Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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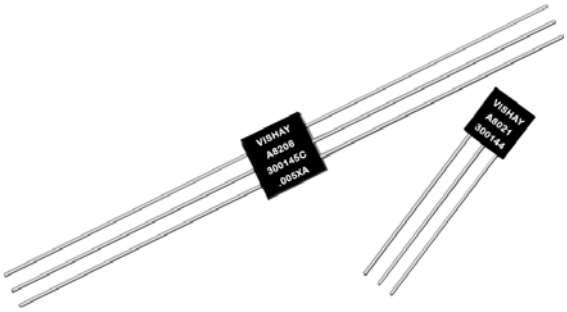
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Bulk Metal® Foil Technology Ultra High Precision Z-Foil Voltage Divider Resistors with TCR Tracking to 0.1 ppm/°C, Power Coefficient Tracking of 5 ppm at Rated Power, and Tolerance Match to 0.005 % (50 ppm)



FEATURES

- 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.)
  TCR tracking: 0.1 ppm/°C typical
- Tolerance: absolute and matching to 0.005 % (50 ppm)
- Power coefficient tracking "ΔR due to self heating": 5 ppm at rated power
- Power rating: 0.2 W at 70 °C, for the entire resistive element R_1 and R_2, divided proportionally between the two values
- Load life ratio stability: < 0.005 % (50 ppm) 0.2 W at 70 °C for 2000 h
- Maximum working voltage: 200 V
- Resistance range: 100R to 20K per resisitve element
- Foil resistors are not restricted to standard values/ratios; specific "as requested" values/ratios can be supplied at no extra cost or delivery (e.g. 1K2345 vs. 1K)
- Electrostatic discharge (ESD) up to 25 000 V
- Non-inductive, non-capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: 0.010 $\mu V_{RMS}/V$ of applied voltage (< - 40 dB)
- Thermal EMF: 0.05 µV/°C typical
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: < 0.08 µH
- Non hot spot design
- Thermal stabilization time < 1 s (nominal value achieved within 10 ppm of steady state value)
- Terminal finish: lead (Pb)-free or tin/lead alloy
- Compliant to RoHS directive 2002/95/EC
- Prototype quantities available in just 5 working days or sooner. For more information, please contact foil@vishaypg.com
- For better performances please contact us

Pb-free Available

RoHS* COMPLIANT

APPLICATIONS

- Instrumentation amplifiers
- Bridge networks
- Differential amplifiers
- Military
- Space
- Medical
- Automatic test equipment
- Down-hole (high temperature)

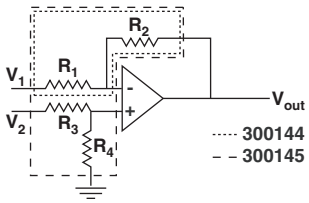


TABLE 1A - MODELS 300144Z AND 300145Z SPECIFICATIONS

RESISTANCE VALUES	ABSOLUTE TOLERANCE	ABSOLUTE TCR (- 55 °C to + 125 °C, + 25 °C ref.) TYPICAL AND MAX. SPREAD
≥ 500 Ω to 20 kΩ	± 0.005 %	± 0.2 ppm/°C ± 1.8 ppm/°C
100 Ω to < 500 Ω	± 0.01 %	

TABLE 1B - MODELS 300144Z AND 300145Z SPECIFICATIONS

RESISTANCE RATIO	TOLERANCE MATCH	TCR TRACKING MAX.
1:1	0.005 %	0.5 ppm/°C
> 1:1 to 4:1		0.75 ppm/°C
> 4:1 to 10:1	0.01 %	1.0 ppm/°C
> 10:1		1.5 ppm/°C

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

INTRODUCTION

Possibly you have become so accustomed (and inured) to a slight instability or drift in your equipment that you no longer regard the problem as a soluble. You have learned to live with it. But have your customers? They are still waiting for a solution. And if you cannot provide one, someone else may. There are so many stability problems directly traceable to resistive devices that skimping on the quality of a few critical resistors, resistive networks may be counterproductive.

Load Life Stability

Load Life stability is the characteristics most relied upon to demonstrate resistor long term reliability. Many applications require a load life of between 2000 h to 10 000 h with limits on the amount of shift and the number of failure rate demonstration.

The ultra high precision Z-Foil divider and network have the tightest allowable limits.

Whether high reliable application or not, the load life stability of Foil resistors is unparalleled and long term serviceability is assured.

With Bulk Metal® Foil resistors, only a minimal shift in resistance value will occur during its entire lifetime. Most of this shift takes place during the first few hundred hours of operation, and virtually no change is noted thereafter.

Ratio Stability

Resistors in dividers or networks form are called upon to maintain a track and match more than at ambient temperature and when they expose to stress factors before, during and after the assembly. Throughout the long service life of the equipment, the resistors around the op amplifier for example are required to track (to hold ratio) even though the dissipation in the feedback resistor is different than that in the sense resistor, causing on one to be at higher temperature than the other. This is called tracking under power for short term (power coefficient of resistance) or for a long term (load life stability).

Temperature Coefficient of Resistance (TCR)

The low temperature coefficient of resistors are achieved by the use of especially selected materials for the resistive and insulating members of the resistors which self-compensate the thermal coefficient of expansion.

Change in a metal's resistivity occurs in two ways: by changes in temperature (external and internal) and by changes in mechanical strain.

By developing resistor element materials whose resistances change positively when subjected to temperature increase, and negativity when subjected to compression, the Foil resistors achieved, in the temperature range - 55 °C to + 125 °C, a maximum absolute TCR of 5 ppm/°C for the classical Foil and maximum 2 ppm/°C for the Z-Foil technology.

To achieve maximum optimum TC tracking between resistors, all factors that affect the TCR of each resistor must be uniform. Whatever their resistance range or wattage, all Foil resistors exhibit identical temperature coefficients as all are made of the same alloy and of identical physical and electrical characteristics. The only variable between these resistors is the pattern photoetched on the element, a process that does not alter alloy properties in any way. In resistors, all TCR and other electrical characteristics are inherent to the alloy, and are therefore uniform between individual resistors, as well as between batches, thus accurate "tracking" of one style resistor to another is assured (even if they differ in size and range). Data on TCR spread shown (fig. 4) illustrate the excellent tracking available with all Foil resistors.

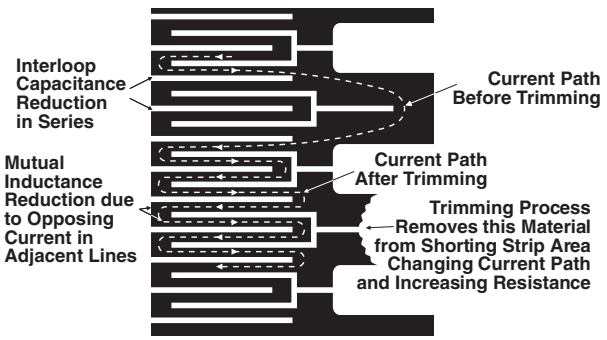
Because of this excellent tracking ability, resistors are ideal for use in resistor networks where accurate ratios must be maintained over a wide temperature range.

This designed-in TCR uniformity contrasts sharply with the TCR tracking capability of wirewound and conventional metal film units. TCR characteristics between wirewounds of different resistance ranges and wattage are highly non-uniform, because (a) different wire diameters are used, (b) winding-induced stresses-which have a direct bearing on TCR.

Conventional metal films units offer quite variable and often unpredictable TC tracking because composition, film thickness, and deposition techniques are varied to meet different resistance range and wattage requirements.

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

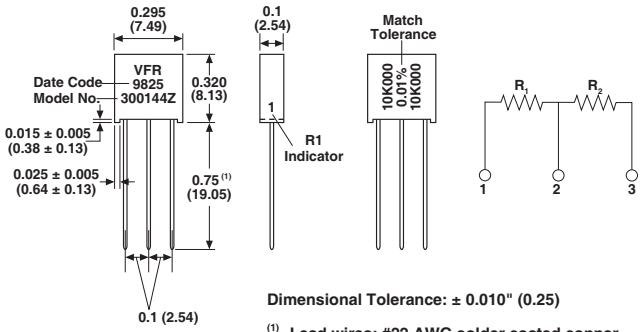
FIGURE 1 - TRIMMING TO VALUES (conceptual illustration)



Note: Foil shown in black, etched spaces in white

FIGURE 2 - STANDARD PRINTING AND DIMENSIONS in inches (millimeters)

Model 300144Z and Schematic (2)



Dimensional Tolerance: ± 0.010" (0.25)

(1) Lead wires: #22 AWG solder coated copper, 0.75" minimum length

(2) Each divider pair consists of two resistors on one single chip

(3) For model 300145Z the 2 chips are independent and with no special relationship from chip to chip

Model 300145Z and Schematic (2)(3)

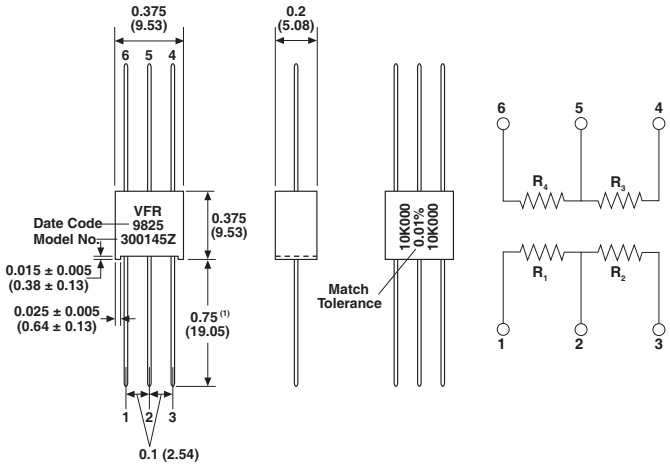


FIGURE 3 - POWER DERATING CURVE 300144Z, 300145Z

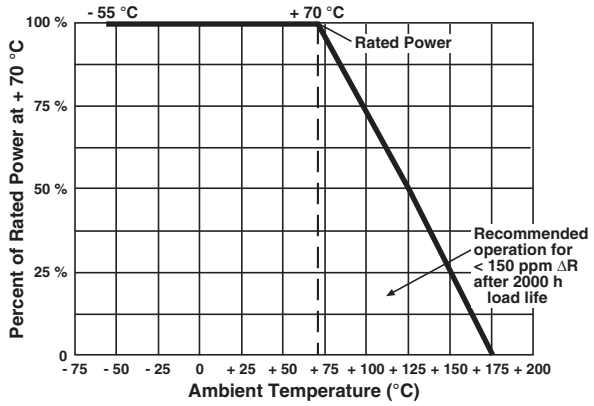
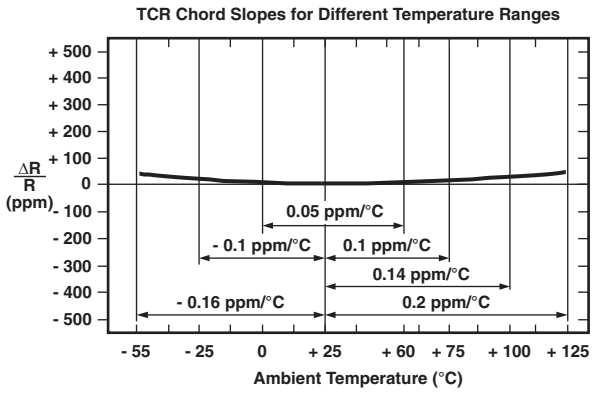


FIGURE 4 - TYPICAL RESISTANCE/ TEMPERATURE CURVE

(for more details see table 1A)

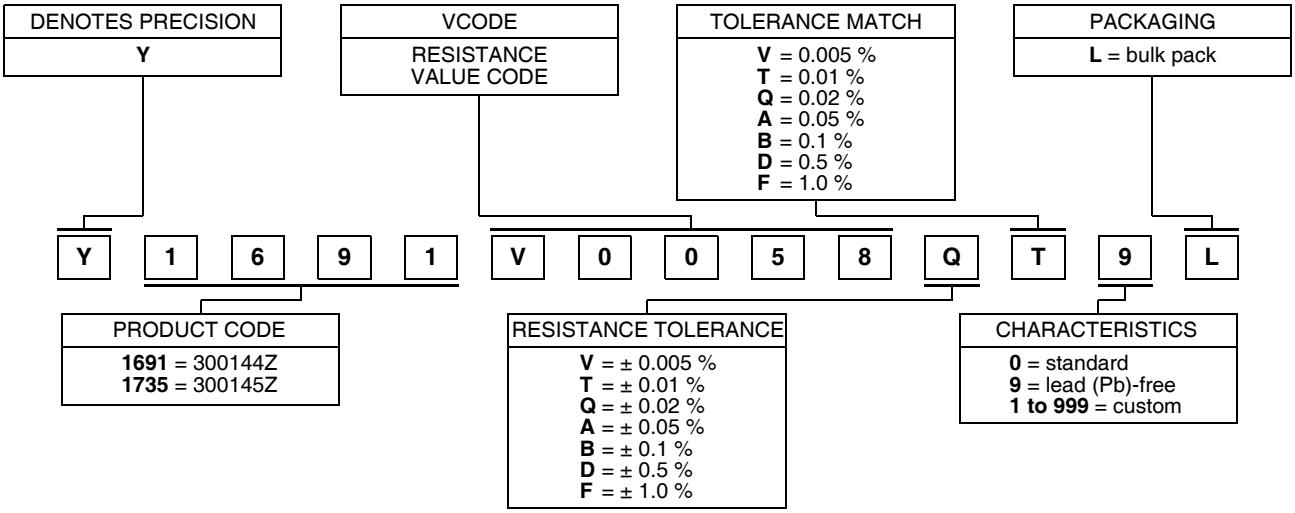


Note

• Power is divided proportionally between the 2 values

TABLE 2 - GLOBAL PART NUMBER INFORMATION (1)

NEW GLOBAL PART NUMBER: Y1691V0058QT9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1691 V0058 Q T 9 L:

TYPE: 300144Z
VALUES: 2K/20K
ABSOLUTE TOLERANCE: ± 0.02 %
TOLERANCE MATCH: 0.01 %
TERMINATION: lead (Pb)-free
PACKAGING: bulk pack

HISTORICAL PART NUMBER: 300144ZT 2K/20K TCR0.2 Q T B (will continue to be used)

300144Z	T	2K/20K	TCR0.2	Q	T	B
MODEL	TERMINATION	OHMIC VALUE	TCR CHARACTERISTIC	ABSOLUTE TOLERANCE	TOLERANCE MATCH	PACKAGING
300144Z **300145Z**	**T** = lead (Pb)-free **None** = tin/lead alloy	R_1 = 2 kΩ R_2 = 20 kΩ R_3 (2) R_4 (2)		**V** = ± 0.005 % **T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**V** = 0.005 % **T** = 0.01 % **Q** = 0.02 % **A** = 0.05 % **B** = 0.1 % **D** = 0.5 % **F** = 1.0 %	**B** = bulk pack

Notes

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

(2) For 300145 please specify the resistance value for each resistor even if all values are equal

TABLE 3 - EXAMPLES OF VCODES FOR POPULAR VALUES (other values available on request)										
300144 RATIOS						**300145 RATIOS**				
VCODES	**R_1**	**R_2**	**VCODES**	**R_1**	**R_2**	**VCODES**	**R_1**	**R_2**	**R_3**	**R_4**
V0009	20K	20K	V0058	2K	20K	V0008	10K	10K	10K	10K
V0010	20K	10K	V0030	2K	18K	V0019	5K	5K	5K	5K
V0100	20K	2K	V0029	2K	4K	V0092	1K	7K812	7K812	1K
V0055	19K4	9K7	V0059	2K	2K	V0023	500R	500R	500R	500R
V0223	17K5	20K	V0103	2K	3K	V0047	100R	8K8	100R	8K8
V0097	15K	15K	V0154	1K5	3K	V0051	100R	10K	100R	10K
V0001	10K	10K	V0032	1K	16K	V0051	100R	10K	100R	10K
V0042	10K	8K323	V0121	1K	2K	V0227	350R	350R	350R	350R
V0006	10K	2K	V0004	1K	1K	-	-	-	-	-
V0166	10K	15K	V0379	1K	7K	-	-	-	-	-
V0226	9K	10K	V0374	800R	800R	-	-	-	-	-
V0003	9K	1K	V0022	511R	16K2	-	-	-	-	-
V0013	8K	16K	V0091	500R	500R	-	-	-	-	-
V0107	6K	20K	V0162	500R	15K	-	-	-	-	-
V0014	6K	7K	V0378	500R	4K5	-	-	-	-	-
V0160	6K	6K	V0061	300R	300R	-	-	-	-	-
V0159	5K5	7K7	V0088	100R	100R	-	-	-	-	-
V0005	5K	10K	V0380	100R	15K	-	-	-	-	-
V0002	5K	5K	V0375	100R	12K3	-	-	-	-	-
V0373	4K	12K	V0381	100R	50R	-	-	-	-	-
V0026	3K	19K2	V0377	50R	28K	-	-	-	-	-
V0156	3K	6K	V0376	35R	20K	-	-	-	-	-
V0158	2K7	10K	-	-	-	-	-	-	-	-

Note

• A combination of these values are available in reverse order and in values up to 5 digits

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