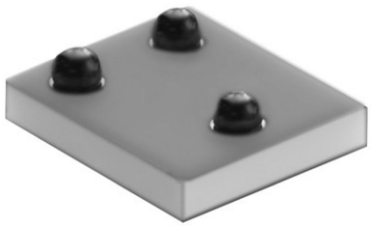
Ultra High Precision Z-Foil BGA Surface Mount Voltage Divider with 0.1 ppm/°C TCR Tracking, 0.01 % Tolerance Match and Load Life Stability Ratio to ± 0.01 % (100 ppm)



INTRODUCTION

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

Model VFB1012D offers low TCR (both absolute and tracking), low PCR (both absolute and tracking), excellent load life stability, tight tolerance, excellent ratio stability, and low current noise, all in one package. 0.05 ppm/°C absolute TCR removes errors due to temperature gradients.

The VFB1012D ball grid array (BGA) surface mount divider provides tight tolerance matching and TCR tracking between 2 resistors simultaneously etched on one piece of foil on a common substrate. The electrical specifications of this integrated construction offers improved performances 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.

FEATURES

Pb-free Available

RoHS* COMPLIANT

- 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.)
  Tracking: 0.1 ppm/°C typical
- Resistance range: 1K to 10K
- Foil resistors are not restricted to standard values/ ratios, we can supply specific "as required" values/ratios at no extra cost or delivery (e.g 2K234/5K456)
- Power coefficient tracking "ΔR due to self heating": 5 ppm at rated power
- Power rating: entire package: 0.2 W at 70 °C, divided between the two resistors proportionally to their value
- Resistance tolerance match: 0.01 %
- Load life stability ratio: 0.01 % (0.2 W at 70 °C, 2000 h)
- Large variety of resistance ratios: 1K to 10K
- Electrostatic discharge (ESD) up to 25 000 V
- Short time overload ≤ 0.01 % (100 ppm)
- Non inductive, non capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: < - 40 dB
- Thermal stabilization < 1 s
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: < 0.08 µH
- Non hot spot design
- Terminal (solder ball) available: lead (Pb)-free, tin/lead alloy
- Compliant to RoHS directive 2002/95/EC
- Maximum working voltage for each element: 32 V
- For better performances please contact us

APPLICATIONS

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

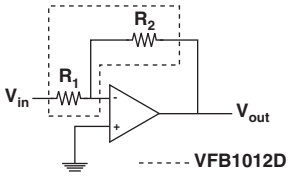
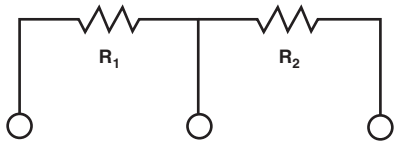


TABLE 1 - RANGE OF RESISTANCES

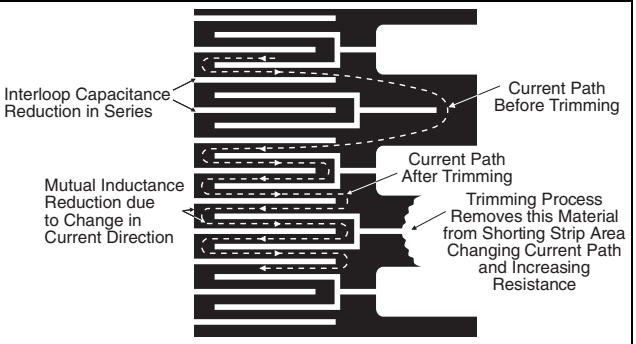
PARAMETER		FROM	TO
Total resistance	$R_1 + R_2$	2K	20K
Individual resistor	R_1 or R_2	1K	10K
Ratio	R_1/R_2	1/10	1/1

FIGURE 1 - SCHEMATIC



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

FIGURE 2 - TRIMMING TO VALUES
(Conceptual Illustration)



Note: Foil shown in black, etched spaces in white

FIGURE 3 - DERATING CURVE

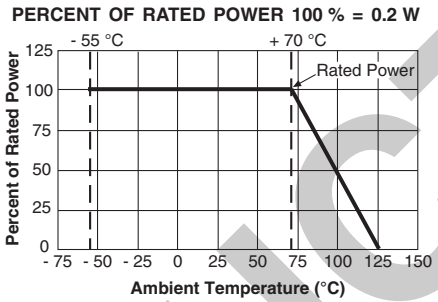


TABLE 2 - RESISTANCE CHARACTERISTICS AND POPULAR RESISTANCE VALUES

VALUES AVAILABLE	RESISTANCE VALUE CODE	RATIO R_1/R_2	TCR Max. (- 55 °C to + 125 °C, + 25 °C Ref.)		TIGHTEST TOLERANCE (1)	
			ABSOLUTE	TRACKING	ABSOLUTE	MATCHING
10K/10K	V0001	1	1.0 ppm/°C	0.5 ppm/°C	± 0.01 %	0.01 %
3K/3K	V0256					
2K5/2K5	V0257					
2K/2K	V0059					
1K/1K	V0004					
10K/5K	V0082	2	1.0 ppm/°C	0.5 ppm/°C	± 0.01 %	0.01 %
8K/4K	V0258					
10K/4K	V0259	2.5				
10K/2K5	V0246	4				
10K/1K	V0071	10	1.0 ppm/°C	1.0 ppm/°C	± 0.02 %	0.02 %

Note

(1) Other available tolerances - see table 4

FIGURE 4 - TYPICAL TCR CURVE Z-FOIL

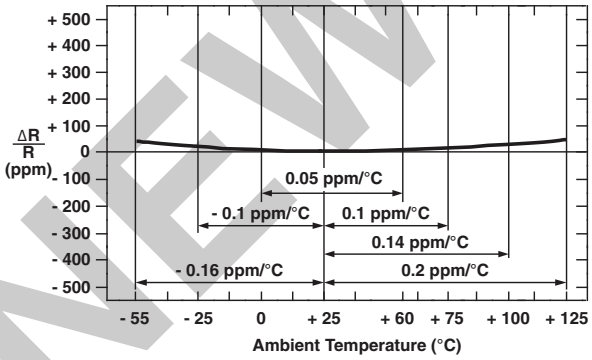


TABLE 3 - TYPICAL PERFORMANCE SPECIFICATIONS PER MIL-PRF-55342 (1)

TEST	ΔR	ΔRATIO
Thermal shock, 5 x (- 65 °C to + 150 °C)	0.01 % (100 ppm)	0.01 % (100 ppm)
Low temperature operation, - 65 °C at $P_{nom.}$ 45 min	0.01 % (100 ppm)	0.005 % (50 ppm)
Short time overload, 6.25 x $P_{nom.}$ x 5 s	0.01 % (100 ppm)	0.01 % (100 ppm)
High temperature exposure, 100 h at + 150 °C	0.01 % (100 ppm)	0.01 % (100 ppm)
Resistance to soldering heat per MIL-PRF-55342	0.01 % (100 ppm)	0.01 % (100 ppm)
Moisture resistance MIL-STD-202, method 106 without load	0.05 % (500 ppm)	0.02 % (200 ppm)
Load life (ratio stability), + 70 °C for 2000 h	0.01 % (100 ppm)	0.01 % (100 ppm)
Weight: 17 mg		

Note

(1) As shown + 0.01 Ω measurement error

FIGURE 5 - CHIP CONFIGURATION

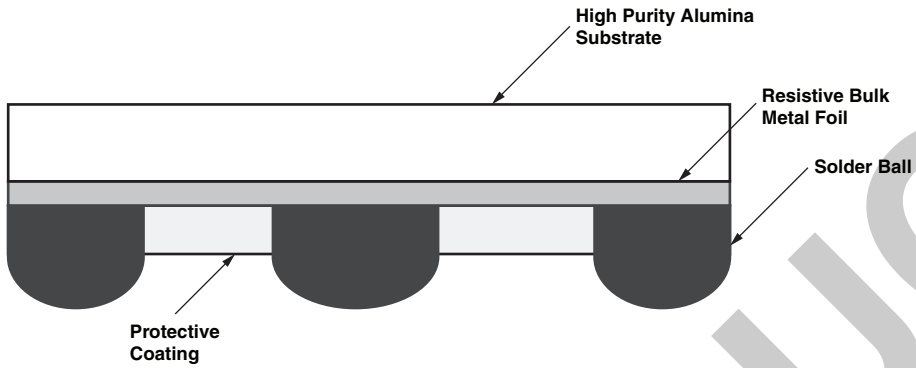
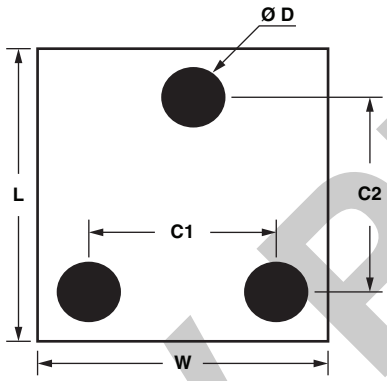
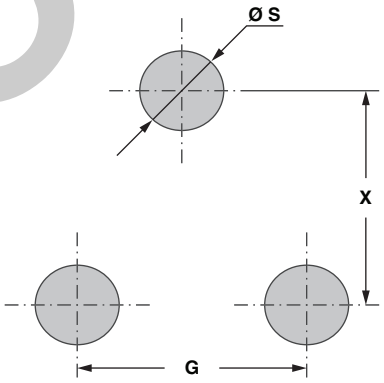


TABLE 4 - DIMENSIONS in Inches (Millimeters)

Chip Dimensions



Recommended Solder Pad Dimensions



DIMENSIONS in Inches (Millimeters)

L	W	D	C1	C2	THICKNESS (with balls)
0.122 ± 0.005 (3.10 ± 0.13)	0.102 ± 0.005 (2.59 ± 0.13)	0.020 ± 0.002 (0.51 ± 0.05)	0.055 ± 0.003 (1.40 ± 0.08)	0.075 ± 0.003 (1.91 ± 0.08)	0.032 ± 0.003 (0.81 ± 0.08)

RECOMMENDED SOLDER PAD DIMENSIONS in Inches (Millimeters)

X	G	S
0.075 (1.91)	0.055 (1.40)	0.018 (0.46)

TABLE 5 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y1683V0258QT9W (preferred part number format)

DENOTES PRECISION	VCODE (2)	TOLERANCE MATCH	PACKAGING
Y	RESISTANCE VALUE CODE	**T** = 0.01 % **Q** = 0.02 % **A** = 0.05 %	**R** = tape and reel **W** = waffle pack

Y	1	6	8	3	V	0	2	5	8	Q	T	9	W

PRODUCT CODE	RESISTANCE TOLERANCE	CHARACTERISTICS (1)
1683 = VFB1012D	**T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.10 % **C** = ± 0.25 %	**0** = standard **9** = lead (Pb)-free **1 to 999** = custom

FOR EXAMPLE: ABOVE GLOBAL ORDER Y1683 V0258 Q T 9 W:

TYPE: VFB1012D
VALUES: 8K/4K
ABSOLUTE TOLERANCE: ± 0.02 %
TOLERANCE MATCH: 0.01 %
TERMINATION: lead (Pb)-free
PACKAGING: waffle pack

HISTORICAL PART NUMBER: VFB1012D 8K/4K Q T S W (will continue to be used)

VFB1012D	8K/4K	Q	T	S	W
MODEL	RESISTANCE VALUE	ABSOLUTE TOLERANCE	TOLERANCE MATCH	TERMINATION	PACKAGING
	R_1 = 8 kΩ R_2 = 4 kΩ	**T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.10 % **C** = ± 0.25 %	**T** = 0.01 % **Q** = 0.02 % **A** = 0.05 %	**S** = lead (Pb)-free **B** = tin/lead	**T** = tape and reel **W** = waffle pack

Notes

(1) For non-standard requests, please contact application engineering

(2) For list of value codes see table 2 (additional values are available on request).

Disclaimer

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

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