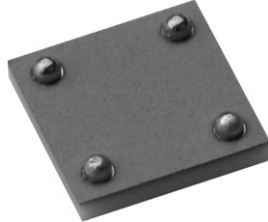


Ultra High Precision Z-Foil BGA Surface Mount Resistor 3R Network, Temperature Coefficient Tracking $0.1 \text{ ppm}/^\circ\text{C}$ and Load Life Ratio Stability to $\pm 0.01 \%$ (100 ppm)



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 VFB1515N 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. $0.05 \text{ ppm}/^\circ\text{C}$ absolute TCR removes errors due to temperature gradients.

The VFB1515N ball grid array (BGA) surface mount 3-resistor network provides tight tolerance matching and TCR tracking between 3 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

- Temperature coefficient of resistance (TCR):
Absolute: $\pm 0.05 \text{ ppm}/^\circ\text{C}$ typical (0°C to $+60^\circ\text{C}$)
 $\pm 0.2 \text{ ppm}/^\circ\text{C}$ typical (-55°C to $+125^\circ\text{C}$, $+25^\circ\text{C}$ ref.)
Tracking: $0.1 \text{ ppm}/^\circ\text{C}$ typical
- Power coefficient tracking "ΔR due to self heating": 5 ppm at rated power
- Power rating: maximum 0.1 W per resistor at 70°C , maximum 0.2 W for entire package
- Resistance tolerance match: 0.01 %
- Ratio stability: 0.01 % (0.2 W at 70°C , 2000 h)
- Large variety of resistance ratios: 200Ω to 10 kΩ
- Electrostatic discharge (ESD) up to 25 000 V
- Short time overload $\leq 0.01 \%$ (100 ppm)
- Non inductive, non capacitive design
- Rise time: 1 ns effectively no ringing
- Thermal stabilization $< 1 \text{ s}$
- Current noise: $< -40 \text{ dB}$
- Voltage coefficient: $< 0.1 \text{ ppm}/\text{V}$
- Non inductive: $< 0.08 \mu\text{H}$
- 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 entire package: 64 V
- For better performances please contact us



TABLE 1 - POPULAR RESISTANCE VALUES/RATIO AND TCR CHARACTERISTICS					
POPULAR VALUES AVAILABLE ⁽¹⁾ (R1/R2/R3)	RESISTANCE VALUE CODE	TCR MAX. (MIL RANGE)		TOLERANCE	
		ABSOLUTE	TRACKING	ABSOLUTE	MATCH (R1/R2 and R3/R2)
10K/400R/10K	V0353	2.0 ppm/°C	2.0 ppm/°C	0.1 %	0.05 %
10K/200R/10K	V0354				

Note

⁽¹⁾ For other values and ratios, please contact sales engineering department: foil@vishay.com

TABLE 2 - TYPICAL PERFORMANCE SPECIFICATIONS PER MIL-PRF-55342		
TEST	ΔR	ΔRATIO
Thermal shock, 5 x (-65°C to $+150^\circ\text{C}$)	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, $6.25 \times P_{\text{nom}}$. x 5 s	0.01 % (100 ppm)	0.01 % (100 ppm)
High temperature exposure, 100 h at $+150^\circ\text{C}$	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), $+70^\circ\text{C}$ for 2000 h	0.01 % (100 ppm)	0.01 % (100 ppm)

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

FIGURE 1 - CHIP CONFIGURATION

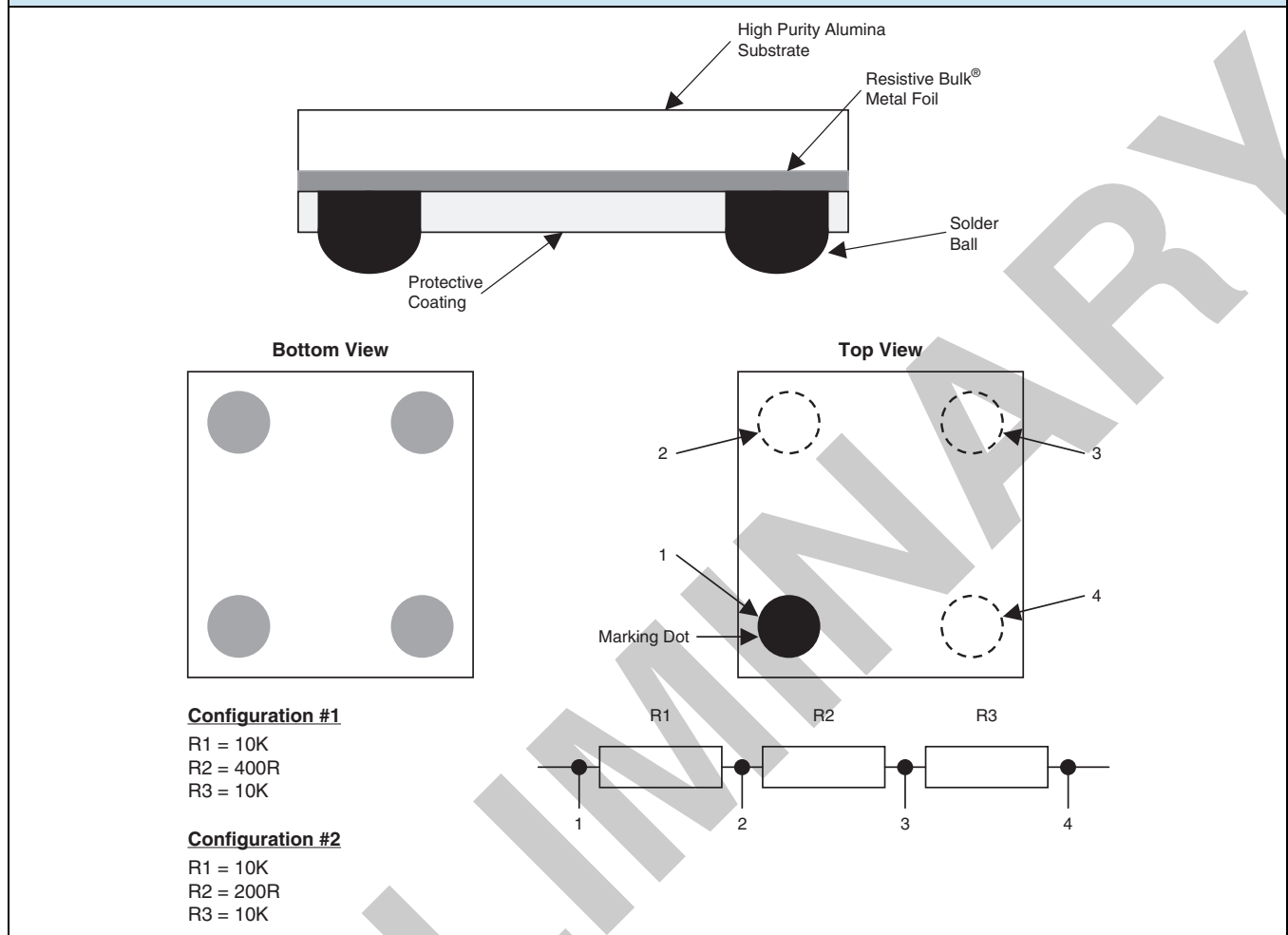
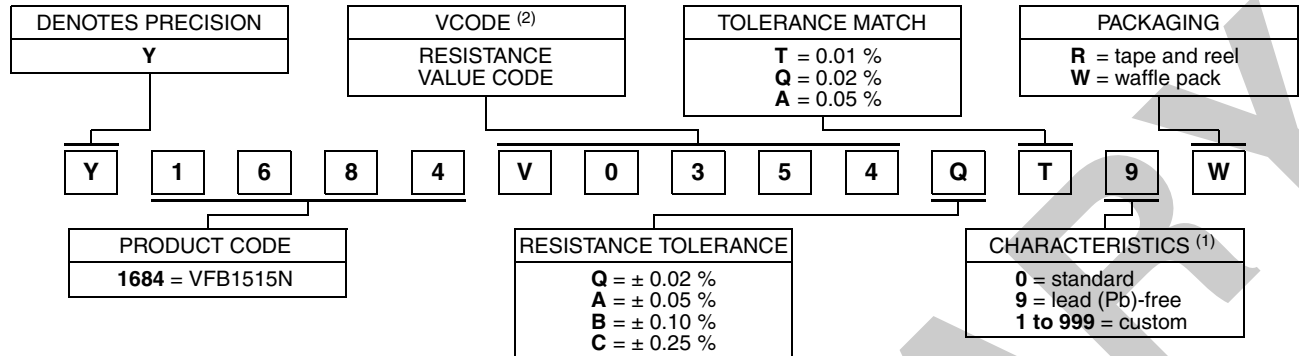


TABLE 3 - DIMENSIONS in Inches (Millimeters)

Chip Dimensions		Recommended Solder Pad Dimensions		
L, W	D1	D2	C	THICKNESS (with balls)
0.152 ± 0.005 (3.86 ± 0.13)	0.020 ± 0.002 (0.50 ± 0.05)	0.018 ± 0.002 (0.46 ± 0.05)	0.105 ± 0.005 (2.67 ± 0.13)	0.032 ± 0.003 (0.81 ± 0.08)

TABLE 4 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y1684V0354QT9W (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1684 V0354 Q T 9 W:

TYPE: VFB1515N

VALUES: 10K/200R/10K

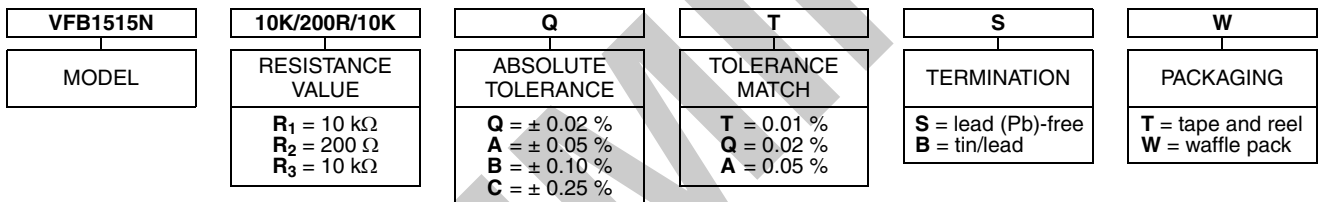
ABSOLUTE TOLERANCE: ± 0.02 %

TOLERANCE MATCH: 0.01 %

TERMINATION: lead (Pb)-free

PACKAGING: waffle pack

HISTORICAL PART NUMBER: VFB1515N 10K/200R/10K Q T S W (will continue to be used)



Notes

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

(2) For list of value codes see table 1 (additional values are available on request).

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