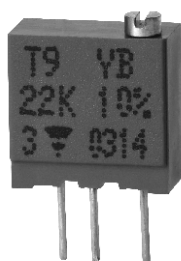


# 3/8" Square Multi-Turn Fully Sealed Container Cermet Trimmer



## FEATURES

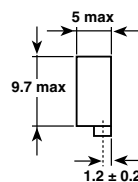
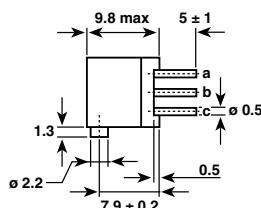
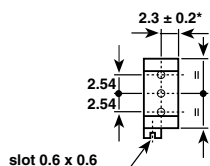
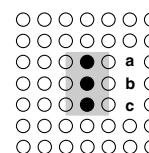
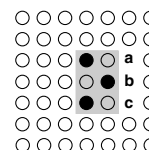
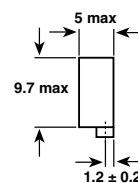
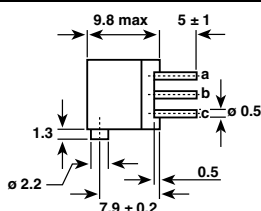
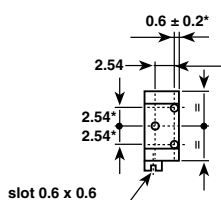
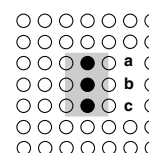
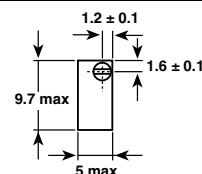
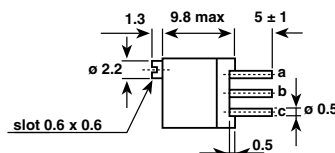
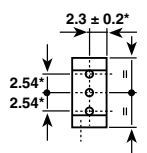
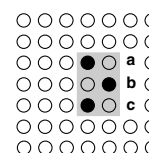
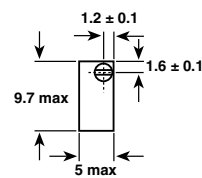
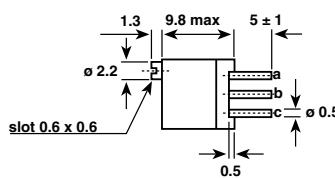
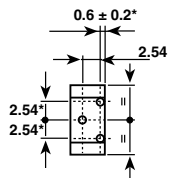
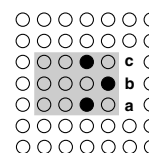
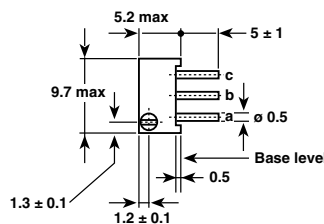
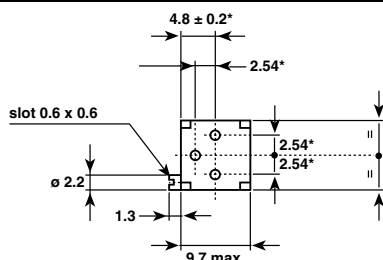
- Military and professional grade
- 0.5 W at 70 °C
- Product qualification according to CECC 41101-004 (A, B, C, D, E)
- Tests according to CECC 41000 or IEC 60393-1
- GAM T1
- Fully sealed
- Operating temperature range -55 °C to +155 °C
- Wide ohmic range from 10 Ω to 2.2 MΩ
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


RoHS  
COMPLIANT

## DESIGN SUPPORT TOOLS

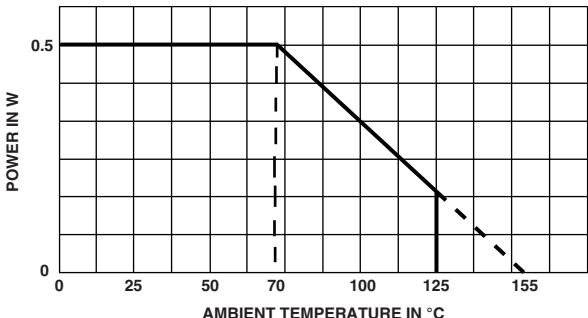
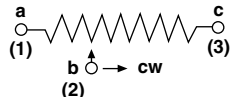
[click logo to get started](#)
**3D**  
Models  
Available

## DIMENSIONS in millimeters (± 0.5 mm)

**T9XA**  
(PM81A) A

Terminal Spacing on  
a 2.54 PCB

**T9XB**  
(PM81B) C

**T9YA**  
(PM82A) B

**T9YB**  
(PM82B) D

**T9Z**  
(PM83) E


## Note

(1) To be measured at base level

| ELECTRICAL SPECIFICATIONS                    |                                                                                                              |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Resistive element                            | Cermet                                                                                                       |
| Electrical travel                            | 21 turns $\pm$ 2                                                                                             |
| Resistance range                             | 10 $\Omega$ to 2.2 M $\Omega$                                                                                |
| Standard series E3                           | 1 - 2.2 - 4.7 and on request 1 - 2 - 5                                                                       |
| Tolerance                                    | Standard 10 %                                                                                                |
|                                              | On request 5 %                                                                                               |
| Power rating                                 | Linear 0.5 W at +70 °C<br> |
| Circuit diagram                              |                            |
| Temperature coefficient                      | See Standard Resistance Element table                                                                        |
| Limiting element voltage (linear law)        | 250 V                                                                                                        |
| Contact resistance variation                 | 2 % R <sub>n</sub> or 2 $\Omega$                                                                             |
| End resistance (typical)                     | 1 $\Omega$                                                                                                   |
| Dielectric strength (RMS)                    | 1000 V                                                                                                       |
| Insulation resistance (500 V <sub>DC</sub> ) | 10 <sup>6</sup> M $\Omega$                                                                                   |

| MECHANICAL SPECIFICATIONS   |                            |
|-----------------------------|----------------------------|
| Mechanical travel           | 23 turns $\pm$ 5           |
| Operating torque (max. Ncm) | 1.5                        |
| End stop torque             | Clutch action              |
| Net weight                  | Approx. 0.82 g             |
| Wiper (actual travel)       | Positioned at approx. 50 % |
| Terminals                   | Pure Sn (code e3)          |

| ENVIRONMENTAL SPECIFICATIONS |                     |
|------------------------------|---------------------|
| Temperature range            | -55 °C to +155 °C   |
| Climatic category            | 55/125/56           |
| Sealing                      | Fully sealed - IP67 |

| PERFORMANCES               |                                                                                                   |                                                                              |                                   |                                                                                             |                                       |
|----------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------|
| CECC 41100                 |                                                                                                   | REQUIREMENTS                                                                 |                                   | TYPICAL VALUES AND DRIFTS                                                                   |                                       |
| TESTS                      | CONDITIONS                                                                                        | $\Delta R_T/R_T$ (%)                                                         | $\Delta R_{1-2}/R_{1-2}$ (%)      | $\Delta R_T/R_T$ (%)                                                                        | $\Delta R_{1-2}/R_{1-2}$ (%)          |
| <b>Climatic sequence</b>   | Phase A dry heat 125 °C<br>Phase B damp heat<br>Phase C cold -55 °C<br>Phase D damp heat 5 cycles | ± 2 %                                                                        | ± 3 %                             | ± 0.5 %                                                                                     | ± 1 %                                 |
| <b>Long term damp heat</b> | 56 days<br>40 °C, 93 % RH                                                                         | ± 2 %<br>Dielectric strength:<br>700 V<br>Insulation resistance:<br>> 100 MΩ | ± 3 %                             | ± 0.5 %<br>Dielectric strength:<br>1000 V<br>Insulation resistance:<br>> 10 <sup>4</sup> MΩ | ± 1 %                                 |
| <b>Rotational life</b>     | 200 cycles                                                                                        | ± 2 %<br>Contact res. variation:<br>< 3 % R <sub>n</sub>                     | -                                 | ± 2 %<br>Contact res. variation:<br>< 1 % R <sub>n</sub>                                    | -                                     |
| <b>Load life</b>           | 1000 h at rated power<br>90'/30' - ambient temp. 70 °C                                            | ± 2 %<br>Contact res. variation:<br>< 3 % R <sub>n</sub>                     | ± 3 %                             | ± 1 %<br>Contact res. variation:<br>< 1 % R <sub>n</sub>                                    | ± 2 %                                 |
| <b>Rapid temp. change</b>  | 5 cycles<br>-55 °C to +125 °C                                                                     | ± 1.5 %                                                                      | $\Delta V_{1-2}/V_{1-3}$<br>± 1 % | ± 0.5 %                                                                                     | $\Delta V_{1-2}/V_{1-3}$<br>< ± 1 %   |
| <b>Shock</b>               | 50 g at 11 ms<br>3 successive shocks<br>in 3 directions                                           | ± 1 %                                                                        | ± 2 %                             | ± 0.1 %                                                                                     | ± 0.2 %                               |
| <b>Vibration</b>           | 10 Hz to 55 Hz<br>0.75 mm or 10 g<br>during 6 h                                                   | ± 1 %                                                                        | $\Delta V_{1-2}/V_{1-3}$<br>± 2 % | ± 0.1 %                                                                                     | $\Delta V_{1-2}/V_{1-3}$<br>< ± 0.2 % |

**Note**

- Nothing stated herein shall be construed as a guarantee of quality or durability

| STANDARD RESISTANCE ELEMENT DATA |                     |                      |                         |                                  |
|----------------------------------|---------------------|----------------------|-------------------------|----------------------------------|
| STANDARD RESISTANCE VALUES       | LINEAR LAW          |                      |                         | TYPICAL TCR<br>-55 °C TO +125 °C |
|                                  | MAX. POWER AT 70 °C | MAX. WORKING VOLTAGE | MAX. CUR. THROUGH WIPER |                                  |
| Ω                                | W                   | V                    | mA                      | ppm/°C                           |
| 10                               | 0.5                 | 2.2                  | 224                     | ± 100                            |
| 22                               | 0.5                 | 3.3                  | 150                     |                                  |
| 47                               | 0.5                 | 4.8                  | 103                     |                                  |
| 100                              | 0.5                 | 7                    | 70                      |                                  |
| 220                              | 0.5                 | 10.5                 | 47                      |                                  |
| 470                              | 0.5                 | 15.3                 | 32                      |                                  |
| 1K                               | 0.5                 | 22.4                 | 22                      |                                  |
| 2.2K                             | 0.5                 | 33.2                 | 15                      |                                  |
| 4.7K                             | 0.5                 | 48.5                 | 10                      |                                  |
| 10K                              | 0.5                 | 70.7                 | 7                       |                                  |
| 22K                              | 0.5                 | 105                  | 4.8                     |                                  |
| 47K                              | 0.5                 | 153                  | 3.2                     |                                  |
| 100K                             | 0.5                 | 224                  | 2.2                     |                                  |
| 220K                             | 0.28                | 250                  | 1.1                     |                                  |
| 470K                             | 0.13                | 250                  | 0.53                    |                                  |
| 1M                               | 0.06                | 250                  | 0.25                    |                                  |
| 2.2M                             | 0.028               | 250                  | 0.11                    |                                  |

**MARKING**

- Vishay trademark
- Model
- Style
- Ohmic value (in Ω, kΩ, MΩ)
- Tolerance (in %)
- Manufacturing date
- Marking of terminal 3

**PACKAGING**

- In tube of 50 pieces code T20 (TU50)



### ORDERING INFORMATION (part number)

|       |                           |   |   |                                                               |   |   |                                |   |                         |   |                                                               |  |  |
|-------|---------------------------|---|---|---------------------------------------------------------------|---|---|--------------------------------|---|-------------------------|---|---------------------------------------------------------------|--|--|
| T     | 9                         | X | A | 4                                                             | 7 | 4 | K                              | T | 2                       | 0 |                                                               |  |  |
| Model | STYLE                     |   |   | OHMIC VALUE                                                   |   |   | TOLERANCE                      |   | PACKAGING               |   | SPECIAL NUMBER                                                |  |  |
| T9    | XA<br>XB<br>YA<br>YB<br>Z |   |   | From<br>10 $\Omega$ to 2.2 M $\Omega$<br>474 = 470 k $\Omega$ |   |   | K = 10 %<br>on request J = 5 % |   | T20 = tube<br>50 pieces |   | (If applicable)<br>Given by<br>Vishay<br>for custom<br>design |  |  |

### DESCRIPTION (for information only)

|       |       |       |           |         |           |         |             |
|-------|-------|-------|-----------|---------|-----------|---------|-------------|
| T9    | XA    | 470K  | 10 %      |         | TU        |         | e3          |
| MODEL | STYLE | VALUE | TOLERANCE | SPECIAL | PACKAGING | SPECIAL | LEAD FINISH |

### RELATED DOCUMENTS

#### APPLICATION NOTES

|                                                                   |                                                                        |
|-------------------------------------------------------------------|------------------------------------------------------------------------|
| Potentiometers and Trimmers                                       | <a href="http://www.vishay.com/doc?51001">www.vishay.com/doc?51001</a> |
| Guidelines for Vishay Sfernice Resistive and Inductive Components | <a href="http://www.vishay.com/doc?52029">www.vishay.com/doc?52029</a> |



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.