

Vishay Foil Resistors

High Temperature Resistors



Stress Measurements



Process Control



Hospital Patient Bed Weighing



Precision Navigation Systems



Axle Overload Protection

Where the World Goes
for Precision Measurement and Control



Introduction

- Over the past few years, there has been considerable growth in the demand for precise, stable and reliable resistors that can operate in harsh environments and especially at high temperatures
- Vishay Foil Resistors provide stabilities well under the maximum allowable drift required by customers' specifications through thousands of hours of operation under harsh conditions such as the extreme temperatures
- **All Bulk Metal® Foil resistors receive stabilization processing such as repetitive thermal cycling and short-term power overloads to assure reliable service through the stresses of extreme operation**



Introduction

- Compared to Bulk Metal[®] Foil, Thick and Thin Film resistor elements are produced with a non-controllable material
- Heat or mechanical stresses on the resistive elements cause the particles forming the film to expand, but after these stresses are alleviated, the particles in the film matrix do not return to the exact same original position, which degenerates their overall stability
- **Bulk Metal[®] Foil resistors come in a variety of configurations, packages, and special terminations to provide an array of power ratings, sizes, resistance values and other operating specifications to meet stability and reliability needs in extreme applications – especially for high temperatures**

Vishay Foil Resistors

High Temperature Resistors

S/N	Product Name	Type	Features	Max working Temperature	
1	HTHG	High Temperature Chip Resistor	Z1- Foil technology Mounting /Connection Method: Face up : <u>Gold</u> wire bonding connection	+240°C	
		Sizes			Mounting
		5x5,15x5,15x10 0603,0805,1206, 1506,2010,2512			Face up only
2	HTHA	High Temperature Chip Resistor	Z1- Foil technology Two Options of Mounting /Connection Methods: 1. Face up : <u>Aluminum</u> wire bonding connection 2. Face down : Conductive epoxy	+240°C	
		Sizes			Mounting
		0603,0805,1206, 1506,2010,2512			Face up & Face down
3	V15x25	Surface Mount Current Sensing, High Power Chip Resistor	Back side metallization Connection Method (face up): Aluminum wire bonding ⁽²⁾	+240°C	
4	FRSH	Surface Mount Chip Resistor (Wrap around)	Z1- Foil technology Extended Pads	+225°C	
5	V5x5,V15x5,V15x10	Hybrid Chip Resistors	Gold wire bonding	+200°C	
6	V5x5Z,V15x5Z		Gold wire bonding (Z-Foil)		
7	PRND	Custom Hermetically Sealed Precision Resistor Network Devices	Wide variety of packages	+200°C ⁽¹⁾	
8	VCS1625	Surface mount Current Sensing, Chip Resistor	Termination: Gold or Tin plated	+200°C ⁽¹⁾	

Notes:

1. For higher working temperature please contact Application Engineering department
2. Gold wire bonding is also available upon special request

Vishay Foil Resistors

High-Temperature Resistors

S/N	Product Name	Type	Features	Max working Temperature
9	L102ZHT	Through Hole	Special Coating (Z-Foil)	+200°C
10	L102HT		Special Coating	
11	300144ZHT	Voltage Divider (Radial)	Special Coating (Z-Foil)	+200°C
12	FRSM	Surface Mount Chip Resistor (Wrap around)	Z1- Foil technology	+175°C
13	SMRXDZ Series	Molded Surface Mount	Flexible termination (Z-Foil)	+175°C
14	SMRXD Series		Flexible termination	
15	Z Series	Through Hole	Z Foil technology	+175°C
16	S Series		Foil technology	+175°C

HTHG and HTHA



Z1-Foil Technology

Product	Connecting Method	Sizes	Value Range	TCR* (Typical) ppm/°C	Tightest Tol. %	Long term stability @ +240°C for 2000hrs, no power (Typical)	Long term stability @ +240°C for 2000hrs, no power (Typical)	Max working Temp.
HTHG	Face up	5x5,15x5,15x10 0603,0805,1206, 1506,2010,2512	5Ω to 80KΩ	±2.5	±0.02	0.05%	0.05%	+240°C
	Gold wire bonding		5Ω to 125KΩ					
HTHA	Face up	0603,0805,1206, 1506,2010,2512	5Ω to 125KΩ					
	Aluminum wire bonding							
	Face down							
	Electrical conductive epoxy							

* Temperature range (-55°C to +220°C,+25°C ref.)

Datasheets: <http://www.vishaypg.com/docs/63222/htha.pdf>
<http://www.vishaypg.com/docs/63221/hthg.pdf>



V15x25

High precision surface mount current sensing resistor, high power (up to 0.5 W at +220°C) with gold plated pads and gold plated back side for high temperature applications up to +240 °C

Product	Feature	Mounting Method	Connecting Methods*	Resistance Range	Tightest Tol. %	TCR** (Typical) ppm/°C	Working Power
V15x25	Surface Mount Chip with back side metallization	Solder/ Epoxy	Aluminum wire bonding	0.01Ω to 10Ω	± 0.1	±10	0.5W at + 220 °C

* Gold wire bonding is also available upon special request

** Temperature range: (- 55°C to + 240°C,+ 25°C ref.)

FRSH



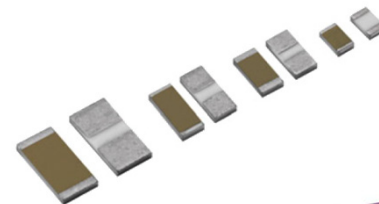
Z1-Foil Technology

***Ultra high precision wraparound surface-mount chip resistor
with extended pads for high power/high temperature applications
up to +225 °C (330mW at +200°C)***

Product	Feature	Sizes	Resistance Range	Tightest Tol. %	TCR* (Typical) ppm/°C	Max Working Power	Load Life 2000h, +200°C at working power (Typical)	Long term stability @ +225°C for 2000h, no power (Typical)
FRSH	Surface mount, extended pads design	0603, 0805, 1206, 1506, 2010, 2512	5 Ω to 125 kΩ	± 0.02	±2.5	330 mW at + 200°C	±0.05%	±0.05%

* Temperature range: (-55°C to +200°C, +25°C ref.)

Datasheet: http://www.vishaypg.com/docs/63211/frsh_z.pdf

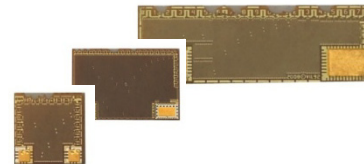


Hybrid Chips

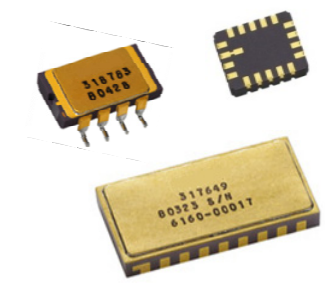
***Bulk Metal® Foil technology discrete chips
for use in hybrid circuits at +200°C and above***

Product	Connecting method	Sizes	Resistance Range	Tightest Tol. %	TCR* (Typical) ppm/°C
Hybrid Chip	Gold wire bonding	V5x5 V15x5 V15x10	5 Ω to 80 kΩ	±0.02	±5

* Temperature range: (-55°C to +200°C, +25°C ref.)



PRND



Precision Resistor Network Devices

Custom designed hermetically-sealed networks built to customer circuit schematic and specifications at +200°C and above

Product	Feature	Chip Sizes	Resistance Range (per chip)	Tightest Tol. %	TCR* (Typical) ppm/C	Load Life 2000hrs, +70°C at rated power (Typical)	Shelf Life (Typical)
PRND	Custom Hermetically Sealed Network	V5x5 V15x5 V15x10	5 Ω to 80 kΩ	±0.02	±5	ΔR: ±0.015% ΔRatio: ±0.005%	ΔR = ±2 ppm ΔRatio = ±2 ppm

* Temperature range: (-55°C to +200°C , +25°C ref.)

- Multiple Foil hybrid chips are arranged within a device and connected by gold-wire bonding
- Wide variety of Packages (e.g. DIP, LCC, Flat pack etc)

VCS1625

Bulk Metal® Foil surface-mount current sensing chip resistor for high temperature applications at +200°C and above

Product	Feature	Resistance Range	Tightest Tol. %	TCR* (Typical) ppm/°C	Rated Power @ +70°C	Terminations
VCS1625	Surface Mount-Current Sensing Resistor	10mΩ to 10Ω	± 0.5	±3	0.5W	Gold or Tin plated

* Temperature range: (-55°C to +200°C, +25°C ref.)



L102HT & L102ZHT

- ***Ultra high precision Bulk Metal[®] Z-Foil through hole resistor with special coating and working temperature up to +200°C***

Features	L102HT	L102ZHT
Resistance range	1 Ω to 150 k Ω	10 Ω to 100 k Ω
Temperature coefficient of resistance (TCR) (- 55°C to + 200 °C, + 25°C,Ref.)	To \pm 6 ppm/°C.	To \pm 3 ppm/°C.

- * S102 type with special coating to withstand high temperature environment
- * AWG 22 – Tin plated leads






300144ZHT

***Ultra high precision Bulk Metal® Z-Foil voltage divider
radial resistor for working temperatures up to +200°C, Zero power***

Product	Resistance Range	Tightest Tol. %	Tightest Match Tol. %	Tightest Absolute TCR ppm/°C	Tightest TCR Tracking ppm/°C	Terminations
303144ZHT Special coating	100 Ω to 20 kΩ	± 0.01	± 0.005	±2.5	±1	AWG 22 – Tin plated leads

* Temperature range: (-55°C to +200°C, +25°C ref.)

Foil Resistors for Applications up to +175 °C

Product	Type	Features	Datasheet
FRSM	Surface mount wrap around chip resistor	Z1- Foil technology	
SMRXDZ Series	Molded surface mount	Flexible termination (Z-Foil)	
SMRXD Series		Flexible termination	
Z Series	Through hole	Z Foil technology	
S Series		Foil technology	

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