](#) [4608X-102-104LF](#) [4610X-AP1-273](#) [4608X-101-104LF](#) [4613X-101-474LF](#) [4605X-102-222LF](#) [4608X-101-224LF](#) [4610X-102-565](#) [4610X-AP1-562](#) [4610X-101-224F](#) [4608X-102-224LF](#) [4610X-102-562](#) [4606X-101-564LF](#) [4605X-101-272LF](#) [4610X-102-203LF](#) [4610X-102-512](#) [4610X-AP1-512](#) [4611X-101-561LF](#) [4606X-102-564LF](#) [4610X-101-273LF](#) [4610X-102-273LF](#) [4610X-101-203LF](#) [4610X-101-154LF](#) [4610X-102-223LF](#) [4610X-102-154LF](#) [4605X-102-272LF](#) [4605X-101-222LF](#) [4610X-101-223LF](#) [4612X-102-564LF](#) [4604X-102-105LF](#) [4604X-102-102LF](#) [4612X-101-564LF](#) [4610X-101-822LF](#) [4608X-101-273LF](#) [4608X-102-273LF](#) [4608X-102-202LF](#) [4610X-102-822LF](#) [4614X-102-223LF](#) [4614X-101-203LF](#) [4614X-101-223LF](#) [4614X-102-203LF](#) [4605X-102-100LF](#)