Ultra High Precision Bulk Metal® Z-Foil Surface Mount Voltage Divider, TCR Tracking of < 0.1 ppm/°C, PCR of ± 5 ppm at Rated Power and Stability of ± 0.005 % (50 ppm)

INTRODUCTION

Bulk Metal® Z-Foil technology out-performs all other resistor technologies available today for applications that require ultra-high precision and ultra-high stabilitly.

The Z-Foil technology provides a significant reduction of the resistive element's sensitivity to ambient temperature variations (TCR) and to self heating when power is applied (power coefficient).

The DSMZ offers low TCR (both absolute and tracking), low PCR, excellent load life stability, tight tolerance match, excellent ratio stability, low thermal EMF, and low current noise - all in one package.

The **DSMZ** surface mount divider provides a matched pair of Bulk Metal® Z-Foil resistors in a small epoxy molded package. The electrical specification of this integrated construction offers improved performance and better real estate utilization over discrete resistors and matched pairs.

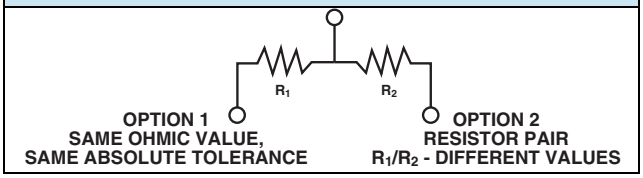
Our application engineering department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

TABLE 1 - RESISTANCE VALUES AND TOLERANCES (1)

RESISTANCE VALUES	100 Ω to 10 kΩ per resistor (2)
ABSOLUTE TOLERANCE EACH RESISTOR	± 0.02 %, ± 0.05 %, ± 0.1 %
RESISTANCE TOLERANCE MATCH	0.01 %, 0.02 %, 0.05 %
TCR - 55 °C to + 125 °C (+ 25 °C reference)	Absolute: (typical and maximum spread): ± 0.2 ± 2.0 ppm/°C Tracking: (maximum) For R1/R2 = 1 — 0.5 ppm/°C For 1 < R1/R2 ≤ 10 — 1.0 ppm/°C For 10 < R1/R2 ≤ 100 — 2.0 ppm/°C

Notes
(1) Tighter performances are available
(2) 100 Ω to 12 kΩ per resistor available in DSM

FIGURE 1 - SCHEMATIC



FEATURES

- Temperature coefficient of resistance (TCR):
  Absolute: ± 0.05 ppm/°C typ. (0 °C to + 60 °C)
  ± 0.2 ppm/°C typ. (- 55 °C to + 125 °C, + 25 °C Ref.)
  Tracking: 0.1 ppm/°C typical
- Power coefficient tracking
  "ΔR due to self heating": ± 5 ppm at rated power
- Power rating at 70 °C: entire package: 0.1 W,
  each resistor: 0.05 W
- Tolerance: absolute: ± 0.02 %; match: 0.01 %
- Ratio stability: 0.005 % (0.05 W at 70 °C, 2000 h)
- Resistance range: 100 Ω to 10 kΩ per resistor
- Large variety of resistance ratios: 1:100
- Foil resistors are not restricted to standard values/ ratios; specific "as required" values/ratios can be supplied at no extra cost or delivery (e.g. 1K234/2K345 vs. 1K/2K)
- Electrostatic discharge (ESD) up to 25 000 V
- Short time overload ≤ 0.005 %
- Non-inductive, non-capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: < - 40 dB
- Thermal EMF: 0.05 µV/°C typical
- Voltage Coefficient: < 0.1 ppm/V
- Non Inductive: < 0.08 µH
- Non Hot Spot Design
- Terminals: silver coated copper alloy
- Compliant to RoHS directive 2002/95/EC
- Prototype quantities available in just 5 working days or sooner. For more information, please contact foil@vpgsensors.com
- For better performances, please contact application engineering

Pb-free Available

RoHS* COMPLIANT

APPLICATIONS

- Instrumentation amplifiers
- Bridge networks
- Differential amplifiers
- Ratio arms in bridge circuits
- Medical and test equipment
- Military
- Airborne etc.

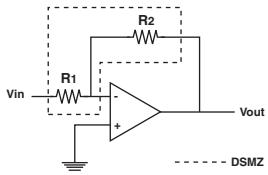
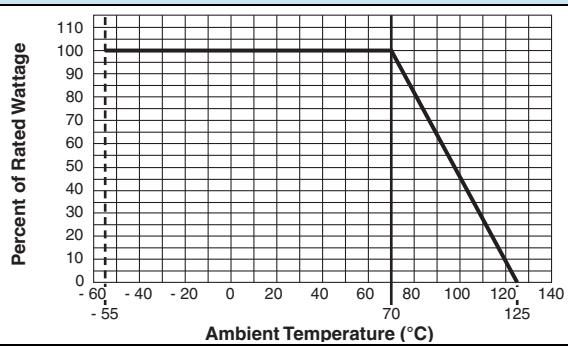
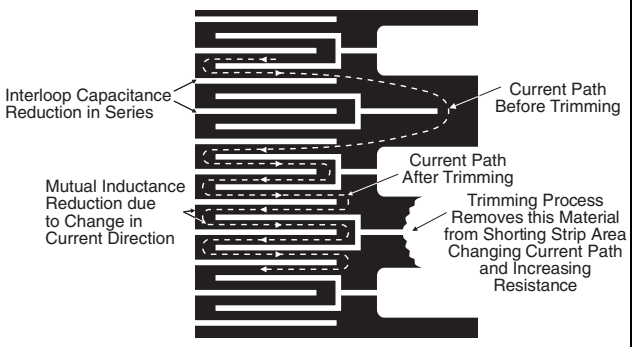


FIGURE 2 - POWER DERATING CURVE



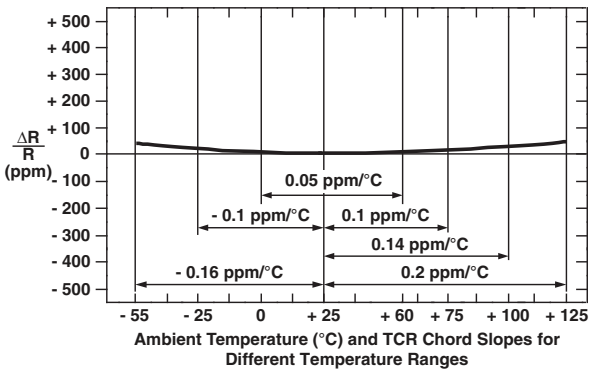
* Pb containing terminations are not RoHS compliant, exemptions may apply

FIGURE 3 - TRIMMING TO VALUES
(Conceptual Illustration)



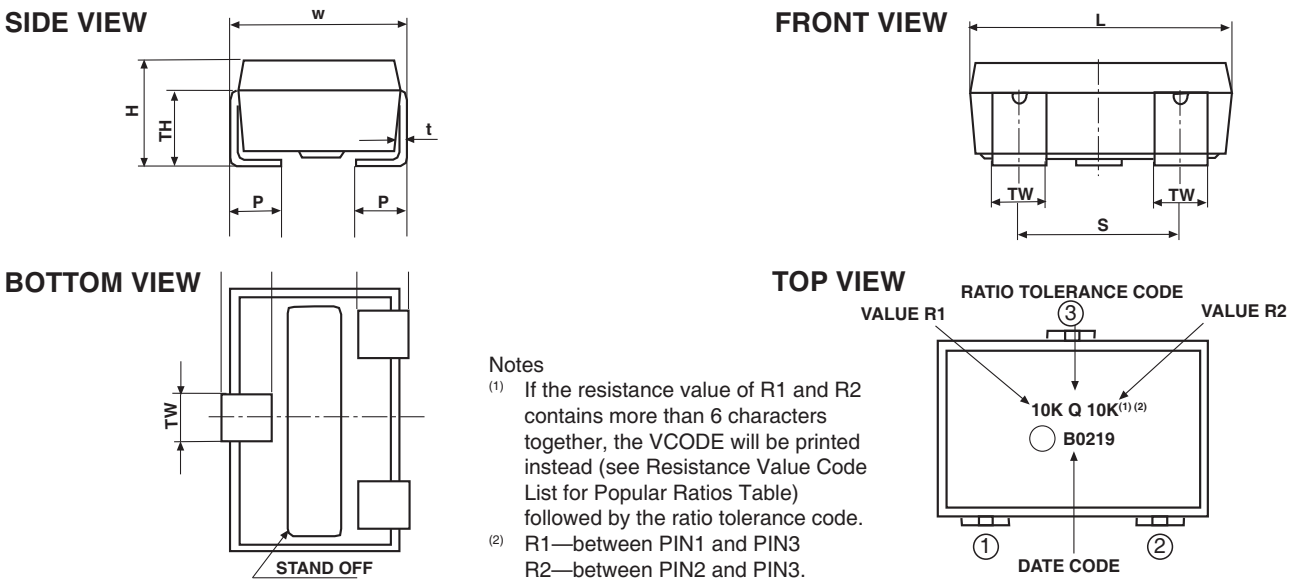
Note: Foil shown in black, etched spaces in white

FIGURE 4 - TYPICAL RESISTANCE/ TEMPERATURE CURVE
(For more details, see table 1)



Ambient Temperature (°C) and TCR Chord Slopes for Different Temperature Ranges

FIGURE 5 - DIMENSIONS AND IMPRINTING



Notes
(1) If the resistance value of R1 and R2 contains more than 6 characters together, the VCODE will be printed instead (see Resistance Value Code List for Popular Ratios Table) followed by the ratio tolerance code.
(2) R1—between PIN1 and PIN3
R2—between PIN2 and PIN3.

DIMENSIONS	L	W	H	P	TW	TH	S	t
INCHES	0.160 ± 0.008	0.106 ± 0.008	0.063 ± 0.008	0.031 ± 0.005	0.031 ± 0.004	0.043 ± 0.008	0.100 ± 0.008	0.005 ± 0.002
MILLIMETERS	4.06 ± 0.20	2.69 ± 0.20	1.60 ± 0.20	0.79 ± 0.13	0.79 ± 0.10	1.09 ± 0.20	2.54 ± 0.20	0.13 ± 0.05

FIGURE 6 - RECOMMENDED LAND PATTERN

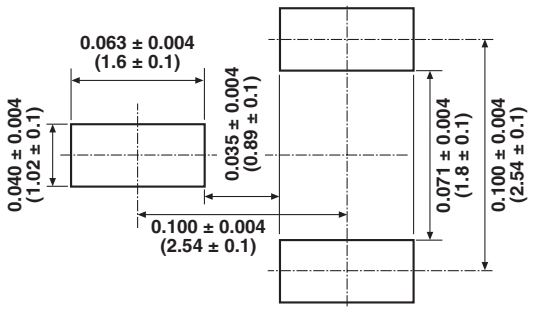
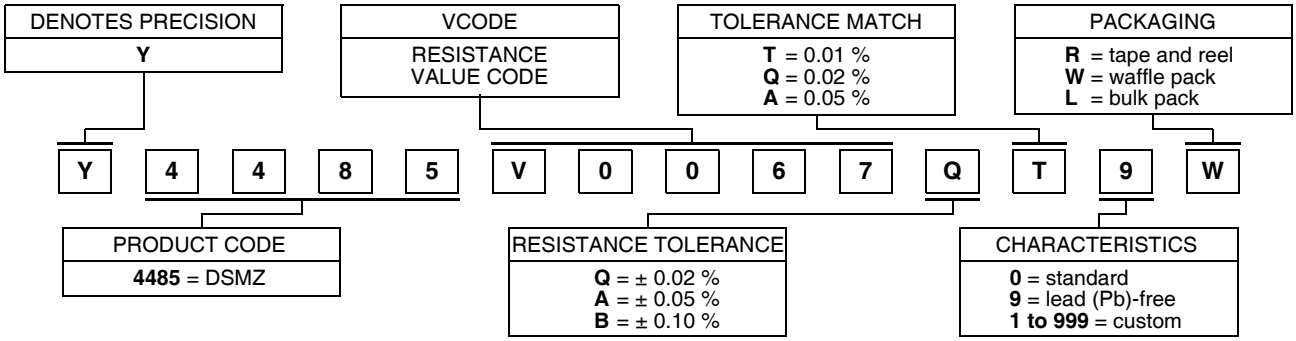


TABLE 2 - PERFORMANCE SPECIFICATIONS (Test Method Per MIL-PRF-914)	
SPECIFICATIONS	**TYPICAL LIMITS**
Power rating at 70 °C	Entire package: 0.1 W Each resistor: 0.05 W
Maximum Working Voltage (each resistor)	25 V
Working Temperature Range	- 65 °C to + 125 °C
Thermal Shock 25 x (- 65 °C to + 125 °C)	ΔR = 0.01 % (100 ppm) ΔRatio = 0.005 % (50 ppm)
Thermal Shock 5 x (- 65 °C to + 125 °C) and **Power Conditioning** 1.5 rated power at 25 °C, 100 hours	ΔR = 0.015 % (150 ppm) ΔRatio = 0.01 % (100 ppm)
DWV atmospheric 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) 100 G	ΔR = 0.005 % (50 ppm) ΔRatio = 0.0025 % (25 ppm)
Vibration, High Frequency (10 Hz - 2000 Hz), 20 G	ΔR = 0.01 % (100 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 2000 hours at + 70 °C; rated power	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)
Low Temperature Operation	ΔR = 0.005 % (50 ppm) ΔRatio = 0.0025 % (25 ppm)
Weight	0.04 g

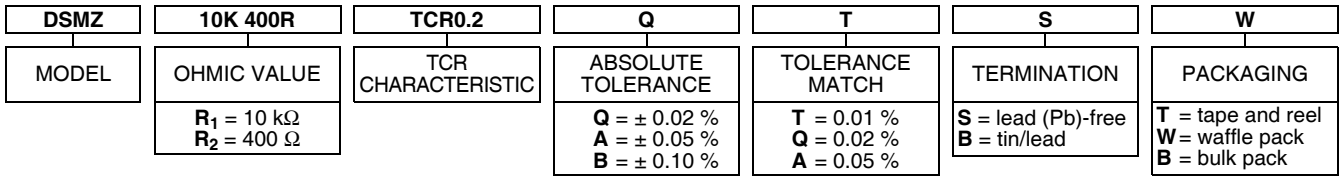
TABLE 3 - GLOBAL PART NUMBER INFORMATION (1)

NEW GLOBAL PART NUMBER: Y4485V0067QT9W (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y4485 V0067 Q T 9 W:
TYPE: DSMZ
VALUES: 10K/400R
ABSOLUTE TOLERANCE: ± 0.02 %
TOLERANCE MATCH: 0.01 %
TERMINATION: lead (Pb)-free
PACKAGING: waffle pack

HISTORICAL PART NUMBER: DSMZ 10K 400R TCR0.2 Q T S W (will continue to be used)



Note

(1) For non-standard requests or additional values, please contact application engineering.

TABLE 4 - RESISTANCE VALUE CODE LIST FOR POPULAR RATIOS (1)

VCODES	R1/R2 RATIO	R1	R2	VCODES	R1/R2 RATIO	R1	R2
V0052	100	10K	100R	V0080	2.5	1K	400R
V0065	50	10K	200R	V0081		500R	200R
V0066		5K	100R	V0082	2	10K	5K
V0067	25	10K	400R	V0083		2K	1K
V0068		5K	200R	V0084		1K	500R
V0069	20	10K	500R	V0085		400R	200R
V0070		2K	100R	V0086		200R	100R
V0071	10	10K	1K	V0087	1.25	500R	400R
V0072		2K	200R	V0001	1	10K	10K
V0073		1K	100R	V0002		5K	5K
V0074	5	5K	1K	V0059		2K	2K
V0075		2K	400R	V0004		1K	1K
V0076		1K	200R	V0091		500R	500R
V0077		500R	100R	V0090		400R	400R
V0246	4	10K	2K5	V0089		200R	200R
V0078		2K	500R	V0088		100R	100R
V0079		400R	100R				

Note

(1) Other values available upon request.

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