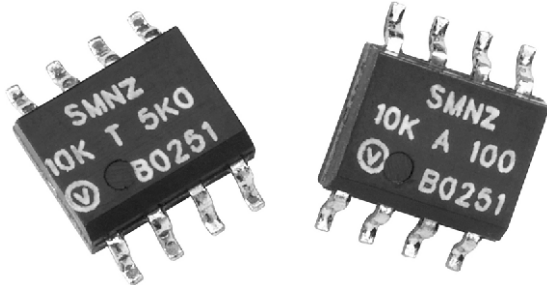


Ultra High Precision Z-Foil Surface Mount 4 Resistor Network Dual-In-Line Package with TCR Tracking of 0.1 ppm/°C, PCR Tracking of 5 ppm at Rated Power, and Tolerance Match of 0.01 %



Any value and any ratio available within resistance range

INTRODUCTION

The Z-Foil Technology provides a significant reduction of the resistive components' sensitivity to ambient temperature variations (TCR) and applied power changes (PCR). 0.05 ppm/°C Absolute TCR removes errors due to temperature gradients.

Model SMNZ offers extremely low TCR (absolute and tracking), excellent load life stability, tight tolerance (absolute and matching), excellent ratio stability, low current noise, low voltage coefficient and non sensitivity to ESD - **all in the same resistor.**

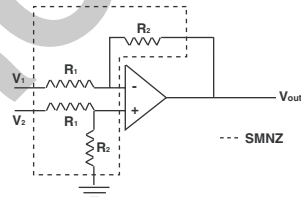
The SMNZ Surface Mount Network is made up of 4 independent Bulk Metal® Z-Foil resistors in a small standard molded epoxy package with 50 MIL lead pitch (JEDEC MS-012 package).

The electrical specification of this integrated construction offers improved performance and better real estate utilization over discrete resistors and matched sets. The resistor may be used independently or as divider pairs.

Our Application Engineering Department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

APPLICATIONS

- Instrumentation Amplifiers
- Bridge Networks
- Differential Amplifiers
- Ratio Arms in Bridge Circuits
- Medical and Test Equipment
- Military
- Airborne etc



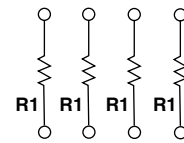
FEATURES

- Temperature Coefficient of Resistance (TCR):
Absolute: ± 0.05 ppm/°C typical (0 °C to + 60 °C)
 ± 0.2 ppm/°C typical (-55 °C to + 125 °C, + 25 °C Ref.) (see table 1)
Tracking: 0.1 ppm/°C typical (see table 1)
- Tolerance Match: 0.01 %
- Power Coefficient Tracking - "R2 -R1 due to self heating":
5 ppm at Rated Power
- Power Rating: at 70 °C
Entire Package: 0.4 W
Each Resistor: 0.1 W
- Ratio Stability: 0.005 % (0.1 W at 70 °C, 2000 hours)
- Large Variety of Resistance Ratios
- Electrostatic Discharge (ESD) above 25 000 Volts
- Short Time Overload ≤ 0.0025 %
- Non Inductive, Non Capacitive Design
- Rise Time: 1 ns without ringing
- Current Noise: < - 40 dB
- Voltage Coefficient < 0.1 ppm/V
- Non Inductive: < 0.08 μ H
- Non Hot Spot Design
- Terminal Finishes available: Lead (Pb)-free
Tin/Lead Alloy
- For better performances please contact us
- Any value available within resistance range (e.g. 1K2345)
- Prototype samples available from 48 hours. For more information, please contact foil@vishay.com

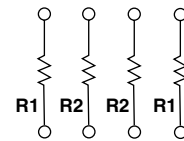


RoHS*
COMPLIANT

FIGURE 1 - SCHEMATICS



OPTION 1
FOUR RESISTORS, SAME OHMIC VALUE
SAME ABSOLUTE TOLERANCE



OPTION 2
TWO RESISTOR PAIRS
R1/R2; R2/R1

Note

1. Different schematics are available (R1, R2, R3, R4)

TABLE 1 - MODEL SMNZ SPECIFICATIONS

MODEL	RESISTANCE VALUES ¹⁾	ABSOLUTE TCR (- 55 °C TO + 125 °C, + 25 °C REF.) (TYPICAL + MAX. SPREAD)	RESISTANCE RATIO	TCR TRACKING		TOLERANCE	
				MAX.	ABSOLUTE	MATCH	
SMNZ	100 Ω - 1 k Ω 1 k Ω - 10 k Ω	± 0.2 ± 2.8 ± 0.2 ± 1.8	R1/R2 = 1 1 < R1/R2 \leq 10 10 < R1/R2 \leq 100	0.5 ppm/°C 1.0 ppm/°C 2.0 ppm/°C	± 0.02 % ± 0.05 % ± 0.1 %	0.01 % 0.02 % 0.05 %	

Note

1. SMN (Classic Foil) available with values up to 20 k Ω

* Pb containing terminations are not RoHS compliant, exemptions may apply



Ultra High Precision Z-Foil Surface Mount 4 Resistor Network Dual-In-Line Package with TCR Tracking of 0.1 ppm/°C, PCR Tracking of 5 ppm at Rated Power, and Tolerance Match of 0.01 %

FIGURE 2 - POWER DERATING CURVE

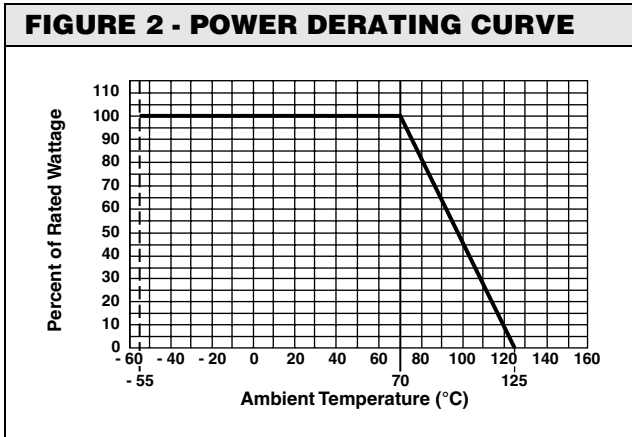


FIGURE 4 - TYPICAL TCR CURVE Z-FOIL

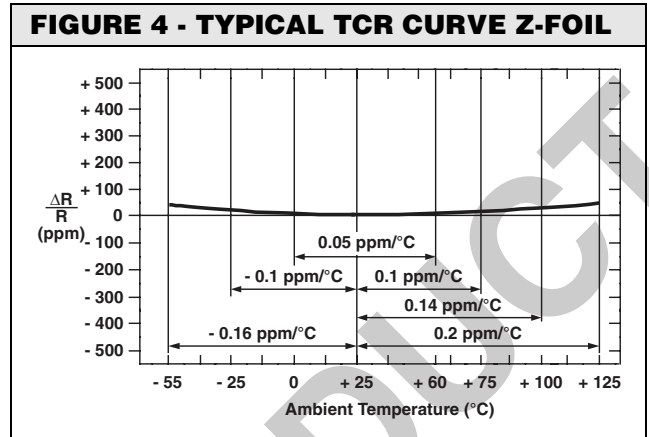


FIGURE 3 - DIMENSIONS AND IMPRINTING EXAMPLE in inches (millimeters)

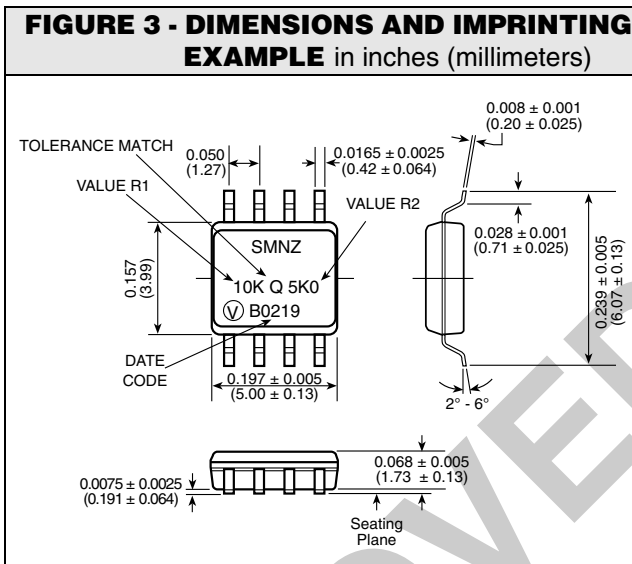


FIGURE 5 - TRIMMING TO VALUES (Conceptual Illustration)

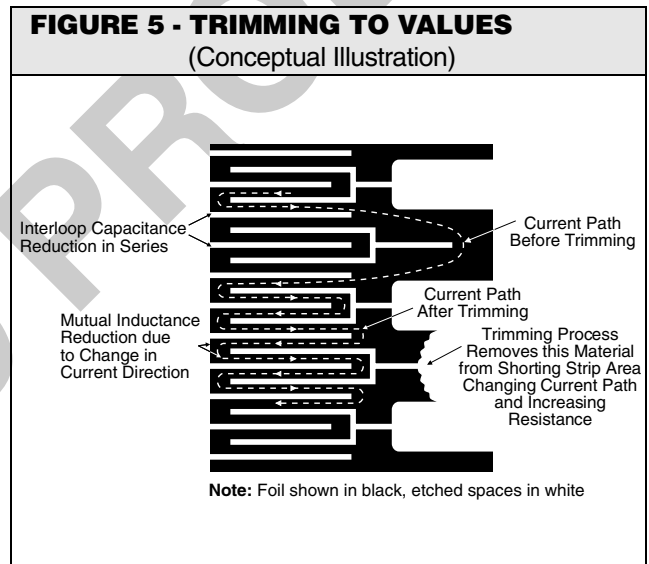
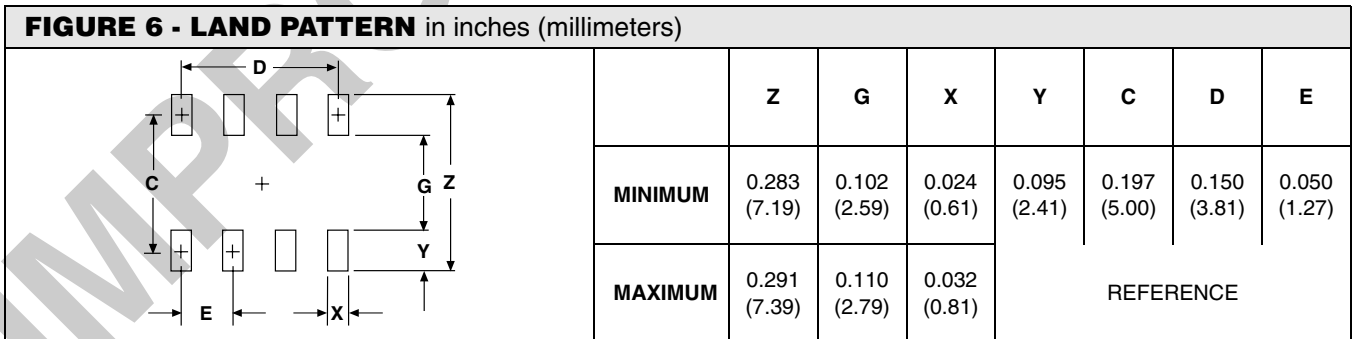


FIGURE 6 - LAND PATTERN in inches (millimeters)



SMNZ (Z-Foil)



Vishay Foil Resistors Ultra High Precision Z-Foil Surface Mount 4 Resistor Network
Dual-In-Line Package with TCR Tracking of 0.1 ppm/°C, PCR
Tracking of 5 ppm at Rated Power, and Tolerance Match of 0.01 %

TABLE 2 - PERFORMANCE SPECIFICATIONS (Per MIL-PRF 914 Test Methods)

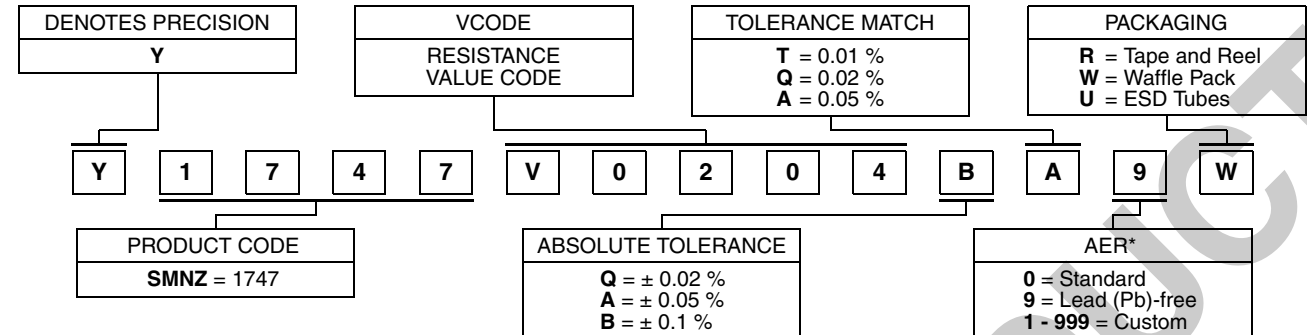
SPECIFICATIONS	TYPICAL LIMITS
Power Rating at + 70 °C	Each resistor: 0.1 watts Entire package: 0.4 watts
Maximum Working Voltage (each resistor)	$(P \times R)^{1/2}$
Thermal Shock 25 x (- 65 °C to + 125 °C)	$\Delta R = 0.01 \% (100 \text{ ppm})$ $\Delta \text{Ratio} = 0.01 \% (100 \text{ ppm})$
Thermal Shock 5 x (- 65 °C to + 125 °C) and Power Conditioning 1.5 rated power at 25 °C, 100 hours	$\Delta R = 0.02 \% (200 \text{ ppm})$ $\Delta \text{Ratio} = 0.015 \% (150 \text{ ppm})$
DWV Atm. Pressure 200 V (A.C), 1 minute	Successfully passed
Insulation Resistance 100 V (D.C), 1 minute	$> 10^4 \text{ M}\Omega$
Resistance to Soldering Heat	$\Delta R = 0.01 \% (100 \text{ ppm})$ $\Delta \text{Ratio} = 0.005 \% (50 \text{ ppm})$
Moisture Resistance + 65 °C to - 10 °C; 90 % to 98 % RH; 0.1 x rated power; 240 hours	$\Delta R = 0.02 \% (200 \text{ ppm})$ $\Delta \text{Ratio} = 0.005 \% (50 \text{ ppm})$
Shock (Specified Pulse) 100G	$\Delta R = 0.01 \% (100 \text{ ppm})$ $\Delta \text{Ratio} = 0.01 \% (100 \text{ ppm})$
Vibration, High Frequency (10 Hz - 2000 Hz), 20G	$\Delta R = 0.005 \% (50 \text{ ppm})$ $\Delta \text{Ratio} = 0.005 \% (50 \text{ ppm})$
High Temperature Exposure 100 hours at 125 °C	$\Delta R = 0.01 \% (100 \text{ ppm})$ $\Delta \text{Ratio} = 0.005 \% (50 \text{ ppm})$
Low Temperature Storage 24 hours at - 65 °C	$\Delta R = 0.005 \% (50 \text{ ppm})$ $\Delta \text{Ratio} = 0.005 \% (50 \text{ ppm})$
Load Life Stability at 70 °C; 0.1 watt per resistor, 2000 hours	$\Delta R = 0.005 \% (50 \text{ ppm})$ $\Delta \text{Ratio} = 0.005 \% (50 \text{ ppm})$
Short Time Overload 6.25 x Rated Power; 5 seconds	$\Delta R = 0.005 \% (50 \text{ ppm})$ $\Delta \text{Ratio} = 0.0025 \% (25 \text{ ppm})$
Weight	0.08 g



Ultra High Precision Z-Foil Surface Mount 4 Resistor Network Dual-In-Line Package with TCR Tracking of 0.1 ppm/°C, PCR Tracking of 5 ppm at Rated Power, and Tolerance Match of 0.01 % Vishay Foil Resistors

TABLE 3 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y1747V0204BA9W (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1747 V0204 B A 9 W:

TYPE: SMNZ
VALUES: 10K/500R
ABSOLUTE TOLERANCE: ± 0.1 %
TOLERANCE MATCH: 0.05 %
TERMINATION: Lead (Pb)-free
PACKAGING: Waffle Pack

HISTORICAL PART NUMBER: SMNZ 10K/500R TCR0.2 B A S W (will continue to be used)

SMNZ	10K/500R	TCR0.2	B	A	S	W
MODEL SMNZ	RESISTANCE VALUE R₁ = 10 kΩ R₂ = 500 Ω	ABSOLUTE TCR TCR0.2	ABSOLUTE TOLERANCE Q = ± 0.02 % A = ± 0.05 % B = ± 0.1 %	TOLERANCE MATCH T = 0.01 % Q = 0.02 % A = 0.05 %	TERMINATION S = Lead (Pb)-free B = Tin/Lead	PACKAGING T = Tape and Reel W = Waffle Pack U = ESD Tubes

Note

* For non-standard requests, please contact Application Engineering.

TABLE 4 - RESISTANCE VALUE CODE LIST FOR POPULAR RATIOS

(other values available upon request)

VCODES	R1/R2 RATIO	R1	R2	VCODES	R1/R2 RATIO	R1	R2
V0201	100	10K	100R	V0189	2.5	1K	400R
V0202	50	10K	200R	V0185		500R	200R
V0197		5K	100R	V0207	2	10K	5K
V0203	25	10K	400R	V0175		2K	1K
V0198	20	5K	200R	V0190		1K	500R
V0204		10K	500R	V0182		400R	200R
V0193	2K	100R	V0179	200R	100R	1.25	
V0205	10	10K	1K	V0186	500R		400R
V0194		2K	200R	V0178	100R	100R	
V0187		1K	100R	V0180	200R	200R	
V0200	5	5K	1K	V0183	400R	400R	1
V0195		2K	400R	V0023	500R	500R	
V0188		1K	200R	V0191	1K	1K	
V0184		500R	100R	V0176	2K	2K	
V0196	4	2K	500R	V0019	5K	5K	10K
V0181		400R	100R	V0008	10K	10K	



Disclaimer

All product specifications and data are subject to change without notice.

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

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

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

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