

100 & 200 Series

Bulk Ceramic Axial Lead Resistors

100 & 200 Series Axial Leaded Non-Inductive Bulk Ceramic Resistors provide excellent performance where high peak power or high-energy pulses must be handled in a small size. The advantage of the bulk construction is that it produces an inherently non-inductive resistor; and it allows energy and power to be uniformly distributed through the entire ceramic resistor body — there is no film or wire to fail. We offer a full line of rugged, reliable ceramic resistors — including custom designs. Three distinctly different ceramic materials are available in each size to afford the designer with unique components to meet the most demanding requirements.

As alternatives to hard to find carbon composition resistors, composition resistors can be used as drop-in replacements for 1 and 2 watt sizes. Much larger sizes, up to 70 watts in a single component, are available for new or re-designs where an array of smaller resistors may have been previously required.



FEATURES

- Non-inductive “bulk ceramic” resistor
- Uniform distribution of energy throughout resistor body
- Replacement of Carbon Composition Resistors
- Large peak energy in small size
- High power dissipation (Type SP)
- High voltage and energy absorption (Type AS)
- Through-hole or post mountable

MATERIAL TYPES

TYPE SP

Withstands high operating temperatures resulting in high power dissipation. Maximum continuous operating temperature is specified at 350°C. This type is suitable for use in oil without an oil-resistant coating.

Applications

- Soft Start/In-rush Limiters
- RC Snubber Circuits
- Spark-Gap Limiters
- Parasitic Suppression
- High Voltage Power Supplies

TYPE AS

Best suited for high energy and voltage pulse applications. Maximum continuous operating temperature is specified at 230°C. The standard dielectric coating is recommended for use in air, and the oil-resistant coating is recommended for use in oil.

- Pulse Waveform
- EMI/EFI Test Circuits
- RF Dummy Load Circuits
- Capacitor Dump Circuits

TYPE BA

Best suited for high energy and voltage pulse applications where the required resistance value is above the resistance values available in Type SP and Type AS resistors. Maximum continuous operating temperature is specified at 230°C. The standard dielectric coating is recommended for use in air, and the oil-resistant coating is recommended for use in oil.

Applications

- DC Coupling and Filter Cap Discharge
- Voltage Balancing
- Pre-charge / Inrush Limit
- Voltage Divider
- Filter
- Snubber
- Crowbar
- Measuring
- EMI / EFI Test Circuits
- Test Loads

(continued)

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Bulk Ceramic Axial Lead Resistors

SPECIFICATIONS

Series	Res. range (Ω)	Avg. power rating ¹ (W)	Rated peak energy ² (J)	Rated peak voltage ²	Rated peak current ³ (A)	Typ. body weight ⁴ (g)
231AS	25-6,350	1.5	75	1,500V	90	0.44
231SP	1-1,000	2.5	15	375V	350	0.44
231BA	6K-390K	1.2	35	1200V		
233AS	6-1,800	2	170	1,100V	150	1.2
233SP	1-120	7	20	375V	550	1.2
233BA	1.8K-150K	1.6	80	900V		
234AS	12-5,000	3	275	2500V	150	1.9
234SP	1-330	10	30	500V	550	1.9
234BA	4K-300K	2.4	140	2,000V		
250AS	4-1,200	2.5	260	1,500V	190	1.9
250SP	1-150	8.5	20	375V	700	1.5
250BA	1K-130K	2	130	1,200V		
251AS	8-2,300	3.5	400	2,500V	190	3.0
251SP	1-330	12	30	500V	700	2.4
251BA	2K-190K	3	200	2,000V		
102AS	30-9,000	5	600	3,000V	150	3.8
102SP	1-700	15	50	1,000V	550	3.8
102BA	9K-700K	4	300	2,400V		
252AS	20-5,800	6	900	3,000V	190	6.0
252SP	1-460	18	75	1,000V	700	4.8
252BA	5K-450K	5	450	2,400V		
104AS	55-18,000	9	1,200	9,000V	150	7.6
104SP	2-1,500	25	95	3,600V	550	7.6
104BA	18K-1M	7	600	7,000V		
254AS	36-12,000	11	1,800	9,000V	190	12.0
254SP	2-1,000	31	150	3,600V	700	9.6
254BA	12K-970K	9	900	7,000V		
106AS	90-30,000	13	1,900	15,000V	150	11.4
106SP	3-2,400	36	155	5,000V	550	11.4
106BA	30K-1M	10	1000	12,000V		
256AS	60-20,000	16	2,900	15,000V	190	18.0
256SP	2-1,600	45	240	5,000V	700	14.4
256BA	20K-1M	13	1500	12,000V		
109AS	150-48,000	20	3,000	25,000V	150	17.1
109SP	4-3,800	55	250	8,800V	550	17.1
109BA	48K-1M	16	1500	20,000V		
259AS	100-32,000	25	4,600	25,000V	190	27.0
259SP	3-2,500	70	380	8,800V	700	21.6
259BA	30K-1M	20	2300	20,000V		

1. @ 40°C Ambient. Derate linearly to 0 Watts at 230°C for Type AS and BA. Derate linearly to 0 Watts at 350 °C for Type SP.

2. Allowable peak energy/voltage will depend on the resistance value and pulse width. Energy ratings are based on pulse <10 milliseconds. Type SP rating can be substantially greater for longer pulses. Consult factory.

3. Peak Current Ratings presume energy approaching rated peak energy values. Allowable current can be higher for lower energy values. Consult factory.

4. Excludes caps/leads and coating.

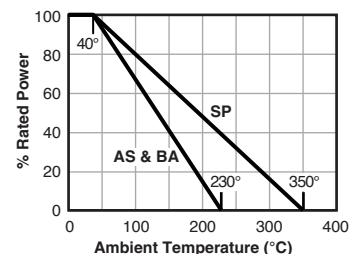
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CHARACTERISTICS

Characteristic	Test	Type SP	Type AS
Operating Temp.		-55°C to +350°C*	-55°C to +230°C
Resistance Temp. Coefficient		+0.2 to -0.08 %/°C	+0.0 to -0.08 %/°C
Voltage Coefficient	Max. % per kilovolt per inch active length	-1.0%	-1.0%
Short Time Overload	Max. % change after 10 cycles of 1000% rated power 5 sec. On, 90 sec. Off	±5%	±2%
Load Life	Max. % change after 1,000 hours at rated power	±5%	±5%
Thermal Shock	Max. % change after 10 cycles -55°C to +125°C	±3%	±3%
Moisture Resistance	Max. % change when tested per MIL-STD-202, Method 103	±5%	±5%
Density		2.2-2.4 gm/cc	2.2-2.6 gm/cc
Specific Heat		0.24-0.26 cal/gm -°C	0.23-0.25 cal/gm -°C
Thermal Conductivity		0.14-0.16 cal/(cm-°C-sec)	0.003-0.006 cal/(cm-°C-sec)

Derating



*When required, Type SP material can withstand short periods of use at red-heat conditions, i.e. up to 550°C to 600°C

DIMENSIONS



Size	Diam. d max. in. (mm)	Length L max. in. (mm)
231	0.2 (5.1)	0.75 (19.1)
233	0.31 (7.9)	0.75 (19.1)
234	0.31 (7.9)	1.125 (28.6)
250	0.44 (11.1)	0.75 (19.1)
251	0.44 (11.1)	1.125 (28.6)
102	0.31 (7.9)	2.125 (54.0)
252	0.44 (11.1)	2.125 (54.0)
104	0.31 (7.9)	4.125 (104.8)
254	0.44 (11.1)	4.125 (104.8)
106	0.31 (7.9)	6.125 (155.6)
256	0.44 (11.1)	6.125 (155.6)
109	0.31 (7.9)	9.125 (231.8)
259	0.44 (11.1)	9.125 (231.8)

ORDERING INFORMATION

Construction Type	Resistance (Ω)	Tolerance	Terminal Options
102	100Ω	J = ±5%	see chart
AS	101	K = ±10%	
101	100Ω	L = ±20%	
KD	7.5Ω		

For ≥10Ω: First 2 digits are significant, third is number of zeros to follow, e.g. 101 = 100Ω
For <10Ω: R replaces decimal point, e.g. 7R5 = 7.5Ω

Type Terminal Option

SP No Suffix = Standard Includes aluminum metalization under caps/leads.

AS, BA D = Standard; includes dielectric coating and flame spray metalization under caps/leads.
DS = Dielectric coating and silver metalization under caps/leads.

AS, BA O = Oil resistant coating

Packaging: Bulk in poly bags is standard. Tape & reel is also available.