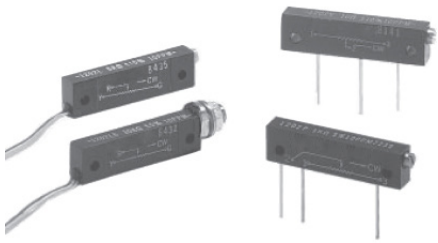
Bulk Metal® Foil Ultra High Technology Precision Trimming Potentiometers, 1¼ in Rectilinear, RJ12 Style

Designed to Meet or Exceed the Requirements of MIL-PRF-22097, Char. F with Smooth and Unidirectional Output

FEATURES

- Temperature coefficient of resistance (TCR): ±10 ppm/°C maximum[3] (–55°C to +150°C ref. at +25°C);
- through the wiper[4]; ±25 ppm/°C
- A smooth and unidirectional resistance with leadscrew adjustment
- Load life stability: 0.1% typical ΔR, 0.5% maximum ΔR under full rated power at +85°C** for 2000 h
- Settability: 0.05% typical; 0.1% maximum
- Setting stability: 0.1% typical; 0.5% maximum, ΔSS
- Power rating: 0.5 W at +85°C
- Resistance range: 2 Ω to 20 kΩ
- "O"-ring prevents ingress of fluids during any board cleaning operation
- Electrostatic discharge (ESD) up to 25 000 V
- Terminal finish: gold plated (tin/lead finish is available on request; see notes at figures 1 and 2)



Pb-free Available

RoHS* COMPLIANT

INTRODUCTION

VFR precision trimmers have the Bulk Metal® Foil resistive element which possesses a unique inherent temperature and load life stability. Plus, their advanced virtually back lash-free adjustment mechanism makes them easy to set quickly and accurately and keeps the setting exactly on target.

Table 1 – Model Selection

MODEL	TERMINATION STYLE	AVERAGE WEIGHT (g)	POWER RATING at +85°C AMBIENT	NO. OF TURNS
1202	P-In line PC pins	2.5	0.5 W	25±2
	Y-staggered PC pins[1]	2.5		
	L-flexible wire leads	3.3		
	LB-flexible wire leads with bushings (panel mounted)	5.1		

See Figures 1 and 2

Table 2 – Values vs. Tolerances

STANDARD RESISTANCE VALUES (in Ω)	STANDARD TOLERANCES
2, 5, 10[2]	±10%, ±20%
20, 50, 100, 200, 250, 500, 1k, 2k, 5k, 10k, 20k	5%, 10%

Notes

Refer to page 5 for footnotes

* 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.

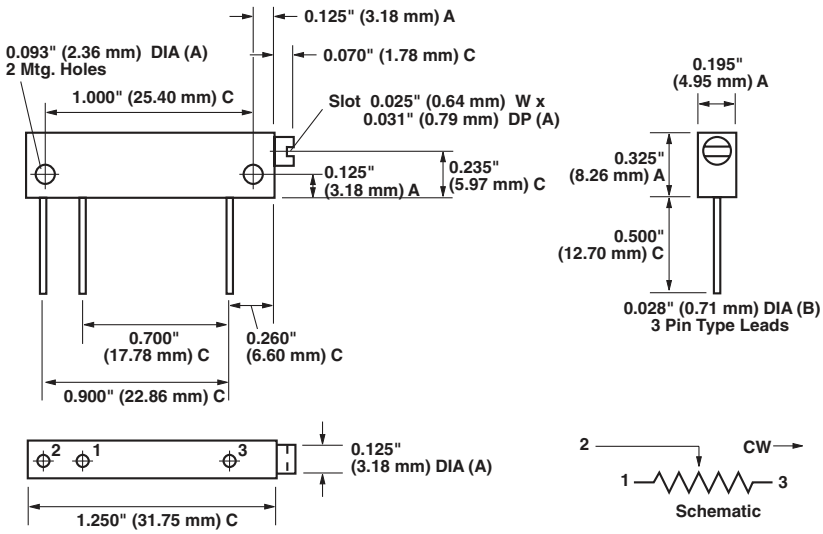
** See a definition of typical in the VPG glossary at the link http://www.vishaypg.com/foil-resistors/faq/glossary/

Table 3 – 1202 (RJ12) Series Electrical Specifications
Temperature Coefficient of Resistance (TCR), 50 Ω and up End-to-end[3]: ±10 ppm/°C (–55°C to +150°C, ref. +25°C) 2 Ω, 5 Ω, 10 Ω, 20 Ω: ±20 ppm/°C (–55°C to +150°C, ref. +25°C) Through the wiper[4]: ±25 ppm/°C (–55°C to +150°C, ref. +25°C)
Stability Load life at 2000 h, under full rated power of 0.5 W at +85°C; 0.1% typical ΔR; 0.5% maximum ΔR Load life at 10 000 h, under full rated power of 0.5 W at +85°C; 0.1% typical ΔR; 1.0% maximum ΔR
Power Rating[5] 0.5 W at +85°C
Settability 0.05% typical; 0.1% maximum
Setting Stability 0.1% typical; 0.5% maximum
Contact Resistance variation – CRV (noise) 3 Ω typical; 10 Ω maximum
Hop-off 0.25% typical; 1.0% maximum
High-Frequency Operation to 100 MHz Rise time: 10 ns at 1 kΩ Inductance: 0.08 µH typical Capacitance: 0.5 pF typical
Operating Temperature Range –55°C to +150°C

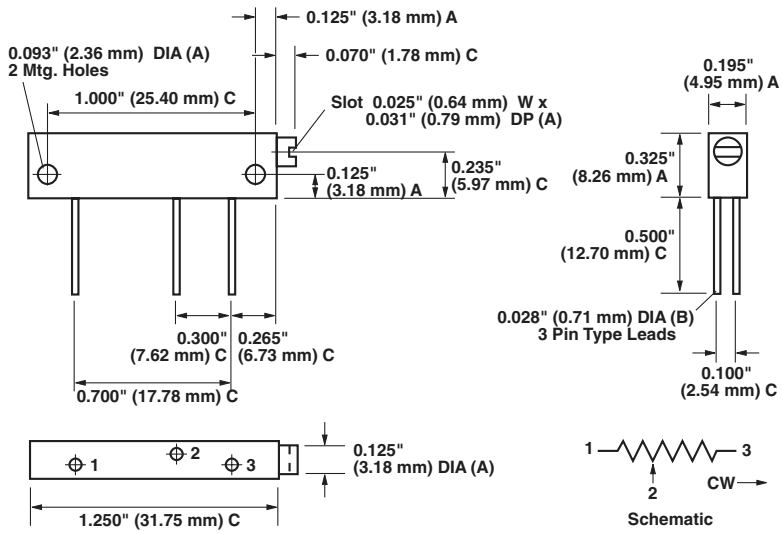
Table 4 – Mechanical Specifications	
Adjustment Turns	25±2
Mechanical Stops	Wiper idles – no discontinuity
Internal Terminations	All welded – no flux
Case Material	Glass fortified diallyl-phthalate (DAP); black
Shaft Torque	8 oz. in. maximum; 3 oz. in. typical
Backlash	0.05% typical

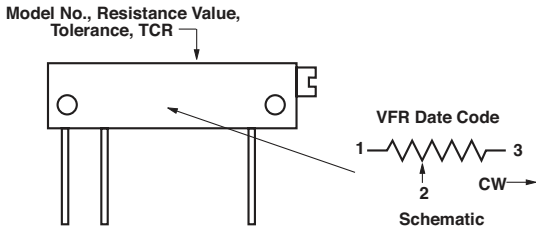
Figure 1 – Schematic and Dimensions for Pin Styles in inches (millimeters)

1202P
(In-Line Pins) [1]



1202Y
(Staggered Pins) [1]



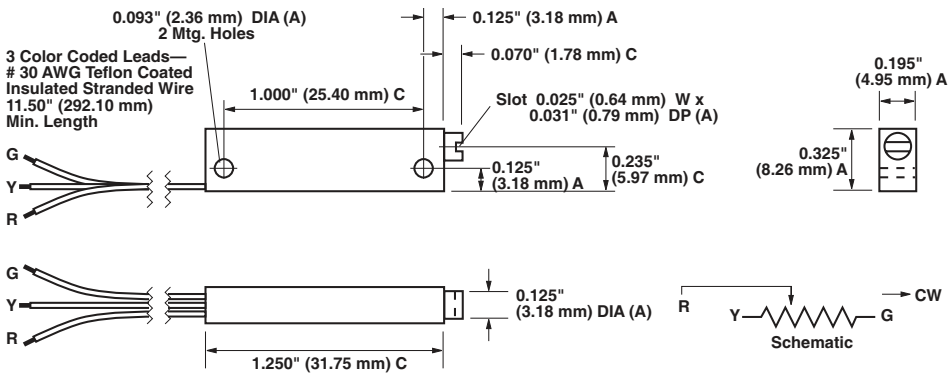


TOLERANCES
A = ±0.005 in (0.13 mm)
B = ±0.003 in (0.08 mm)
C = ±0.010 in (0.25 mm)

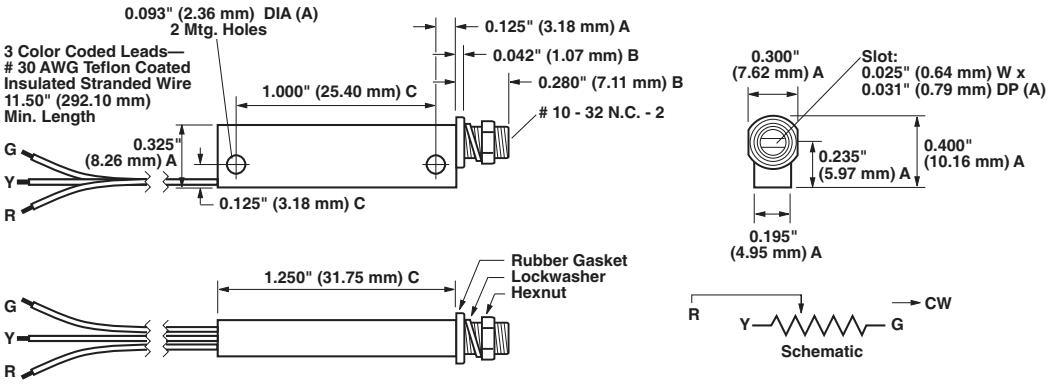
Note
[1] Pin leads are gold plated nickel which are solderable or weldable.

Figure 1 – Schematic and Dimensions for Flexible Wire Styles in inches (millimeters)

1202L
(Flexible Leads)[2]



1202LB
(Panel Mounted)[2]



TOLERANCES
A = ±0.005 in (0.13 mm)
B = ±0.003 in (0.08 mm)
C = ±0.010 in (0.25 mm)

Standard marking shown on previous page.

Note
(2) Wire terminations: silver plated copper.

Figure 3 – Power Derating Curve

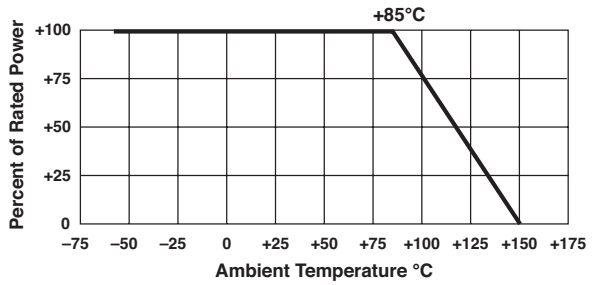


Table 5 – Comparison		
	MIL-PRF-22097/2 CHARACTERISTIC F	**1202 MAXIMUM (Worst Case)[6]**
TEST GROUP I		
Visual and mechanical	No failures	No failures
Total resistance	±10%	±10%
Actual effective electrical travel	17 to 27 turns	25±2 turns
End resistance	±2% or 20 Ω[7]	2 Ω
Contact resistance variation – CRV (noise)	±3.0% or 3 Ω[7]	3 Ω typical, 10 Ω maximum
Dielectric withstanding voltage – DWV Per MIL-STD-202, methods 301 and 105		
Atmospheric pressure	900 VAC, 1 min	900 VAC, 1 min
Barometric pressure	350 VAC, 1 min	350 VAC, 1 min
Insulation resistance	≥ 1000 MΩ	≥ 1000 MΩ
Shaft torque	8 oz. in. maximum	8 oz. in. maximum
Thermal shock	±1.0%	±1.0%
TEST GROUP II		
Resistance temperature characteristic – TCR	±0.01% (±100 ppm/°C)	±0.001% (±10 ppm/°C)
Moisture resistance	±1.0%	±0.5%
Contact resistance variation – CRV (noise)	3.0% or 3 Ω[7]	3 Ω typical, 10 Ω maximum
TEST GROUP III		
Shock (specified pulse)	±1.0%	±0.5%
Vibration (high-frequency)	±1.0%	±0.5%
Contact resistance variation – CRV (noise)	±3.0% or 3 Ω[7]	3 Ω typical, 10 Ω maximum
Salt spray	No corrosion	No corrosion
TEST GROUP IV		
Solder heat	±1.0%	±0.05%
Life (1000 h at +85°C) (8)	±2.0%	±0.5%
Contact resistance variation – CRV (noise)	±3.0% or 3 Ω[7]	3 Ω typical, 10 Ω maximum
TEST GROUP V		
Low-temperature operation	±1.0%	±0.5%
High-temperature exposure	±2.0%	±0.5%
Contact resistance variation – CRV (noise)	±3.0% or 3 Ω[7]	3 Ω typical, 10 Ω maximum
TEST GROUP VI		
Rotational life	±2.0%	±2.0%
Contact resistance variation – CRV (noise)	±3.0% or 3 Ω[7]	3 Ω typical, 10 Ω maximum
Terminal strength	2 lbs	2 lbs
TEST GROUP VII		
Solderability (excluding terminations L and LB)	MIL-STD-202 method 208	MIL-STD-202 method 208
Immersion (excluding terminations L and LB)	No continuous stream of bubbles	No continuous stream of bubbles
TEST GROUP VIII		
Fungus	MIL-STD-810 method 508 No mechanical damage	MIL-STD-810 method 508 No mechanical damage

Notes

(1) Preferred termination style for current 1¼ in rectilinear trimmers (staggered PC pins present a sturdier mounting arrangement for shock, vibration, and impact situations).

(2) 10 Ω at ±5% available on special order.

(3) Maximum TCR applies to the 3 σ (sigma) limit or 99.73% of a production lot. (Measured end-to-end with wiper off the element.)

(4) Measurements of TCR through the wiper are influenced more by setting stability and the percentage of the total resistance in use (at the wiper) than by fundamental resistance change due to temperature alone. The parameter shown in Table 3 is a 2 σ distribution typifying the behavior of the device when used with 40% or more of the total resistance in use.

(5) Derated linearly from full power at +85°C to zero power at +150°C. See Figure 3 in this datasheet.

(6) All ΔR's are measured to the tolerance specified +0.01 Ω.

(7) Whichever is greater.

(8) Load-Life test performed at nominal rated power, 0.5 W, at +85°C.

Special Available Options

Special marking, Special lengths for lead wires (L, LB Style), Hooked leads, Alternate bushing and PC combinations Power conditioning and screening operations

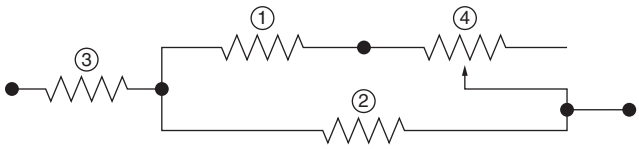
VFR Trimmers are Inspected

100% for:
Immersion, Resistance tolerance check, End resistance, Visual-mechanical, Dynamic tests for continuity, CRV

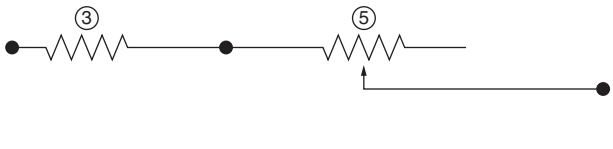
By sample for:
TCR, DWV

Circuit A is a conventional circuit employing a high value wire wound trimmer (4) linearized by two padding resistors (1 and 2) for the purpose of trimming resistor (3) to within less than 100 ppm absolute resistance.

Circuit B uses only a low value infinite resolution VFR trimming potentiometer (5) to accomplish the same results. Saving in cost and board space is achieved. A low value wire wound trimmer cannot be used because of poor resolution.



Circuit A



Circuit B

Table 2 – Global Part Number Information

NEW GLOBAL PART NUMBER: Y5050500R000K0L (preferred part number format)

DENOTES PRECISION	VALUE	CHARACTERISTICS (3)
Y	**R** = Ω **K** = kΩ	**0** = gold plated pins (lead (Pb)-free) **0** = silver plated copper wire terminations (lead (Pb)-free); styles L & LB **1 to 999** = custom

Y	5	0	5	0	5	0	0	R	0	0	0	K	0	L

PRODUCT CODE	TOLERANCE	PACKAGING
5050 = 1202L(2) **0050** = 1202LB(2) **0051** = 1202P(1) **6050** = 1202PB(1) **5051** = 1202Y(1) **7050** = 1202YB(1)	**J** = ± 5% **K** = ± 10% **M** = ± 20%	**L** = foam/box pack

FOR EXAMPLE: ABOVE GLOBAL ORDER Y5050 500R000 K 0 L:
TYPE: 1202L
VALUE: 500.0 Ω
ABSOLUTE TOLERANCE: ± 10.0%
TERMINATION: gold plated (lead (Pb)-free)
PACKAGING: foam/box pack

HISTORICAL PART NUMBER: 1202L 500R00 K B (will continue to be used)

1202L	500R00	K	B
MODEL	RESISTANCE VALUE	TOLERANCE	PACKAGING
1202L(2) 1202LB(2) 1202P(1) 1202PB(1) 1202Y(1) 1202YB(1)	500.0 Ω	**J** = ± 5% **K**= ± 10% **M**= ± 20%	**B** = bulk pack

Notes
(1) Pin leads are gold plated nickel which are solderable or weldable (lead (Pb)-free).
(2) Wire terminations: silver plated cooper (lead (Pb)-free).
(3) For non-standard requests, please contact application engineering.