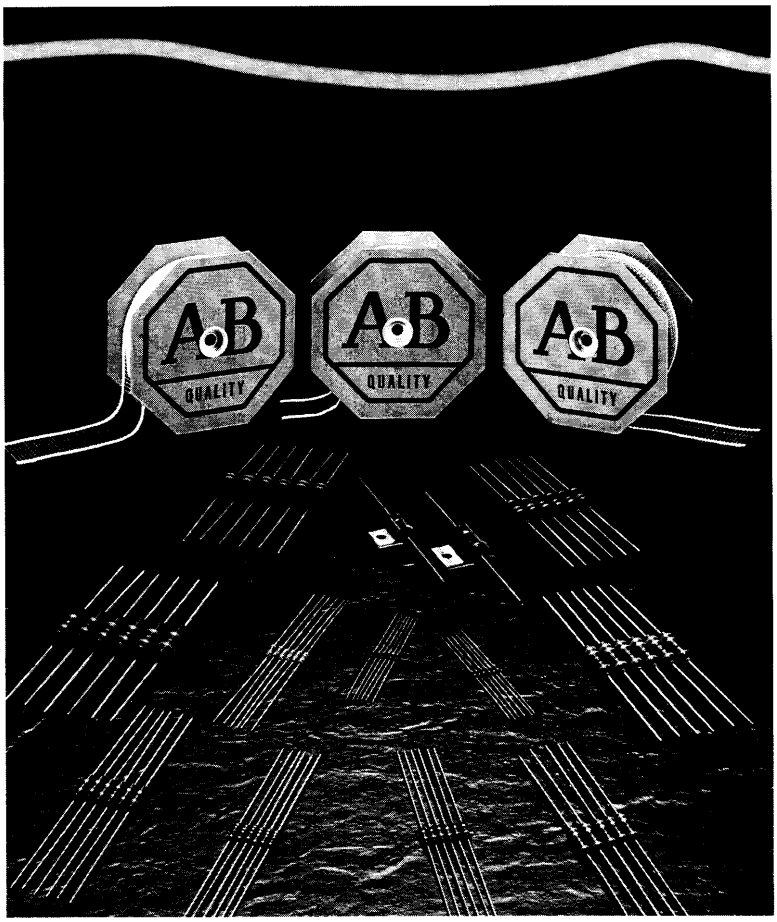
103-2860
-2884

Rockwell Automation
Allen-Bradley

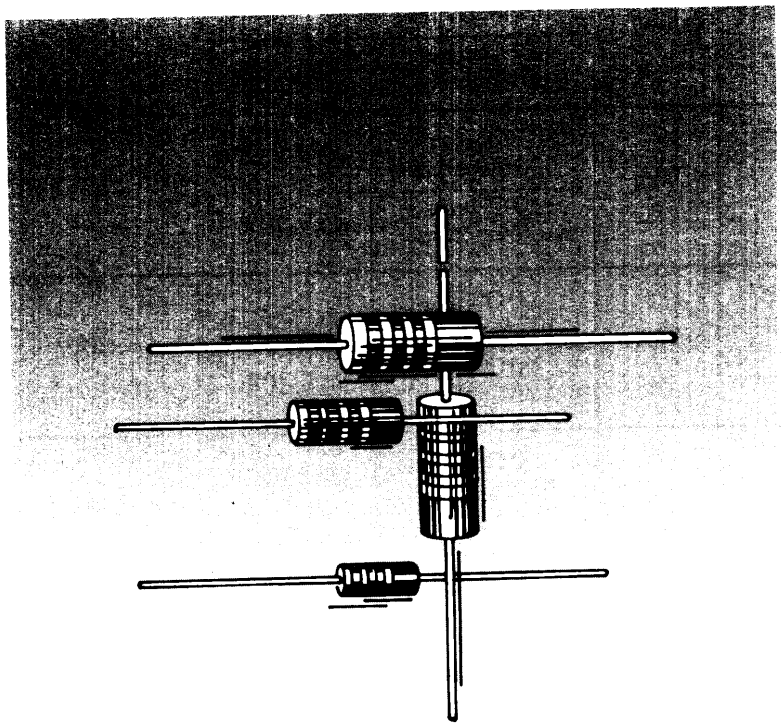


Fixed Resistors

Hot-Molded Carbon Composition Resistors

Short Form Catalog

A L L E N - B R A D L E Y

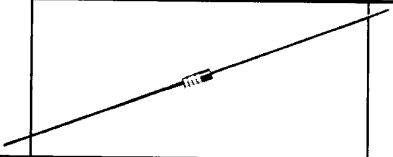
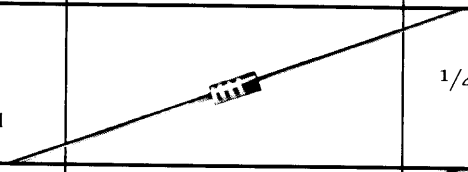
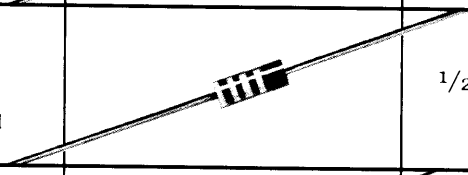
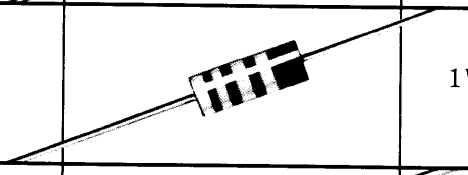
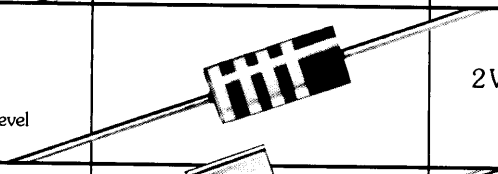
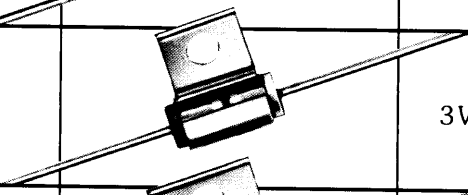
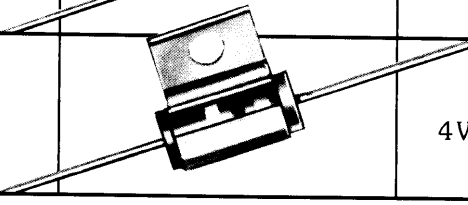


Fixed Resistors

	Page No.
Selector Guide	2
Hot-Molded Carbon Composition Fixed Resistors	4
Hot Solder Dip Leads	12
Sales Offices	13

Fixed Resistors

SELECTOR GUIDE: Hot-Molded Carbon Composition Fixed Resistors

Type		Power at 70°	Resistance Range [1]	Tolerance	Voltage Rating (RMS or DC [2] E(Max) = $\sqrt{PR}$
Industrial Grade **BB** Military Grade **RC05** Military Grade-S Level **RCR05**		1/8 Watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	150V
			2.7 Ohms to 22 Megohms	±5, 10%	
Industrial Grade **CB** Military Grade **RC07** Military Grade-S Level **RCR07**		1/4 Watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	250V
			2.7 Ohms to 22 Megohms	±5, 10%	
Industrial Grade **EB** Military Grade **RC20** Military Grade-S Level **RCR20**		1/2 Watt	1.0 Ohm to 100 Megohms	±5, 10, 20%	350V
			1.0 Ohm to 22 Megohms	±5, 10%	
Industrial Grade **GB** Military Grade **RC32** Military Grade-S Level **RCR32**		1 Watt	1.0 Ohm to 100 Megohms	±5, 10, 20%	500V
			1.0 Ohm to 22 Megohms	±5, 10%	
Industrial Grade **HB** Military Grade **RC42** Military Grade-S Level **RCR42**		2 Watts	10 Ohms to 100 Megohms	±5, 10, 20%	750V
			10 Ohms to 22 Megohms	±5, 10%	500V
Industrial Grade **GM**		3 Watts	1.0 Ohm to 22 Megohms	±5, 10%	500V
Industrial Grade **HM**		4 Watts	10 Ohms to 22 Megohms	±5, 10%	750V

[1] **Ultra-High Resistance Values**—Resistance values up to 100 gigaohms are available in the Industrial Grade BB, CB, and EB products. Contact the factory for information.

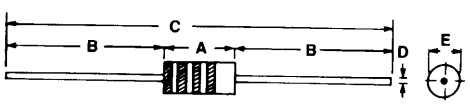
[2] Voltage ratings (RMS or DC) listed above are rated continuous working voltages (RCWV) at sea level. Use the equation E(max) = $\sqrt{PR}$ to determine the maximum RCWV for any specific resistance value. In no case should it exceed those values listed above in a circuit application.

Hot-Molded Carbon Composition Fixed Resistors

Maximum Ambient Temperature	Dimensions in Inches (millimeters)									Unit Weight (nominal)
	A	B	C (nominal)	D	E	F	G	H	J	
+130°C	0.145 ± .015 (3,68 ± 0,38)	1.000 ± .125 (25,40 ± 3,18)	2.145 (54,48)	0.015 ± .003 (0,38 ± 0,08)	0.062 ± .004 (1,57 ± 0,10)					0.077gm
+150°C	0.250 ± .015 (6,35 ± 0,38)	1.500 ± .125 (38,10 ± 3,18)	3.250 (82,55)	0.025 ± .002 (0,64 ± 0,05)	0.090 ± .008 (2,29 ± 0,20)					0.28gm
+150°C	0.375 ± .031 (9,53 ± 0,79)	1.500 ± .125 (38,10 ± 3,18)	3.375 (85,73)	0.033 ± .002 (0,84 ± 0,05)	0.140 ± .008 (3,56 ± 0,20)					0.61gm
+150°C	0.562 ± .031 (14,27 ± 0,79)	1.500 ± .125 (38,10 ± 3,18)	3.562 (90,47)	0.041 ± .002 (1,04 ± 0,05)	0.225 ± .008 (5,72 ± 0,20)					1.45gm
+150°C	0.688 ± .031 (17,48 ± 0,79)	1.500 ± .125 (38,10 ± 3,18)	3.688 (93,68)	0.045 ± .003 (1,14 ± 0,08)	0.312 ± .008 (7,92 ± 0,20)					2.80gm
+150°C	0.562 ± .031 (14,27 ± 0,79)	1.500 ± .125 (38,10 ± 3,18)	3.562 (90,47)	0.041 ± .002 (1,04 ± 0,05)	0.225 ± .008 (5,72 ± 0,20)	0.305 ± .010 (7,75 ± 0,25)	0.438 ± .016 (11,13 ± 0,41)	0.656 ± .016 (16,66 ± 0,41)	0.167 ± .010 (4,24 ± 0,25)	4.70gm
+150°C	0.688 ± .031 (17,48 ± 0,79)	1.500 ± .125 (38,10 ± 3,18)	3.688 (93,68)	0.045 ± .003 (1,14 ± 0,08)	0.312 ± .008 (7,92 ± 0,20)	0.391 ± .010 (9,93 ± 0,25)	0.562 ± .016 (14,27 ± 0,41)	0.766 ± .016 (19,46 ± 0,41)	0.156 ± .010 (3,96 ± 0,25)	8.00gm

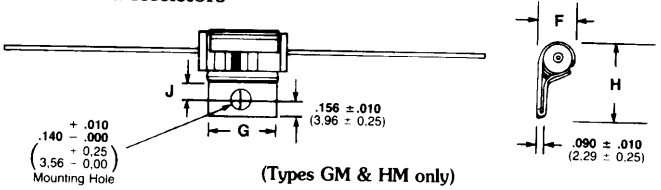
Hot-Molded Carbon Composition Resistors

Standard Resistors



(All Types – Ratings 1/8w through 2w)

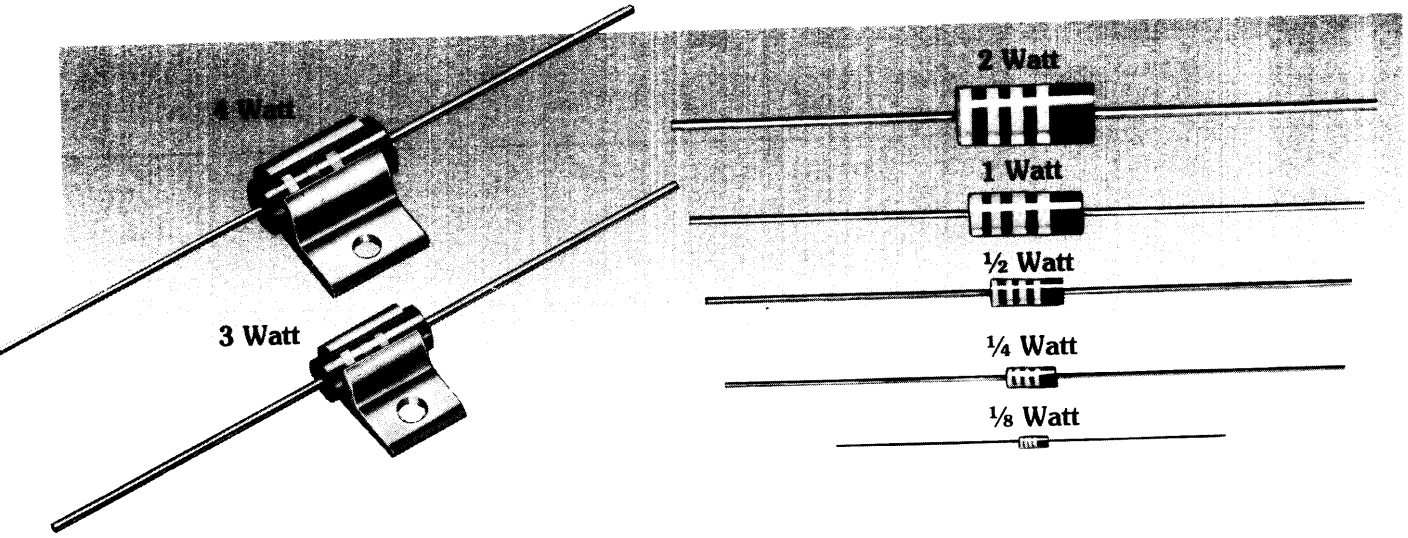
Metal Clad Resistors



(Types GM & HM only)

Hot-Molded Carbon Composition Fixed Resistors

(⅛W through 4W @ 70°C)



KEY CHARACTERISTICS

- **MIL-SPEC Reliability**
- **Pulse Withstanding**
- **Power Dissipation**
- **High Frequency Stability**
- **Low Inductance**
- **Rugged Construction**
- **Dependable Performance**
- **Ultra-High Resistance Values**

Features and Benefits

Uniform Quality — Consistent performance for over 50 years! Same quality built into all parts – regardless of value, rating or tolerance. MIL-SPEC and Industrial grade parts are made using the same process.

Reliable — Recognized as the **most** reliable of all electronic components, Allen-Bradley Hot-Molded Carbon Composition resistors provide freedom from catastrophic failure when used within ratings.

Predictable performance — Because of their outstanding uniformity, Allen-Bradley Hot-Molded Carbon Composition resistors exhibit consistent responses to environment and loading.

Conservative ratings — All performance specifications are based on extensive testing and massive field experience.

Rugged construction — The solid, integral structure, combining leads, insulation, and resistance material in the exclusive Allen-Bradley hot-molding process provides exceptional strength and resistance to damage in automatic handling machinery.

Wide range of values — Available in standard EIA resistance values from 1 ohm to 100 megohms.

High resistance values — Resistance values from 100 megohms to 100 gigaohms are available on special order in Types BB, CB, and EB.

Solderable leads — Hot solder coated leads remain easy to solder even after long periods in stock.

Tracking — Allen-Bradley resistors exhibit extremely uniform tracking characteristics. For example, in flip-flop circuits, resistors used in pairs which are drawn from the same package or reel (a normal mass production practice) will track with each other throughout changes of temperature, humidity, and load. This assures reliable circuit performance throughout the design life of the equipment.

Durable color coding — Baked-on color code paints are resistant to solvents, and also resist the abrasion and chipping associated with automatic handling. They remain bright and easily readable even after long periods of use.

Temperature stable — Between 0° C and 85° C, Allen-Bradley Hot-Molded Carbon Composition resistors exhibit a very low temperature characteristic, typically less than two percent deviation from room temperature values, less in low resistance values.

Explanation of Part Numbers

All Allen-Bradley Hot-Molded Carbon Composition resistors are identified by a Part Number which will provide information as to the type of resistor, resistance value, and tolerance. The Part Number is merely for identification on drawings, specifications, ordering, and other areas where it is convenient to use a Part Number to describe a particular resistor. The only markings that appear on the resistor are the Color Code bands.

Industrial Type Designation → EB5145

Type or Style

Allen-Bradley	Rating (Watts) (at 70° C)	MIL-R-11 Style	MIL-R-39008 Style
BB	1/8	RC05	RCR05
CB	1/4	RC07	RCR07
EB	1/2	RC20	RCR20
GB	1	RC32	RCR32
HB	2	RC42	RCR42
GM	3	—	—
HM	4	—	—

Resistance

Expressed in ohms and identified by a three-digit number. First two digits represent significant figures. Last digit specifies the number of zeros to follow, except below 10 ohms (see below).

FOR VALUES BELOW 10 OHMS:

ALLEN-BRADLEY DESIGNATION	MIL DESIGNATION
The letter "G" is substituted in place of the third digit. The desired resistance value is then the first two digits multiplied by 0.1.	The letter "R" is substituted in place of a significant digit to represent the decimal point. The following digits represent significant figures.

EXAMPLE

Allen-Bradley	Resistance	MIL Designation
27G	2.7 Ohm	2R7

RESISTANCE TOLERANCE

Allen-Bradley	Tolerance	MIL Designation
5	± 5%	J
1	± 10%	K
2	± 20%	—

FAILURE RATE LEVEL

At 50% rated wattage expressed in %/1000 hrs.

M = 1.0%
P = 0.1%
R = 0.01%
S = 0.001%

Type

Fixed Composition Resistors, Insulated, Established Reliability

MIL-R-39008 Type Designation → RCR 20 G514 JS

MIL-R-11 Type Designation → RC20 GF514J

MAXIMUM AMBIENT TEMPERATURE AND RESISTANCE TEMPERATURE CHARACTERISTIC
(Refer to MIL-R-11 or MIL-R-39008 Specifications as Applicable)

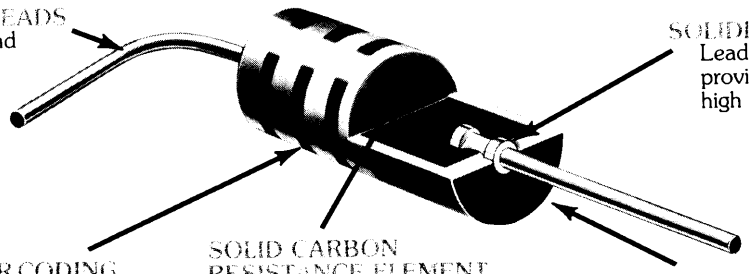
Standard Color Code and Preferred Number Series

Color	Digit	Multiplier	Tolerance	Reliability Level (Percent Per 1000 Hours) (When Applicable)
Black	0	1	—	—
Brown	1	10	—	M = 1.0%
Red	2	100	—	P = 0.1%
Orange	3	1000	—	R = 0.01%
Yellow	4	10,000	—	S = 0.001%
Green	5	100,000	—	—
Blue	6	1,000,000	—	—
Violet	7	10,000,000	—	—
Gray	8	—	—	—
White	9	—	—	—
Gold	—	0.1	± 5%	—
Silver	—	—	± 10%	—
No color	—	—	± 20%	—

Perferred Number Series

± 5% Tolerance	10	15	22	33	47	68
	11	16	24	36	51	75
	12	18	27	39	56	82
	13	20	30	43	62	91
± 10% Tolerance	10	15	22	33	47	68
	12	18	27	39	56	82
± 20% Tolerance	10	15	22	33	47	68

Important Electrical and Mechanical Characteristics
Hot-Molded Carbon Composition Fixed Resistors



SOLDER COATED LEADS
Suitable for soldering and welding even after long periods in stock.

SOLIDLY EMBEDDED LEADS
Lead wires are formed to provide large contact area and high pull strength.

PERMANENT COLOR CODING
Bright, baked on colors are highly resistant to solvents, abrasion and chipping. Colors remain clearly readable after long service.

SOLID CARBON RESISTANCE ELEMENT
Resistance material has large cross section resulting in low current density and high overload capacity. Uniformity of material eliminates "hot spots".

RUGGED CONSTRUCTION
Resistors are hot molded. Resistance material, insulation material and lead wires are molded at one time into a solid integral structure.

■ TEST VOLTAGE ■ EFFECT OF MOISTURE ■ CONDITIONING

Moisture absorption and the use of too low test voltages will cause the resistance value to read higher than when measured under standard conditions. It is important to understand these characteristics to facilitate using the parts effectively.

Resistance measurement — Measured resistance value is dependent upon the resistor temperature, the test voltage, and the dryness of the resistor. Accurate correlation between repeated measurements, especially at different times, and different locations, requires that these three conditions be essentially the same.

Resistor temperature — Slight variations in resistor body temperature are not significant in room temperature measurements. However, the temperature of the resistor body may increase appreciably when tested at too high a voltage or when the voltage is applied for too long a time, causing excessive heating.

Resistor test voltage — The test voltage is very important and sometimes misunderstood or overlooked. This is because a tester is often unaware of the actual voltage that the instrument used is applying to the resistor under test. Commonly used instruments, such as highly accurate resistance bridges, digital voltmeters, or ATE devices, employ relatively low voltages to make measurements (usually between 0.1 volt and 1.0 volt and seldom higher than 10 volts). This does not cause significant differences for low resistance values, where the use of low test voltages is specified; however, for higher resistance values, such as, 100K ohms or higher, a test voltage of 100 volts is specified and use of a low voltage test instrument will result in readings higher than actual value. For reference purposes, the voltages listed below should be used to obtain an accurate measure of the resistance value:

Nominal Resistance Range	Recommended Test Voltage (DC Volts)	
	Without Voltage Coefficient Factor (p.7)	With Voltage Coefficient Factor (p.7)
1.0 to 9.1 ohms	0.3	.5
10 to 91 ohms	1.0	.5
100 to 910 ohms	3.0	.5
1000 to 9100 ohms	10.0	10
10K to 91K ohms	30.0	10
100K ohms and higher	100.0	10

Consult the table on Page 7 to obtain the appropriate Resistance-Voltage Coefficient application factors (%/Volt) for different test voltages.

Effect of moisture absorption — Moisture attraction is a generic characteristic of carbon, and when the Hot-Molded Carbon Composition resistor absorbs moisture, e.g., during shipment and storage, its resistance value will always increase. Under high humidity conditions it is not unusual for parts to increase 6% in resistance value in as little as 72 hours. The characteristic is reversible, and dehumidifying the parts is easily accomplished either by storing them in a controlled, low-humidity area or by conditioning them in a convection oven at 100° C. The chart below lists the proper conditioning parameters.

Rating	Conditioning Time @ 100°C
1/8W	25 Hours
1/4W	50 Hours
1/2W	75 Hours
1W	120 Hours
2W	130 Hours

Solderability — Allen-Bradley Hot-Molded Carbon Composition resistors meet the solderability requirements of MIL-R-39008 and MIL-STD-202, Method 208.

Resistance to solvents — The color code remains legible after resistors are subjected to the Resistance To Solvents test of MIL-STD-202, Method 215.

Military qualification — The Allen-Bradley Hot-Molded Carbon Composition resistors meet or exceed all applicable military specifications including MIL-R-39008, Resistors, Fixed, Composition (Insulated), Established Reliability, and are fully qualified in all wattage sizes and all resistance values to the best reliability level, the "S" level, with a failure rate lower than 0.001 % per 1000 hours.

Performance Characteristics

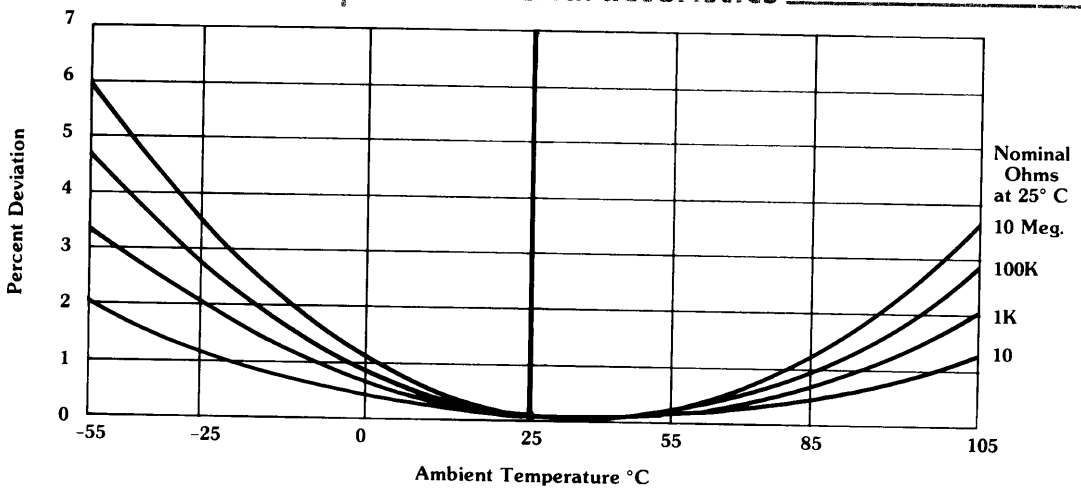
Characteristics			Hot-Molded Carbon Composition Resistors				
			⅛ Watt Type BB	¼ Watt Type CB	½ Watt Type EB	1 Watt Type GB	2 Watt Type HB
Insulation Resistance Minimum			10,000 megohms	10,000 megohms	10,000 megohms	10,000 megohms	10,000 megohms
Dielectric Withstanding Voltage	At Sea Level Atmospheric Press.		300 volts	500 volts	700 volts	1000 volts	1500 volts
	At 3.4" (86,36 mm) Hg (Simulated 50,000 ft. [15240 meters])		200 volts	325 volts	450 volts	625 volts	625 volts
Resistance-Voltage Coefficient Maximum instantaneous change in resistance per volt based on ΔR for ΔV of (1.0—0.1) RCWV. **Nominal Resistance** (ohms)		10K	— 0.020%/volt	— 0.015%/volt	— 0.010%/volt	— 0.007%/volt	— 0.010%/volt
		100K	— 0.030	— 0.020	— 0.015	— 0.012	— 0.015
		1 Meg	— 0.045	— 0.025	— 0.020	— 0.015	— 0.020
		10 Meg	— 0.050	— 0.030	— 0.030	— 0.020	— 0.020
		22 Meg	— 0.050	— 0.035	— 0.035	— 0.020	— 0.020
		100 Meg	— 0.055	— 0.035	— 0.035	— 0.025	— 0.025
Load Life 1000 hours operating at RCWV at 70° C ambient for duty cycle of 1½ hour "on", ½ hour "off". Permanent resistance change.		Maximum	+4% −6%	+4% −6%	+4% −6%	+4% −6%	+4% −6%
		Typical	−3%	−3%	−3%	−3%	−3%
Load Life (temperature-derated) 1000 hours (1½ hour "on", ½ hour "off") at RCWV derated per temperature. Tested at temperatures between 70°C and maximum ambient temperature. Permanent resistance change. modified with respect to voltage applied, as described above.]		Maximum	+4% −6%	+4% −6%	+4% −6%	+4% −6%	+4% −6%
		Typical	−4%	−4%	−4%	−4%	−4%
Short-Time Overload 5 seconds at 2½ times RCWV; voltage limit as stated. Maximum permanent resistance change.		Voltage Limits	200 volts	400 volts	700 volts	1000 volts	1000 volts
		Maximum	±(2.5% + 0.05 ohm)	±(2% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)
		Typical	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%
Terminal Strength 5 lb. (2,27 Kgm) Pull Test. Three turn Twist Test. Maximum permanent resistance change.			±(1% + 0.05 ohm) (2 lb. Pull Test) (0.91 Kgm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)
Effect of Solder Heat Leads immersed to .125 in. (3,18 mm) of body in 350°C solder for 3 seconds. Maximum permanent resistance change.			±(2% + 0.05 ohm) (250°C Solder)	±(2% + 0.05 ohm)	±(3% + 0.05 ohm)	±(3% + 0.05 ohm)	±(3% + 0.05 ohm)
Vibration 10-2000 Hz, 0.06 inch (1,52 mm) peak-to-peak or 20G, whichever is less.	Mechanical or Electrical Damage		No Damage	No Damage	No Damage	No Damage	No Damage
	Maximum Permanent Resistance Change		±(1% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)	±(1% + 0.05 ohm)
Shock 100g, 6 ms, sawtooth, 10 shocks, 2 planes.	Mechanical or Electrical Damage		No Damage	No Damage	No Damage	No Damage	No Damage
	Maximum Permanent Resistance Change		± (2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)
Moisture Resistance Temporary resistance change.	Maximum		+15% −0	+12% −0	+14% −0	+8% −0	+7% −0
	Typical		+ 9%	+ 6%	+ 7%	+ 5%	+ 4%
Humidity Characteristic (steady state) 240 hours at + 40° C and 95% relative humidity. Temporary resistance change. **Nominal Resistance** (ohms)	10	Maximum	+8% −0	+5% −0	+4% −0	+3% −0	+3% −0
		Typical	+ 4%	+ 3%	+ 2%	+ 2%	+ 1%
	1000	Maximum	+9% −0	+6% −0	+6% −0	+4% −0	+4% −0
		Typical	+ 5%	+ 4%	+ 4%	+ 2%	+ 2%
	100K	Maximum	+11% −0	+9% −0	+8% −0	+5% −0	+5% −0
		Typical	+ 8%	+ 6%	+ 6%	+ 3%	+ 2.5%
	10 Meg. and 100 Meg.	Maximum	+13% −0	+10% −0	+9% −0	+5% −0	+5% −0
		Typical	+ 9%	+ 8%	+ 7%	+ 3%	+ 2.5%
Low Temperature Operation After 1 hour at −65, + 0 −5° C, apply RCWV for 45 minutes. Remove RCWV, return to room temperature. Resistance change measured 24 hours after test.		Maximum	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)
		Typical	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%
Temperature Cycling Limits: − 55° C and + 85° C. Resistance change after five cycles.		Maximum	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)	±(2% + 0.05 ohm)
		Typical	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%

Temperature Characteristics

In addition to the maximum values given in this table, typical curves of temporary resistance change due to temperature are illustrated below.

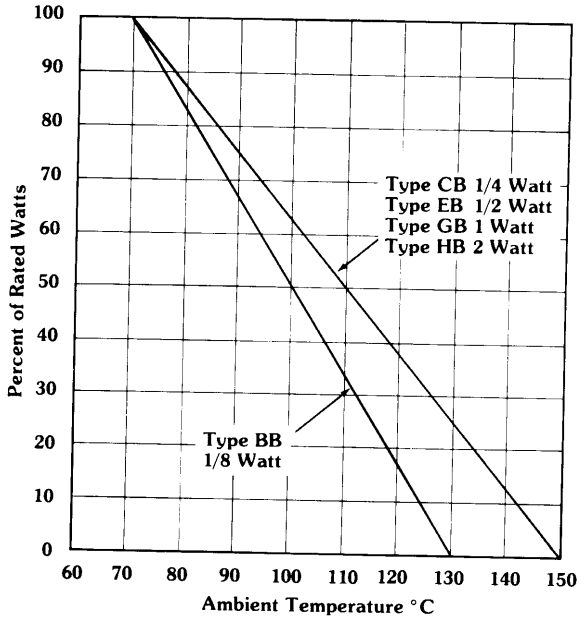
Resistance — Temperature Characteristic [6.3]	− 55° C Range (%)	− 25° C Range (%)	− 15° C Range (%)	0° C Range (%)	+ 25° C Nominal Ohms	+ 55° C Range (%)	+ 65° C Range (%)	+ 85° C Range (%)	+ 105° C Range (%)
Maximum temporary resistance change from the + 25° C initial resistance value. Note — Linear interpolation approximates intermediate values.	+0.2 to + 3.8	-0.2 to + 2.0	-0.2 to + 1.5	-0.2 to + 0.9	1	-1.1 to + 0.5	-1.5 to + 0.7	-2.0 to + 1.3	-2.5 to + 2.0
	+ 0.2 to + 2.6	− 0.2 to + 1.3	− 0.2 to + 1.0	− 0.2 to + 0.6	2.7	− 0.4 to + 0.5	− 0.5 to + 0.7	− 0.5 to + 1.3	− 0.4 to + 2.0
	+ 0.2 to + 3.8	− 0.3 to + 2.0	− 0.3 to + 1.5	− 0.3 to + 0.9	10	− 0.6 to + 0.8	− 0.7 to + 1.1	− 0.8 to + 2.0	− 0.6 to + 3.0
	+ 0.3 to + 5.1	− 0.3 to + 2.7	− 0.4 to + 2.0	− 0.4 to + 1.1	100	− 0.8 to + 1.0	− 0.9 to + 1.5	− 1.0 to + 2.6	− 0.8 to + 4.0
	+ 0.3 to + 6.4	− 0.4 to + 3.4	− 0.5 to + 2.5	− 0.5 to + 1.4	1000	− 1.0 to + 1.3	− 1.2 to + 1.8	− 1.3 to + 3.3	− 1.0 to + 5.0
	+ 0.4 to + 7.7	− 0.5 to + 4.0	− 0.6 to + 3.0	− 0.6 to + 1.7	10K	− 1.2 to + 1.5	− 1.4 to + 2.2	− 1.5 to + 3.9	− 1.2 to + 6.0
	+ 0.5 to + 8.9	− 0.6 to + 4.7	− 0.7 to + 3.5	− 0.7 to + 2.0	100K	− 1.4 to + 1.8	− 1.6 to + 2.6	− 1.8 to + 4.6	− 1.4 to + 7.1
	+ 0.5 to + 10.2	− 0.7 to + 5.4	− 0.9 to + 4.0	− 0.8 to + 2.3	1 Meg	− 1.6 to + 2.0	− 1.9 to + 3.0	− 2.0 to + 5.2	− 1.6 to + 8.1
	+ 0.6 to + 11.5	− 0.8 to + 6.0	− 0.9 to + 4.5	− 0.9 to + 2.6	10 Meg	− 1.8 to + 2.3	− 2.1 to + 3.3	− 2.3 to + 5.9	− 1.8 to + 9.1
	+ 0.6 to + 11.9	− 0.8 to + 6.3	− 0.9 to + 4.7	− 0.9 to + 2.6	22 Meg	− 1.9 to + 2.4	− 2.2 to + 3.5	− 2.4 to + 6.1	− 1.9 to + 9.4
	+ 0.7 to + 12.8	− 0.8 to + 6.7	− 1.0 to + 5.0	− 0.9 to + 2.8	100 Meg	− 2.0 to + 2.5	− 2.4 to + 3.7	− 2.5 to + 6.6	− 2.0 to + 10.1

Typical Resistance – Temperature Characteristics



Percent Resistance Deviation from 25°C Value for Various Nominal Resistance Values and Temperatures.

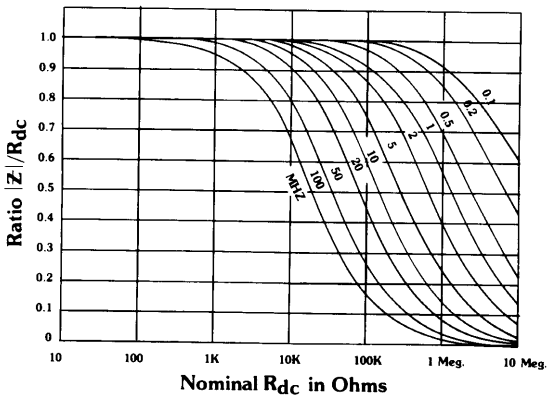
Derating with Respect to Ambient Temperature

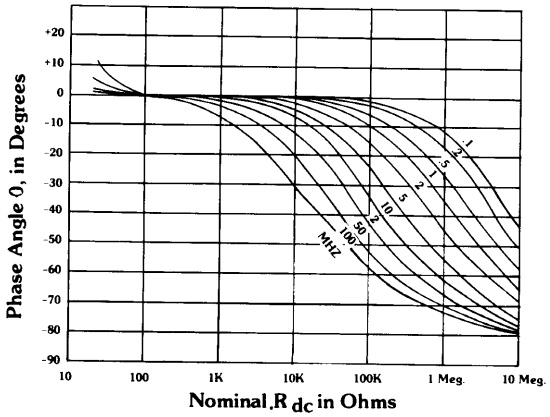


Derating — For resistors operated in ambient temperatures above 70°C, the change in resistance after 1000 hours under conditions similar to the Load Life Test will be less than +4% to −6% when the load wattage is derated in accordance with the curve shown. The most significant factor in proper derating to achieve minimal permanent resistance change over long periods of operation is the resultant surface temperature of the resistor.

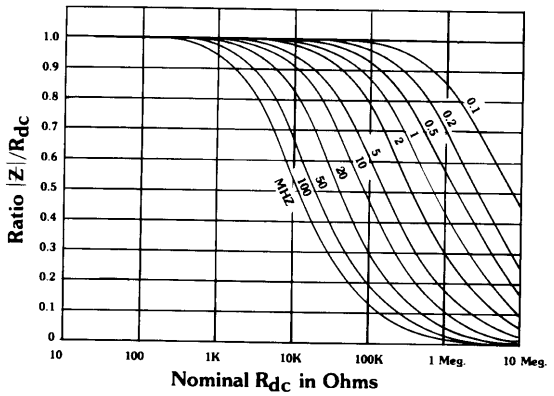
Typical High Frequency Characteristics

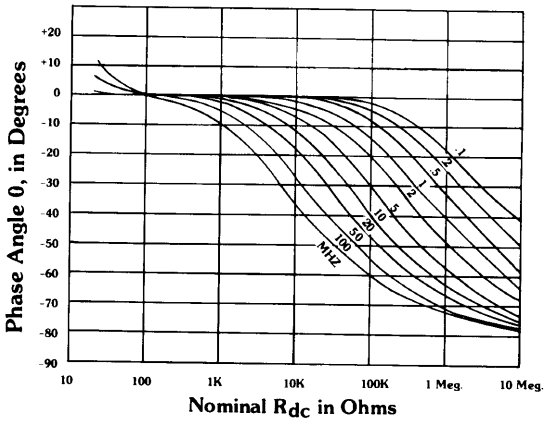
Measurement conditions – The curves below give typical values of impedance to DC resistance ratio and phase angle from 100 KHz to 100 MHz. Care was taken in test fixture design to prevent distributed capacitance-to-ground along the length of the resistor from contributing to measured values. Lead length was held at one-quarter inch to standardize the lead inductance contribution. User's circuit variations from test conditions in mounting position and lead length can have a significant effect on the high frequency characteristics.



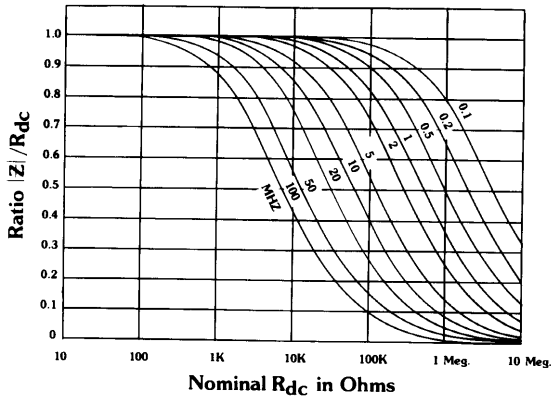


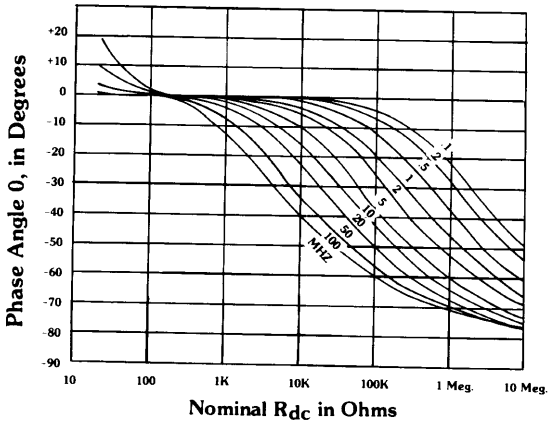
⅛W (Types BB, RC05 & RCR05) & ¼W (Types CB, RC07 & RCR07)



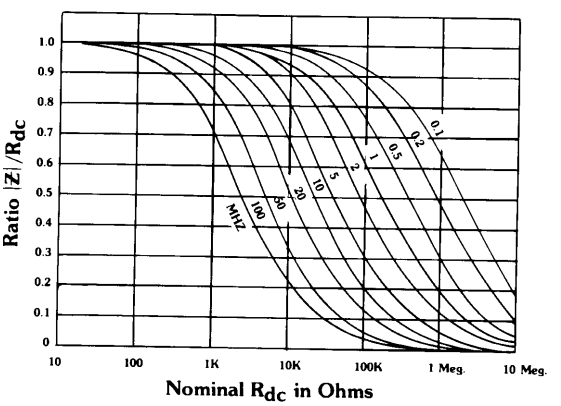


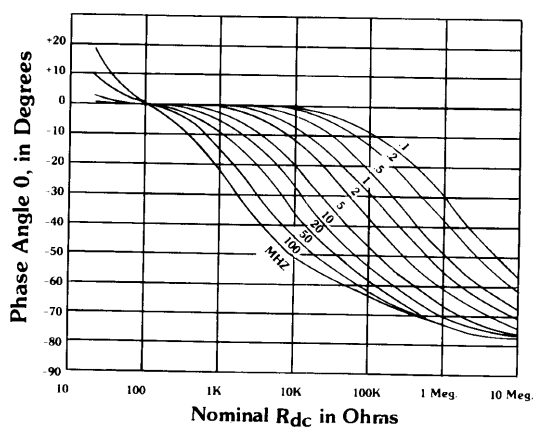
½W (Types EB, RC20 & RCR20)





1W (Types GB, RC32 & RCR32)





2W (Types HB, RC42 & RCR42)

Packaging Methods for Allen-Bradley Hot-Molded Carbon Composition Resistors

Allen-Bradley Hot-Molded Carbon Composition resistors are packaged to ensure maximum protection during shipment and storage, and maximum utility during end product circuit assembly operations. Two types of packaging are available to choose from: double lead tape reels and natural copolymer clam shells. (Note: 1/8 W resistors are packed in the clam shells for distribution and in boxes for non-distributors.) The chart below lists this bulk packaging information for reference:

Standard Bulk Packaging Quantities

A-B TYPE	BB RC05 RCR05	CB RC07 RCR07	EB RC20 RCR20	GB RC32 RCR32	HB RC42 RCR42
Qty per clam shell	100	100	100	50	25
Clam shells per carton	5	10	5	5	5
Qty per carton	500	1,000	500	250	125
Qty per box	1000	N/A	N/A	N/A	N/A

Allen-Bradley Tape Reel Packaging

Allen-Bradley offers a wide variety of double lead tape reel options to support automatic assembly operations. The octagon reels are made using corrugated fiberboard sides glued to a strong fiberwound core. Each reel is provided with metal bearings having a 0.562" (14,27 mm) diameter hole for simple mounting on automatic assembly equipment. The reels are disposable after use. Although the adhesive tape used is of the highest quality, storage for more than one year is not recommended due to normal adhesive aging. A minimum of 12" (304,80 mm) of free tape is provided at each end of a reel to facilitate setup and splicing. To ensure proper alignment and trouble-free feeding, interliner paper is wound between all layers throughout the reels of 1/8 and 1/4 Watt and is optional on other wattage sizes. One turn of corrugated wrapping is added to the outside of each reel to protect the parts during shipping, handling and storage. The following information is provided to assist in the selection of the desired type of tape reel packaging. Please note that not all tape reel types conform to E.I.A. Standard RS-296-E and care must be taken to select the proper type.

Allen-Bradley Resistor Tape and Reel Packaging Guide

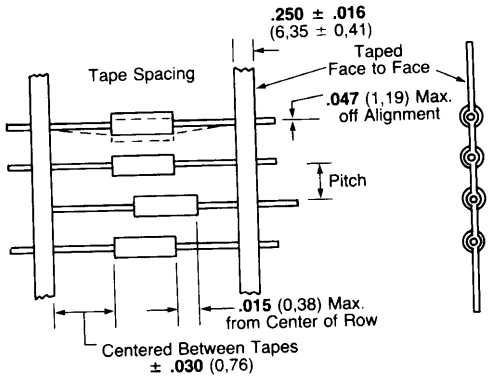
A-B Type	Rating	Tape Spacing	Pitch	Qty. Reel
BB **RC05** **RCR05**	1/8W	2.062" 1.812" 1.930"	.200" .200" .200"	2,000 2,000 2,000
CB **RC07** **RCR07**	1/4W	2.062" 2.812" 2.062" 2.874"	.200" .200" .200" .200"	2,500 2,500 5,000 2.500
EB **RC20** **RCR20**	1/2W	2.062" 2.812" 2.500" 2.874"	.200" .200" .200" .200"	2,500 2,500 2,500 2,500
GB **RC32** **RCR32**	1W	2.874" 3.062" 2.062" 2.500"	.375" .375" .375" .375"	2,000 2,000 2,000 2,000
HB **RC42** **RCR42**	2W	2.874" 3.062" 2.062" 2.500"	.375" .375" .375" .375"	1,000 1,000 1,000 1,000

Important Packaging Comments:

The overall length of the 1/8W resistor is 2.145" (54,48 mm). At the 2.062" tape spacing, the leads are captured approximately .065" within the tape.

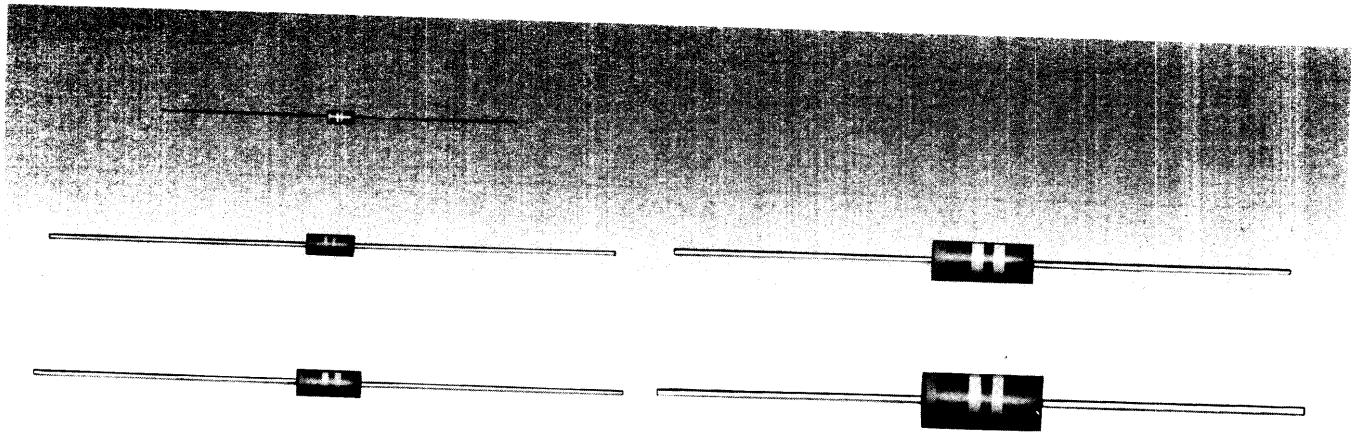
The width of the tape is 0.250" (6,35 mm). The overall length of wattage sizes 1/4W, 1/2W, 1W, and 2W is such that the leads would extend beyond the tape. The excess leads will be trimmed near the outside edges of the lead tape and the resultant resistor leads will be shortened accordingly with reference to the tape spacing selected.

Reel quantities for 1/2, 1, and 2 Watt resistors will vary from those listed above when optional interliner paper is specified throughout the reel.



Hot Solder Dip Leads for RCR Product

⅛, ¼, ½, 1, and 2 Watts
1 Ohm to 22 Megohm



Key Characteristics

- **Meets Naval Weapons - WS-6536**
- **Meets MIL-STD-202 Method 208**
- **Enhance Solderability**
- **Extends Shelf Life**
- **8-Hour Steam Age**

General

The information described here is considered appropriate for evaluation of hot-solder dip leads for Allen-Bradley Carbon Composition Resistors.

Our eutectic solder coating (63/37Sn/Pb) is tested and approved to MIL-STD-202, Method 208 (8-hour steam age).

Features and Benefits

Meets the Naval Weapons requirement WS-6536. This increases the integrity of the thru-hold solder joint: thus, improving component solderability.

Uniform Quality — Meets MIL-STD-202 Method 208. Consistently meets the new 8-hour steam aging requirement for solderability.

Environmental Protection — This value added feature extends component shelf life by protecting the leads from environmental conditions.

Reliability — This feature enhances the board level performance of the Allen-Bradley Carbon Composition Resistor that is recognized as the most reliable of all electronic components.

Packaging Options — The hot-solder dip leads are available with all current packaging options in bulk or tape and reel.

Sales Offices

Headquarters

For sales assistance or product information, contact a Customer Service Representative in El Paso.

EL PASO, TEXAS
Allen-Bradley Co., Inc.
Electronic Components Business
1414 Allen-Bradley Drive
El Paso, TX 79936
Tel: 800/592-4888
915/592-4888
FAX: 915/594-8922

Domestic Distributors

Hammond Electronics
1230 W. Central Blvd.
Orlando, FL 32805
Tel: 407/849-6060
FAX: 407/843-3316

Marsh Electronics
1563 S. 101st St.
Milwaukee, WI 53214
Tel: 414/475-6000
FAX: 414/771-2847

Ohm Electronics
746 Vermont Ave.
Palatine, IL 60067
Tel: 708/359-5500
FAX: 708/359-9686

Kent Electronics
7433 Harwin Dr.
Houston, TX 77036
Tel: 713/780-7770
FAX: 713/978-5892

Newark Electronics
4801 Ravenswood
Chicago, IL 60640
Tel: 312/784-5100
FAX: 312/907-5217

TTI, Inc.
2441 NE Parkway
Fort Worth, TX 76106
Tel: 817/740-9000
FAX: 817/740-9898

International Distributors

DENMARK
Dan-Contact A/S
Smakkegaardsvej 145
DK-2820 Gentofte, Denmark
Tel: 45-31-68-36-33
FAX: 45-31-68-33-62

FRANCE
CED-Euromega s.a.
121-135 Avenue du Docteur Vaillant
93230 Romainville, France
Tel: 33-14-942-7000
FAX: 33-14-844-2020

GERMANY
Walter Kluxen GmbH
Postfach 103720
2000 Hamburg 1, Germany
Tel: 49-40-23-7010
FAX: 49-40-23-0385

TTI, Inc.
Zeppelin Str. 4
D82178 Puchheim/Munich, Germany
Tel: 49-89-890-153-0
FAX: 49-89-890-153-99

INDIA
Pamir Electronics
603 N. Gordon Drive
Gordon Park
Exton, PA 19341
Tel: 610/594-8337
FAX: 610/594-8559

ITALY
Special-IND SPA
Per L'Industria SPA
Piazza Spotorno 3
1-20159 Milano, Italy
Tel: 39-2-66-805-177
FAX: 39-2-66-800-493

SWEDEN
Avnet Nortec AB
Box 1830
S-171 27
Solna, Sweden
Tel: 46-8-629-1400
FAX: 46-8-627-0280

SWITZERLAND
EM Egli AG Zurich
Bauteile Und Steuersysteme
Postfach CH-8123
Lohwisstrasse 52
Ebmatingen, Switzerland
Tel: 41-1-980-1111
FAX: 41-1-980-0869

UNITED KINGDOM
Newark Electronics
River Wey Ind Prk
5075 Newman Lane Alton
Hampshire, GU34 2QL England
Tel: 44-420-543500
FAX: 44-420-544450

TTI, Inc.
Suite 5, Regency House
Dedmore Road
Marlow, Bucks SL7 IFJ England
Tel: 44-0628-487884
FAX: 44-0628-473050

Terms and Conditions of Sale

As stated in the Allen-Bradley Company, Inc. Terms and Conditions of Sale Publication 6500 (most current revision). Additional specifications available in Publication ROFR - March 1990.

For Your Protection

The information and recommendations in this publication are, to the best of our knowledge, reliable. Suggestions made concerning the products and their uses, applications, storage and handling are only the opinion of Allen-Bradley, Electronic Components Business, and users should make their own test to determine the suitability of these products for their own particular purposes and of the storage and handling methods herein suggested. The toxicity and risk characteristics of products made by Allen-Bradley, Electronic Components Business, will necessarily differ from the toxicity and risk characteristics developed when such products are used with other materials during a manufacturing process. The resulting risk characteristics should be determined and made known to ultimate end-users and processors. Because of the numerous factors affecting results, Allen-Bradley, Electronic Components Business, MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, other than that the material conforms to the current applicable Standard Specifications. Statements made herein, therefore, should not be construed as representations or warranties. The responsibility of Allen-Bradley, Electronic Components Business, for claims arising out of breach of warranty, negligence, strict liability, or otherwise is limited to the purchase price of the material.

Statements concerning the use of the products or processes described herein are not to be construed as recommending the infringement of any patent, and no liability for infringements arising out of any such use is assumed.

Review Material Safety Data Sheets for the solder, flux, degreasing agents and fluids specified. Follow manufacturer's recommendations for safe handling and use of solder, flux, degreasing agents and fluids specified.

Allen-Bradley Company

Rockwell *Automation*

Allen-Bradley

Electronic Components Business
1414 Allen-Bradley Drive
El Paso, Texas 79936-6415

Publication ROFS - September, 1994