Ultra High Precision Bulk Metal® Z-Foil Surface Mount Voltage Divider

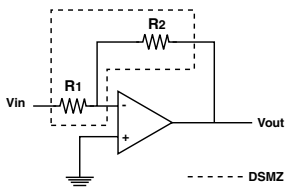
TCR Tracking of <0.1 ppm/°C, PCR of ±5 ppm at Rated Power and Stability of ±0.005% (50 ppm)

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

APPLICATIONS

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



Pb-free Available

RoHS* COMPLIANT

INTRODUCTION

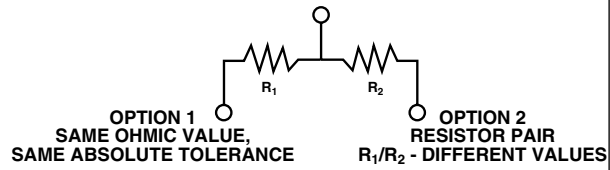
Bulk Metal® Z-Foil technology out-performs all other resistor technologies available today for applications that require ultra-high precision and ultra-high stabilitly.

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.

Figure 1 – Schematic



Note

* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS compliant. Please see the information/tables in this datasheet for details.

Table 1 - Model DSMZ Specifications[1]

Resistance Values	Absolute TCR (- 55 °C to +125 °C, +25 °C Ref.) typical + max. spread	Resistance Ratio	TCR Tracking	Tolerance	
				Absolute	Match
100 Ω to 10 kΩ per resistor[2]	±0.2 ppm/°C ±2.0 ppm/°C	R1/R2 = 1	0.5 ppm/°C	±0.02 %	0.01 %
		1 < R1/R2 ≤ 10	1.0 ppm/°C	±0.05 %	0.02 %
		10 < R1/R2 ≤ 100	2.0 ppm/°C	±0.1 %	0.05 %

Note

(1) Tighter performances are available

(2) For resistance values above 10 kΩ per resistor, please contact application engineering

Figure 2 – Power Derating Curve

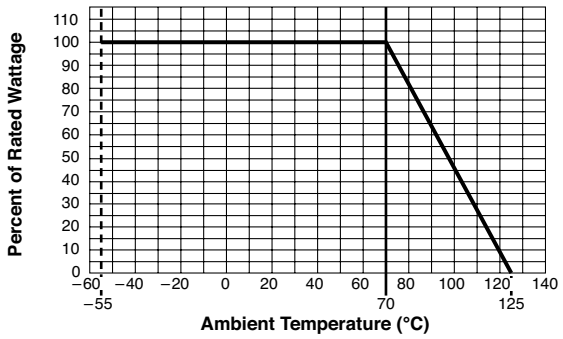


Figure 3 – Typical Resistance/Temperature Curve (for more details, see table 1)

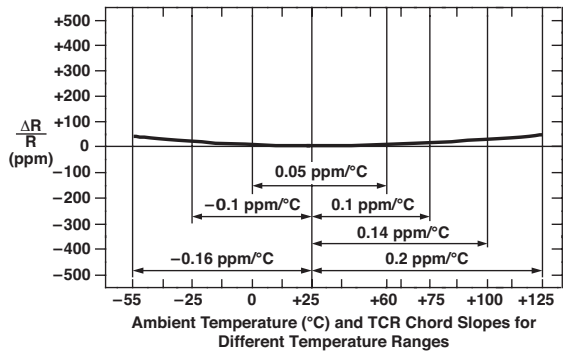
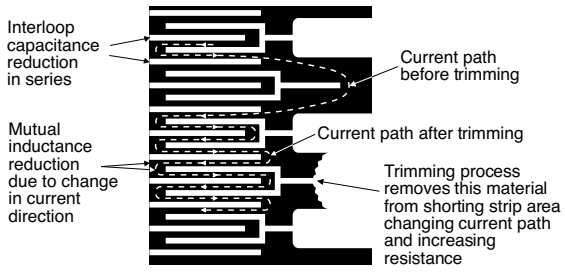


Figure 4 – Trimming to Values



Foil shown in black, etched spaces in white

Note

To acquire a precision resistance value, the Bulk Metal® Foil chip is trimmed 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 Bulk Metal® Foil resistors.

Figure 5 – Recommended Land Pattern

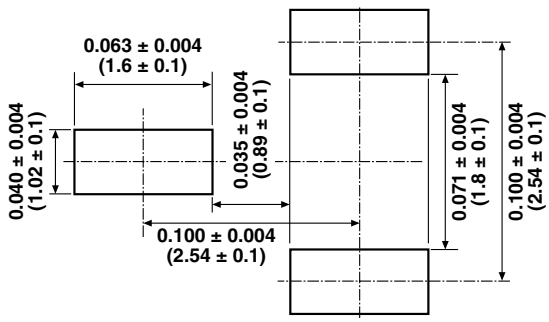
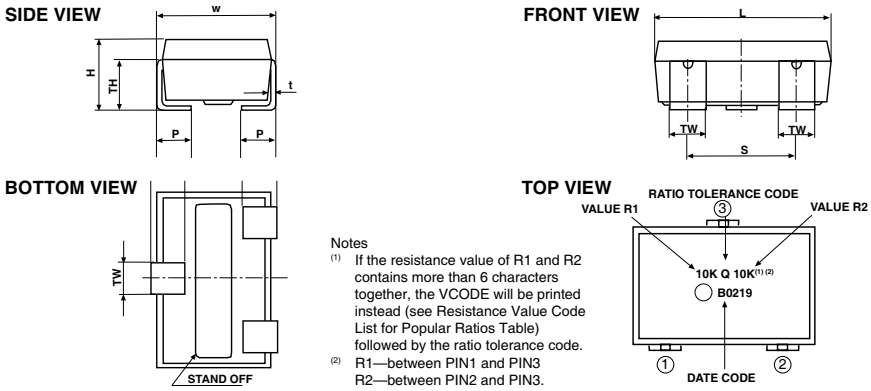


Figure 6 – Dimensions and Imprinting



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.

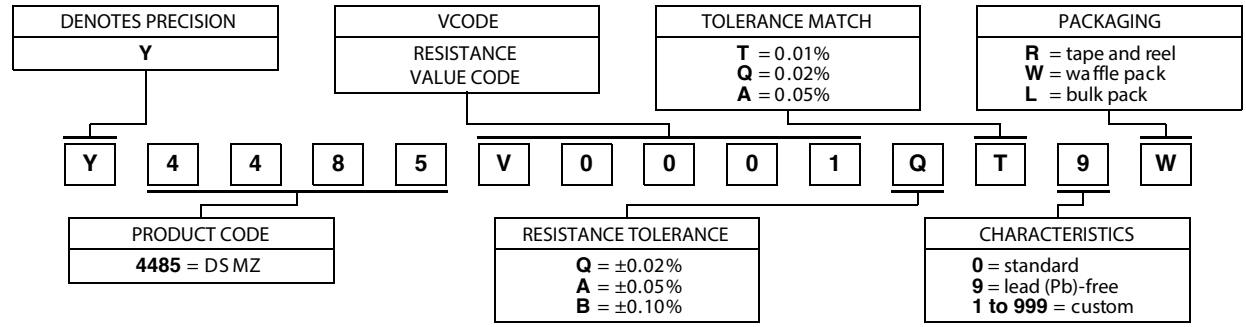
DIMENSIONS	L	W	H	P	TW	TH	S	t
INCHES	0.160±0.008	0.106±0.008	0.063±0.008	0.031±0.005	0.031±0.004	0.043±0.008	0.100±0.008	0.005±0.002
MILLIMETERS	4.06±0.20	2.69±0.20	1.60±0.20	0.79±0.13	0.79±0.10	1.09±0.20	2.54±0.20	0.13±0.05

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 × (–65°C to +125°C)	ΔR = 0.01% (100 ppm) ΔRatio = 0.005% (50 ppm)
Thermal Shock 5 × (–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 VAC, 1 minute	Successfully passed
Insulation Resistance 100 VDC, 1 minute	$>10^4$ MΩ
Resistance to Soldering Heat +245°C ±5°C for 30 sec ±5 sec	ΔR = 0.01% (100 ppm) ΔRatio = 0.005% (50 ppm)
Moisture Resistance +65°C to –10°C; 90% to 98% RH; 0.1 × 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 × Rated Power; 5 seconds	ΔR = 0.005% (50 ppm) ΔRatio = 0.0025% (25 ppm)
Low Temperature Operation -65°C, 45 min at P_{nom}	ΔR = 0.005% (50 ppm) ΔRatio = 0.0025% (25 ppm)
Weight	0.04 g

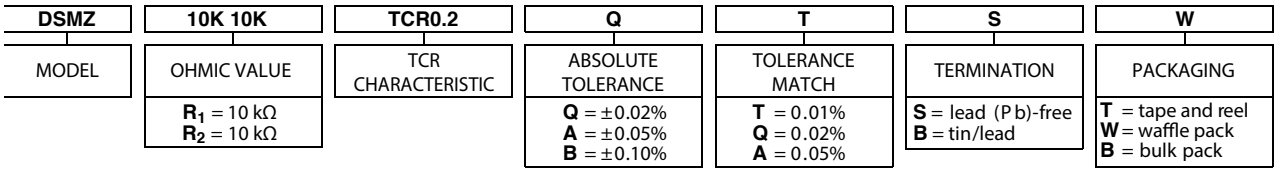
Table 3 – Global Part Number Information[1]

NEW GLOBAL PART NUMBER: Y4485V0001QT9W (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y4485 V0001 Q T 9 W:
TYPE: DSMZ
VALUES: 10K/10K
ABSOLUTE TOLERANCE: ± 0.02%
TOLERANCE MATCH: 0.01%
TERMINATION: lead (Pb)-free
PACKAGING: waffle pack

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

Note
(1) Other values available upon request.

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