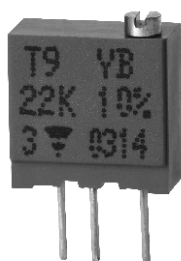


# 3/8" Square Multi-Turn Fully Sealed Container Cermet Trimmer



## FEATURES

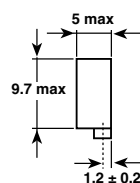
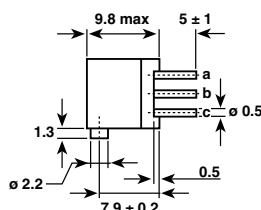
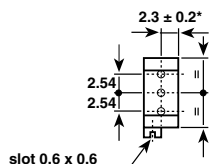
- Military and professional grade
- 0.5 W at 70 °C
- Product qualification according to CECC 41101-004 (A, B, C, D, E)
- Tests according to CECC 41000 or IEC 60393-1
- GAM T1
- Fully sealed
- Operating temperature range -55 °C to +155 °C
- Wide ohmic range from 10 Ω to 2.2 MΩ
- Material categorization: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



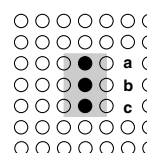
**RoHS**  
COMPLIANT

## DIMENSIONS in millimeters (± 0.5 mm)

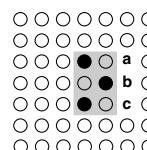
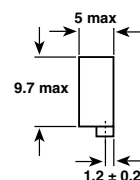
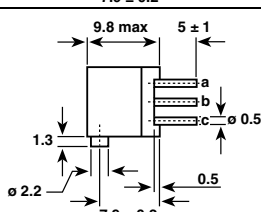
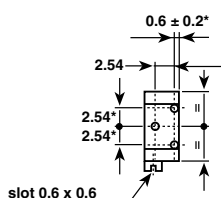
### T9XA (PM81A) A



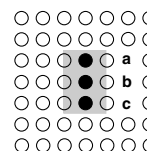
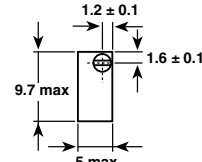
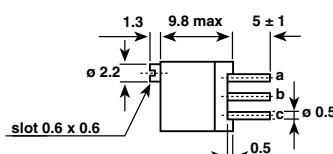
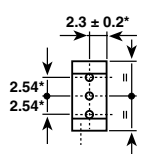
### Terminal Spacing on a 2.54 PCB



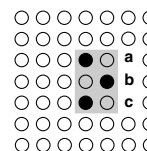
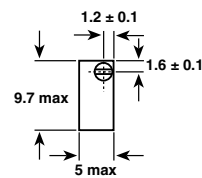
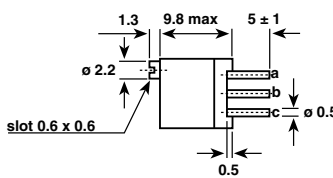
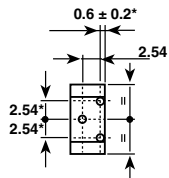
### T9XB (PM81B) C



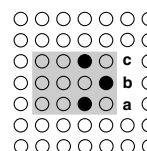
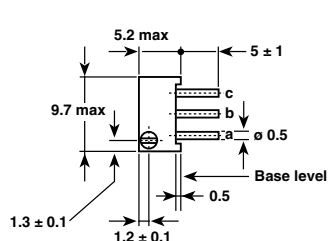
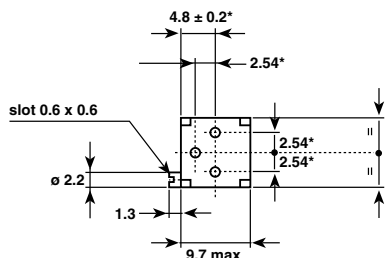
### T9YA (PM82A) B



### T9YB (PM82B) D

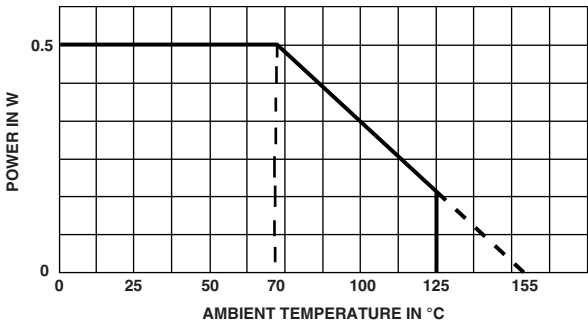
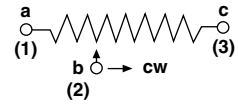


### T9Z (PM83) E



## 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> |



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