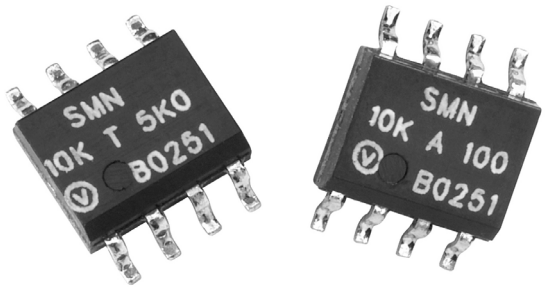
High Precision Surface Mount 4 Resistor Network Dual-In-Line Package with TCR Tracking ≤ 0.5 ppm/°C, Tolerance Match of 0.01 % and Ratio Stability of 0.005 %



Any value and any ratio available within resistance range

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, and products based on this technology are the most suitable for a wide range of applications.

BMF technology allows us to produce Customer Orientated products designed to satisfy challenging and specific technical requirements.

Model SMN offers low TCR (absolute and tracking), excellent load life stability, tight tolerance (absolute and match), excellent ratio stability, low thermal EMF, low current noise and low voltage coefficient - **all in the same resistor.**

The SMN Surface Mount Network is made up of 4 independent BMF 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 also available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

FEATURES

- Temperature Coefficient of Resistance (TCR) (- 55 °C to + 125 °C, + 25 °C Ref):
  Absolute: ± 2 ppm/°C typical (see table 2)
  Tracking: 0.5 ppm/°C typical (see table 2)
- Power Rating: at 70 °C
  Entire Package: 0.4 W
  Each Resistor: 0.1 W
- Resistance Tolerance Match: 0.01 %
- 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
- Thermal EMF: 0.05 µV/°C
- Voltage Coefficient < 0.1 ppm/V
- Non Inductive: < 0.08 µH
- Non Hot Spot Design
- Terminal Finishes available: Lead (Pb)-free
  Tin/Lead Alloy
- For better performances please contact us
- Available with Z-Foil technology, please see SMNZ datasheet

Pb-free Available

RoHS* COMPLIANT

APPLICATIONS

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

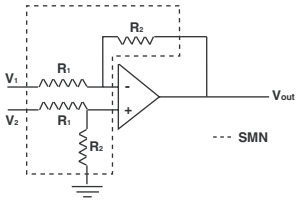
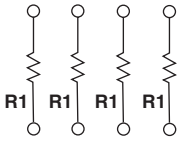


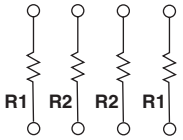
TABLE 1 - RESISTANCE VALUES AND TOLERANCES
(Tighter performances are available)

RESISTANCE VALUES	100 Ω - 10 kΩ per resistor
ABSOLUTE TOLERANCE EACH RESISTOR	± 0.02 %, ± 0.05 %, ± 0.1 %
RESISTANCE TOLERANCE MATCH	0.01 %, 0.02 %, 0.05 %

FIGURE 1 - SCHEMATICS[1)]



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)

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

FIGURE 2 - POWER DERATING CURVE

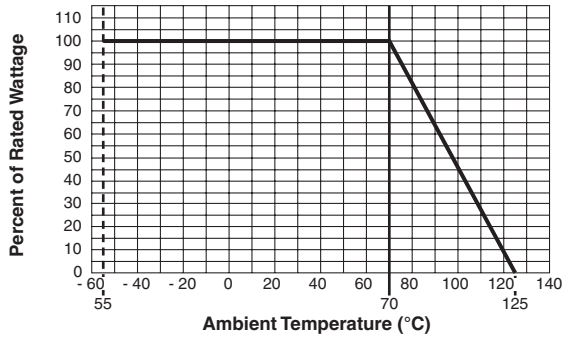


FIGURE 4 -TYPICAL TCR CURVE
(For more details, see table 2)

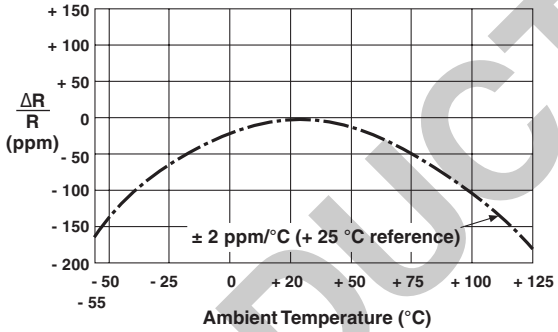


FIGURE 3 - DIMENSIONS AND IMPRINTING EXAMPLE in inches (millimeters)

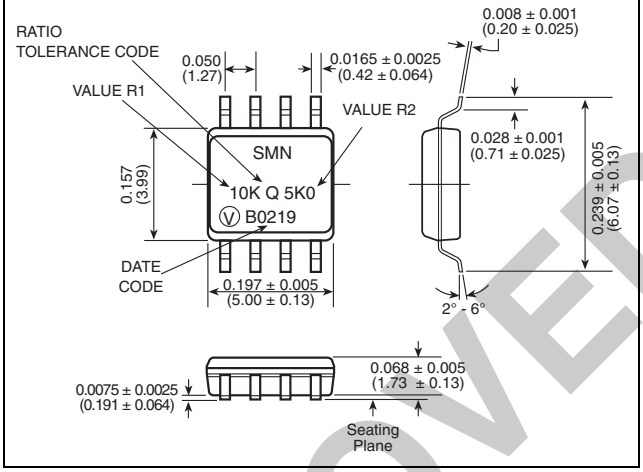
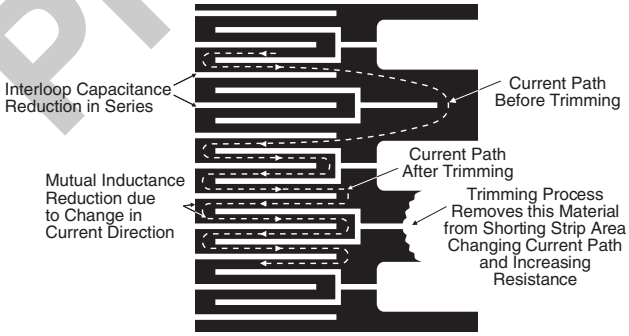
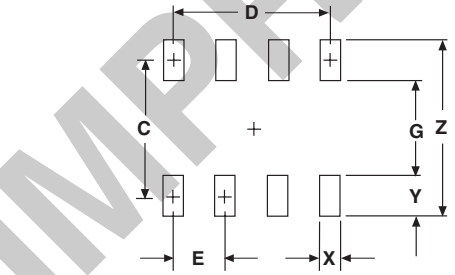


FIGURE 5 - TRIMMING TO VALUES
(Conceptual Illustration)



Note: Foil shown in black, etched spaces in white

FIGURE 6 - LAND PATTERN in inches (millimeters)



	Z	G	X	Y	C	D	E
MINIMUM	0.283 (7.19)	0.102 (2.59)	0.024 (0.61)	0.095 (2.41)	0.197 (5.00)	0.150 (3.81)	0.050 (1.27)
MAXIMUM	0.291 (7.39)	0.110 (2.79)	0.032 (0.81)	REFERENCE			

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)	$(P \times R)^{1/2}$
TCR - 55 °C to + 125 °C (25 °C reference)	Absolute (typical and max. spread): ± 2 ± 3 ppm/°C Tracking (maximum): For R1/R2 = 1 1.0 ppm/°C For 1 < R1/R2 ≤ 10 2.0 ppm/°C For 10 < R1/R2 ≤ 100 3.0 ppm/°C
Thermal Shock 25 x (- 65 °C to + 125 °C)	ΔR = 0.01 % (100 ppm) ΔRatio = 0.01 % (100 ppm)
Thermal Shock 5 x (- 65 °C to + 125 °C) and **Power Conditioning** 1.5 rated power at 25 °C, 100 hours	ΔR = 0.02 % (200 ppm) ΔRatio = 0.015 % (150 ppm)
DWV Atm. Pressure 200 V (A.C), 1 minute	Successfully passed
Insulation Resistance 100 V (D.C), 1 minute	> 10^4 MΩ
Resistance to Soldering Heat	ΔR = 0.01 % (100 ppm) ΔRatio = 0.005 % (50 ppm)
Moisture Resistance + 65 °C to - 10 °C; 90 % to 98 % RH; 0.1 x rated power; 240 hours	ΔR = 0.02 % (200 ppm) ΔRatio = 0.005 % (50 ppm)
Shock (Specified Pulse) 100G	ΔR = 0.01 % (100 ppm) ΔRatio = 0.01 % (100 ppm)
Vibration, High Frequency (10 Hz - 2000 Hz), 20G	ΔR = 0.005 % (50 ppm) ΔRatio = 0.005 % (50 ppm)
High Temperature Exposure 100 hours at 125 °C	ΔR = 0.01 % (100 ppm) ΔRatio = 0.005 % (50 ppm)
Low Temperature Storage 24 hours at - 65 °C	ΔR = 0.005 % (50 ppm) ΔRatio = 0.005 % (50 ppm)
Load Life Stability at 70 °C; 0.1 watt per resistor, 2000 hours	ΔR = 0.005 % (50 ppm) ΔRatio = 0.005 % (50 ppm)
Short Time Overload 6.25 x Rated Power; 5 seconds	ΔR = 0.005 % (50 ppm) ΔRatio = 0.0025 % (25 ppm)
Weight	0.08 g

TABLE 3 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y1365V0204QT9W (preferred part number format)

DENOTES PRECISION	VCODE	TOLERANCE MATCH	PACKAGING
Y	RESISTANCE VALUE CODE	**T** = 0.01 % **Q** = 0.02 % **A** = 0.05 %	**R** = Tape and Reel **W** = Waffle Pack **U** = ESD Tubes

Y	1	3	6	5	V	0	2	0	4	Q	T	9	W

PRODUCT CODE	ABSOLUTE TOLERANCE	AER*
SMN = 1365	**Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 %	**0** = Standard **9** = Lead (Pb)-free **1 - 999** = Custom

FOR EXAMPLE: ABOVE GLOBAL ORDER Y1365 V0204 Q T 9 W:
TYPE: SMN
VALUES: 10K/500R
ABSOLUTE TOLERANCE: ± 0.02 %
TOLERANCE MATCH: 0.01 %
TERMINATION: Lead (Pb)-free
PACKAGING: Waffle Pack

HISTORICAL PART NUMBER: SMN 10K/500R TCR2 Q T S W (will continue to be used)

SMN	10K/500R	TCR2	Q	T	S	W
MODEL	RESISTANCE VALUE	ABSOLUTE TCR	ABSOLUTE TOLERANCE	TOLERANCE MATCH	TERMINATION	PACKAGING
SMN	R_1 = 10 kΩ R_2 = 500 Ω	**TCR2**	**Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 %	**T** = 0.01 % **Q** = 0.02 % **A** = 0.05 %	**S** = Lead (Pb)-free **B** = Tin/Lead	**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

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		5K	200R	V0190		1K	500R
V0204	20	10K	500R	V0182		400R	200R
V0193		2K	100R	V0179		200R	100R
V0205	10	10K	1K	V0186	1.25	500R	400R
V0194		2K	200R	V0178	1	100R	100R
V0187		1K	100R	V0180		200R	200R
V0200	5	5K	1K	V0183		400R	400R
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
V0181		400R	100R	V0008		10K	10K

Note

- Other values available upon request.

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