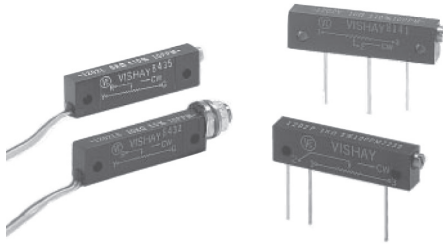


# Bulk Metal® Foil Ultra High Technology Precision Trimming Potentiometers, 1 1/4" Rectilinear, RJ12 Style, Designed to Meet or Exceed The Requirements of MIL-PRF-22097, Char. F with Smooth and Unidirectional Output



## INTRODUCTION

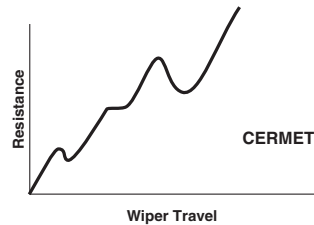
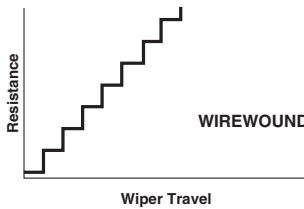
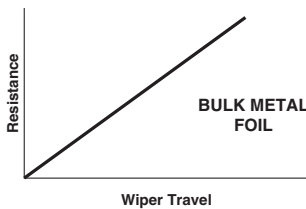
Vishay Foil precision trimmers have the Bulk Metal® Foil resistive element which possesses a unique inherent temperature and load life stability. Plus, their advanced virtually back lash-free adjustment mechanism makes them easy to set quickly and accurately and keeps the setting exactly on target.

## FEATURES

- Temperature coefficient of resistance (TCR):  $\pm 10$  ppm/°C maximum <sup>(3)</sup> (- 55 °C to + 150 °C ref. at + 25 °C); through the wiper <sup>(4)</sup>;  $\pm 25$  ppm/°C
- A smooth and unidirectional resistance with leadscrew adjustment
- Load life stability: 0.1 % typical  $\Delta R$ , 0.5 % maximum  $\Delta R$  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,  $\Delta SS$
- Power rating: 0.5 W at + 85 °C
- Resistance range: 2  $\Omega$  to 20 k $\Omega$
- "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)



RoHS\*  
COMPLIANT



| 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 $\pm$ 2   |
|                           | Y-staggered PC pins <sup>(1)</sup>   | 2.5                |                                 |              |
|                           | L-flexible wire leads                | 3.3                |                                 |              |
|                           | LB-flexible wire leads with bushings | 5.1                |                                 |              |

| TABLE 2 - VALUES VS. TOLERANCES                  |  |
|--|--|
| STANDARD RESISTANCE VALUES (in $\Omega$ )        | STANDARD TOLERANCES                    |
| 2, 5, 10   | $\pm 10$ % <sup>(2)</sup> , $\pm 20$ % |
| 20, 50, 100, 200, 250, 500, 1K, 2K, 5K, 10K, 20K | 5 %, 10 %                              |

### Note

- See Figures 1 and 2

| TABLE 3 - 1202 (RJ12) SERIES ELECTRICAL SPECIFICATIONS   |   |
|--|---|
| <b>Temperature Coefficient of Resistance (TCR), 50 <math>\Omega</math> and up End-to-end <sup>(3)</sup></b><br>2 $\Omega$ , 5 $\Omega$ , 10 $\Omega$ , 20 $\Omega$<br>Through the wiper <sup>(4)</sup> | $\pm 10$ ppm/°C maximum (- 55 °C to + 25 °C)<br>$\pm 10$ ppm/°C maximum (+ 25 °C to + 150 °C)<br>$\pm 20$ ppm/°C (- 55 °C to + 150 °C, ref. + 25 °C)<br>$\pm 25$ ppm/°C (- 55 °C to + 150 °C, ref. + 25 °C) |
| <b>Stability</b><br>Load life at 2000 h, under full rated power of 0.5 W at + 85 °C<br>Load life at 10 000 h, under full rated power of 0.5 W at + 85 °C   | 0.1 % typical $\Delta R$ ; 0.5 % maximum $\Delta R$<br>0.1 % typical $\Delta R$ ; 1.0 % maximum $\Delta R$  |
| <b>Power Rating <sup>(5)</sup></b>   | 0.5 W at + 85 °C  |
| <b>Settability</b>   | 0.05 % typical; 0.1 % maximum   |
| <b>Setting Stability</b>   | 0.1 % typical; 0.5 % maximum  |
| <b>Contact Resistance variation - CRV (noise)</b>  | 3 $\Omega$ typical; 10 $\Omega$ maximum   |
| <b>Hop-off</b>   | 0.25 % typical; 1.0 % maximum   |
| <b>High-Frequency Operation</b><br>Rise time<br>Inductance<br>Capacitance  | to 100 MHz<br>10 ns at 1 k $\Omega$<br>0.08 $\mu$ H typical<br>0.5 pF typical   |
| <b>Operating Temperature Range</b>   | - 55 °C to + 150 °C   |

### Note

- Refer to page 4 for footnotes

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

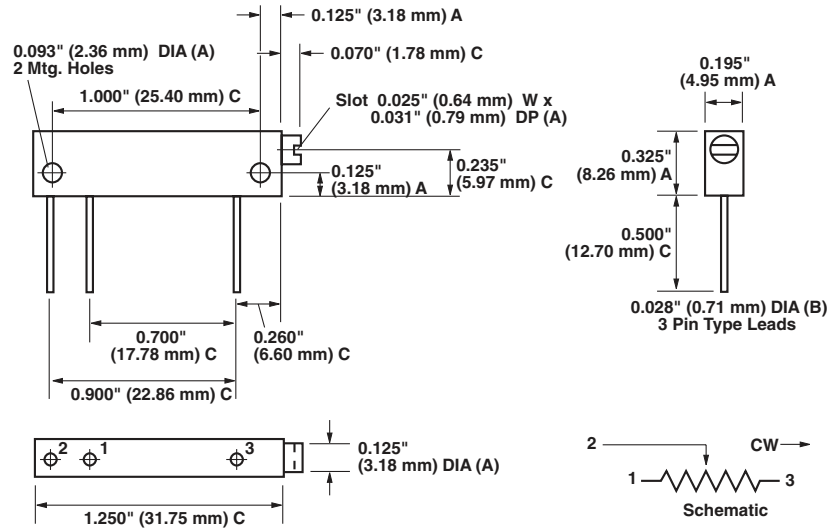
**TABLE 4 - MECHANICAL SPECIFICATIONS**

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

**FIGURE 1 - SCHEMATIC AND DIMENSIONS** in Inches (Millimeters)

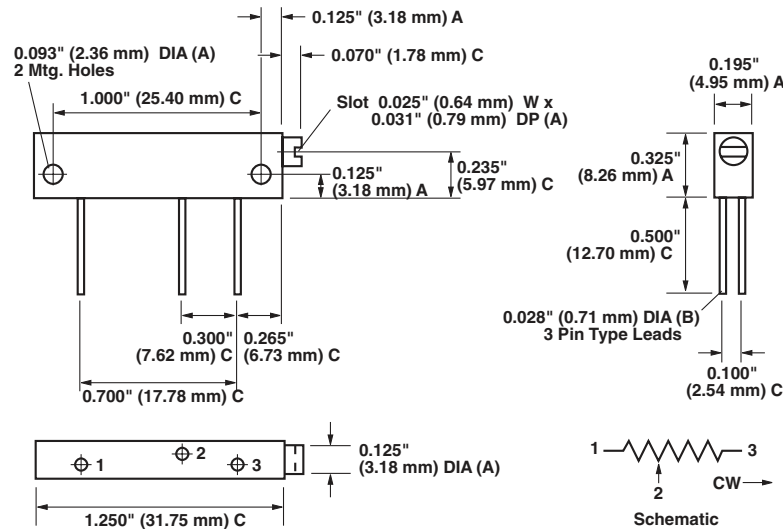
**1202P**

(In-Line Pins) <sup>(1)</sup>



**1202Y**

(Staggered Pins) <sup>(1)</sup>



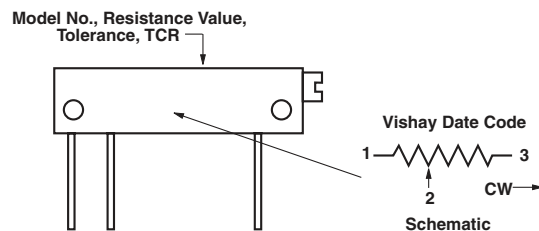
**TOLERANCES:**

- A = ± 0.005" (0.13 mm)
- B = ± 0.003" (0.08 mm)
- C = ± 0.010" (0.25 mm)

**Note**

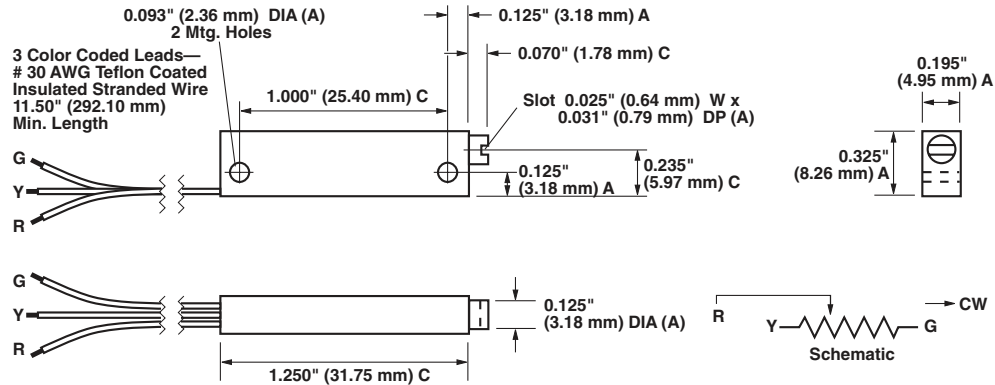
<sup>(1)</sup> Pin leads are gold plated nickel which are solderable or weldable.

**STANDARD MARKING ILLUSTRATION:**

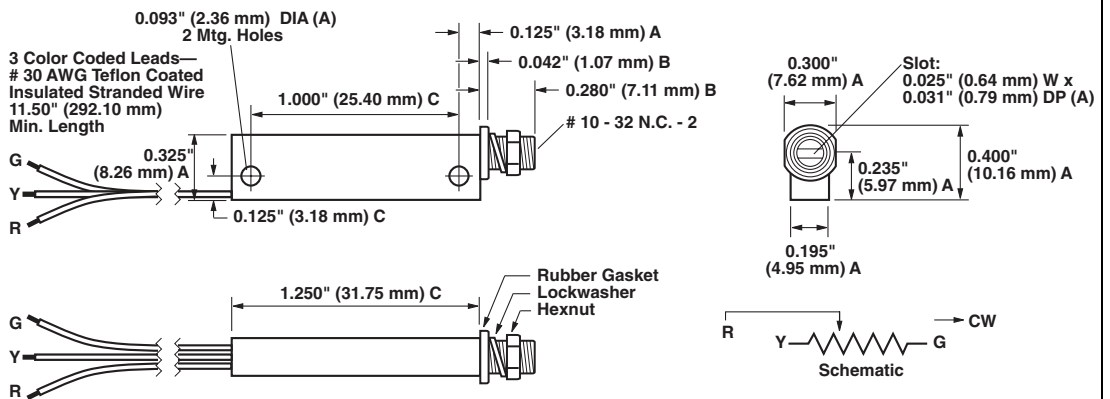


**FIGURE 2 - SCHEMATIC AND DIMENSIONS** in Inches (Millimeters)

**1202L**  
(Flexible Leads)



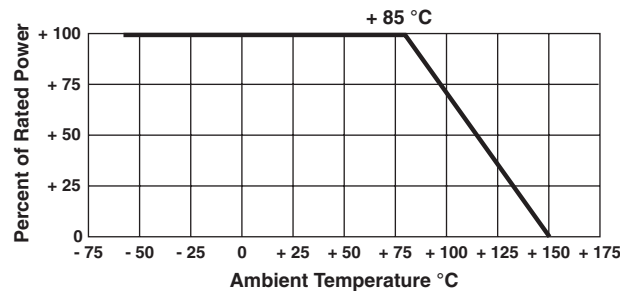
**1202LB**  
(Panel Mounted)



**TOLERANCES:**  
 A = ± 0.005" (0.13 mm)  
 B = ± 0.003" (0.08 mm)  
 C = ± 0.010" (0.25 mm)

Standard marking shown on previous page.

**FIGURE 3 - POWER DERATING CURVE**



**TABLE 5 - COMPARISON**

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

**Notes**

- (1) Preferred termination style for current 1-1/4 inch 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

**VISHAY TRIMMERS ARE INSPECTED**

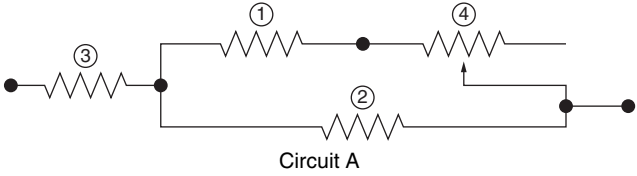
100 % for:

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

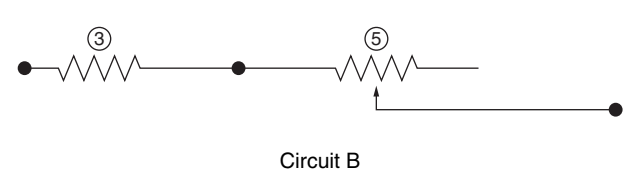
By sample for:

- 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 Vishay 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.



**TABLE 6 - GLOBAL PART NUMBER INFORMATION**

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

|  |   |   |
|--|---|---|
| <b>DENOTES PRECISION</b><br>Y  | <b>VALUE</b><br>R = Ω<br>K = kΩ                           | <b>CHARACTERISTICS (1)</b><br>0 = gold plated termination (lead (Pb)-free)<br>1 to 999 = custom |
| Y  | 5 0 5 0   | 5 0 0 R 0 0 0 K 0 L   |
| <b>PRODUCT CODE</b><br>5050 = 1202L<br>0050 = 1202LB<br>0051 = 1202P<br>6050 = 1202PB<br>5051 = 1202Y<br>7050 = 1202YB | <b>TOLERANCE</b><br>J = ± 5 %<br>K = ± 10 %<br>M = ± 20 % | <b>PACKAGING</b><br>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)**

|  |  |  |  |
|--|--|--|--|
| <b>1202L</b><br>MODEL<br>1202L<br>1202LB<br>1202P<br>1202PB<br>1202Y<br>1202YB | <b>500R00</b><br>RESISTANCE VALUE<br>500.0 Ω | <b>K</b><br>TOLERANCE<br>J = ± 5 %<br>K = ± 10 %<br>M = ± 20 % | <b>B</b><br>PACKAGING<br>B = bulk pack |
|--|--|--|--|

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

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