



301009

Facts in Brief

Author: Yuval Hernik
Tel: +972-355-70852
E-mail: Yuval.Hernik@vishay.com

Obtaining Samples of Foil Resistors and Small Prototype Runs with No Minimum Order Quantity within Five Working Days from Vishay In-Plant Facilities (Precision Centers)

How to Make Precision Resistors in Your Own Plant with Better Specs than Wirewound, Thin Film, or Any Other Resistor Technology Available...AND AT LOWER COST!

The quick, economical, easy-to-learn way to produce Precision Resistors...The exact values you need. In the exact quantities you need...When you need them.

Do you want to save money for R&D? Why order reels for a few resistors when you aren't sure about the final values?

Did you ask how to minimize your R&D expenses for resistors? Would you like to know how can you avoid Minimum Order Quantity (MOQ) without being limited to so-called "standard" values? Especially when no one knows for sure if the resistance value to be chosen for production will be used at the prototype stage?

A few pieces are generally considered a sample, but a few pieces are not the custom among resistor makers. If the sample must be a specific value, you cannot get it and must use standard values. You might have to take a full reel (or multiple reels). Not so with Vishay Bulk Metal® foil resistors. Through a system of Precision Centers strategically located around the world, any value from 2 mΩ to 1MΩ and any tolerance from 0.001% in small quantities is available in five working days or less. Today, you might have to pay \$10 or more for a few pieces of metal film with 5 ppm/° C TCR for *standard values* of lower performance resistors (thin film, thick film).

Prototype Runs

Speed to market and design work in general, have a short time frame within which the equipment must be designed, built, and performance checked. Should there be a second round of resistor selection, the Vishay Precision Center concept is the ideal solution for small prototype runs and quick changes prior to full production.

Vishay Intertechnology, Inc.

63 Lancaster Ave, Malvern, PA, 19355, +1 (610) 644-1300 Fax (610) 889-0935 www.vishay.com

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS



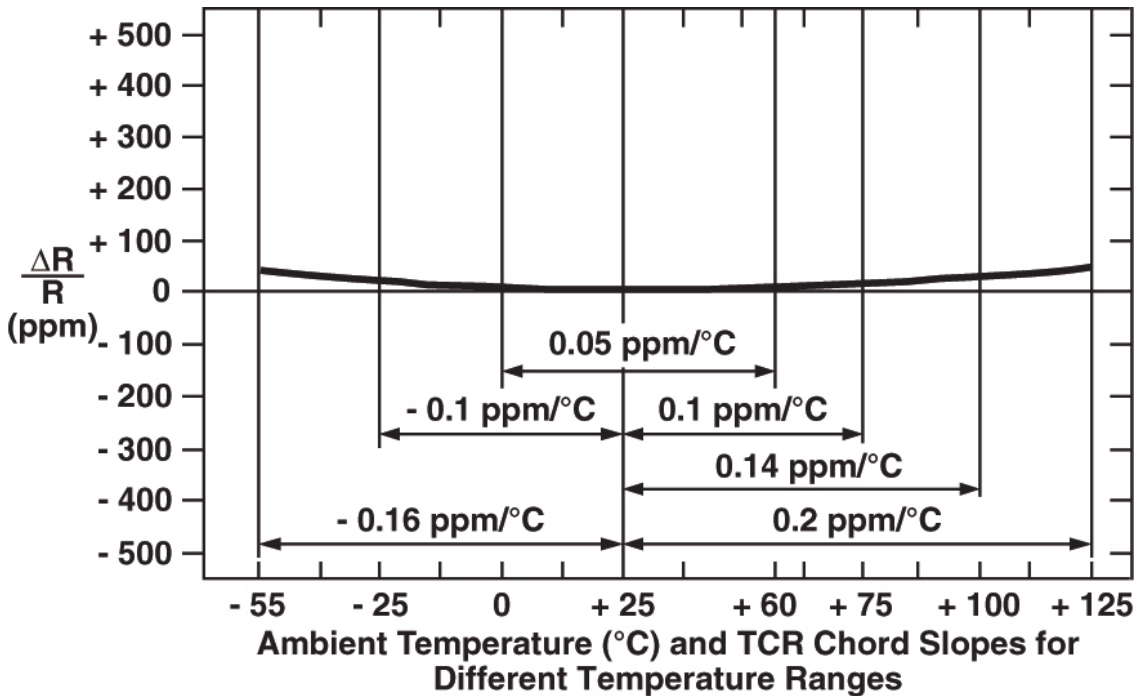
Bulk Metal Foil Resistors

For those not familiar with Bulk Metal® foil resistors from Vishay, they are the best performing device among all resistor technologies. They are the best choice for use in prototype runs even if another lower-performing resistor is planned for the full production. Here's why:

- (1) The Bulk Metal foil resistor is the cheapest route to quick delivery of small quantities of any R value
- (2) It will permit full performance capability to be evaluated
- (3) It just might point the way to a second-generation instrument

If you are not satisfied with the lead-time you've received from your purchasing channels, it will be worthwhile to drop us an email with your details so we can provide quick support. In many cases, our original lead-times are much less than you currently receive due to middlemen and lack of understanding of our production capabilities, especially for prototype orders. Please give us a chance to correct the misinterpretation that "foil resistors have long lead-times." Contact us at foil@vishay.com.

Figure 1. Z-Foil TCR Curve



Vishay Intertechnology, Inc.

63 Lancaster Ave, Malvern, PA, 19355, +1 (610) 644-1300 Fax (610) 889-0935 www.vishay.com

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS



Vishay Bulk Metal Foil In-Plant Facilities (Precision Centers)

The Precision Centers are located in proximity to major markets. They are open to messenger pick-up and other timesaving techniques as required by the user. The resistors made in this fashion may have a little higher unit price, but with time in the equation they are a decided cost advantage compared to standard procurement methods. For more details, please email us at: Foil@vishay.com.

Given the breadth of products available today with Bulk Metal® foil resistor elements, it is not possible for the Precision Centers to do the finishing stages of all models. But with factory assistance, all models can be given the sample/prototype expediting that is required by the user. The Precision Centers stock certain types but manufacture "major models" on site. Keep in mind that Bulk Metal® foil resistors are not subject to any discipline of standard values and can be supplied at "any value to any tolerance."



All you need to calibrate a foil resistor in seconds! Finish it and send it on the same day!

Products of the Precision Centers:

1. VSMP Series <http://www.vishay.com/doc?63060>
2. VSM Series <http://www.vishay.com/doc?63070>
3. S Series <http://www.vishay.com/doc?63001>
4. Z201 <http://www.vishay.com/doc?63113>
5. 300144 (Z) <http://www.vishay.com/doc?63115>

Vishay Intertechnology, Inc.

63 Lancaster Ave, Malvern, PA, 19355, +1 (610) 644-1300 Fax (610) 889-0935 www.vishay.com

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS



Hybrid Applications <http://www.vishay.com/doc?63024>

For hybrid applications and in situ, you can use the Vishay unadjusted chip. Wire connect to the circuit and adjust the desired resistance value of the chip by cutting certain resistance lines by laser or otherwise. This unique system solves two basic problems common to the electronics industry. First is the problem of operationally trimming a circuit with a potentiometer limited by resolution, drift and setting stability in addition to the electrical characteristics of temperature drift, etc. The Vishay resistor chip can be operationally trimmed after installation, while monitoring the important output parameters of the circuit. Once calibrated, the value is permanently set and remains unaffected by shock and vibration.

Foil Resistor Performance

While the final design may not initially be determined to need all the performance of foil Resistors, the performance attributes are listed in Table 1.

Table 1. Performance of Foil Resistors with Comparison to Other Technologies

Technology	Z-Foil	Classic Foil	Precision Thin Film	Thick Film
Typical TCR	0.05 ppm/° C (0° C to +60° C) 0.2 ppm/° C (-55° C to +125° C, +25° C ref.)	< 2 ppm/° C (-55° C to +125° C, +25° C ref.)	10 - 25 ppm/° C* (-55° C to +125° C, +25° C ref.)	100 - 300 ppm/° C (-55° C to +125° C, +25° C ref.)
Load-life stability (> 2000 h at +70° C)	0.005% (rated power)	0.005% (rated power)	0.1%	1% - 3%
PCR at rated power	5 ppm	20 ppm	> 200 ppm	> 1000 ppm
ESD withstanding	> 25,000 V	> 25,000 V	3000 V	< 2000 V

* 5 ppm is available but is very expensive and requires special screening

Other Technologies

From all the different ways of making a resistor, the precision end of the spectrum is defined as end-of-life tolerance and not just the initial tolerance, low absolute TCR and long-term stability. With this in mind, Bulk Metal® foil resistors comply fully while wirewounds and thin film resistors are runners-up. Some insight into how resistors are made will give credence to the preference for foil.

Vishay Intertechnology, Inc.

63 Lancaster Ave, Malvern, PA, 19355, +1 (610) 644-1300 Fax (610) 889-0935 www.vishay.com

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS



Conclusions:

- (1) Bulk Metal® foil resistors can be obtained from Vishay Precision Centers around the world and also inside the plants for any value, any tolerance, and quick delivery of samples and prototypes
- (2) Bulk Metal foil performance exceeds the performance of all other types of resistors
- (3) Using Bulk Metal foil resistors as prototypes is a cost-effective way to bring new designs to market
- (4) We guarantee that you should see cost savings in the long-term and not just in unit price
- (5) The Vishay Bulk Metal® foil resistor is the only resistor that comes with a life insurance certificate for guaranteed performance. We stand behind any and all maximum figures in our datasheets; no small letters are used to describe the expected drifts

Please contact Engineering Sales for more information:

Foil@vishay.com

Foil products:

<http://www.vishay.com/resistors-discrete/metal-foil/tcr-video-list/>

New Products:

<http://www.vishay.com/resistors-discrete/metal-foil/press>

Vishay Intertechnology, Inc.

63 Lancaster Ave, Malvern, PA, 19355, +1 (610) 644-1300 Fax (610) 889-0935 www.vishay.com

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS