

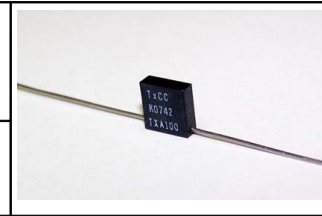


**Texas
Components
Corporation**

USA Manufacturer of Precision Resistors featuring Bulk Metal® Foil*

TZA Series

Bulk Metal® Foil Resistor
for Axial Lead Applications



Ultra Low TCR; Ultra High Precision; Ultra High Stability

The same great Bulk Metal® Foil performance in a popular axial lead design!

Resistors made with Bulk Metal® Foil are known for their unique combination of unmatched performance in all major technical areas:

Temperature Coefficient of Resistance (TCR)
Power Coefficient of Resistance (PCR)
Voltage Coefficient of Resistance (VCR)

Tolerance
Thermal Stabilization
Load Life Stability
Response Time

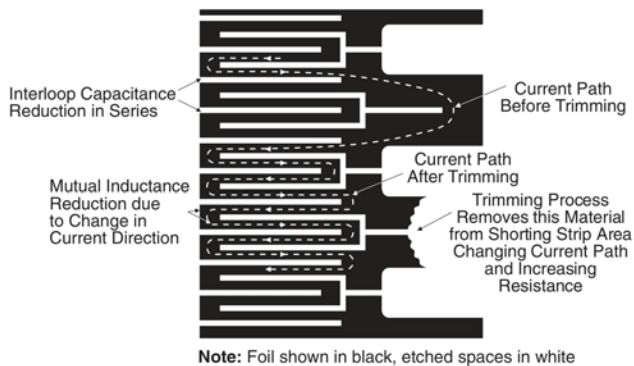
Thermal Electromotive Force (EMF)
Electrostatic Discharge (ESD)
Noise

The TZA100 Axial Lead Bulk Metal® Foil Resistor is the Z-Foil upgrade to TXA100, and answers the industry's demand for an axial lead resistor with even greater precision and lower TCR. The Bulk Metal® Foil technology used in the TZA100 reduces by an order of magnitude the resistive component's sensitivity to ambient temperature variations (TCR), while still minimizing changes due to applied power (PCR). This, along with the many other additional Bulk Metal® Foil benefits (presented in the features section below) allows designers to guarantee the highest degree of accuracy and stability in fixed-resistor applications. Example applications include precision amplifiers; high precision instrumentation; medical and automatic test equipment; metrology and laboratory equipment; high end audio equipment; military, airborne and spaceborne electronics; down-hole and other harsh, high temperature environments. For any non-standard technical requirements and/or special applications, our applications engineering department is on-site and available to help and advise.

Table 1 – The Best Available Performance Characteristics of Different Resistor Technologies

Technology	Temperature Coefficient of Resistance (TCR) -55°C to +125°C, +25°C ref.	Initial Tolerance	Accumulated End of Life Tolerance	Load Life Stability at +70°C, Rated Power at 2000 Hours and then at 10,000 Hours	ESD (V)	Thermal Stabilization	Noise (dB)
Bulk Metal® Foil	< ± 1 ppm/°C	From 0.001%	< 0.05 %	0.0025% (25 ppm) 0.005% (50 ppm)	25,000V	< 1 second	-42db
Thin Film	± 5 ppm/ °C	From 0.01%	< 0.4 %	0.05% (500 ppm) 0.15% (1500 ppm)	2,500V	> minutes	-20db
Thick Film	± 50 ppm/ °C	From 0.5%	< 5 %	0.5% (5000 ppm) 2% (20,000 ppm)	2,000V	> minutes	+20db
Wirewound	± 3 ppm/ °C	From 0.005%	< 0.5 %	0.05% (500 ppm) 0.15% (1500 ppm)	25,000V	> minutes	-35db

FIGURE 1 - TRIMMING TO SPECIFIC VALUES
(a conceptual illustration of Bulk Metal® Foil)



To achieve a precise resistance value, the Bulk Metal® Foil chip is adjusted 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 the resistor.

• Bulk Metal® Foil resistors are not restricted to standard values; specific custom values are available at no extra cost (e.g. 1K2345 vs 1K).

TZA100 FEATURES & SPECIFICATIONS

- Temperature coefficient of resistance (TCR): ± 0.05 ppm/°C typical; -55 °C to +125 °C, +25 °C ref; (See Table 2)
- Rated power: For 10Ω to 100kΩ, to 0.6 W at +70 °C, 0.3 W at +125 °C See Table 5 (and Table 6 for higher values)
- Resistance tolerance: to ± 0.005 % (See Table 3)
- Resistance range: 1Ω to 100kΩ (not restricted to any standard values) (See Table 6 for values down to 0.25Ω and up to 1MΩ)
- Exceptional load life stability: ± 0.005 % at +70 °C, 2000 h and ± 0.01 % at +70 °C, 10,000 h subject to applied power. See Table 4.
- Power coefficient of resistance (PCR): ± 5 ppm at rated power
- Voltage coefficient of resistance (VCR): < 0.1 ppm/V
- Max working voltage: 300 V (and ≤ VPxR) See Table 6 for higher values.
- Electrostatic discharge (ESD): at least to 25 kV
- Capacitance: 0.5 pF typical; 1.0 pF max (non-capacitive design)
- Inductance: < 0.08 μH typical; 0.1 μH max; (non-inductive design)
- Rise time: 1.0 ns at 1kΩ (effectively no ringing)
- Current noise: 0.010 μV RMS/Volt of Applied Voltage (< -40 dB)
- Thermal EMF: 0.05 μV/°C typical (0.10 μV/°C max) and 1 μV/W (μV/°C relates to EMF due to ΔT wrt to leads and μV/watt due to the applied power)
- Thermal stabilization time: < 1 s (nominal value achieved within 10 ppm of steady state value)
- Total accumulated ΔR over life (EOL): to ± 0.05 % (an order of magnitude better than any other technology)
- Matched sets are available by special request: TCR tracing to ± 0.5ppm/°C
- Terminal Finish: tin/lead alloy std; Pb free (RoHS-compliant) is available
- Higher values or power: See our models TZA200, TZA300, TZA400, etc
- Expedited delivery in less than 1 week is possible, even for custom values.

*Bulk Metal® Foil is a registered trademark of Vishay Precision Group, Inc. (VPG)

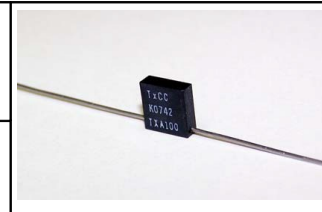


FIGURE 2 – RESISTANCE/TEMPERATURE CURVE(S)
[STATISTICALLY COMBINED]

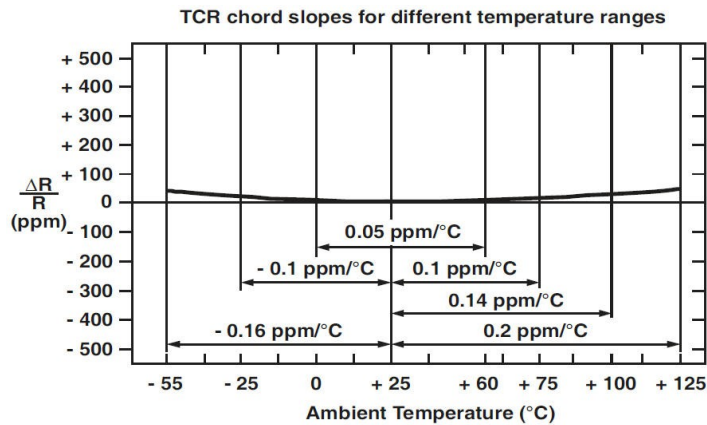


FIGURE 3 – POWER DERATING CUR

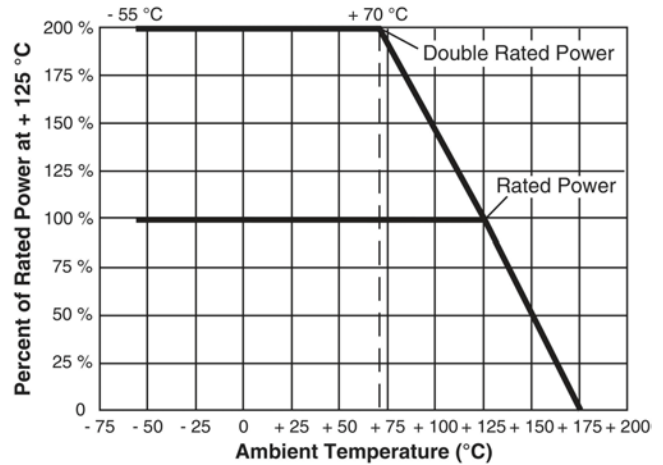


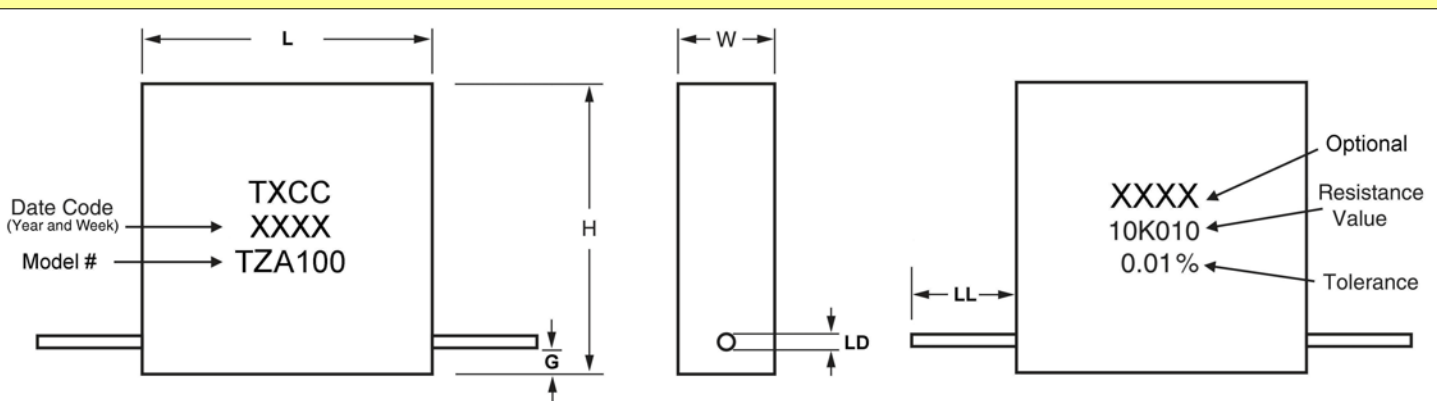
TABLE 2 – TCR BY RESISTANCE RANGE

RESISTANCE VALUE (Ω)	TYPICAL TCR (& MAX SPREAD)
> 100Ω	± 0.2 (± 0.6) (ppm/°C)
80Ω to < 100Ω	± 0.2 (± 0.8) (ppm/°C)
50Ω to < 80Ω	± 0.2 (± 1.0) (ppm/°C)
25Ω to < 50Ω	± 0.2 (± 1.3) (ppm/°C)
10Ω to < 25Ω	± 0.2 (± 1.6) (ppm/°C)

TABLE 3 – AVAILABLE TOLERANCES BY RESISTANCE RANGE

RESISTANCE VALUE (Ω)	AVAILABLE TOLERANCES (%) ²	CODE
≥ 50Ω	±0.005%	V
≥ 25Ω	±0.01%	T
≥ 12Ω	±0.02%	Q
≥ 5Ω	±0.05%	A
≥ 2Ω	±0.1%	B
≥ 2Ω	±0.25%	C
≥ 1Ω	±0.5%	D
≥ 0.25Ω	±1.0%	F

FIGURE 4 – STANDARD IMPRINTING AND DIMENSIONS



Inches	Typical Average Weight = 0.6 grams	W: 0.100 ± 0.020	L: 0.300 ± 0.010	H: 0.300 ± 0.010	LL: 1.750 ± 0.125	G: 0.050 ± 0.0125	LD: 0.025 (22 AWG)
Millimeters		W: 2.54 ± 0.51	L: 7.62 ± 0.26	H: 7.62 ± 0.26	LL: 44.45 ± 3.18	G: 1.27 ± 0.38	LD: 0.64



**Texas
Components
Corporation**

USA Manufacturer of Precision Resistors featuring Bulk Metal® Foil*

TZA Series

Bulk Metal® Foil Resistor
for Axial Lead Applications

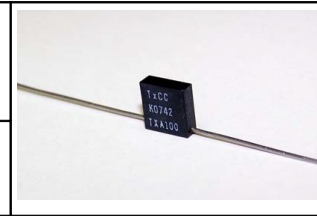


TABLE 4 – TZA100 LOAD LIFE STABILITY SPECIFICATIONS/EXAMPLES (power and temperature dependent)¹

Power & Temperature	Max ΔR @ 2000 hours	Max ΔR @ 10,000 hours
0.1 Watts @ +70 °C	± 0.005% (50 ppm)	± 0.01% (100 ppm)
0.3 Watts @ +125 °C	± 0.015% (150 ppm)	± 0.05% (500 ppm)

1) Load life stability can be improved by 80% via specialized post-manufacturing operations. Ask our applications engineering department for details.

TABLE 5 - SPECIFICATIONS

MODEL	RESISTANCE RANGE (Ω)	MAX WORKING VOLTAGE	AMBIENT POWER RATING			PACKAGING
			Ω	at +70 °C	at +125 °C	
TZA100	10Ω to 100kΩ ²	300 V (and ≤ √P×R)	10Ω to 100kΩ	0.6 W	0.3 W	All are provided in Bulk Pack

2) For greater or smaller resistance values and/or higher power ratings, see models TZA200, TZA300, TZA400, etc.

TABLE 6 – MORE TZA SERIES MODELS

(All of these models include standoffs at the base of the case, whose dimension is accounted for here.)

Model	Resistance Range	Power Rating at +70 °C / +125 °C	Max Voltage (and ≤ √P×R)	Typical Average Weight (grams)	W _{max} inches (mm)	L _{max} inches (mm)	H _{max} inches (mm)	G _{max} inches (mm)	LL _{max} inches (mm)	LD inches (AWG)
TZA200	5Ω to 200kΩ	1.00 W / 0.30 W	350	1.4	0.138 (3.51)	0.565 (14.36)	0.413 (10.50)	0.055 (1.40)	1.875 (47.63)	0.025 (22 AWG)
TZA300	3.3Ω to 300kΩ	1.50 W / 0.75 W	425	1.9	0.138 (3.51)	0.890 (22.61)	0.413 (10.50)	0.055 (1.40)	1.875 (47.63)	0.025 (22 AWG)
TZA400	2.5Ω to 400kΩ	2.00 W / 1.00 W	500	4.0	0.260 (6.61)	1.200 (30.50)	0.413 (10.50)	0.055 (1.40)	1.875 (47.63)	0.025 (22 AWG)

TABLE 7 – HOW TO ORDER THE CORRECT PART NUMBER

MODEL	TERMINATIONS (Finish)	RESISTANCE VALUE	TOLERANCE (see Table 3)	PACKAGING
TZA100 TZA200 TZA300 TZA400	TIN/LEAD (Std) (no code required)	5Ω to 400kΩ (R = Ω, K = KΩ, and M=MΩ) Always given as 6 characters	0.005% to 1.0%	All are provided in Bulk Pack
	LEAD FREE = T (add code to part number)			



A 20,001 ohm resistor with lead free terminations, at a 0.005% tolerance, in bulk pack would be ordered as: **TZA100-T-20K0010-0.005%**

A 15.3 ohm resistor with standard terminations, at 0.5% tolerance, in bulk pack would be ordered as: **TZA100-15R3000-0.5%**

A 1.5W 250,000 ohm resistor with standard terminations, at a 0.01% tolerance, in bulk pack would be ordered as: **TZA300-250K000-0.01%**

A 2W 350,060 ohm resistor with standard terminations, at a 0.02% tolerance, in bulk pack would be ordered as: **TZA400-350K060-0.02%**

LEGAL DISCLAIMER: ALL PRODUCTS, PRODUCT SPECIFICATIONS, AND OTHER DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE AND TO CERTAIN DISCLAIMERS AND EXCLUSIONS. Please make sure to view the complete, and latest, product legal disclaimer at this link: [TxCC Legal Disclaimer](#)

For more information about this subject or this product line, please call us at (+1) 713-468-3882 or email us at resistorinfo@texascomponents.com

You can also "Follow" Texas Components on Twitter [@TexasComponents](#) and/or "Like" Texas Components on [Facebook](#)