



**Product Family:** [Ultra Precision SMT Resistor Networks](#)

**Part Number Series:** [BR Standard Series \(BGA Style\)](#)

	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>High Purity Alumina Substrate</li> <li>Ni alloy thin-film resistive element</li> <li>BGA Package</li> <li>Available in RoHS (Sn96.5/Ag3.0/Cu0.5) or Non-RoHS (Sn63/Pb37)</li> </ul>	<p><b>Features:</b></p> <ul style="list-style-type: none"> <li>Various Sizes</li> <li>2 to 8 resistors/package</li> <li>Resistance tolerances to 0.02%</li> <li>Tracking tolerances to 0.02%</li> <li>TCR as low as <math>\pm 5</math> ppm/<math>^{\circ}</math>C</li> <li>TCR tracking of <math>\pm 1</math>, <math>\pm 2</math> or <math>\pm 5</math> ppm/<math>^{\circ}</math>C</li> </ul>
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**Description:**

These surface mount resistor networks feature BGA style electrodes in various product sizes. BGA packages save space and allow for lower thermal resistance between the package and circuit board. Because all of the resistors are fabricated together, these networks offer extremely tight tracking and offers TCR tracking tolerances that are difficult to achieve by using individual discrete resistors. The number of resistors in the package is either 2, 4 or 8.

**Product Dimensions and Schematics (All dimensions in inches):**

B1/BR01 Series	B2/BR02 Series	B3/BR03 Series	B4/BR04 Series
<p>Dimensions: 0.150 <math>\pm</math> 0.008, 0.065 max, 0.250 <math>\pm</math> 0.020, 0.028 Dia, 0.100. Marking: BR01 <math>\emptyset</math>M, 1002/1002.</p> <p>Schematic: Two resistors R1 and R2 in parallel between terminals A/B and C.</p>	<p>Dimensions: 0.259 <math>\pm</math> 0.008, 0.065 max, 0.400 <math>\pm</math> 0.020, 0.028 Dia, 0.209, 0.350 (0.05 <math>\times</math> 7), 0.050 <math>\times</math> 3.</p> <p>Marking: BR02 <math>\emptyset</math>M, 1002/1002.</p> <p>Schematic: Eight resistors R1 through R8 in parallel between terminals A and B.</p>	<p>Dimensions: 0.259 <math>\pm</math> 0.008, 0.065 max, 0.200 <math>\pm</math> 0.008, 0.028 Dia, 0.209, 0.150 (0.050 <math>\times</math> 3).</p> <p>Marking: BR03 <math>\emptyset</math>M, 1002/1002.</p> <p>Schematic: Three resistors R1, R2, and R3 in parallel between terminals A and B.</p>	<p>Dimensions: 0.098 <math>\pm</math> 0.008, 0.026 max, 0.126 <math>\pm</math> 0.008, 0.028 Dia, 0.100, 0.050, 0.012 Dia.</p> <p>Marking: 04 <math>\emptyset</math>M.</p> <p>Schematic: Two resistors R1 and R2 in parallel between terminals B and A.</p>

Note: Marking shown in diagrams above is reflective of Non-RoHS packages. Refer to following pages for full description of marking for both RoHS compliant and non-RoHS compliant products.

**Recommended Land Patterns:**

Please refer to the following pages.

**RoHS Compliant Part Numbering:** Ex: B3BA1002/1002YR1-C

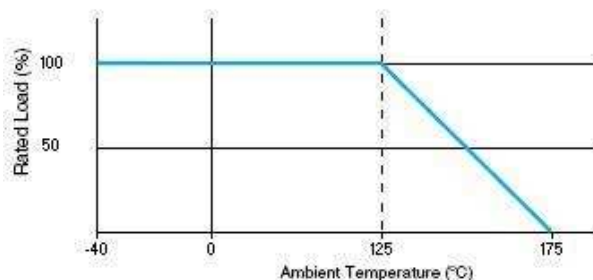
Package Type	Absolute Resistance Tolerance	Resistance Ratio Tolerance	Resistance Values	Absolute TCR Tolerance	TCR Tracking Tolerance (See notes 1, 2)	Tape and Reel Qty	RoHS Indicator
B1 B2 B3 B4	Q = 0.02% A = 0.05% B = 0.10% C = 0.25% D = 0.50%	Q = 0.02% A = 0.05% B = 0.10% C = 0.25% D = 0.50% Z = NONE	<b>XXXX / XXXX</b> R1 value / R2 value The first 3 digits are significant figures. The last digit specifies the number of zeros. For values <100Ω, "R" is used to designate the decimal position. Multiple values are separated by a slash (/). e.g. 1001 = 1,000Ω 75R0 = 75.0Ω 1001/1002 = 1,000/10,000Ω	M = ±5ppm/°C Y = ±10ppm/°C E = ±25ppm/°C	X = ±1ppm/°C R = ±2ppm/°C M = ±5ppm/°C	1 = 100/reel 5 = 500/reel A = 1,000/reel	-C
BR01 BR02 BR03 BR04	Q = 0.02% A = 0.05% B = 0.10% C = 0.25% D = 0.50%	Q = 0.02% A = 0.05% B = 0.10% C = 0.25% D = 0.50% Z = NONE	<b>XXXX / XXXX</b> R1 value / R2 value The first 3 digits are significant figures. The last digit specifies the number of zeros. For values <100Ω, "R" is used to designate the decimal position. Multiple values are separated by a slash (/). e.g. 1001 = 1,000Ω 75R0 = 75.0Ω 1001/1002 = 1,000/10,000Ω	M = ±5ppm/°C Y = ±10ppm/°C E = ±25ppm/°C	X = ±1ppm/°C R = ±2ppm/°C M = ±5ppm/°C	1 = 100/reel 5 = 500/reel A = 1,000/reel	N/A (leave blank)

**Non-RoHS Part Numbering:** Ex: BR03BA1002/1002YR1**Notes:**

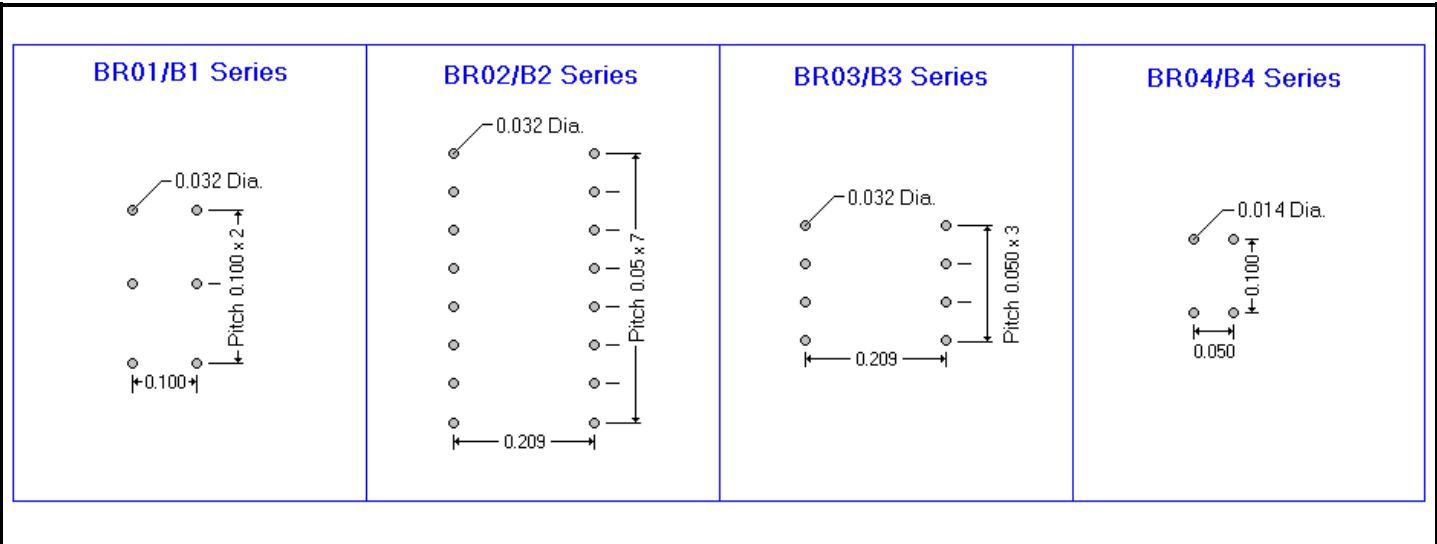
- 1) 1ppm/°C TCR Tracking available only with identical resistance values
- 2) Ratio values greater than 50:1 only available with 5ppm/°C TCR Tracking tolerance
- 3) Certain combinations of resistance values may incur initial setup costs.

**Electrical Specifications:**

Package Type	B1/BR01			B2/BR02			B3/BR03			B4/BR04		
Dimensions in Inches (L x W x H)	0.250 x 0.150 x 0.065			0.400 x 0.259 x 0.065			0.200 x 0.259 x 0.065			0.126 x 0.098 x 0.026		
Dimensions in mm (L x W x H)	6.35 x 3.81 x 1.65			10.16 x 6.57 x 1.65			5.08 x 6.57 x 1.65			3.20 x 2.50 x 0.65		
Resistance Range (Ω)	10~40K			10~32K			10~32K			10~10K		
	10~<20	20~<100	100~max	10~<20	20~<100	100~max	10~<20	20~<100	100~max	10~<20	20~<100	100~max
Absolute Resistance Tolerance (± %)	0.05, 0.10, 0.25, 0.50	0.02, 0.05, 0.10, 0.25, 0.50		0.05, 0.10, 0.25, 0.50	0.02, 0.05, 0.10, 0.25, 0.50		0.05, 0.10, 0.25, 0.50	0.02, 0.05, 0.10, 0.25, 0.50		0.05, 0.10, 0.25, 0.50	0.02, 0.05, 0.10, 0.25, 0.50	
Resistance ratio (± %)	0.02, 0.05, 0.10, 0.25, 0.50, None			0.02, 0.05, 0.10, 0.25, 0.50, None			0.02, 0.05, 0.10, 0.25, 0.50, None			0.02, 0.05, 0.10, 0.25, 0.50, None		
Absolute TCR (± ppm/°C)	25		5, 10, 25	25		5, 10, 25	25		5, 10, 25	25		5, 10, 25
Tracking TCR (± ppm/°C)	5	2, 5	1, 2, 5	5	2, 5	1, 2, 5	5	2, 5	1, 2, 5	5	2, 5	1, 2, 5
Power Rating / Package	0.30 watts @125°C (Refer to derating curve)			0.80 watts @125°C (Refer to derating curve)			0.40 watts @125°C (Refer to derating curve)			0.10 watts @125°C (Refer to derating curve)		
Operating Temp Range	-40~175°C (Refer to derating curve)											
Packaging	100, 500, 1,000 pcs/reel											

**Derating Curve:**

**Recommended Land Patterns (All dimensions in Inches):**

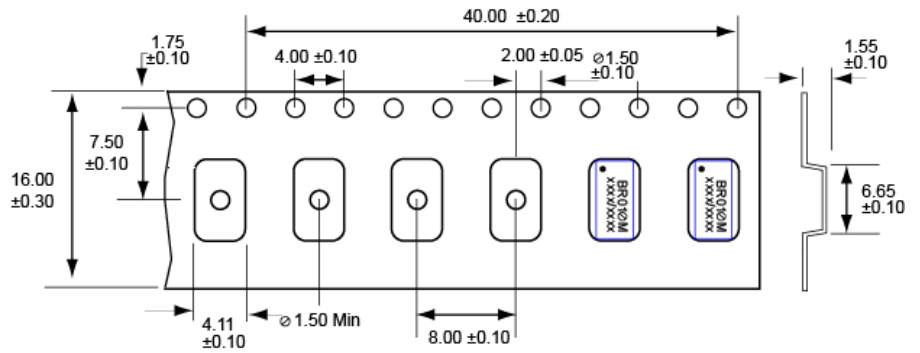
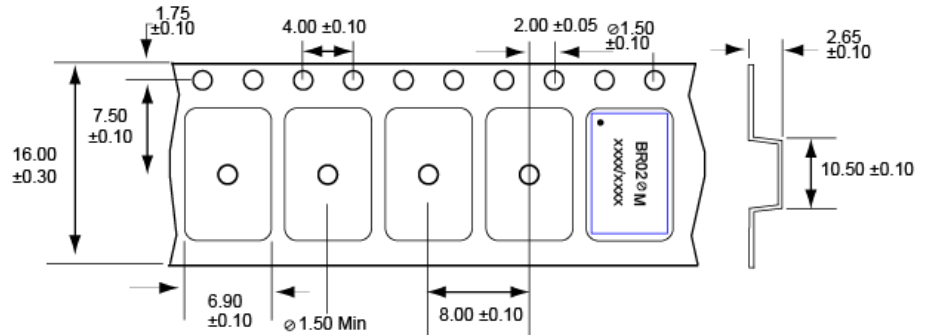
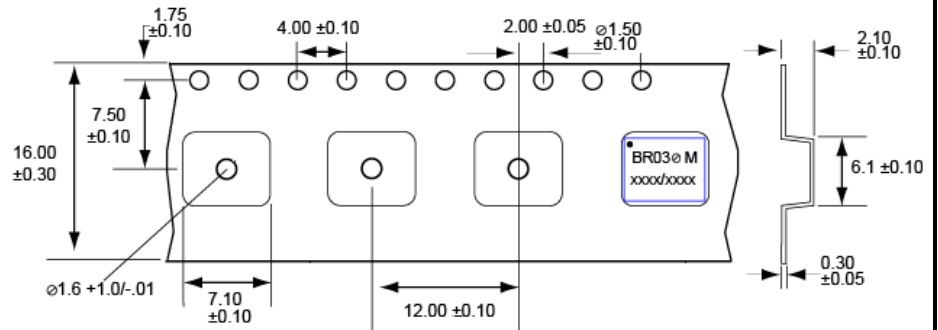
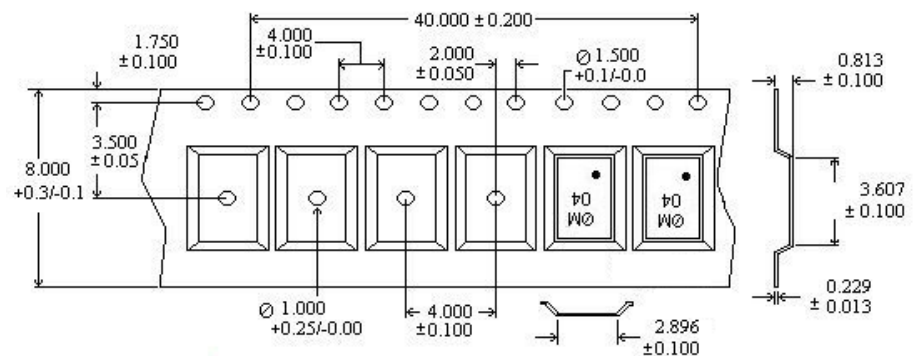


**Product Marking for RoHS Compliant Products:**

<p><b>B1 Series Marking</b></p>	<p><b>B2 Series Marking</b></p>	<p><b>B3 Series Marking</b></p>	<p><b>B4 Series Marking</b></p>
<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• 2 digit series code</li> <li>• Absolute resistance tolerance code</li> <li>• Tracking tolerance code</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• Two 4 digit resistance codes</li> </ul>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• 2 digit series code</li> <li>• Absolute resistance tolerance code</li> <li>• Tracking tolerance code</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• Two 4 digit resistance codes</li> </ul>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• 2 digit series code</li> <li>• Absolute resistance tolerance code</li> <li>• Tracking tolerance code</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• Two 4 digit resistance codes</li> </ul>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• 2 digit series code</li> </ul>

**Product Marking for Non-RoHS Compliant Products:**

<p><b>BR01 Series Marking</b></p>	<p><b>BR02 Series Marking</b></p>	<p><b>BR03 Series Marking</b></p>	<p><b>BR04 Series Marking</b></p>
<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• 4 digit series code</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• Two 4 digit resistance codes</li> </ul>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• 4 digit series code</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• Two 4 digit resistance codes</li> </ul>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• 4 digit series code</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• Two 4 digit resistance codes</li> </ul>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>• Pin A1 identifier</li> <li>• TFT "Don't Stop" logo</li> <li>• 1 digit manufacturing code</li> <li>• 2 digit series code</li> </ul>

**Packaging** (All dimensions in millimeters):**B1/BR01  
Series****B2/BR02  
Series****B3/BR03  
Series****B4/BR04  
Series****Notes for all product types:**

- 1) All dimensions are in millimeters
- 2) Drawings are not to scale
- 3) All taping done in accordance with EIA 481 standards. Pieces taped with the marking facing up and showing through the cover tape.
- 4) Labels will contain the TFT part number and quantity of pieces taped.