High Precision Bulk Metal® Foil Surface Mount Voltage Divider

TCR Tracking of <0.5 ppm/°C, Tolerance Match of 0.01% and Stability of ±0.005% (50 ppm)

FEATURES

- Temperature coefficient of resistance (TCR): Absolute: 2 ppm/°C typical (–55°C to +125°C, +25°C ref.) Tracking: 0.5 ppm/°C typical
- Tolerance: absolute: ±0.02%; match: 0.01%
- Power rating: at 70°C: entire package: 0.1 W each resistor: 0.05 W
- Ratio stability: 0.005% (0.05 W at 70°C, 2000 h)
- Resistance range: 100 Ω to 12 kΩ per resistor
- Large variety of resistance ratios: 1:120
- Bulk Metal® 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)
- Thermal stabilization time <1 s (nominal value achieved within 10 ppm of steady state value)
- Electrostatic discharge (ESD) at least to 25 kV
- Short time overload: 0.005%
- Non inductive, non capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: <0.010 μV_{RMS}/V of applied voltage (–40 dB)
- Voltage coefficient: 0.1 ppm/V
- Non inductive: 0.08 µH
- Non hot spot design
- Terminals: silver coated copper alloy (see Table 5)
- 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 see DSMZ datasheet (Z-Foil)

Pb-free Available

RoHS* COMPLIANT

INTRODUCTION

Bulk Metal® Foil (BMF) technology out-performs all other resistor technologies available today for applications that require high precision and high stability.

This technology has been invented, patented and pioneered by Vishay Foil Resistors (VFR). Products based on this technology are the most suitable for a wide range of appilcations.

BMF technology allows the production of customer oriented products designed to satisfy challenging and specific technical requirements. Model DSM offers low TCR (both absolute and tracking), excellent load life stability, tight tolerance, excellent ratio stability, and low current noise, all in one package.

The DSM surface mount divider provides a matched pair of Bulk Metal® 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.

VFR’s application engineering department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact: foil@vpgsensors.com.

Figure 1 – Schematic

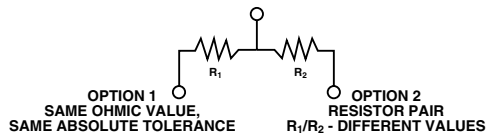


Table 1 – Model DSM Specifications

MODEL	ABSOLUTE TCR (–55°C TO +125°C, +25°C REF.) TYPICAL + MAX. SPREAD	RESISTANCE RATIO	TCR TRACKING	TOLERANCE	
				ABSOLUTE	MATCH
DSM	±2 ppm/°C±3 ppm/°C	R1/R2 = 1	1.0 ppm/°C	±0.02%	0.01%
		1 <R1/R2 ≤10	2.0 ppm/°C	±0.05%	0.02%
		10 <R1/R2 ≤120	3.0 ppm/°C	±0.1%	0.05%

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.

Figure 2 – Power Derating Curve

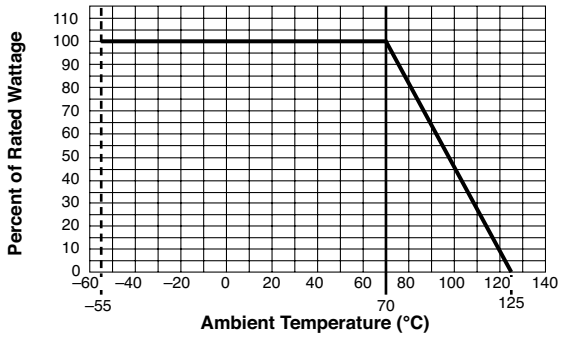


Figure 3 – Typical Resistance/Temperature Curve (for more details, see table 1)

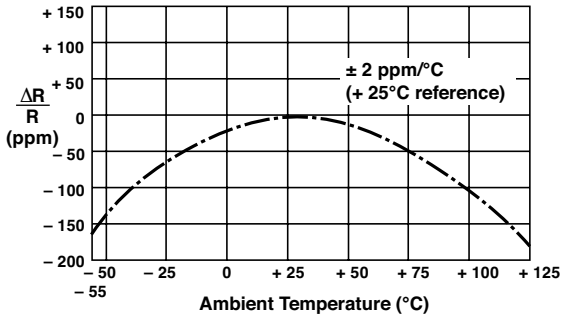
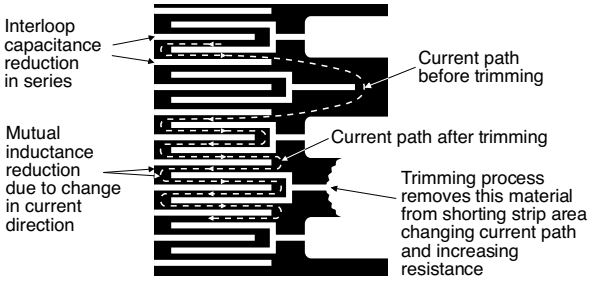


Figure 4 – Trimming to Values



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

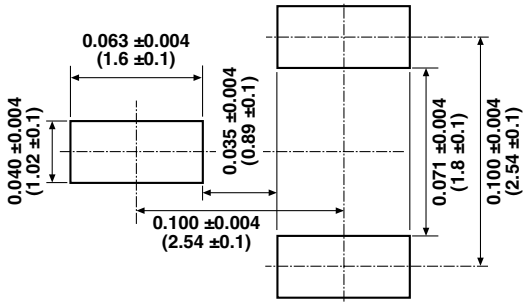
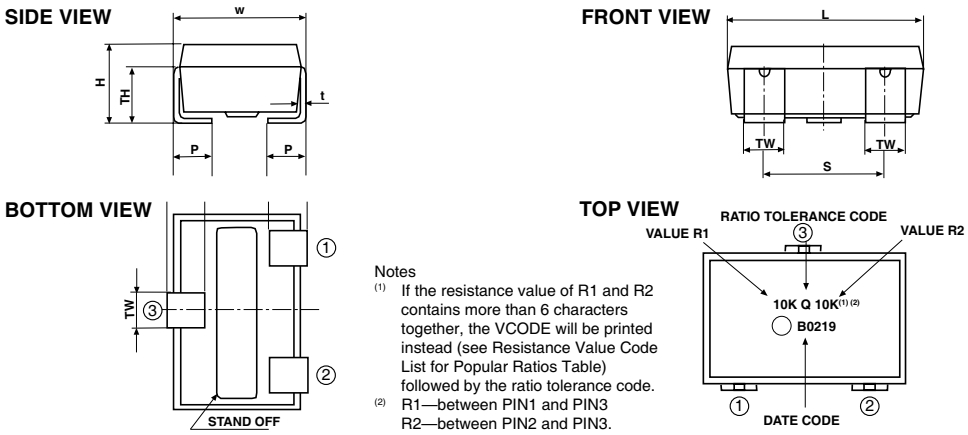


Figure 6 – Dimensions and Imprinting



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 3 – 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 h	ΔR = 0.015% (150 ppm) ΔRatio = 0.01% (100 ppm)
DWV atmospheric pressure, 200 V (A.C.), 1 min	Successfully passed
Insulation Resistance 100 VDC, 1 min	>104 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 × rated power, 240 h	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 to 2000 Hz), 20 G	ΔR = 0.01% (100 ppm) ΔRatio = 0.005% (50 ppm)
High Temperature Exposure 100 h at 125°C	ΔR = 0.01% (100 ppm) ΔRatio = 0.005% (50 ppm)
Low Temperature Storage 24 h at –65°C	ΔR = 0.005% (50 ppm) ΔRatio = 0.005% (50 ppm)
Load Life Stability 2000 h at +70°C; rated power	ΔR = 0.005% (50 ppm) ΔRatio = 0.005% (50 ppm)
Short Time Overload 6.25 × rated power; 5 s	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

Figure 7 – DSM 10k/10k, 20 Units, Load Life 0.05 W Each Value, at +70°C

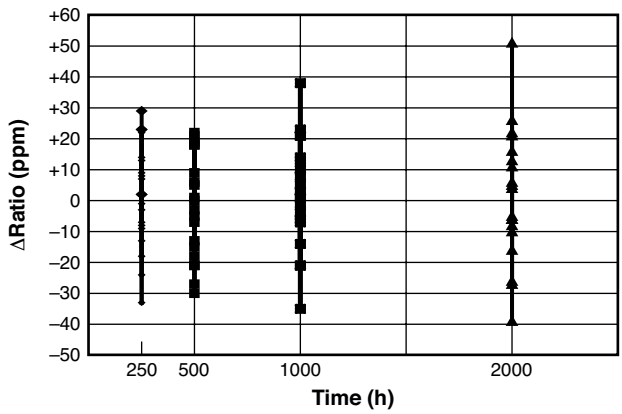


Figure 8 – DSM 10k/10k, 20 Units, High Temperature Exposure,
100 h at 125°C, Followed by Low Temperature Storage, 24 h at –65°C

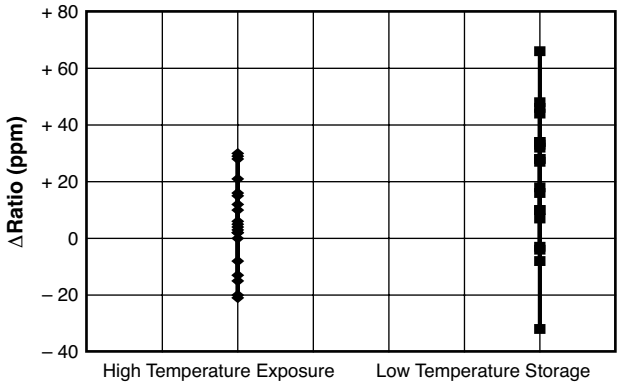
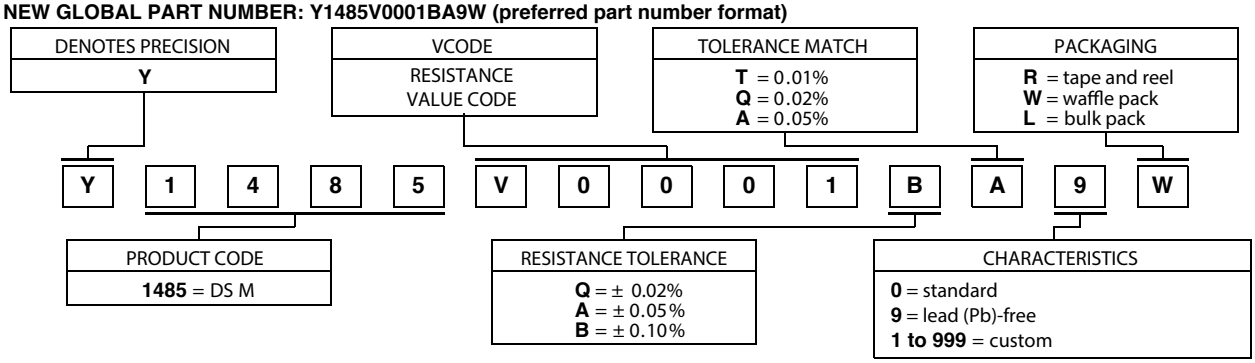


Table 4 – Resistance Value Code List for Popular Ratios (other values available upon request)

VCODES	R1/R2RATIO	R1	R2	VCODES	R1/R2RATIO	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 00R
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				

Table 5 – Global Part Number Information[1]

NEW GLOBAL PART NUMBER: Y1485V0001BA9W (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1485 V0001 B A 9 W:
TYPE: DSM
VALUES: 10K/10K
ABSOLUTE TOLERANCE: ± 0.1 %
TOLERANCE MATCH: 0.05 %
TERMINATION: lead (Pb)-free
PACKAGING: waffle pack

HISTORICAL PART NUMBER: DSM 10K 10K TCR2 B A S W (will continue to be used)

DSM	10K 10K	TCR2	B	A	S	W
MODEL	OHMIC VALUE R_1 = 10kΩ R_2 = 10KΩ	TCR CHARACTERISTIC	ABSOLUTE TOLERANCE Q = ± 0.02% A = ± 0.05% B = ± 0.10%	TOLERANCE MATCH T = 0.01% Q = 0.02% A = 0.05%	TERMINATION S = lead (Pb)-free B = standard	PACKAGING T= tape and reel W= waffle pack B= bulk pack

Note

[1] For non-standard requests or additional values, please contact application engineering.

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