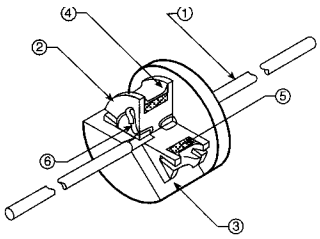
Vishay Ultronix
Precision Wirewound Resistors

CONTENTS

Construction is the Key to Our Performance



1. Welded Lead-Tab Assembly, (Molded in Place).
2. Molded Thermosetting Alkyd Polyester Bobbin.
3. Molded Thermosetting Alkyd Polyester Encapsulation.
4. Stress Relief Coating.
5. Resistance Wire.
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All Welded Construction: The combination of all welded construction and compatible materials provide the most reliable means of interconnects possible.
Butt Weld of Tab to Lead: A tab material of 800 alloy (the same as the resistance wire) is butt welded to the lead and molded deep into the resistor bobbin. This design parameter assures the least possible D.C. transients due to thermal EMF.
Bobbin Design: The ratio of the height of the Pi wall to the width of the Pi and to the diameter of the bobbin mandrel are critical to the basic stability of a wirewound resistor. These parameters are optimized for each wire size, wattage size and range of resistor values.
Encapsulation Material: Both the bobbin and the final encapsulation material are alkyd polyesters. The resulting resistor is virtually a homogeneous mass with compatible coefficients of expansion. All types are unaffected by application of solvents.

ULTRONIX RESISTORS

In addition to MIL-PRF-39005 and commercial wirewound resistors, ULTRONIX offers a full range of special precision wirewound products (some formerly produced by Elliott Jordan). This makes ULTRONIX a very unique source for high performance precision wirewound resistors, with the experience to meet your requirements.

Combining Elliott Jordan's technology with our 40 year background in wirewound production, lets you access almost any wirewound requirement – military or commercial, standard or custom.

You'll find ULTRONIX offers precision wirewounds with the exact combination of accuracy, stability and value you need for critical applications. And we can provide the package you want.

WINDING FORMS

To ensure minimum stresses on the resistor winding due to environmental changes, the winding forms, or bobbins, are molded of an alkyd polyester which has thermal expansion characteristics compatible with those of the resistance-wire alloys and terminals.

RESISTANCE WIRE

The optimum resistance wire for a particular resistor design is selected for its resistivity (ohms/CMF, ohms/circula mil-foot), its temperature coefficient of resistance (TCR) over the operating temperature range, its low-thermal EMF properties compared to copper, and other contributing characteristics.

For most resistor applications, wire alloys are selected for low TCR (0 ±10ppm/°C or less); however, ULTRONIX also manufactures resistors wound with wire offering TCRs to +6000 ppm/°C. The resistance wire is coated with a high-temperature resilient-enamel insulation. The resistance wire is tested, categorized and inventoried by resistivity and temperature coefficient of resistance.

LEADS AND LEAD MATERIAL

High structural strength and lead integrity is assured by molding the leads into the bobbin. The standard lead material is hot solder dipped oxygen-free copper. Special lead materials such as nickel can be provided. Special platings such as gold are also available when specified.

TERMINATION

Proper termination of the resistance wire to the resistor leads is the heart of quality resistor manufacturing. ULTRONIX employs a layer or sandwich-type termination. The resistance wire is sandwiched between two layers of a ribbon material, made mechanically solid, and welded with an exact pressure/heat/time-weld profile. Welding and weld inspection are performed under microscope.

ENCAPSULATION

After the resistor is wound, calibrated, aged and terminated, the resistance winding is coated with a resilient buffer material to protect the windings during encapsulation, and to further isolate the winding from mechanical stresses.
The resistor is encapsulated using an alkyd polyester selected for its mechanical, electrical and thermal characteristics. To further reduce stresses in the winding, the encapsulation material is selected so that the thermal-expansion characteristic is matched to those of the bobbin and resistance element.

MARKING

Standard markings are the ULTRONIX logo, part number (may be abbreviated on very small-size resistors), resistance value, resistance tolerance and date code. All markings are made with permanent epoxy ink which is resistant to most common cleaning solvents used on printed circuit boards and assemblies.

RESISTANCE RANGE

The maximum resistance values for each resistor style and type are listed in this catalog. A value of 10 Megohm can be considered common on large sizes, although resistors of 50 Megohm have been produced. Low values, depending on the size of the resistor, can run into the fractional ohm.

RESISTOR TOLERANCE

A vital factor in the manufacture of precision wire-wound resistors is the ability to measure and calibrate the resistance, during production, with a high degree of accuracy and dependability. ULTRONIX uses resistance bridges which are traceable to NIST standards.

Standard available resistance tolerances are ± 1%, ± 0.5%, ± 0.25%, ± 0.1%, ± 0.05%, ± 0.02% and ± 0.01%. For accuracies of ± 0.005% and tighter, contact the factory.

For minimum resistance guide, refer to individual model data sheets in this catalog.

TEMPERATURE COEFFICIENT OF RESISTANCE (TCR)

TCR is defined as the unit change in resistance per degree change in the temperature. The resistance change in wire-wound resistors as a function of temperature is non-linear and, therefore, must be stipulated over a specific temperature range. TCR is expressed in parts per million per degree Centigrade (ppm/°C), and is calculated using the formula:

$$\text{TCR (ppm/°C)} = \frac{R_2 - R_1}{(T_2 - T_1)\,R_1} \times 10^6$$

R_1 = Resistance in ohms at reference temperature T_1

R_2 = Resistance in ohms at temperature T_2

T_1 = Reference temperature in °C (usually + 25°C)

T_2 = Test temperature in °C

The TCR calculated by using this formula is the cord slope between the two points T_1 and T_2.

Standard TCR for ULTRONIX industrial precision wirewound resistors is 0 ± 10 ppm/°C; – 10 to 80°C.

TCRs as low as 0 ± 3 ppm/°C or as high as 6000 ppm/°C over different temperature ranges are obtainable, consult factory.

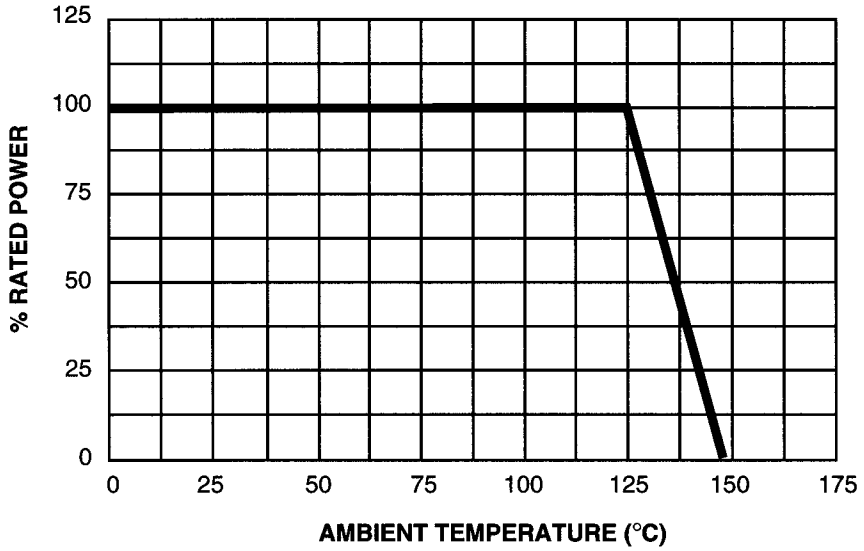
TCR TRACKING

By proper selection of materials and sizes, and by the utilization of special manufacturing processes, TCR tracking of 1 ppm/°C can be obtained. Tracking of multiple resistors is dependent upon value, style and temperature range. Please contact our applications engineering department for your specific requirements.

POWER DERATING

The power ratings listed in this databook are based on achieving maximum stability at maximum ambient temperatures of +125°C. If a resistor is to be used at a higher ambient temperature, the power should be derated to zero at +145°C. Refer to derating curve below. Further derating can provide an additional factor of safety for stability.

POWER DERATING CHART



LONG-TERM STABILITY

When selecting a precision resistor, one of the most important parameters is long-term stability – the ability of the resistor to maintain its original value under specific conditions of load, temperature and humidity. Stability is usually specified as a change in resistance per unit of time. Shelf-life stabilities (no load) are available to ± 0.001%/year (± 10 ppm/year). Typical dry shelf-life stability for non-hermetically-sealed parts is 50 ppm/year or less. Typical load-life stabilities for 10,000 hours at rated power, at + 125°C, is ≤ 0.01%.

THERMAL EMF

Thermal EMF is the parasitic voltage generated at the junction of dissimilar metals when the metals are at different temperatures. Thermal EMF is generated in a resistor due to external temperature gradients and non-symmetrical power distribution within the resistor. ULTRONIX bobbin construction almost eliminates this effect and makes ULTRONIX wirewounds superior.

CRITICAL RESISTANCE VALUE

The critical resistance value (R_{CV}) is that value of resistance for which the resistor dissipates the rated power (P_R) when the maximum working voltage (E_M) is applied.

For resistance values above R_{CV}, the power must be derated so as not to exceed the maximum working voltage. For resistance values below R_{CV}, the voltage must be reduced so as not to exceed the maximum rated power.

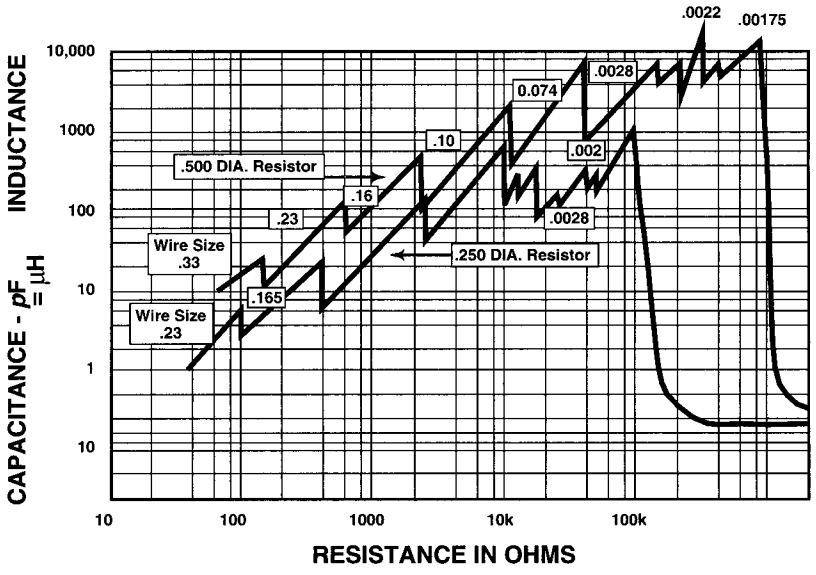
$$R_{CV} = \frac{E^2_m}{P_R}$$

REACTANCE (RISE TIME)

Capacitive reactance and inductive reactance are intrinsic parameters of wirewound resistors. In high-speed switching circuits, the time constant, or rise time, of the resistor may be far more significant than the DC resistance accuracy. The capacitive and inductive parameters vary with winding techniques, bobbin configuration and wire diameter.

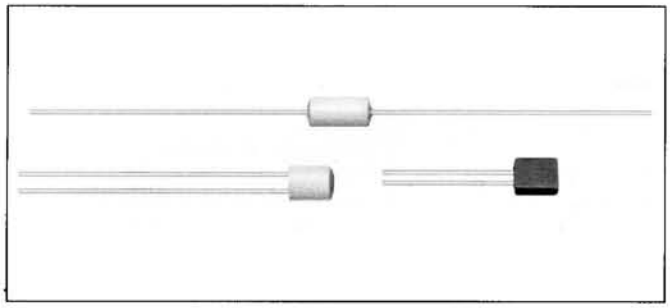
Our designs and manufacturing processes minimize reactance (see chart below)

REACTANCE VS RESISTOR SIZE, WIRE SIZE, VALUE



Commercial Discrete Wirewound Resistors

Axial and Radial Models



FEATURES

- High precision
- All welded construction
- Molded thermosetting plastic bobbin
- Wide ohmic range combined with tight tolerance
- Excellent long-term stability
- Inherent low temperature coefficient
- Extremely low Thermal EMF
- Low voltage coefficient
- Low noise

STANDARD ELECTRICAL SPECIFICATIONS

	MODELS	MAXIMUM RESISTANCE VALUE (Ohms)	POWER RATING @ 125°C (Watts)
AXIAL	123A	111k	0.05
	118A	192k	0.05
	122A	199k	0.05
	102A	334k	0.10
	102AL	334k	0.10
	101A	410k	0.10
	153A	435k	0.10
	103A	633k	0.10
	135A	750k	0.10
	105A	820k	0.125
	184A	820k	0.125
	185A*	961k	0.125
	202A	968k	0.25
	204A	1.42 M	0.25
	203A	1.7 M	0.25
	205A*	1.93 M	0.33
	207A*	3.0 M	0.50
	308A	3.0 M	0.60
	210A*	4.10 M	0.50
	307A	5.63 M	0.60
	310A	7.68 M	1.00
	505A	10 M	1.00
	510A*	24 M	1.25
	515A*	35 M	1.50
	517A	43 M	1.75
	520A*	43 M	2.00
RADIAL	101P	453k	0.125
	102P	821k	0.125
	203PC	1.59 M	0.25
	203PA	1.48 M	0.25
	305PA	3.3 M	0.50
	505PA	9.5 M	1.00

* Available in hermetically sealed. See page 7.

ELECTRICAL SPECIFICATIONS

Minimum Values: 0.1 ohm for ± 1% and ± 0.5%. 10 ohm for ± 0.1% and tighter.

Resistance Tolerance: ± 0.005%, ± 0.01%, ± 0.02%, ± 0.05%, ± 0.1%, ± 0.5%, and ± 1%, depending on style and value.

Temperature Coefficient: ± 10 ppm/°C standard for 10 ohm and above. Higher T. C.'s on low ohmic values. T. C. match to ± 1 ppm/°C. High T. C.'s up to + 6000 ppm/°C are available.
Standard temperature range: – 10°C to + 80°C.
Working temperature range: – 60°C to + 145°C.

CONSTRUCTION

All Welded Construction: The combination of all welded construction and compatible materials provide the most reliable means of interconnects possible.

Butt Weld of Tab to Lead: A tab material of 800 ohm alloy (the same as the resistance wire) is butt welded to the lead and molded deep into the resistor bobbin. This design parameter assures the least possible D. C. transients due to thermal EMF.

Bobbin Design: The ratio of the height of the Pi wall to the width of the Pi and to the diameter of the bobbin mandrel are critical to the basic stability of a wirewound resistor. These parameters are optimized for each wire size, wattage size and range of resistor values.

Encapsulation Material: Both the bobbin and the final encapsulation material are thermosetting alkyd polyester. The resulting resistor is virtually a homogeneous mass with an identical coefficient of expansion which is unaffected by the most violent of temperature cycling. All types are unaffected by application of solvents.

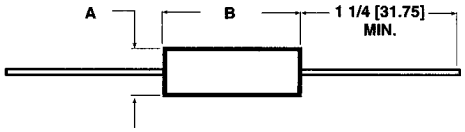
Lead Materials: The standard lead material is hot solder dipped copper (C5N). Other available materials are bare nickel (N1N) and gold plated nickel (N2N).

Commercial Discrete

Vishay Ultronix — Commercial Discrete Wirewound Resistors

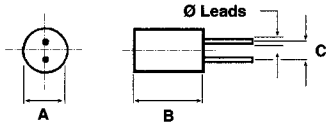
DIMENSIONS in inches [millimeters]

Axial Models

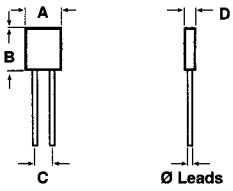


	MODEL	DIMENSIONS ± .020 [.508]				Ø LEADS	
		DIAMETER A	LENGTH B	C	D	AWG	DIAMETER
AXIAL	123A	0.100 [2.54]	0.230 [5.84]	—	—	24*	0.020 [0.508]
	118A	0.130 [3.30]	0.180 [4.57]	—	—	26	0.016 [0.406]
	122A	0.123 [3.12]	0.218 [5.54]	—	—	24	0.020 [0.508]
	102A	0.110 [2.79]	0.250 [6.35]	—	—	24	0.020 [0.508]
	102AL	0.130 [3.30]	0.313 [7.95]	—	—	24	0.020 [0.508]
	101A	0.130 [3.30]	0.375 [9.53]	—	—	22*	0.026 [0.660]
	153A	0.150 [3.81]	0.245 [6.22]	—	—	22	0.026 [0.660]
	103A	0.150 [3.81]	0.300 [7.62]	—	—	22	0.026 [0.660]
	105A	0.160 [4.06]	0.500 [12.70]	—	—	22	0.026 [0.660]
	135A	0.150 [3.81]	0.310 [7.87]	—	—	22	0.026 [0.660]
	184A	0.187 [4.75]	0.375 [9.53]	—	—	22	0.026 [0.660]
	185A	0.187 [4.75]	0.500 [12.70]	—	—	22	0.026 [0.660]
	202A	0.250 [6.35]	0.310 [7.87]	—	—	22	0.026 (0.660)
	204A	0.250 [6.35]	0.375 [9.53]	—	—	20	0.032 [0.813]
	203A	0.250 [6.35]	0.343 [8.71]	—	—	20	0.032 [0.813]
	205A	0.250 [6.35]	0.500 [12.70]	—	—	20*	0.032 [0.813]
	207A	0.250 [6.35]	0.750 [19.05]	—	—	20*	0.032 [0.813]
	308A	0.312 [7.93]	0.810 [20.57]	—	—	20	0.032 [0.813]
	210A	0.250 [6.35]	1.00 [25.40]	—	—	20	0.032 [0.813]
	307A	0.375 [9.53]	0.750 [19.05]	—	—	20	0.032 [0.813]
	310A	0.375 [9.53]	1.00 [25.40]	—	—	20	0.032 [0.813]
	505A	0.500 [12.70]	0.500 [12.70]	—	—	20	0.032 [0.813]
	510A	0.500 [12.70]	1.00 [25.40]	—	—	20	0.032 [0.813]
	515A	0.500 [12.70]	1.50 [38.10]	—	—	20	0.032 [0.813]
	517A	0.500 [12.70]	1.75 [44.45]	—	—	20	0.032 [0.813]
	520A	0.500 [12.70]	2.00 [50.8]	—	—	20	0.032 [0.813]
RADIAL	101P	0.300 [7.62]	0.320 [8.13]	0.150 [3.81]	0.110 [2.79]	22	0.026 [0.660]
	102P	0.250 [6.35]	0.250 [6.35]	0.125 [3.18]	0.125 [3.18]	22*	0.026 [0.660]
	203PC	0.250 [7.92]	0.312 [7.93]	0.150 [3.81]	—	22	0.026 [0.660]
	203PA	0.270 [6.86]	0.320 [8.13]	0.200 [5.08]	—	22	0.026 [0.660]
	305PA	0.375 [9.53]	0.500 [12.70]	0.200 [5.08]	—	20	0.032 [0.813]
	505PA	0.500 [12.70]	0.500 [12.70]	0.300 [7.62]	—	20	0.032 [0.813]

Round Radial Models



Flat Radial Models



* Different lead gauges available – Contact Factory for part number.

PART MARKING

- — ULTRONIX Logo
- — Model
- — Resistance value
- — Resistance tolerance
- — Date code

ORDERING INFORMATION

203A	1000	T
MODEL	RESISTANCE VALUE	TOLERANCE

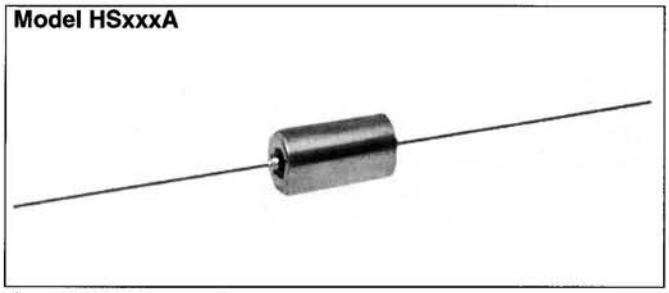
T = ± 0.01%
Q = ± 0.02%
A = ± 0.05%
B = ± 0.1%
F = ± 1.0%

Tel. 1-866-9-OHMITE • Fax 1-847-574-7522 • www.ohmite.com • info@ohmite.com

MODEL HSxxxA

Hermetically Sealed, Ultra-High Stability

Model HSxxxA



FEATURES

- Accuracy to ± 0.001% absolute
- Shelf life to 10 ppm/year
- Temperature coefficient to ± 3 ppm/°C, - 10°C to + 80°C
- Low voltage coefficient
- Low noise
- Extremely low thermal EMF
- Available in 4 terminal on HS500 Series

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	MAXIMUM RESISTANCE VALUE (Ohms)	POWER RATING @ 25°C* (Watts)	MAXIMUM VOLTAGE (Volts)
HS185A	1.0M	0.125	300
HS205A	1.4M	0.25	300
HS207A	2.8M	0.40	600
HS210A	3.0M	0.50	600
HS308A	5.6M	0.60	600
HS310A	7.6M	0.80	600
HS510A	24M	1.00	600
HS515A	35M	1.25	600
HS520A	43M	1.50	900

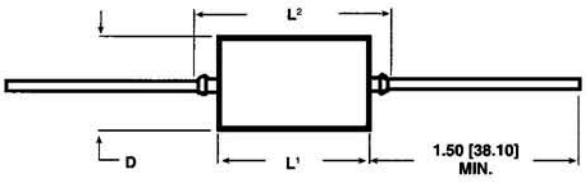
NOTE: Minimum Value = 10 ohms

PART MARKING

— Ultronix
— Model
— Resistance value
— Resistance tolerance
— Date code

DIMENSIONS in inches [millimeters]

Model HSxxxA



MODEL	DIMENSIONS			Ø LEADS
	D ± 0.010 [0.254]*	L¹ ± 0.020 [0.508]	L²± 0.030 [0.762]	
HS185A	0.187 [4.75]	0.500 [12.70]	0.625 [15.88]	22 AWG - 0.026 [0.660]
HS205A	0.250 [6.35]	0.500 [12.70]	0.562 [14.27]	20 AWG - 0.032 [0.813]
HS207A	0.250 [6.35]	0.750 [19.05]	0.812 [20.62]	20 AWG - 0.032 [0.813]
HS210A	0.250 [6.35]	1.00 [25.40]	1.063 [27.00]	20 AWG - 0.032 [0.813]
HS308A	0.375 [9.52]	0.820 [20.80]	0.920 [23.35]	20 AWG - 0.032 [0.813]
HS310A	0.375 [9.52]	1.00 [25.40]	1.050 [26.67]	20 AWG - 0.032 [0.813]
HS510A	0.500 [12.70]	1.05 [25.40]	1.220 [30.99]	20 AWG - 0.032 [0.813]
HS515A	0.500 [12.70]	1.50 [38.10]	1.605 [40.77]	20 AWG - 0.032 [0.813]
HS520A	0.500 [12.70]	2.00 [50.80]	2.160 [54.86]	20 AWG - 0.032 [0.813]

* Clear sleeving available, add 0.040" [1.016] to body diameter.

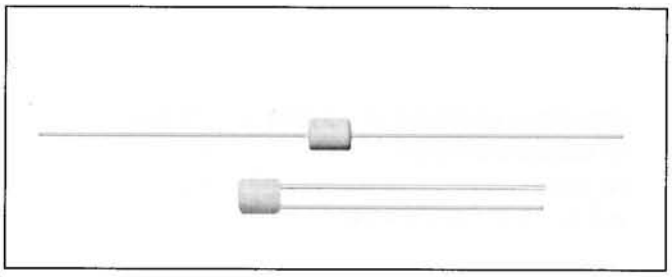
ORDERING INFORMATION

HS185A	*	10k	±0.01%
MODEL		RESISTANCE	TOLERANCE

* add suffix "SL" for sleeving

Military Established Reliability

MIL-PRF-39005, Type RBR, MIL-R-93, Type RB, QPL Approved



FEATURES

- High precision
- All welded construction
- Molded thermosetting plastic bobbin
- Wide ohmic range combined with tight tolerances
- Excellent long-term stability
- Inherent low temperature coefficient
- Extremely low thermal EMF
- Low voltage coefficient
- Low noise
- Complete traceability of materials and processing

ELECTRICAL SPECIFICATIONS

Minimum Values: 0.1Ω for ± 1%
10 ohm for ± 0.1% and tighter.
(Except RBR74 =100 Ω and RBR76 =18.36 Ω)

Resistance Tolerance: ± 0.01%, ± 0.02%, ± 0.05%, ± 0.1%, and ± 1.0%, depending on style and value.

Temperature Coefficient: (MIL spec requirements) Less than 1Ω, ± 90 ppm/°C. 1Ω to < 10Ω, ± 30 ppm/°C. 10 Ω to < 100Ω, ± 15 ppm/°C, 100Ω and above, ± 10ppm/°C.

Dielectric Strength: 750V_{RMS}, one minute.

Insulation Resistance: Meets requirements of MIL-STD-202, Method 302.

Short Time Overload: Twice rated power.

MECHANICAL SPECIFICATIONS

Resistance Element: Nickel chromium alloy.

Core: Molded thermosetting alkyd polyester.

Encapsulation: Molded thermosetting alkyd polyester.

Terminals: Hot solder dipped copper.

Solderability: Meets requirements of MIL-STD-202, Method 208.

Moisture Resistance: Meets requirements of MIL-STD-202, Method 106.

Terminal Strength: Meets requirements of MIL-STD-202, Method 211.

Shock: Meets requirements of MIL-STD-202, Method 213.

Vibration (high frequency): Meets requirements of MIL-STD-202, Method 204.

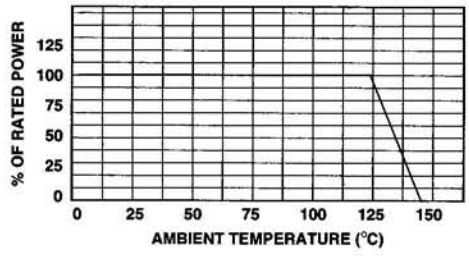
STANDARD ELECTRICAL SPECIFICATIONS

MILITARY TYPE		MAXIMUM RES. VALUE (Ohms)		POWER RATING @ 125°C (Watts)	MAXIMUM VOLTAGE
MIL-PRF-39005	MIL-R-93	MIL-PRF-39005	MIL-R-93		
RBR74	—	6.52k	—	0.125	150
RBR75		150k		0.125	150
RBR56	RB56	220k	42k	0.125	150
RBR71	RB71	150k	100k	0.125	150
RBR55	RB55	332k	80k	0.150	200
RBR54	RB54	562k	170k	0.250	300
RBR53	RB53	1.1M	320k	0.333	300
RBR76	—	3.344k	—	0.500	300
RBR52	RB52	1.21M	610k	0.500	600
RBR57	RB57	1.37M	830k	0.750	600

APPLICATIONS

High reliability programs require a resistor that is electrically and mechanically sound. The RBR series design represents the ultimate wirewound resistor to meet these demanding requirements. Production methods with in-place quality control systems allow complete traceability of materials and processing with documented back-up.

DERATING



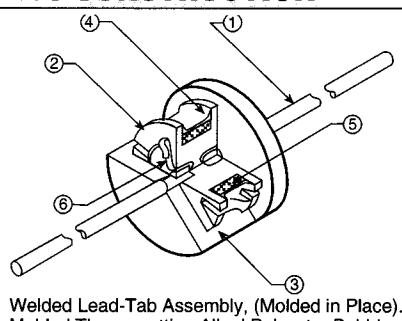
The power ratings listed in the tables are based upon achieving the specified stabilities at maximum ambient temperatures of + 125°C. If a resistor is to be used at a higher ambient temperature, the power should be derated linearly to zero at + 145°C.

PART MARKING

— Source code
— Date code and "JAN" marking
— Type designation*
— Manufacturer's production lot code

JAN AND J MARKING
Resistors procured to MIL-PRF-39005 and meeting all required specifications shall bear the "JAN" mark, except those resistors too small shall bear the letter "J". Resistors furnished under contracts or orders which permit or require deviations from the applicable detail specifications shall not bear "JAN" or "J".

RBR75 CONSTRUCTION

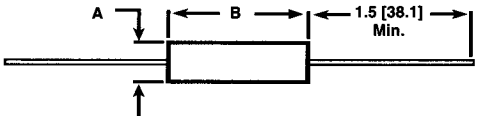


1. Welded Lead-Tab Assembly, (Molded in Place).
2. Molded Thermosetting Alkyd Polyester Bobbin.
3. Molded Thermosetting Alkyd Polyester Encapsulation.
4. Stress Relief Coating.
5. Resistance Wire.
6. Sandwich-Welded Termination.

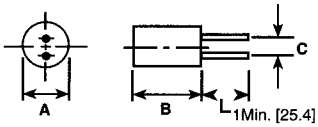
All Welded Construction: The combination of all welded construction and compatible materials provide the most reliable means of interconnects possible.
Butt Weld of Tab to Lead: A tab material of 800 alloy (the same as the resistance wire) is butt welded to the lead and molded deep into the resistor bobbin. This design parameter assures the least possible D.C. transients due to thermal EMF.
Bobbin Design: The ratio of the height of the Pi wall to the width of the Pi and to the diameter of the bobbin mandrel are critical to the basic stability of a wirewound resistor. These parameters are optimized for each wire size, wattage size and range of resistor values.
Encapsulation Material: Both the bobbin and the final encapsulation material are alkyd polyesters. The resulting resistor is virtually a homogeneous mass with compatible coefficients of expansion. All types are unaffected by application of solvents.
Lead Materials: The standard lead materials are hot solder dipped copper (C5N) for solderable terminals and nickel (N1N) for weldable terminals.

DIMENSIONS in inches [millimeters]

Axial Models



RBR71



MODEL	RBR DIMENSIONS						
	A		B		C	LEADS	
	Nom.	Tol.	Nom.	Tol.		AWG	Diameter
RBR74	0.193 [4.90]	± 0.010 [0.254]	0.500 [12.70]	± 0.020 [0.508]	—	22	0.026 [0.660]
RBR75	0.250 [6.35]	± 0.015 [0.381]	0.295 [7.49]	+ 0.020 [0.508] − 0.032 [0.813]	—	22	0.026 [0.660]
RBR56	0.250 [6.35]	± 0.015 [0.381]	0.344 [8.74]	+ 0.020 [0.508] − 0.032 [0.813]	—	20	0.032 [0.813]
RBR71	0.250 [6.35]	± 0.031 [0.787]	0.312 [7.92]	± 0.031 [0.787]	0.200 [5.08] ± 0.010 [0.254]	22	0.026 [0.660]
RBR55	0.250 [6.35]	± 0.015 [0.381]	0.500 [12.70]	+ 0.020 [0.508] − 0.032 [0.813]	—	20	0.032 [0.813]
RBR54	0.250 [6.35]	± 0.015 [0.381]	0.750 [19.05]	+ 0.020 [0.508] − 0.032 [0.813]	—	20	0.032 [0.813]
RBR53	0.375 [9.53]	± 0.015 [0.381]	0.750 [19.05]	+ 0.020 [0.508] - 0.032 [0.813]		20	0.032 [0.813]
RBR76	0.312 [7.92]	± 0.015 [0.381]	0.812 [20.63]	+ 0.020 [0.508] − 0.032 [0.813]	—	20	0.032 [0.813]
RBR52	0.375 [9.53]	± 0.015 [0.381]	1.00 [25.40]	+ 0.020 [0.508] − 0.032 [0.813]	—	20	0.032 [0.813]
RBR57	0.500 [12.7]	± 0.015 [0.381]	1.00 [25.40]	+ 0.020 [0.508] − 0.032 [0.813]	—	20	0.032 [0.813]

ENVIRONMENTAL PERFORMANCE

TEST	CONDITIONS	REQUIREMENTS* (MIL-R-39005)	MAX. ΔR* (Typical Test Lots)
Power Conditioning	100 hours at rated power at + 125°C	≤ .01%	± .006%
Thermal Shock	MIL-STD-202, Method 102	≤ .05%	± .003%
Short Time Overload	Twice rated power for 10 minutes	≤ .01%	± .005%
Moisture Resistance	MIL-STD-202, Method 106	≤ .10%	± 0.04%
Resistance to Soldering	MIL-STD-202, Method 210	≤ .01%	± .002%
Shock	20 shocks, 6 ms sawtooth at 100g	≤ .01%	± .005%
Vibration	MIL-STD-202, Method 204	≤ .01%	± .005%
Load Life	10,000 hours at rated power at + 125°C	≤ .20%	± .010%
Terminal Strength	MIL-STD-202, Method 211 (pull-twist)	≤ .01%	± .005%

* Add .01 ohm below 10 ohm.
All readings at dry state.

ORDERING INFORMATION

RBR52	L	12601	F	M
SERIES	TERMINAL	RESISTANCE VALUE	TOLERANCE	FAILURE RATE

L = Solderable
U = Weldable

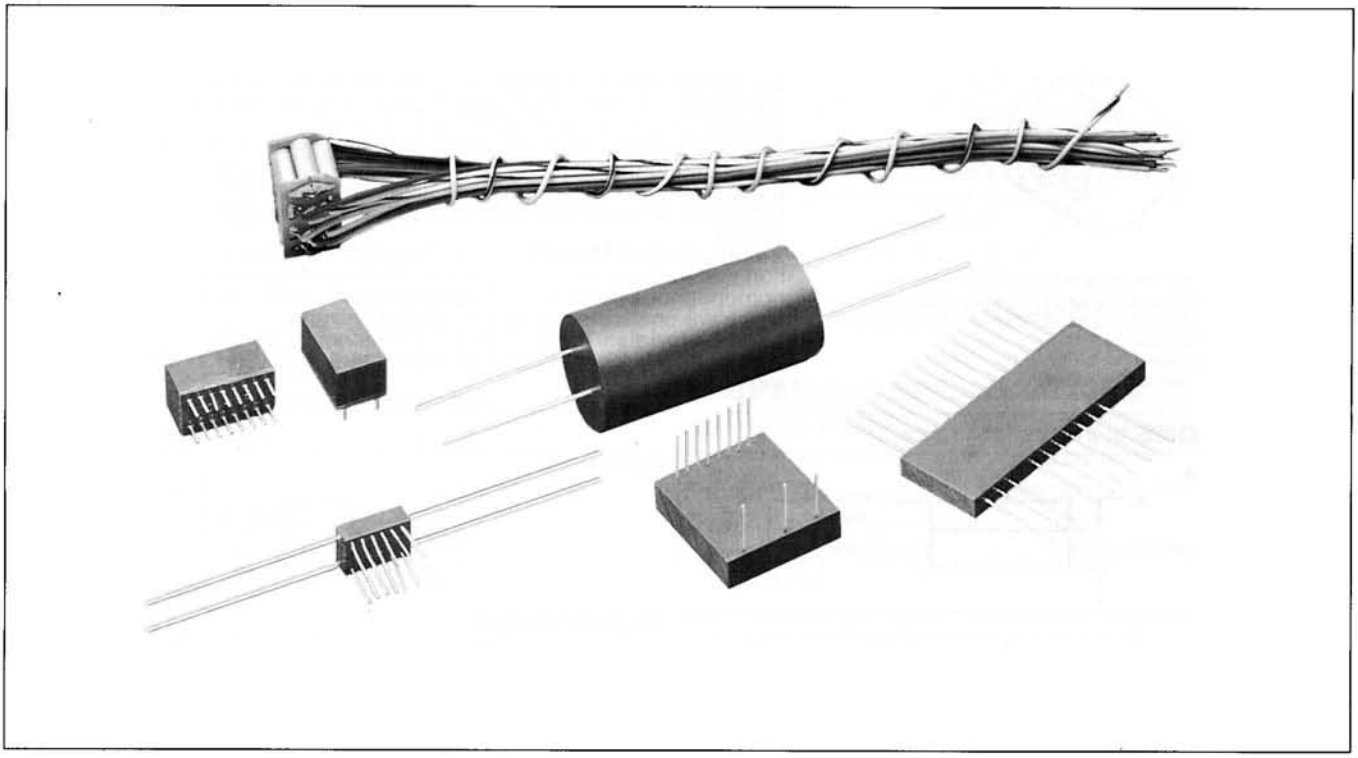
MIL code	Value
1R260	1.26 Ohms
126R0	126 Ohms
12600	1.26 K-Ohms
12601	12.6 K-Ohms
12602	126 K-Ohms
12603	1.26 Megohms

T = ± 0.01%
Q = ± 0.02%
A = ± 0.05%
B = ± 0.1%
F = ± 1.0%

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

Networks and Matched Sets

Custom Designed



Networks provide design engineers with the flexibility to package several resistors in a small space while maintaining resistance-ratio matching, close temperature-coefficient-of-resistance tracking and minimum temperature gradients between resistors. For more details and assistance in network design, contact the applications engineering department. In many cases we will be able to help reduce costs while improving the performance and reliability of the end product.

ELECTRICAL SPECIFICATIONS

Ambient Operating Temperature Range: – 55°C to + 125°C.
Resistance Range: 10 ohms to 43 Megohms.
Absolute Resistor Tolerances: To ± 0.005%.
Matched Resistance Ratios: To ± 0.005%.
Temperature Coefficient: To ± 3ppm/°C, – 10°C to + 80°C.
TCR Tracking: To ± 1ppm/°C.

APPLICATIONS

Matched resistor sets and custom designed networks are available from Ultronix for equipment design requiring close ratio matching and temperature tracking of resistors.
Our networks are used in a wide variety of applications such as communications satellites, precision instrumentation, aircraft controls, etc.
Network quality is determined by the precision of its individual resistors plus packaging and mounting techniques. Ultronix offers a unique background of experience in manufacturing and testing wirewound resistor networks.

BASIC INFORMATION REQUIRED FOR DESIGN AND QUOTATION

ELECTRICAL

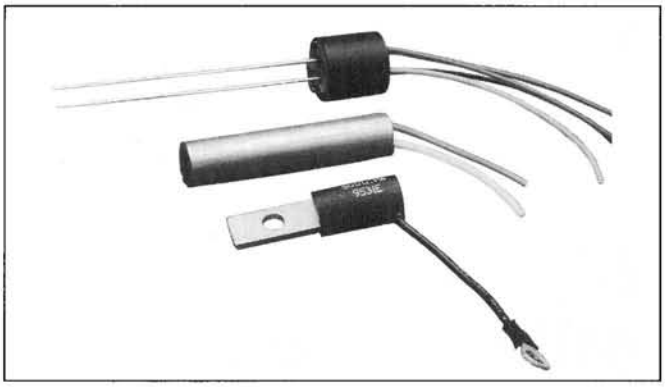
- Circuit schematic
- Resistance values
- Resistance tolerances
- Ratio tolerances
- Absolute TCR (each resistor)
- TCR tracking (between resistors)
- Power dissipation
  - — per resistor
  - — total
- Operating temperature

MECHANICAL

- Case configuration
- Maximum volume available
- Dimensions
  - — length
  - — width
  - — height
- Mounting requirements
- Leads
  - — material
  - — size
  - — length
  - — spacing

Temperature Sensitive Resistors

Large ΔR/ΔT



FEATURES

- Custom TCR to ± 2% tolerance
- Absolute resistance tolerance to ± 0.1%
- Fast thermal transition
- Physical configurations to your specifications
- Excellent TCR linearity
- Excellent repeatability

The Table below lists several common resistance-wire alloys according to the TCR. There are many alloys available with special TCRs within this range. Availability of alloys, however, does not limit the ability to obtain other special TCRs up to + 6000 ppm/°C. Intermediate values can be obtained by utilizing various manufacturing techniques and by selecting and combining resistance wires of various alloys.

Although precision wirewound resistors are usually selected for their tight tolerance and low TCR capabilities, it is sometimes necessary to use a high-TCR resistor to compensate for other circuit components which exhibit negative TC. Also, because of their high reliability and linear resistance vs. temperature characteristics, high-positive-TCR resistive devices are frequently used to measure temperature or provide temperature reference for thermocouples.

High TCR resistors are offered in our standard packages, (page 5 & 6), and special packages are available to meet your design specifications. If you have a unique application or package requirement, our applications engineering department is ready to assist in your design.

TABLE 7 - WIRE SELECTION

Wire Alloy Common Trade Name or Equivalent	Temperature Coefficient (ppm/°C)		Resistivity (Ohms/CMF)	Maximum Resistance Factor*
	– 55°C to + 25°C	+ 25°C to + 125°C		
Evanohm®	+ 5 ±10	+ 5 ± 10	800	1.00
3520 Ni/TOPHET D®	+ 380 ± 40	+ 400 ± 40	600	0.76
90 ALLOY	+ 450 ± 50	+ 450 ± 50	90	0.11
60 ALLOY	+ 700 ± 200	+ 700 ± 200	60	0.08
316 S.S.	+ 850 ± 80	+ 850 ± 80	470	0.59
304 S.S.	+ 1000 ± 100	+ 1000 ± 100	420	0.53
30 ALLOY	+ 1400 ± 300	+ 1400 ± 300	30	0.04
42% Ni Fe	+ 2600 ± 200	+ 2600 ± 200	420	0.53
KOVAR®	+ 3500 ± 300	+ 3500 ± 300	294	0.37
BALCO®[1]	+ 3900 ± 300	+ 4500 ± 400	120	0.15
NICKEL 270[1]	+ 5000 ± 300	+ 6000 ± 300	42	0.05

NOTE: Special RTC's available by combining alloys

*To obtain maximum resistance available, multiply the maximum value for the particular resistor style by the maximum resistance factor.

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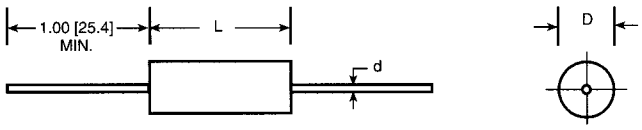
BASIC INFORMATION REQUIRED FOR DESIGN AND QUOTATION

Resistor description
- Style/size/mechanical description, if special
- Resistance value at a given temperature
- Tolerance at the same temperature
- Amount of variation per °C and temperature range
- Linearity and tolerance on TCR
- Power rating desired

Cross Reference Table for[1] Elliot/Jordan Part Numbers

ELLIOT/JORDAN PART NUMBERS[1] AND CHARACTERISTICS						CLOSEST ULTRONIX EQUIVALENTS
		DIMENSIONS		LEADS		
E/J MODEL[1]	POWER RATING @125°C (watts)	DIAMETER D ±.010 [.254]	LENGTH L ±.064 [1.63]	AWG	DIAMETER d ±002 [.051]	(Direct)*
A0931	0.030	0.097 [2.46]	0.312 [7.92]	24	0.020 [0.508]	102A/123A
A1020	0.050	0.100 [2.54]	0.200 [5.08]	24	0.020 [0.508]	123A*
A1025	0.050	0.105 [2.67]	0.250 [6.35]	24	0.020 [0.508]	102A/123A*
A1030	0.050	0.100 [2.54]	0.300 [7.62]	24	0.020 [0.508]	102A
A1221	0.050	0.125 [3.18]	0.215 [5.46]	24	0.020 [0.508]	122A*
A1225	0.100	0.125 [3.18]	0.250 [6.35]	24	0.020 [0.508]	102A/122A
A1231	0.100	0.125 [3.18]	0.312 [7.92]	22	0.025 [0.635]	101A/102AL
A1237	0.100	0.125 [3.18]	0.375 [9.52]	22	0.025 [0.635]	101A*
A1527	0.100	0.155 [3.94]	0.270 [6.86]	22	0.025 [0.635]	153A*
A1531	0.125	0.156 [3.96]	0.310 [7.87]	22	0.025 [0.635]	103A/135A*
A1535	0.125	0.156 [3.96]	0.350 [8.89]	22	0.025 [0.635]	103A/105A
A1550	0.150	0.155 [3.94]	0.500 [12.7]	22	0.025 [0.635]	105A*
A1825	0.125	0.187 [4.75]	0.250 [6.35]	22	0.025 [0.635]	103A/153A
A1831	0.125	0.187 [4.75]	0.312 [7.92]	22	0.025 [0.635]	103A/184A
A1838	0.150	0.187 [4.75]	0.375 [9.52]	22	0.025 [0.635]	184A*
A1850	0.200	0.187 [4.75]	0.500 [12.7]	22	0.025 [0.635]	185A*
A1862	0.200	0.187 [4.75]	0.625 [15.88]	22	0.025 [0.635]	185A
A2525	0.150	0.250 [6.35]	0.250 [6.35]	22	0.025 [0.635]	202A
A2529	0.175	0.250 [6.35]	0.295 [7.49]	22	0.025 [0.635]	202A*
A2535	0.200	0.250 [6.35]	0.350 [8.89]	22	0.025 [0.635]	202A*
A2536	0.250	0.250 [6.35]	0.350 [8.89]	20	0.032 [0.813]	203A*
A2550	0.250	0.250 [6.35]	0.500 [12.7]	22	0.025 [0.635]	205BH*
A2552	0.330	0.250 [6.35]	0.500 [12.7]	20	0.032 [0.813]	205AB*
A2575	0.330	0.250 [6.35]	0.750 [19.05]	22	0.025 [0.635]	207BH*
A2576	0.500	0.250 [6.35]	0.750 [19.05]	20	0.032 [0.813]	207AB*
A25100	0.500	0.250 [6.35]	1.00 [25.4]	22	0.025 [0.635]	210AB
A25101	0.600	0.250 [6.35]	1.00 [25.4]	20	0.032 [0.813]	210AB*
A3175	0.450	0.312 [7.92]	0.750 [19.05]	22	0.025 [0.635]	207A/308A
A3181	0.500	0.312 [7.92]	0.812 [20.62]	22	0.025 [0.635]	308A
A3481	0.600	0.343 [8.71]	0.812 [20.62]	20	0.032 [0.813]	308A*
A3750	0.330	0.375 [9.52]	0.500 [12.7]	20	0.032 [0.813]	205A
A3762	0.400	0.375 [9.52]	0.625 [15.88]	20	0.032 [0.813]	307A
A3775	0.500	0.375 [9.52]	0.750 [19.05]	20	0.032 [0.813]	307A*
A37100	1.00	0.375 [9.52]	1.00 [25.4]	20	0.032 [0.813]	310A*
A5050	0.500	0.500 [12.7]	0.500 [12.7]	20	0.032 [0.813]	505A*
A5062	0.600	0.500 [12.7]	0.625 [15.88]	20	0.032 [0.813]	505A
A5075	0.750	0.500 [12.7]	0.750 [19.05]	20	0.032 [0.813]	505A
A50100	1.00	0.500 [12.7]	1.00 [25.4]	20	0.032 [0.813]	510A*
A50125	1.25	0.500 [12.7]	1.250 [31.75]	20	0.032 [0.813]	510A
A50150	1.50	0.500 [12.7]	1.50 [38.1]	20	0.032 [0.813]	515A*
A50200	2.00	0.500 [12.7]	2.00 [50.8]	20	0.032 [0.813]	520A*

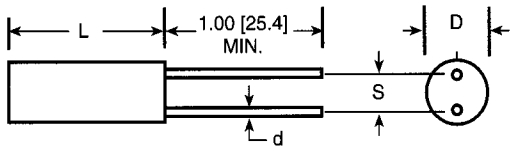


[1] These part numbers are obsolete for new designs

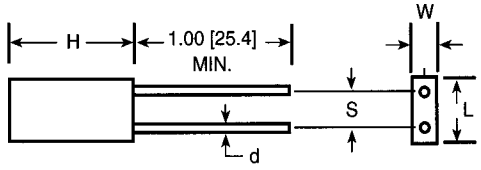
Cross Reference

Cross Reference Table for Elliot/Jordan Part Numbers[1] Vishay Ultronix

ELLIOT/JORDAN PART NUMBERS[1] AND CHARACTERISTICS							CLOSEST ULTRONIX EQUIVALENTS
E/J MODEL[1]	Power Rating @ + 125°C watts	DIMENSIONS		LEADS			
		DIAMETER D ± 0.010 [0.254]	LENGTH L ± 0.032 [0.813]	SPACING S ± 0.005 [0.127]	AWG	DIAMETER d ± 0.002 [0.051]	(Direct)*
P1831	0.100	0.187 [4.75]	0.315 [8.00]	0.100 [2.54]	24	0.020 [0.508]	—
P1837	0.130	0.187 [4.75]	0.375 [9.52]	0.100 [2.54]	22	0.025 [0.635]	—
P2525	0.150	0.250 [6.35]	0.250 [6.35]	0.100 [2.54]	24	0.020 [0.508]	—
P2526	0.200	0.250 [6.35]	0.250 [6.35]	0.150 [3.81]	22	0.025 [0.635]	203PC
P2527	0.200	0.250 [6.35]	0.250 [6.35]	0.200 [5.08]	22	0.025 [0.635]	203PA
P2528	0.150	0.250 [6.35]	0.280 [7.11]	0.150 [3.81]	22	0.025 [0.635]	203PC
P2531	0.180	0.250 [6.35]	0.312 [7.92]	0.200 [5.08]	22	0.025 [0.635]	203PA
P2535	0.200	0.250 [6.35]	0.350 [8.89]	0.150 [3.81]	22	0.025 [0.635]	203PC
P2537	0.200	0.250 [6.35]	0.375 [9.52]	0.150 [3.81]	24	0.020 [0.508]	203PC
P2550	0.250	0.250 [6.35]	0.500 [12.7]	0.175 [4.44]	22	0.025 [0.635]	—
P2551	0.250	0.250 [6.35]	0.500 [12.7]	0.150 [3.81]	22	0.025 [0.635]	203PC
P3750	0.330	0.375 [9.52]	0.500 [12.7]	0.250 [6.35]	20	0.032 [0.813]	—
P3751	0.400	0.375 [9.52]	0.500 [12.7]	0.200 [5.08]	20	0.032 [0.813]	305PA*
P5050	0.500	0.500 [12.7]	0.500 [12.7]	0.300 [7.62]	20	0.032 [0.813]	505PA*
P5051	0.500	0.500 [12.7]	0.500 [12.7]	0.400 [10.16]	20	0.032 [0.813]	205R



ELLIOT/JORDAN PART NUMBERS[1] AND CHARACTERISTICS								CLOSEST ULTRONIX EQUIVALENTS
E/J MODEL[1]	Power Rating @ + 125°C watts	DIMENSIONS			LEADS			
		HEIGHT H ± 0.020 [0.508]	LENGTH L ± 0.010 [0.254]	WIDTH W ± 0.010 [0.254]	SPACING S ± 0.005 [0.127]	AWG	DIAMETER d ± 0.002 [0.051]	(Direct)*
PR2525	0.200	0.250 [6.35]	0.250 [6.35]	0.125 [3.18]	0.125 [3.18]	20	0.032 [0.813]	102PAB
PR2526	0.125	0.250 [6.35]	0.250 [6.35]	0.125 [3.18]	0.125 [3.18]	22	0.025 [0.635]	102PBA
PR3230	0.300	0.320 [8.13]	0.300 [7.62]	0.100 [2.54]	0.150 [3.81]	22	0.025 [0.635]	101P*
PR2550	0.250	0.250 [6.35]	0.500 [12.7]	0.125 [3.18]	0.250 [6.35]	20	0.032 [0.813]	—
PR3231	0.300	0.328 [8.33]	0.306 [7.77]	0.110 [2.79]	0.150 [3.81]	22	0.025 [0.635]	101P*
PR5256	0.500	0.520 [13.21]	0.565 [14.35]	0.150 [3.81]	0.400 [10.16]	22	0.025 [0.635]	—
PR5387	0.700	0.530 [13.46]	0.875 [22.22]	0.180 [4.57]	0.650 [16.51]	22	0.025 [0.635]	—



[1] These part numbers are obsolete for new designs