

High Precision Foil Resistor

**with TCR of ± 2 ppm/ $^{\circ}$ C, Tolerance of $\pm 0.015\%$ and
Load Life Stability of $\pm 0.05\%$**

FEATURES

- **Temperature coefficient of resistance (TCR) at -55° C to $+125^{\circ}$ C, 25° C ref.:**
 ± 2 ppm/ $^{\circ}$ C typical (see table 1)
- **Power rating: to 1.2 W**
- Resistance tolerance: to $\pm 0.015\%$ (50 ppm)
- **Load life stability: $\pm 0.05\%$ at 70° C, 2000 h at rated power**
- **Resistance range: 1 Ω to 200 k Ω (for higher or lower values, please contact application engineering)**
- Bulk Metal[®] Foil resistors are not restricted to standard values; specific "as required" values can be supplied at no extra cost or delivery (e.g., 1K2345 vs. 1K)
- Electrostatic discharge (ESD) up to 25 kV
- Non inductive, non capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: $0.010 \mu V_{RMS}/V$ of applied voltage (<-40 dB)
- Thermal EMF: $0.05 \mu V/^{\circ}$ C
- Voltage coefficient: <0.1 ppm/V
- Low inductance: <0.08 μ H
- Non hot-spot design capacitance; 0.5 pF
- Terminal finishes available: lead (Pb)-free; tin/lead alloy
- Matched sets are available on request
- TCR tracking: to 0.5 ppm/ $^{\circ}$ C
- Prototype quantities available in up to 5 working days.
For more information, please contact:
foil@vpgsensors.com

APPLICATIONS:

- Avionics/Military/Space
- Automatic Test Equipment
- Medical
- Electron Beam Applications
- Industrial
- Precision Weighing
- Laboratory and Precision Instruments
- Test & Measurement



RoHS*
COMPLIANT

INTRODUCTION

Bulk Metal[®] Foil (BMF) technology outperforms all other resistor technologies available today for applications that require high precision and high stability.

This technology has been pioneered and developed by Vishay Foil Resistors (VFR), and products based on this technology are the most suitable for a wide range of applications. BMF technology allows the production of customer-oriented products, designed to satisfy specific challenging technical requirements.

The PZ102 is based on Z1 Foil Technology offers low TCR, excellent load life stability, tight tolerance, fast response time, low current noise, low thermal EMF and low voltage coefficient, all in one resistor.

The PZ102 is virtually insensitive to destabilizing factors. The resistor element is a solid alloy that displays the desirable bulk properties of its parent material, thus it is inherently stable and noise free. The standard design of this resistor provides a unique combination of characteristics found in no other single resistor.

For non-standard technical requirements and special applications, please contact: foil@vpgsensors.com.

Table 1 – Resistance Versus TCR⁽¹⁾
(-55° C to $+125^{\circ}$ C, $+25^{\circ}$ C ref.)

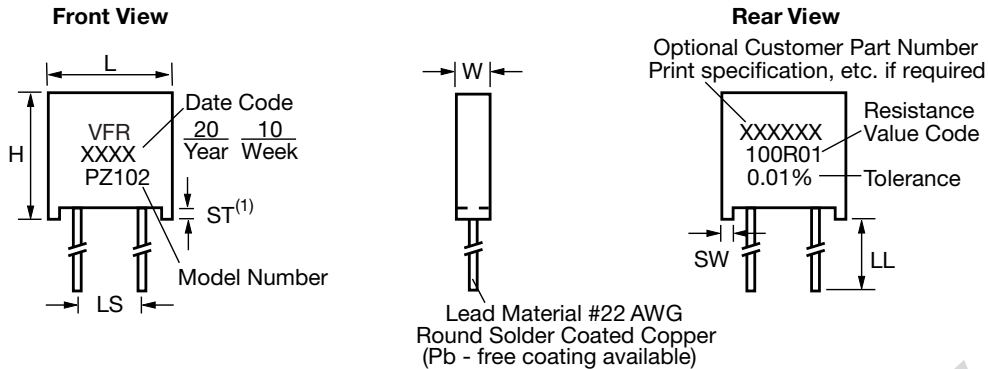
RESISTOR	RESISTANCE VALUE (Ω)	TYPICAL TCR AND MAX SPREAD (ppm/ $^{\circ}$ C)
PZ102	80 to 200k	$\pm 1.5 \pm 2.5$
	50 to <80	$\pm 1.5 \pm 3.5$
	1 to <50	$\pm 1.5 \pm 4.5$

(1) For tighter TCR, please contact Application Engineering.

Notes

* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS compliant. Please see the information/tables in this datasheet for details.

Figure 1 – Standard Imprinting and Dimensions



Notes

- (1) Standoffs provided to allow proper flushing of flux, debris, and contaminants from under resistor after all solder operations.
- (2) The standoffs shall be so located as to give a lead clearance of 0.010" minimum between the resistor body and the printed circuit board when the standoffs are seated on the printed circuit board.

Table 2 – Specifications

MODEL NUMBER	RESISTANCE RANGE (Ω)	MAXIMUM WORKING VOLTAGE	AMBIENT POWER RATING		AVERAGE WEIGHT IN GRAMS	DIMENSIONS		TIGHTEST TOLERANCE VS. LOWEST RESISTANCE VALUE
			at +70°C	at +125°C		INCHES	MM	
PZ102 (PZ102J) (1)	1 ≤ 100K	$\leq \sqrt{P \times R}$	1.2 W	0.6 W	0.6	W: 0.105±0.010 L: 0.300±0.010 H: 0.326±0.010 ST: 0.010 min. SW: 0.040±0.005 LL: 1.000±0.125 LS: 0.150±0.005	2.67±0.25 7.62±0.25 8.28±0.25 0.254 min. 1.02±0.13 25.4±3.18 3.81±0.13	0.005%/50 Ω 0.01%/25 Ω 0.02%/12 Ω 0.05%/5 Ω 0.1%/2 Ω 0.50%/1 Ω 1%/0.5 Ω
	100K to 200K		0.8 W	0.4 W				

(1) 0.200" (5.08 mm) lead spacing available – specify PZ102J

Figure 2 – Power Derating Curve

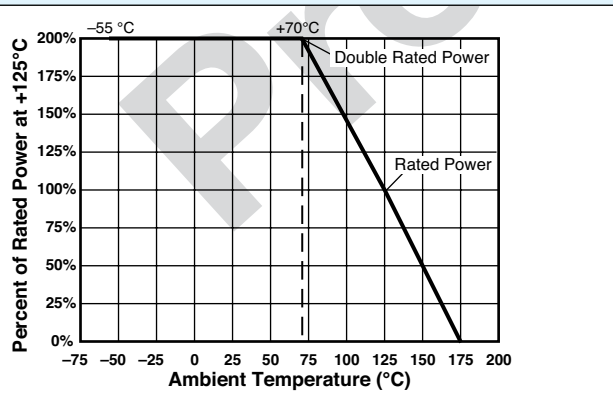
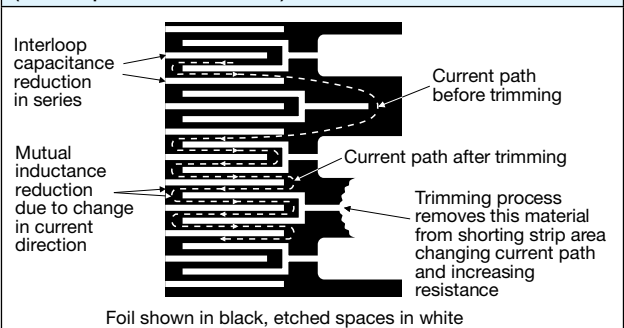


Figure 3 – Trimming to Values (conceptual illustration)



Note

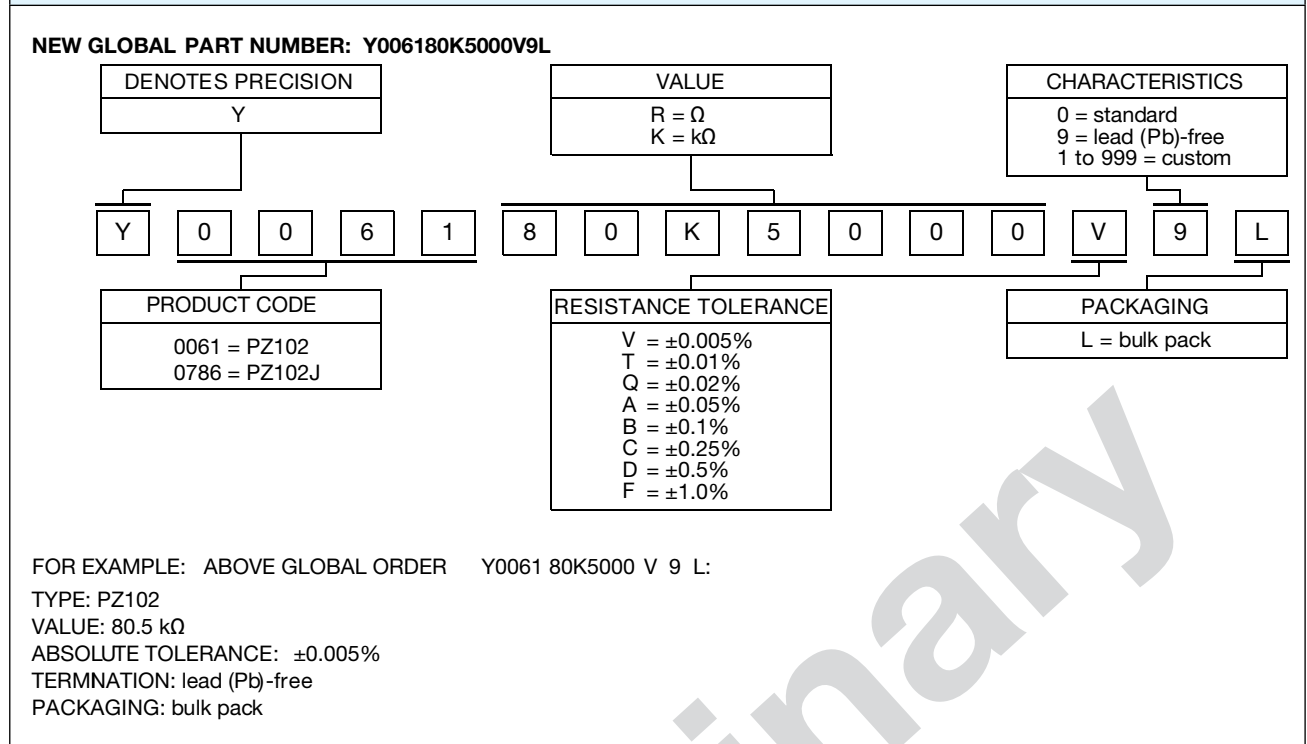
To acquire a precision resistance value, the Bulk Metal® Foil chip is trimmed by selectively removing built-in “shorting bars.” To increase the resistance in known increments, marked areas are cut, producing progressively smaller increases in resistance. This method reduces the effect of “hot spots” and improves the long-term stability of Bulk Metal® Foil resistors.

Table 3 – Environmental Performance		
	MIL-PRF-55182 CHAR J	MAXIMUM ΔR
Test Group I Thermal shock, 5 x (–65°C to +150°C) Short time overload, 6.25 x rated power	±0.2% ±0.2%	±0.01% (100 ppm) ±0.01% (100 ppm)
Test Group II Resistance temperature characteristics ⁽¹⁾ Low temperature storage (24 h at –65°C) Low temperature operation (45 min, rated power at –65°C) Terminal strength	±25 ppm/°C ±0.15% ±0.15% ±0.2%	±6.5 ppm/°C ±0.01% (100 ppm) ±0.01% (100 ppm) ±0.01% (100 ppm)
Test Group III Dielectric Withstanding Voltage (DWV) Resistance to solder heat Moisture resistance	±0.15% ±0.1% ±0.4%	±0.01% (100 ppm) ±0.01% (100 ppm) ±0.05% (500 ppm)
Test Group IV Shock Vibration	±0.2% ±0.2%	±0.01% (100 ppm) ±0.01% (100 ppm)
Test Group V Life test at 0.6 W/0.4 W (depends on value) @ +125°C 2000 h 10 000 h	±0.5% ±2.0%	±0.015% (150 ppm) ±0.05% (500 ppm)
Test Group Va Life test at 1.2 W/0.4 W (depends on value) (2 x rated power), +70°C, 2000 h	±0.5%	±0.015% (150 ppm)
Test Group VI High temperature exposure (2000 h at +175°C)	±2.0%	±0.05% (500 ppm)
Test Group VII Voltage coefficient	5 ppm/V	<0.1 ppm/V

⁽¹⁾ See Table 1.

Continues on next page.

Table 4 – Global Part Number Information⁽¹⁾



Note

⁽¹⁾ For non-standard requests, please contact application engineering.

Preliminary



Disclaimer

ALL PRODUCTS, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Vishay Precision Group, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "VPG"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

The product specifications do not expand or otherwise modify VPG's terms and conditions of purchase, including but not limited to, the warranty expressed therein.

VPG makes no warranty, representation or guarantee other than as set forth in the terms and conditions of purchase. **To the maximum extent permitted by applicable law, VPG disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.**

Information provided in datasheets and/or specifications may vary from actual results in different applications and performance may vary over time. Statements regarding the suitability of products for certain types of applications are based on VPG's knowledge of typical requirements that are often placed on VPG products. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. You should ensure you have the current version of the relevant information by contacting VPG prior to performing installation or use of the product, such as on our website at vpgsensors.com.

No license, express, implied, or otherwise, to any intellectual property rights is granted by this document, or by any conduct of VPG.

The products shown herein are not designed for use in life-saving or life-sustaining applications unless otherwise expressly indicated. Customers using or selling VPG products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify VPG for any damages arising or resulting from such use or sale. Please contact authorized VPG personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.

Copyright Vishay Precision Group, Inc., 2014. All rights reserved.