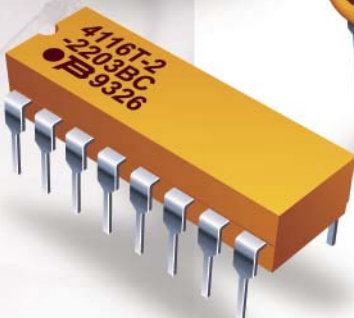
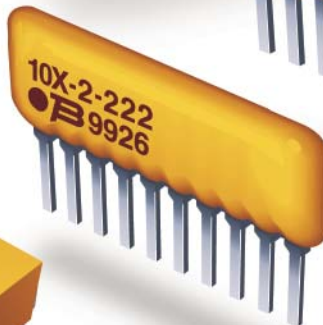
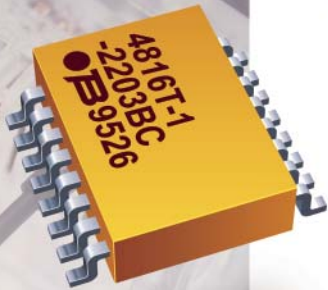
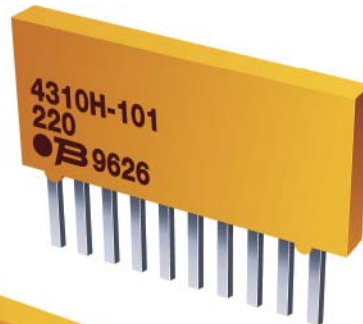
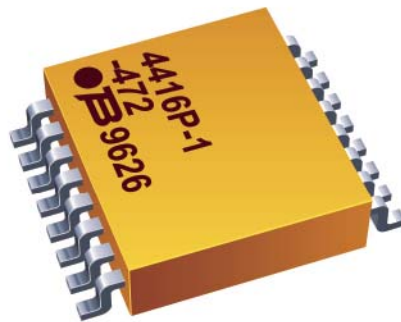


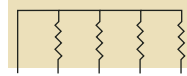
Bourns® Resistor Networks

Short Form Catalog



What is a Resistor Network?

A resistor network is a single package that contains two or more resistors. The package will include multiple leads by which the network can be made part of a larger circuit.



Resistor Network

Why Networks?

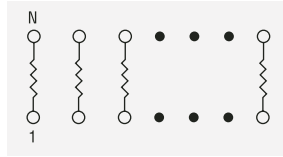
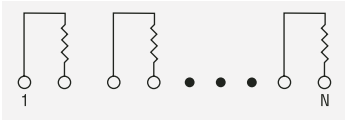
- *Board Space Reduction*
- *Improved Reliability*
- *Fewer Solder Connections*
- *Improved TCR Tracking*
- *Improved Resistor Tolerance Matching*
- *Lower Installed Cost*
- *Part Count Reduction*
- *Increased Factory Throughput*

Network Solutions

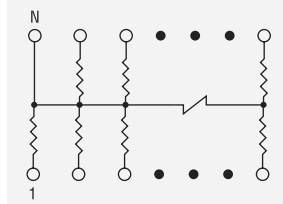
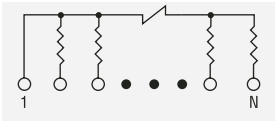
- **Types Available:** *Thick-Film Resistor and RC Networks, Precision Thin-Film-on-Ceramic Resistors, Thin-Film-on-Silicon (please refer to Bourns® Integrated Passive & Active Devices Short Form Catalog)) Resistors and Capacitors.*
- **Mounting:** *Surface Mount and Through-hole.*
- **Pin Counts:** *4 to 20.*
- **Functions:** *EMI/RFI Filters, T-Filters, IEEE Filters, Memory Termination, RC Terminators, AC Terminators, V.35 Terminators, ECL Termination, R2R Ladders, SCSI Terminators, Pull Up/Pull Down, Current Limiting.*
- **Standard Circuits:** *Bussed, Isolated or Dual Terminator.*
- **Thick-film and Precision Thin-film Package**
Types: *Through-hole: Conformal SIP, Molded SIP, Molded DIP. Surface Mount: Wide Body SOIC, Medium Body SOIC, Narrow Body SOIC, QSOP (Narrow Body SOIC and QSOP - Silicon substrate).*
- **Packaging:** *Tape and Reel, Ammo Pack, Plastic Tubes, Bulk.*
- **Applications:** *Bourns® Networks benefit space-sensitive applications by minimizing space, reducing costs, increasing board yields and reliability by reducing component count.*

Standard Circuits

Isolated

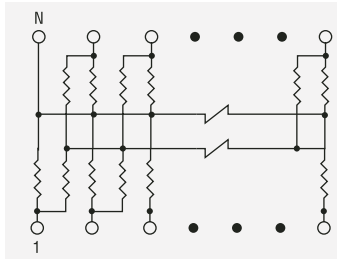
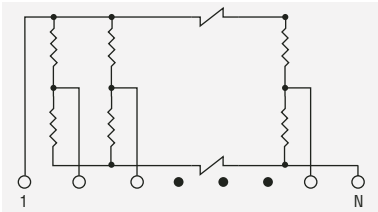


Bussed



Dual Terminator

Not available in thin-film



Application Specific Circuits

- *AC Terminators*
- *CMOS Terminators*
- *EMI/RFI Filters*
- *R2R Ladder Networks*
- *Single Ended SCSI Terminators*
- *Differential SCSI Terminators*

Common Characteristics of Resistor Networks

Tolerance (Absolute Tolerance)

The permitted variation from the specified value of a single resistor. Defined as a \pm percentage of the ideal value, e.g. $\pm 5\%$.

Ratio Tolerance

The permitted variation from the specified ratio formed by two or more values within a resistor network. Defined as a \pm percentage of the ideal ratio, e.g. $\pm 0.1\%$.

TCR (Absolute TC; Temperature Coefficient of Resistance)

The expected change in value of a single resistor in response to a change in temperature. Usually defined in units of PPM/ $^{\circ}$ C. For reference:
 $\pm 100 \text{ PPM}/^{\circ}\text{C} = 0.01\%/^{\circ}\text{C}$.

TCR Tracking (Ratio TC)

The expected change in the ratio formed by two or more resistors in response to a change in temperature. Usually defined in units of PPM/ $^{\circ}$ C.

Networks Capabilities

Custom Networks Guidelines

- All standard catalog package styles
- Minimum order as low as 2,000 pieces for resistor networks
- Within capability matrix guidelines

Special features include:

- Pin length - As short as 0.100 “, as long as 0.200 “
- Special ratios - As tight as $\pm 0.05\%$
- Custom marking
- Custom values/circuits

SMT – DIP Package

Thick-Film DIP: Two models

- 44xxP (0.295 inch wide)
- 48xxP (0.220 inch wide)

Thin-Film DIP: Two models

- 44xxT (0.295 inch wide)
- 48xxT (0.220 inch wide)

Through-Hole SIP & DIP Packages

Thick-Film DIP:

- 41xxR

Thick-Film SIP: Two models (Three heights per model)

- 46xxX, M, H – Conformal Coat
- 43xxR, M, H – Molded

Thin-Film DIP & SIP: Two models

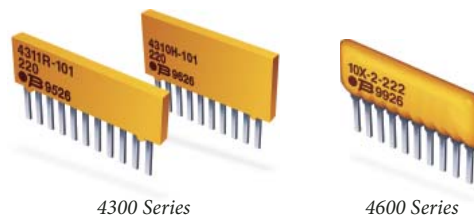
- 41xxT (DIP)
- 43xxT,S,K (SIP, Three heights)

Product Selection Thick vs. Thin-Film

	Thick-film (Ceramic)	Thin-film (Ceramic)	Thin-film (Silicon)
Resistance Range	1	2	3
Power	1	2	2
Broadest Package Selection	1	2	3
Smallest Packages	2	2	1
Precision	3	2	1
Cost	1	3	2
TCR/Tracking	3	1	2
Density	2	3	1
Component Integration	1	2	3

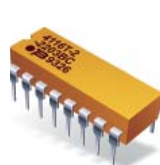
Key: 1= best

Note: Please refer to Integrated Passive & Active Devices Short Form Catalog for Thin-Film-on-Silicon



Thick-Film Resistors SIP

Series	Mounting	Available Number of Pins	Max. Lead-Lead Spacing (mm)	Resistance Range (ohms)	Max. Voltage (Volts)	Absolute TCR (50 to 2.2M ohms)	Ratio TCR Standard	Max. Package Power (W)	Resistor Power Rating (W)
Molded Encapsulate									
4300R	TH	11	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	1.38	.20 -.30
4300M	TH	10	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	1.50	.25 -.40
4300H	TH	10	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	2.00	.30 -.50
Conformal Coat Encapsulate									
4600X	TH	14	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	1.75	.20 -.30
4600M	TH	14	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	2.10	.25 -.40
4600H	TH	14	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	2.80	.30 -.50



4100 Series



4400 Series



4800 Series

Thick-Film Resistors DIP

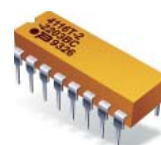
Series	Mounting	Available Number of Pins	Max. Lead-Lead Spacing (mm)	Resistance Range (ohms)	Max. Voltage (Volts)	Absolute TCR (50 to 2.2M ohms)	Ratio TCR Standard	Max. Power (Watts)	Resistor Power Rating (W)
Molded Encapsulate									
4100R	TH	20	2.54	10 to 10M	100	±100 PPM/°C	±100 PPM/°C	2.80	.125-.25
4400P	SMT	20	1.27	10 to 2.2M	50	±100 PPM/°C	±100 PPM/°C	2.00	.115 - .16
4800P	SMT	20	1.27	10 to 2.2M	50	±100 PPM/°C	±100 PPM/°C	1.60	.08 - .16



4300 Series

Thin-Film Resistors on Ceramic SIP

Series	Mounting	Available Number of Pins	Max. Lead-Lead Spacing (mm)	Resistance Range (ohms)	Max. Voltage (Volts)	Absolute TCR (within Resistance Range)	Ratio TCR Standard	Max. Power (Watts)	Resistor Power Rating (W)
Molded Encapsulate									
4300T	TH	11	2.54	20 to 200K	50	±100 - ±25 PPM/°C	±5 PPM/°C	1.38	.10 -.18
4300S	TH	11	2.54	20 to 200K	50	±100 - ±25 PPM/°C	±5 PPM/°C	1.50	.12 - .20
4300K	TH	11	2.54	20 to 200K	50	±100 - ±25 PPM/°C	±5 PPM/°C	2.00	.15 - .25



4100 Series



4400 Series



4800 Series

Thin-Film Resistors on Ceramic DIP

Series	Mounting	Available Number of Pins	Max. Lead-Lead Spacing (mm)	Resistance Range (ohms)	Max. Voltage (Volts)	Absolute TCR (within Resistance Range)	Ratio TCR Standard	Max. Power (Watts)	Resistor Power Rating (W)
Molded Encapsulate									
4100T	TH	20	2.54	50 to 100K	50	±100 - ±25 PPM/°C	±5 PPM/°C	2.80	.12 - .20
4400T	SMT	20	1.27	10 to 150K	50	±100 - ±25 PPM/°C	±5 PPM/°C	2.00	.10 - .15
4800T	SMT	20	1.27	100 to 100K	50	±100 - ±25 PPM/°C	±5 PPM/°C	1.60	.08 - .10

Note: Standard Resistor Tolerance is ± 2 %; add "F" after resistor code for ± 1 % (100 to 1 M ohms); or add "D" after resistor code for ± 0.5 % (100 to 1 M ohms)



4400 Series



4800 Series

How to Order

4400P (DIP Surface Mount, Wide Body) / **4800P** (DIP Surface Mount, Medium Body)

44xx/48xxP - 1- 152

Model

- 44 = SMD SOL Package
- 48 = SOM Package

Number of Pins

- 16/20 (44 Series)
- 14/16/18/20 (48 Series)

Type

- P = Thick-Film ; T = Thin-Film

Electrical Configuration

- 1 or 4 = Isolated
- 2 = Bussed
- 3 = Dual Terminator

Resistance Code

- First 2 digits are significant; 3rd digit is the number of zeroes to follow (Thin film only) First 3 digits are significant; 4th digit is the number of zeroes to follow

Resistance Tolerance

- Blank = 2 %
- F = 1 % (100 to 1 Megohm)
- D = 0.5 % (100 to 1 Megohm)

Terminations

- LF = Tin-Plated (Lead Free)
- Blank = Solder-Plated (Tin Lead); 63 % Tin 37 % Lead



4100 Series

4100R (DIP Through-hole)

41XX R - 1 - 152

Model

- 41 = Molded DIP

Number of Pins

- 08/14/16/18/20

Physical Configuration

- R= Thick-Film Low Profile

Electrical Configuration

- 1 = Isolated
- 2 = Bussed
- 3 = Dual Terminator

Resistance Code

- First 2 digits are significant; 3rd digit is the number of zeroes to follow

Resistance Tolerance

- Blank = 2 %
- F = 1 % (100 to 1 Megohm)
- D = 0.5 % (100 to 1 Megohm)

Terminations

- LF = Tin-Plated (Lead Free)
- Blank = Solder-Plated (Tin Lead); 90 % Tin 10 % Lead



4300 Series



4600 Series

4300H/M/R (SIP Surface Mount, High/Medium/Low Profile)

4600H/M/X (SIP Surface Mount, High/Medium/Low Profile)

46XX H - 101 - 222

Model

- 43 = Molded SIP
- 46 = Conformal SIP

Number of Pins

- 6 to 11 (4300); 4 to 14 (4600)

Physical Configuration

- H = High Profile
- M = Medium Profile
- X = Low Profile (4600) or R = Low Profile (4300)

Electrical Configuration

- 101/AP1 = Bussed / Bussed Ammo
- 102/AP2 = Isolated / Isolated Ammo
- 104/AP4 = Dual Terminator / Dual Ammo

Resistance Code

- First 2 digits are significant; 3rd digit is the number of zeroes to follow

Resistance Tolerance

- Blank = 2 %
- F = 1 % (100 to 1 Megohm)
- D = 0.5 % (100 to 1 Megohm)

Terminations

- LF = Tin-Plated (Lead Free) (except 104 & AP4)
- L = Tin-Plated Lead Free (Only 104 & AP4)
- Blank = Solder-Plated (Tin Lead); 90 % Tin 10 % Lead (4300); 96.5 % Tin 3.0 % Silver 0.5 % Copper (4600)

How to Order

Thin-Film

4100T (Thin-Film Molded DIP)

4300T, S, K (Thin-Film Molded SIP Low/Medium/High Profile)

4400T (Wide Body)

4800T (Medium Body)



4100 Series



4300 Series



4400 Series



4800 Series

4116 T - 2 - 2222 F A B

Model

- 41 = Molded DIP
- 43 = Molded SIP
- 44 = SOL Wide Body Gull Wing
- 48 = SOM Medium Body Gull Wing

Number of Pins

- 8/14/16/18/20 (4100T Series)
- 4/6/8/9/10/11 (4300T Series)
- 16/20 (4400T Series)
- 14/16/18/20 (4800T Series)

Physical Configuration

- T = Thin Profile

4300:

- K = High Profile
- M = Medium Profile
- T = Low Profile

Electrical Configuration

- 1 = Isolated
- 2 = Bussed

4100T Series:

- 101 = Isolated
- 102 = Bussed
- 106 = Series

Resistance Code

- First 3 digits are significant; 4th digit is the number of zeros to follow

Absolute Tolerance Code

- B = 0.1 %
- D = 0.5 %
- F = 1 %

Temperature Coefficient Code (PPM/°C)

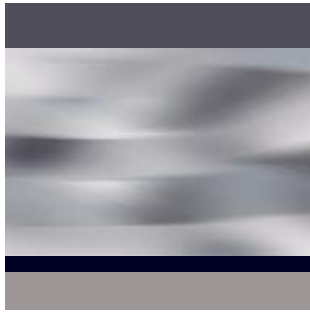
- A = 100
- B = 50
- C = 25

Ratio Tolerance (Optional)

- A = 0.05 % to R1
- B = 0.1 % to R1
- D = 0.5 % to R1

Terminations

- L = Tin-Plated Lead Free
- Blank = Solder-Plated (Tin Lead); 90 % Tin 10 % Lead (4100 & 4300); 63 % Tin 37 % Lead (4400 and 4800)



Worldwide Sales Offices

Country	Phone	Fax
Benelux:	+41 (0)41 768 5555	+41 (0)41 768 5510
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China:	+86 21 64821250	+86 21 64821249
France:	+33 (0)2 5473 5151	+33 (0)2 5473 5156
Germany:	+49 (0)69 800 78212	+49 (0)69 800 78299
Ireland/UK:	+44 (0)1276 691087	+44 (0)1276 691088
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Japan:	+81 49 269 3204	+81 49 269 3297
Malaysia (KL Office):	+60 3 71183138	+60 3 71183139
Malaysia (Penang Office):	+60 4 6581771	+60 4 6582771
Singapore:	+65 63461933	+65 63461911
Switzerland:	+41 (0)41 768 5555	+41 (0)41 768 5510
Taiwan:	+886 2 25624117	+886 2 25624116
UK/Ireland:	+44 (0)1276 691087	+44 (0)1276 691088
USA:	+1-951-781-5500	+1-951-781-5006

Non-Listed European

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Technical Assistance

Region	Phone	Fax
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Europe:	+41 (0)41 768 5555	+41 (0)41 768 5510
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Reliable Electronic Solutions

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