

## Ultra Low TCR; Ultra High Precision; Ultra High Stability

Resistors featuring Bulk Metal® Foil are renowned for their unique combination of unmatched performance in all major technical areas, including:

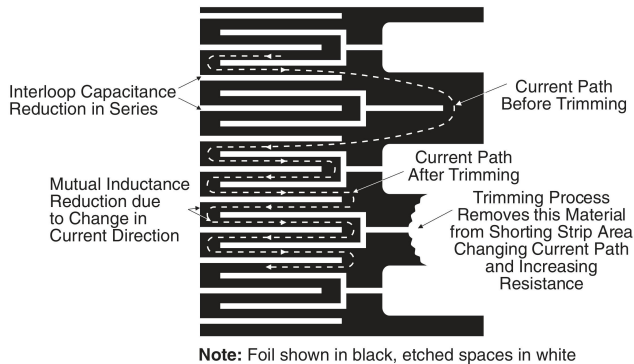
- Temperature Coefficient of Resistance (TCR)
- Voltage Coefficient of Resistance (VCR)
- Electrostatic Discharge (ESD)
- Thermal Stabilization
- Response Time
- Power Coefficient of Resistance (PCR)
- Thermal Electromotive Force (EMF)
- Tolerance
- Load Life Stability
- Noise

**Bulk Metal® Foil technology outperforms all other resistor technologies today, making it the clear choice for applications that require high precision and high stability.** This technology allows for the production of products to meet very challenging technical requirements – products that would not be possible otherwise. The TXZ series of Bulk Metal® Foil resistors takes this to a new level, by offering TCR performance that is an order of magnitude better than previous generation models. The TXZ series uses new Z-Foil technology and offers ultra low TCR, excellent load life stability, tight tolerance, fast response time, low current noise, low thermal EMF and low power and voltage coefficient, all in an encapsulated radial lead through hole design. The TXZ series is virtually insensitive to common destabilizing factors that can completely undermine the accuracy and usefulness of other resistors. The resistor element is a solid alloy that is inherently stable and noise free which, 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. For special applications and/or requirements, 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	< ± 0.2 ppm/°C	From 0.001%	< 0.05 %	0.0025% (25 ppm) 0.005% (50 ppm)	25,000V	< 1 second	-42db
Thin Film	± 2 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)

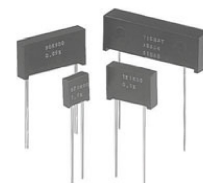


To achieve a precise resistance value, the Bulk Metal® Foil chip is adjusted by selectively removing built-in "shorting bars". To increase the resistance in known increments, marked areas are cut, producing progressively smaller increases in resistance. This method reduces the effect of "hot spots" and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

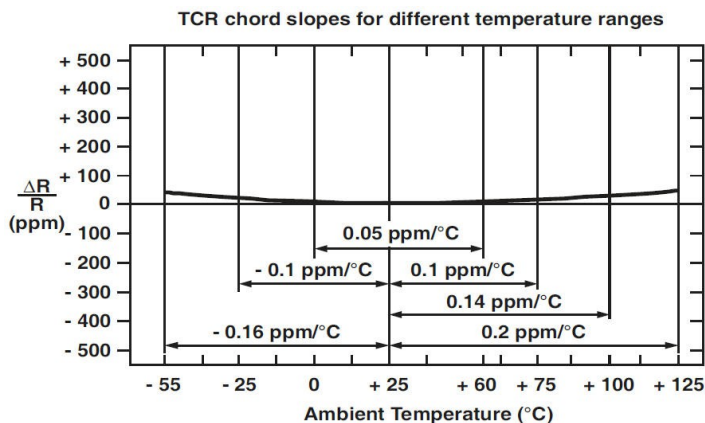
- Bulk Metal® Foil resistors are not restricted to standard values; specific custom values are available at no extra cost (e.g. 1K2345 vs 1K).
- Expedited delivery in less than 1 week is possible, even for custom values.

### TXZ201 FEATURES & SPECIFICATIONS

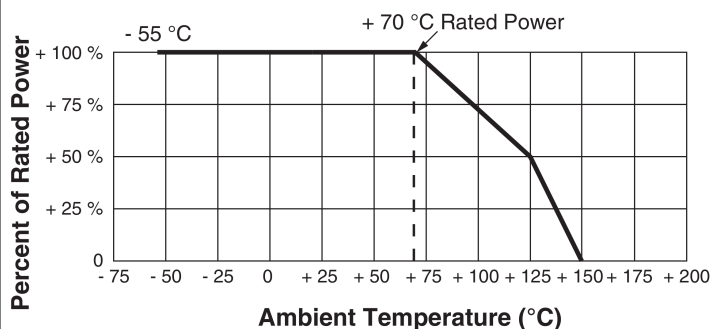
- Resistance range: 10Ω to 100kΩ (not restricted to any standard values)
- Rated power: 0.6 W at +70 °C, 0.3 W at +125 °C
- Resistance tolerance: to ± 0.005 % (See Table 3)
- Temperature coefficient of resistance (TCR): ± 0.2 ppm/°C nominal; -55 °C to +125 °C, +25 °C ref; ± 0.05 ppm/°C min to ± 1.8 ppm/°C max (See Table 2)
- Exceptional load life stability: ± 0.005 % at +70 °C, 2000 h and ± 0.015 % at +70 °C, 10,000 h subject to applied power. (See Table 4; Load life stability, can be improved even more through in-house stabilization)
- 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)
- 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 tracking to ± 0.5ppm/°C
- Terminal Finish: tin/lead alloy std; Pb free (RoHS-compliant) is available
- Higher values or power: See our models TXZ204, TXZ205, TXZ206, etc.
- Lifetime warranty (excluding damage or abuse)
- Made in the USA!



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



**FIGURE 3 – POWER DERATING CURVE**



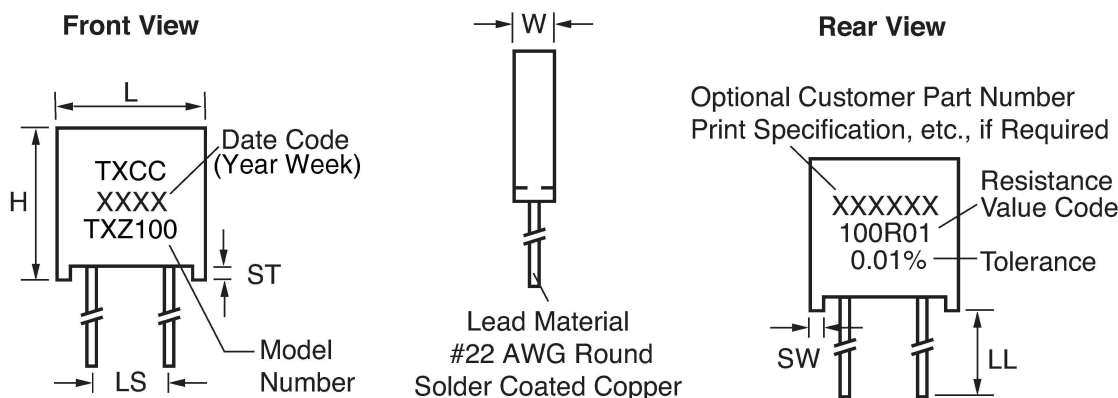
**TABLE 2 – TCR BY RESISTANCE RANGE**

RESISTANCE VALUE (Ω)	TYPICAL/NOMINAL 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 (%) <sup>2</sup>	CODE
≥ 80Ω	±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**



The standoffs (ST) are designed to insure there is a clearance between the resistor body and the circuit board such that flux and other contaminants can be cleaned/cleared from under the body and between the leads after the soldering process is complete. SW max = 0.055 inches, or 1.40 mm.

Inches	Typical Average Weight = 0.6 grams	W: 0.105 ± 0.010	L: 0.300 ± 0.010	H: 0.326 ± 0.010	LL: 1.000 ± 0.125	LS: 0.150 ± 0.005 <sup>1</sup>	ST: 0.010 min
Millimeters		W: 2.67 ± 0.25	L: 7.62 ± 0.25	H: 8.28 ± 0.25	LL: 25.4 ± 3.18	LS: 3.81 ± 0.013	ST: 0.254 min

1) Choose model TXZ201L for a 0.200" lead spacing.

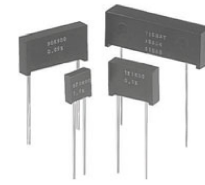


**Texas  
Components  
Corporation**

USA Manufacturer of Precision Resistors featuring Bulk Metal® Foil\*

# TXZ Series

**Bulk Metal® Foil Resistor**  
for Radial Lead Through Hole Applications



**TABLE 4 – TXZ201 LOAD LIFE STABILITY SPECIFICATIONS/EXAMPLES (power and temperature dependent)<sup>2</sup>**

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)

2) 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
			at +70 °C	at +125 °C	
TXZ201 (& TXZ201L)	10Ω to 100kΩ <sup>3</sup>	300 V (and ≤ √PxR)	0.6 W	0.3 W	Bulk Pack (Code = B)

3) For greater or smaller resistance values and/or higher power ratings, see models TXZ204, TXZ205, TXZ206, etc.

**TABLE 6 – MORE TXZ SERIES MODELS**

Model	Resistance Range	Power Rating at +70 °C / +125 °C	Max Voltage (and ≤ √PxR)	Typical Average Weight (grams)	W <sub>max</sub> inches (mm)	L <sub>max</sub> inches (mm)	H <sub>max</sub> inches (mm)	LS inches (mm)	LL <sub>max</sub> inches (mm)	ST <sub>min</sub> inches (mm)
TXZ204	5Ω to 200kΩ	1.00 W / 0.30 W	350	1.4	0.138 (3.51)	0.565 (14.36)	0.413 (10.50)	0.400 ± 0.020 (10.16 ± 0.51)	1.125 (28.6)	0.030 (0.759)
TXZ205	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)	0.700 ± 0.050 (17.78 ± 1.27)	1.125 (28.6)	0.030 (0.759)
TXZ206	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)	0.900 ± 0.020 (22.86 ± 0.51)	1.125 (28.6)	0.030 (0.759)

**TABLE 7 – HOW TO ORDER THE CORRECT PART NUMBER**

MODEL	TERMINATIONS (Finish)	RESISTANCE VALUE	TOLERANCE (see Table 3)	PACKAGING
TXZ201 TXZ201L TXZ204 TXZ205 TXZ206	TIN/LEAD (Std) (no code required)  LEAD FREE = T (add code to part number)	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



A 20,001 ohm resistor with lead free terminations, at a 0.005% tolerance, in bulk pack would be ordered as: **TXZ201-T-20K0010-0.005%**

A 15.3 ohm resistor with standard terminations, at 0.5% tolerance, in bulk pack would be ordered as: **TXZ201-15R3000-0.5%**

A 1.5W 250,000 ohm resistor with standard terminations, at a 0.01% tolerance, in bulk pack would be ordered as: **TXZ205-250K000-0.01%**

A 2W 350,060 ohm resistor with standard terminations, at a 0.02% tolerance, in bulk pack would be ordered as: **TXZ206-350K060-0.02%**

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](mailto:resistorinfo@texascomponents.com)

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