

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 short-term power overloads to assure reliable service through the unpredictable 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	HTH	High Temp.Hybrid Chip (5x5,15x5,15x10) & (0603,0805,1206,2010,2512)	Z1- Foil technology Two Options of Mounting /Connection Methods: 1. Face down : Conductive epoxy 2. Face up : Gold wire bonding connection	+240°C
2	HTHA	High Temp.Hybrid Chip (0603,0805,1206,2010,2512)	Z1- Foil technology Two Options of Mounting /Connection Methods: 1. Face down : Conductive epoxy / Soldering 2. Face up : Aluminum wire bonding connection	+240°C
3	V15x25	SMD Current Sensor High Power Chip	Back side metallization Two Options of Connection Methods (face up): 1.Aluminum wire bonding 2.Gold wire bonding	+240°C
4	FRSH	SMD	Z1- Foil technology Extended Pads	+225°C
5	V5x5,V15x5,V15x10	Hybrid Chips	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	Wrap around SMD Current Sensor	Termination: Gold or Tin plated	+200°C ⁽¹⁾

Note:

1. For higher working temperature please contact Application Engineering department

Vishay Foil Resistors

High-Temperature Resistors

S/N	Product Name	Type	Features	Max working Temperature
9	L102HTZ	Through hole	Special Coating (Z-Foil)	+200°C
10	L102HT		Special Coating	
11	300144ZHT	Voltage Divider (Through hole/Axial)	Special Coating (Z-Foil)	+200°C
12	FRSM	Wrap around SMD chip	Z1- Foil technology	+175°C
13	SMRXdZ Series	Molded SMD	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

HTH and HTHA



Z1-Foil Technology

Product	Connecting Method	Sizes	Value Range	TCR* (Typical) ppm/°C	Best Tol. %	Max working Temp.	Long term stability @ + 240°C for 1000h, no power
HTH	Face up	5x5,15x5,15x10	5Ω to 80KΩ	±3	±0.02	+240°C	0.1%
	Gold wire bonding		5Ω to 125KΩ				
	Face down	0603,0805,1206, 2010,2512	5Ω to 125KΩ				
	Electrical conductive Epoxy		5Ω to 125KΩ				
HTHA	Face up	0603,0805,1206, 2010,2512	5Ω to 125KΩ	±3	±0.02	+240°C	0.1%
	Aluminum wire bonding						
	Face down						
	1. Electrical conductive epoxy 2. Soldering						

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



V15x25

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

Product	Feature	Connecting Methods	Resistance Range	Best Tol. %	TCR* (Typical) ppm/°C	Working Power
V15x25	SMD Power Chip back side metallization	Gold/ Aluminum wire bonding	0.01Ω to 10Ω	± 0.1	±10	0.5W at + 220 °C

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

FRSH

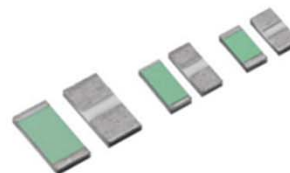
Z1-Foil Technology



***Ultra high precision wraparound surface-mount chip resistor
with extended pads for high power/high temperature applications
up to +225 °C (150mW at + 200°C)***

Product	Feature	Sizes	Resistance Range	Best Tol. %	TCR* (Typical) ppm/°C	Max Working Power	Load Life 2000hrs,+70°C at rated power	Long term stability@ + 225°C for 1000h, no power
FRSH	SMD extended pads design	0603, 0805, 1206, 1506, 2010, 2512	5 Ω to 125 kΩ	± 0.02	± 3	150 mW at + 200°C	±0.0025%	±0.1%

* Temperature range: (- 55°C to + 225°C, + 25°C ref.)

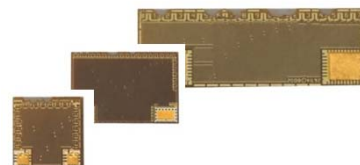


Hybrid Chips

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

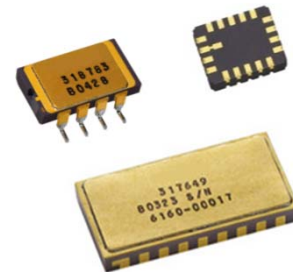
Product	Connecting method	Sizes	Resistance Range	Best Tol. %	TCR* (Typical) ppm/°C
Hybrid Chip	Gold wire bonding	V5x5 V15x5 V15x10	5 Ω to 80 k Ω	± 0.02	± 5

* 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)	Best Tol. %	TCR* (Typical) ppm/C	Load Life 2000hrs,+70°C at rated power (Typical)	Shelf Life (Typical) ppm
PRND	Custom Hermetically Sealed Network	V5x5 V15x5 V15x10	5 Ω to 80 k Ω	± 0.02	± 5	$\Delta R: \pm 0.015\%$ $\Delta \text{Ratio}: \pm 0.005\%$	$\Delta R = \pm 2$ $\Delta \text{Ratio} = \pm 2$

* 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	Best Tol. %	TCR* (Typical) ppm/°C	Terminations
VCS1625	SMD Current Sensing	10mΩ to 10Ω	± 0.5	±3	Gold or Tin plated

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



L102HT & L102HT-Z-Foil

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

Features	L102HT	L102HTZ
Temperature coefficient of resistance (TCR) (- 55°C to + 200 °C, + 25°C, Ref.)	To ± 6 ppm/°C.	To ± 3 ppm/°C.
Resistance range	1 Ω to 150 k Ω	10 Ω to 100 k Ω

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

303144HT – Z-Foil

Ultra high precision Bulk Metal® Z-Foil voltage divider
Through hole/axial resistor with special coating
and working temperature up to +200°C

Product	Feature	Resistance Range	Best Tol. %	TCR* (Typical) ppm/°C	Terminations
303144HT	Special coating	100 Ω to 20 k Ω	± 0.01	± 3	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	Wrap around SMD chip	Z1- Foil technology	
SMRXdZ Series	Molded SMD	Flexible termination (Z-Foil)	
SMRXd Series		Flexible termination	
Z Series	Through hole	Z Foil technology	
S Series		Foil technology	

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