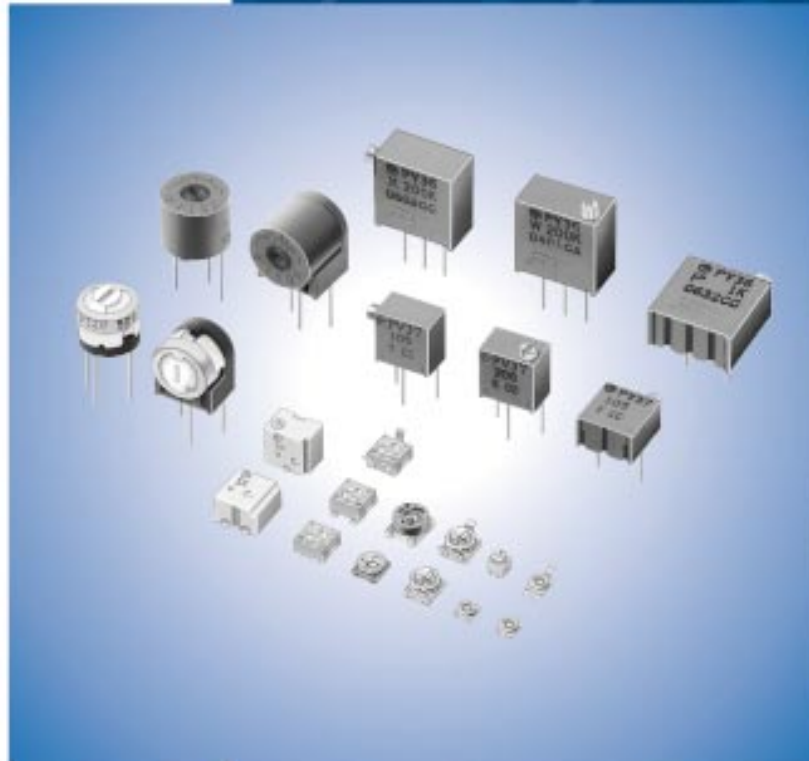


# Trimmer Potentiometers



**muRata** *Innovator  
in Electronics*

**Murata  
Manufacturing Co., Ltd.**

**Cat.No.R50E-16**

**for EU RoHS Compliant**

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (<http://www.murata.com/info/rohs.html>).

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• The RoHS compliance means that we judge from EU Directive 2002/95/EC the products do not contain lead, cadmium, mercury, hexavalent chromium, PBB and PBDE, except exemptions stated in EU Directive 2002/95/EC annex and impurities existing in the natural world.  
 • This statement does not insure the compliance of any of the listed parts with any laws or legal imperatives developed by any EU members individually with regards to the RoHS Directive.

## ● Part Numbering

### Trimmer Potentiometers

(Part Number) 

|    |    |   |     |     |     |
|----|----|---|-----|-----|-----|
| PV | Z3 | A | 103 | C01 | R00 |
| ①  | ②  | ③ | ④   | ⑤   | ⑥   |

#### ① Product ID

| Product ID |                        |
|------------|------------------------|
| PV         | Trimmer Potentiometers |

#### ② Series

#### ③ Adjustment Direction /Lead Type

| Code | Series  | Code | Adjustment Direction/<br>Lead Type |
|------|---|------|------------------------------------|
| Z2   | SMD Open 2mm Size<br>Carbon Resistive Element | A    | Top                                |
|      |   | R    | Rear                               |
| A2   | SMD Open 2mm Size                             | A    | Top                                |
|      |   |      |                                    |
| Z3   | SMD Open 3mm Size<br>Carbon Resistive Element | A    | Top                                |
|      |   | G    | Top                                |
|      |   | K    | Rear                               |
| F2   | SMD Sealed 2mm Size                           | A    | Top                                |
|      |   |      |                                    |
| G3   | SMD Sealed 3mm Size                           | A    | Top, J-hook                        |
|      |   | G    | Top, Gull-wing                     |
|      |   | K    | Rear                               |
| M4   | SMD Sealed 4mm Size                           | A    | Top                                |
| G5   | SMD Sealed 5mm Square<br>11-turns             | A    | Top                                |
|      |   | H    | Side                               |
| 32   | Lead Sealed 6mm Round<br>Single-turn          | H    | Top, Triangle                      |
|      |   | P    | Top, Triangle                      |
|      |   | R    | Top, Inline                        |
|      |   | N    | Side, Triangle                     |
|      |   | T    | Side, Triangle                     |
|      |   | S    | Side, Triangle                     |
|      |   |      |                                    |
| 12   | Lead Sealed 7mm Round<br>4-turns              | H    | Top, Triangle                      |
|      |   | P    | Top, Triangle                      |
|      |   | T    | Side, Triangle                     |
|      |   | S    | Side, Triangle                     |
| 36   | Lead Sealed 10mm Square<br>25-turns           | W    | Top, Inline                        |
|      |   | Y    | Top, Triangle                      |
|      |   | P    | Side, Triangle                     |
|      |   | X    | Side, Inline                       |
|      |   | Z    | Side, Triangle                     |
| 37   | Lead Sealed 6mm Square<br>12-turns            | W    | Top, Triangle                      |
|      |   | Y    | Top, Inline                        |
|      |   | P    | Side, Triangle                     |
|      |   | X    | Side, Triangle                     |
|      |   | Z    | Side, Inline                       |

#### ④ Total Resistance

Expressed by three figures. The unit is ohm. The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

| Code | Total Resistance |
|------|------------------|
| 100  | 10Ω              |
| 102  | 1000Ω            |
| 104  | 100000Ω (=100kΩ) |

#### ⑤ Individual Specification

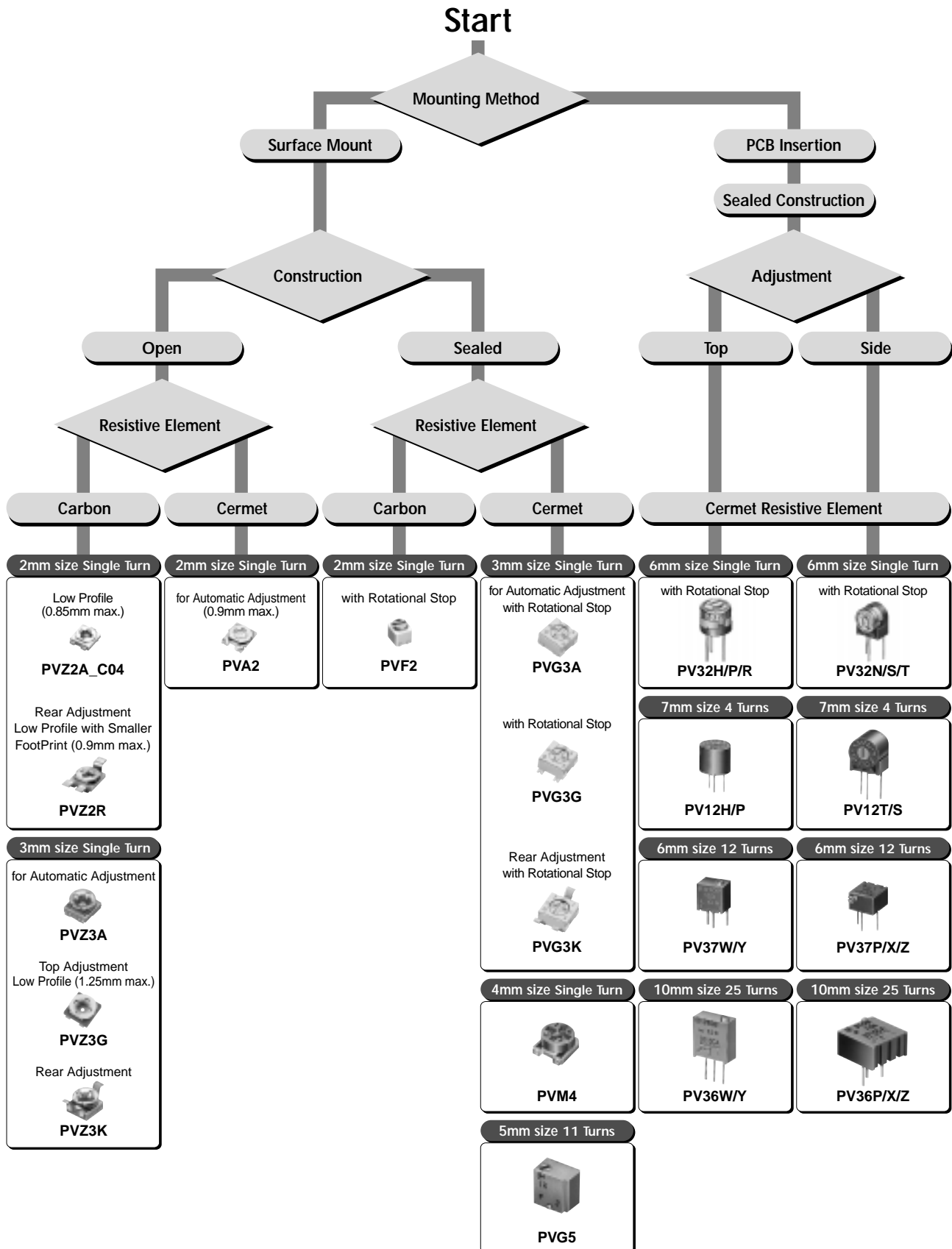
| Series             | Code | Individual Specification Code                             |
|--------------------|------|---|
| PVA2               | A01  | Standard Type   |
| PVZ2               | C04  | Standard Type (High-heat Resistance Type/Ultra-thin Type) |
|                    |      |   |
| PVZ3               | C01  | Standard Type (High-heat Resistance Type/Top Adjustment)  |
|                    | F01  | High Characteristic Carbon Type (only PVZ3G)              |
|                    | E01  | High-heat Resistance Type (for Rear Adjustment)           |
| PVM4               | C01  | Standard Type   |
|                    | D01  | High-liability Type                                       |
| PVF2               | A11  | Standard Type (Resistance Change Characteristics: Linear) |
| PV32/PV12          | A01  | Standard Type   |
| PVG3/<br>PV36/PV37 | C01  | Standard Type   |
| PV36/PV37          | C01  | Standard Type   |
|                    | C31  | Radial Taping   |
| PVG5               | C03  | Standard Type   |

#### ⑥ Packaging

| Code | Packaging |
|------|-----------|
| A00  | Ammo Pack |
| B00  | Bulk      |
| M00* | Magazine  |
| R00  | Reel      |

\* M12 for PV36P Type and M15 for PV36W/Y/X/Z Type.

## Selection Guide of Trimmer Potentiometers



# Trimmer Potentiometers



## SMD Open Type 2mm Size PVZ2/PVA2 Series

### PVZ2 Series

#### ■ Features

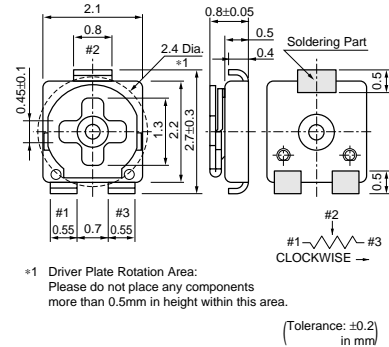
1. Ultra-small and thin external dimensions of 2.1(W)x2.7(L)x0.85 max. (T)mm.  
(Top adjustment type: PVZ2A\_C04 Series)
2. Ultra-small and thin external dimensions of 2.1(W)x4.8(L)x0.9 max. (T)mm.  
(Rear adjustment type: PVZ2R\_C04 Series)  
Compact PCB design is possible by smaller adjustment hole (3.0mm dia.) due to short wing length (4.8mm).
3. Au plated termination achieves a high density PCB mounting.
4. Cross-shaped driver slot allows for in-process automatic adjustment and it provides superior adjustability.
5. Two-piece parts construction achieves low cost and excellent quality.
6. Special resin substrate allows high peak temperature for reflow soldering. (PVZ2\_Cxx Series)

#### ■ Applications

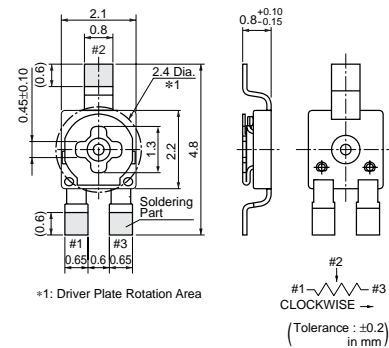
- |                   |                         |
|-------------------|-------------------------|
| 1. Pick-up module | 2. LCD                  |
| 3. Cellular-phone | 4. PHS                  |
| 5. Pager          | 6. DVC                  |
| 7. Digital camera | 8. Portable audio, etc. |



PVZ2A



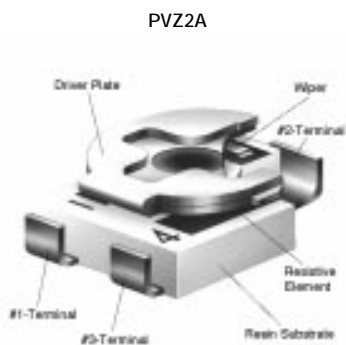
PVZ2R



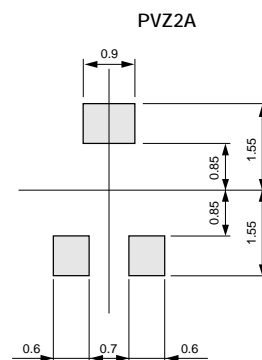
| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVZ2□471C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 470ohm ±30%            | ±500         |
| PVZ2□102C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 1k ohm ±30%            | ±500         |
| PVZ2□222C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 2.2k ohm ±30%          | ±500         |
| PVZ2□472C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 4.7k ohm ±30%          | ±500         |
| PVZ2□103C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 10k ohm ±30%           | ±500         |
| PVZ2□223C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 22k ohm ±30%           | ±500         |
| PVZ2□473C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 47k ohm ±30%           | ±500         |
| PVZ2□104C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 100k ohm ±30%          | ±500         |
| PVZ2□224C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 220k ohm ±30%          | ±500         |
| PVZ2□474C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 470k ohm ±30%          | ±500         |
| PVZ2□105C04 | 0.05(50°C)       | Reflow/Soldering Iron | 1(240°±10°)                                | 1M ohm ±30%            | ±500         |

\*Available for other resistance value.  
 Operating Temperature Range: -25 to 85 °C  
 The blank column is filled with the code of adjustment direction and lead type A (top) or R (rear).

■ Construction

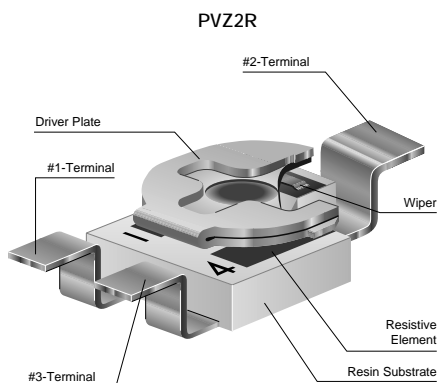


■ Standard Land Pattern

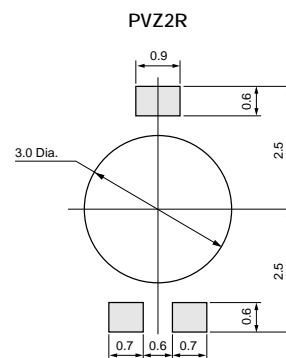


(Tolerance : ±0.1 in mm)

■ Construction



■ Standard Land Pattern



(Tolerance : ±0.1 in mm)

■ Characteristics

|                           |  |
|---------------------------|--|
| Humidity Exposure         | Res. Change: +10, -2%  |
| High Temperature Exposure | Res. Change: $R \leq 50\text{kohm} \dots +2, -10\%$<br>$50\text{kohm} < R \dots +2, -15\%$ |
| Humidity Load Life        | Res. Change: ±10%  |
| Load Life                 | Res. Change: $R \leq 50\text{kohm} \dots +2, -10\%$<br>$50\text{kohm} < R \dots +2, -15\%$ |
| Temperature Cycle         | Res. Change: ±5%   |
| Rotational Life           | Res. Change: ±10% (10 cycles)  |

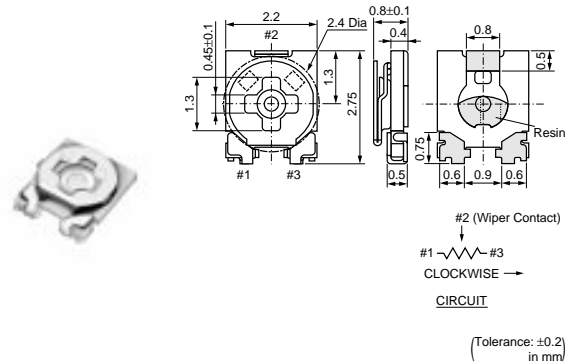
## PVA2 Series

### ■ Features

1. Ultra-small and thin external dimensions of 2.2(W)x2.75(L)x0.90 max.(T)mm.
2. For the terminal attachment method of construction which uses neither solder nor adhesives, good solderability and terminal attachment intensity are realized.
3. Because of multi-contact wiper structure, PVA2 has a stable characteristics (low noise).
4. PVA2 series do not use a solder, flux and cleaning solvent, so they are environmentally friendly products.
5. Heat resistance performance enables high temperature peak re-flow soldering.

### ■ Applications

1. Thin-model optical pick-up module
2. LCD module
3. Optical communication module
4. Small sensor module
5. Digital camera
6. Small telecommunicaions equipment, etc.



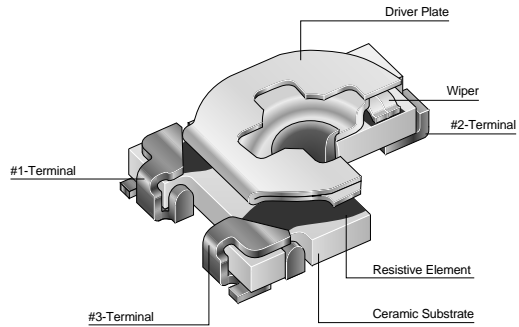
| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVA2A101A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 100ohm ±25%            | ±250         |
| PVA2A221A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 220ohm ±25%            | ±250         |
| PVA2A471A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 470ohm ±25%            | ±250         |
| PVA2A102A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 1k ohm ±25%            | ±250         |
| PVA2A222A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 2.2k ohm ±25%          | ±250         |
| PVA2A472A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 4.7k ohm ±25%          | ±250         |
| PVA2A103A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 10k ohm ±25%           | ±250         |
| PVA2A223A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 22k ohm ±25%           | ±250         |
| PVA2A473A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 47k ohm ±25%           | ±250         |
| PVA2A104A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 100k ohm ±25%          | ±250         |
| PVA2A224A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 220k ohm ±25%          | ±250         |
| PVA2A474A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 470k ohm ±25%          | ±250         |
| PVA2A105A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 1M ohm ±25%            | ±250         |
| PVA2A225A01 | 0.1(70°C)        | Reflow/Soldering Iron | 1(260°±10°)                                | 2.2M ohm ±25%          | ±250         |

\*Available for other resistance value.

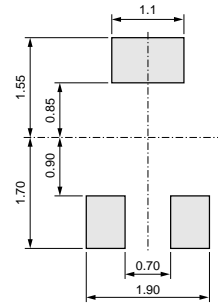
Operating Temperature Range: -55 to 125 °C



■ Construction



■ Standard Land Pattern



(Tolerance : ±0.1 in mm)

■ Characteristics

|                           |                               |
|---------------------------|-------------------------------|
| Humidity Exposure         | Res. Change: ±3%              |
| High Temperature Exposure | Res. Change: ±3%              |
| Humidity Load Life        | Res. Change: ±3%              |
| Load Life                 | Res. Change: ±3%              |
| Temperature Cycle         | Res. Change: ±3%              |
| Rotational Life           | Res. Change: ±10% (10 cycles) |

## PVZ2/PVA2 Series Notice

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.
3. If the trimmer potentiometer is used in DC and high humidity conditions, please connect wiper (#2) for plus and resistive element (#1 or #3) for minus.  
(PVZ Series only)

### ■ Notice (Soldering and Mounting)

1. Soldering
  - (1) Reflow soldering method and soldering iron are available. Cannot be soldered using the flow soldering method (dipping). If you use the flow soldering method, the trimmer potentiometer may not function.
  - (2) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
  - (3) Soldering condition  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
  - (4) Apply the appropriate amount of solder paste.  
The thickness of solder paste should be printed from 100 micro m to 150 micro m and the dimension of land pattern used should be Murata's standard land pattern at reflow soldering.  
Insufficient amounts of solder can lead to insufficient soldering strength on PCB.  
Excessive amounts of solder may cause bridging between the terminals.

- (5) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.
2. Mounting
  - (1) Do not apply excessive force, preferably 4.9N max. (Ref. 500gf) when the trimmer potentiometer is mounted to the PCB.
  - (2) Do not warp and/or bend PC board to prevent trimmer potentiometer from breakage.
  - (3) In chip placers, the recommended size of the cylindrical pick-up nozzle should be outer dimension 1.5-1.8mm dia. and inner dimension 1.3mm dia.
3. Cleaning
  - (1) In case there is flux on the resistive element, clean sufficiently with cleaning solvents and completely remove all residual flux.
  - (2) Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please evaluate performance with your product.

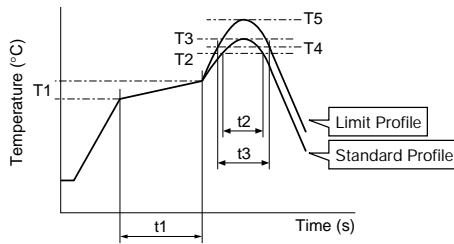
## PVZ2/PVA2 Series Notice

1

### ■ Soldering Profile

#### ● Reflow Soldering Profile

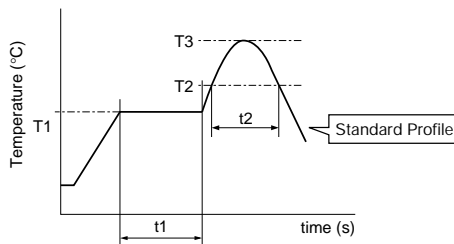
##### 1. Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu)



| Series     | Standard Profile |           |            |           |                       |                 | Limit Profile |           |            |           |                       |                 |
|------------|------------------|-----------|------------|-----------|-----------------------|-----------------|---------------|-----------|------------|-----------|-----------------------|-----------------|
|            | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow | Pre-heating   |           | Heating    |           | Peak Temperature (T5) | Cycle of Reflow |
|            | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 | Temp. (T1)    | Time (t1) | Temp. (T4) | Time (t3) |                       |                 |
| °C         | sec.             | °C        | sec.       | °C        | Time                  | °C              | sec.          | °C        | sec.       | °C        | Time                  |                 |
| PVA2       | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180    | 60 to 120 | 220        | 30 to 60  | 260 +5/-0             | 2               |
| PVZ2***C** | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180    | 60 to 120 | 220        | 30 to 60  | 260                   | 2               |

##### 2. Soldering profile for Eutectic solder (63Sn/37Pb)

(Limit profile: refer to 1)



| Series     | Standard Profile |           |            |           |                       |                 |
|------------|------------------|-----------|------------|-----------|-----------------------|-----------------|
|            | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow |
|            | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 |
| °C         | sec.             | °C        | sec.       | °C        | Time                  |                 |
| PVA2       | 150              | 60 to 120 | 183        | 30        | 230                   | 1               |
| PVZ2***C** | 150              | 60 to 120 | 183        | 30        | 230                   | 1               |

### ● Soldering Iron

| Series     | Standard Condition                |                |                             |                         |
|------------|-----------------------------------|----------------|-----------------------------|-------------------------|
|            | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Soldering Iron |
|            | °C                                | sec.           | W                           | Time                    |
| PVA2       | 350±10                            | 3 max.         | 30 max.                     | 1                       |
| PVZ2***C** | 350±10                            | 3 max.         | 30 max.                     | 1                       |

### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdriver below.  
\* Recommended screwdriver for manual adjustment  
Murata P/N: KMDR190
- The screwdriver should be set in the products vertically, do not apply more than 4.9N (Ref. 500gf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.
- Please use within the effective rotational angle.  
The trimmer potentiometer does not have a mechanical stop for over rotation. In cases out of effective rotational angle, the trimmer potentiometer may not function.
- When using a lock paint to fix slot position or cover the rotor, please evaluate performance with your product. Lock paint may cause corrosion or electrical contact problems.

### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.

# Trimmer Potentiometers



## SMD Open Type 3mm Size PVZ3 Series

2

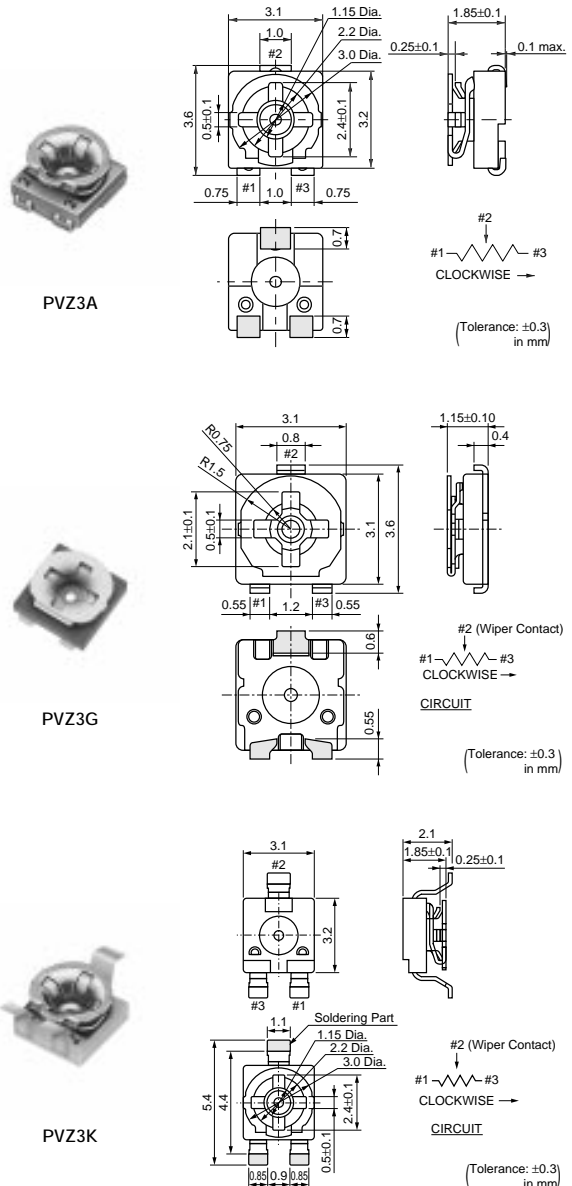
### PVZ3 Series

#### ■ Features

1. Excellent solderability characteristics are achieved via special plating techniques on each termination.
2. Specially designed substrate prevents wicking of flux onto the top of the part body.
3. Funnel shaped adjustment slot allows for in-process automatic adjustment. (PVZ3A/PVZ3K Series)
4. High-heat resistance type is available (PVZ3A\_C01/PVZ3G\_C01/PVZ3K\_E01).
5. Enlarged bottom termination enhances soldering strength while reducing the necessary land area required promoting high-density PCB mounting (PVZ3A/PVZ3G Series).
6. The standard position of driver plate is adjusted at the center normally, but another position is also available.
7. This product meets PB-free standards.

#### ■ Applications

- |                      |                        |
|----------------------|------------------------|
| 1. Optical pick up   | 2. Cordless telephones |
| 3. CD players        | 4. FDD                 |
| 5. Motor             | 6. CD-ROMs             |
| 7. Car stereos       | 8. TFT-LCD TV sets     |
| 9. Headphone stereos |                        |



| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVZ3□221C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 220ohm ±30%            | ±500         |
| PVZ3□471C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 470ohm ±30%            | ±500         |
| PVZ3□102C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 1k ohm ±30%            | ±500         |
| PVZ3□222C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 2.2k ohm ±30%          | ±500         |
| PVZ3□472C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 4.7k ohm ±30%          | ±500         |
| PVZ3□103C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 10k ohm ±30%           | ±500         |
| PVZ3□223C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 22k ohm ±30%           | ±500         |
| PVZ3□473C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 47k ohm ±30%           | ±500         |
| PVZ3□104C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 100k ohm ±30%          | ±500         |
| PVZ3□224C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 220k ohm ±30%          | ±500         |

Continued on the following page.

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| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVZ3□474C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 470k ohm ±30%          | ±500         |
| PVZ3□105C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 1M ohm ±30%            | ±500         |
| PVZ3□225C01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 2.2M ohm ±30%          | ±500         |
| PVZ3□221E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 220ohm ±30%            | ±500         |
| PVZ3□471E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 470ohm ±30%            | ±500         |
| PVZ3□102E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 1k ohm ±30%            | ±500         |
| PVZ3□222E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 2.2k ohm ±30%          | ±500         |
| PVZ3□472E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 4.7k ohm ±30%          | ±500         |
| PVZ3□103E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 10k ohm ±30%           | ±500         |
| PVZ3□223E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 22k ohm ±30%           | ±500         |
| PVZ3□473E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 47k ohm ±30%           | ±500         |
| PVZ3□104E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 100k ohm ±30%          | ±500         |
| PVZ3□224E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 220k ohm ±30%          | ±500         |
| PVZ3□474E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 470k ohm ±30%          | ±500         |
| PVZ3□105E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 1M ohm ±30%            | ±500         |
| PVZ3□225E01 | 0.1(50°C)        | Reflow/Soldering Iron | 1(230°±10°)                                | 2.2M ohm ±30%          | ±500         |

\*Available for other resistance value.

Operating Temperature Range: -25 to 85 °C

The blank column is filled with the code of adjustment direction and lead type A (top adjustment), G (top adjustment and thin type),

K (rear adjustment).

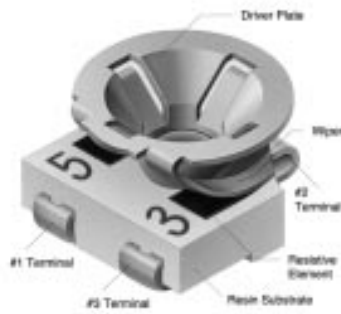
A and G are only for C01.

K is only for E01.

2

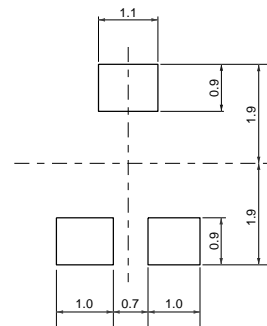
■ Construction

PVZ3A



■ Standard Land Pattern

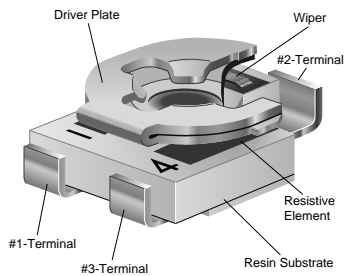
PVZ3A/PVZ3G



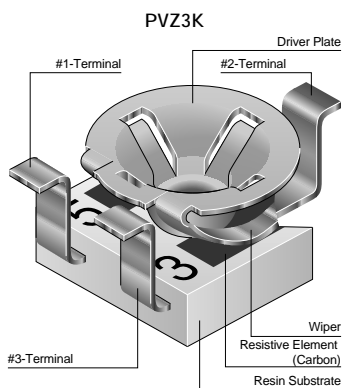
(Tolerance : ±0.1 in mm)

■ Construction

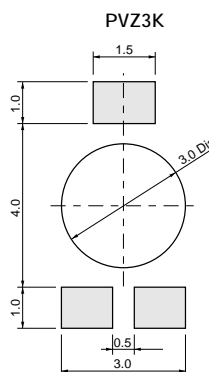
PVZ3G



■ Construction



■ Standard Land Pattern



(Tolerance : ±0.1 in mm)

2

■ Characteristics

|                           |  |
|---------------------------|--|
| Humidity Exposure         | Res. Change: +10, -2%  |
| High Temperature Exposure | Res. Change: $R \leq 100 \text{ kohm} \dots +2, -10\%$<br>$100 \text{ kohm} < R \dots +2, -15\%$ |
| Humidity Load Life        | Res. Change: ±10%  |
| Load Life                 | Res. Change: $R \leq 100 \text{ kohm} \dots +2, -10\%$<br>$100 \text{ kohm} < R \dots +2, -15\%$ |
| Temperature Cycle         | Res. Change: ±5%   |
| Rotational Life           | Res. Change: ±10% (10 cycles)  |

## PVZ3 Series Notice

2

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.
3. If the trimmer potentiometer is used in DC and high humidity conditions, please connect wiper (#2) for plus and resistive element (#1 or #3) for minus.

### ■ Notice (Soldering and Mounting)

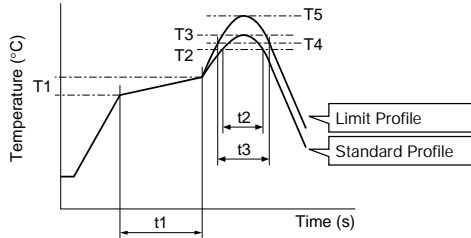
1. Soldering
  - (1) Soldering conditions  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.  
Do not use flow soldering method (dipping).  
If you use the flow soldering method, the trimmer potentiometer may not function.
  - (2) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
  - (3) Apply the appropriate amount of solder paste.  
The thickness of solder paste should be printed from 100 micro m to 150 micro m and the dimension of land pattern used should be Murata's standard land pattern at reflow soldering. Insufficient amounts of solder can lead to insufficient soldering strength on PCB.  
Excessive amounts of solder may cause bridging between the terminals.
  - (4) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged. (PVZ Series only)
2. Mounting
  - (1) Do not apply excessive force, preferably 4.9N max. (Ref. 500gf) when the trimmer potentiometer is mounted to the PCB.
  - (2) Do not warp and/or bend PC board to prevent trimmer potentiometer from breakage.
  - (3) In chip placers, the recommended size of the cylindrical pick-up nozzle should be outer dimension 2.5-2.8mm dia. and inner dimension 2mm dia.
3. Cleaning
  - (1) In case there is flux on the resistive element, clean sufficiently with cleaning solvents and completely remove all residual flux.
  - (2) Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please evaluate performance with your product.

## PVZ3 Series Notice

### ■ Soldering Profile

#### ● Reflow Soldering Profile

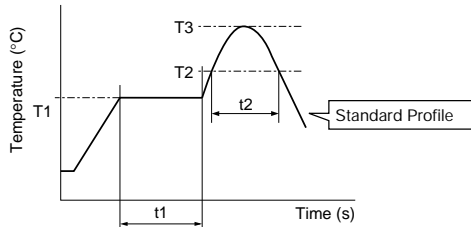
1. Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu)



| Series      | Standard Profile |           |            |           |                       | Limit Profile   |             |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|-------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow | Pre-heating |           | Heating    |           | Peak Temperature (T5) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 | Temp. (T1)  | Time (t1) | Temp. (T4) | Time (t3) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  | °C              | sec.        | °C        | sec.       | °C        | Time                  |                 |
| PVZ3xxxCxx  | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180  | 60 to 120 | 220        | 30 to 60  | 260                   | 2               |
| PVZ3GxxxFxx | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180  | 60 to 120 | 220        | 30 to 60  | 260                   | 2               |
| PVZ3xxxExx  | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180  | 60 to 120 | 220        | 30 to 60  | 260                   | 2               |

2. Soldering profile for Eutectic solder (63Sn/37Pb)

(Limit profile: refer to 1)



| Series                                  | Standard Profile |           |            |           |                       |                 |
|---|------------------|-----------|------------|-----------|-----------------------|-----------------|
|   | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow |
|   | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 |
| °C                                      | sec.             | °C        | sec.       | °C        | Time                  |                 |
| PVZ3xxxCxx<br>PVZ3GxxxFxx<br>PVZ3xxxExx | 150              | 60 to 120 | 183        | 30        | 230 max.              | 1               |

### ● Soldering Iron

| Series                                  | Standard Condition                |                |                             |                      |
|---|-----------------------------------|----------------|-----------------------------|----------------------|
|   | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Solder Iron |
|   | °C                                | sec.           | W                           | Time                 |
| PVZ3xxxCxx<br>PVZ3GxxxFxx<br>PVZ3xxxExx | 350±10                            | 3 max.         | 30 max.                     | 1                    |

### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdrivers below.
  - \* Recommended screwdriver for manual adjustment  
>VESSEL MFG.: NO.9000+1.7x30  
(Murata P/N: KMDR080)
  - \* Recommended screwdriver for automatic adjustment  
>TORAY MFG.: JB-2225 (Murata P/N: KMBT070)
- Don't apply more than 4.9N (Ref.; 500gf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.
- Please use within the effective rotational angle. Do not have a mechanical stop for over rotation. In cases out of effective rotational angle, the trimmer potentiometer may not function.
- When using a lock paint to fix slot position or cover the rotor, please evaluate performance by your product. Lock paint may cause corrosion or electrical contact problems.

### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.



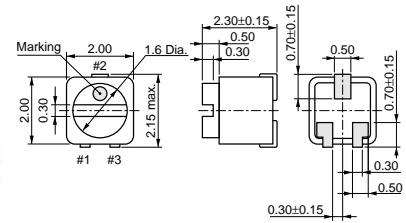
# Trimmer Potentiometers



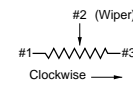
## SMD Sealed Type 2mm Size PVF2 Series

### ■ Features

1. Ultra-compact size of "2x2x2.3mm"
2. A sealed structure prevents liquids (water, cleaning liquid, sweat, etc.) from entering.
3. A rotation service life of 100 cycles is guaranteed.
4. Can be automatically mounted using a chip placer, as well as mounted using reflow soldering.



CIRCUIT



(Tolerance: ±0.10 in mm)

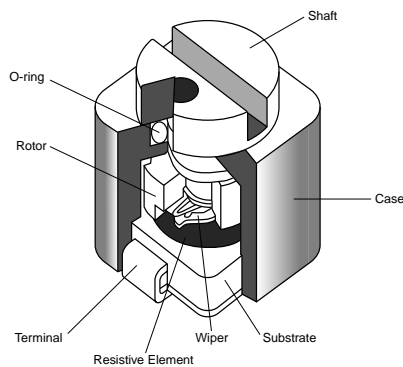
### ■ Applications

1. Hearing aids
2. Ultra-compact sensors or the like
3. Applications requiring ultra-compactness, and a sealed structure

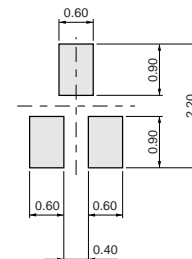
| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVF2A501A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 500ohm ±30%            | ±500         |
| PVF2A102A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 1k ohm ±30%            | ±500         |
| PVF2A202A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 2k ohm ±30%            | ±500         |
| PVF2A502A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 5k ohm ±30%            | ±500         |
| PVF2A103A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 10k ohm ±30%           | ±500         |
| PVF2A203A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 20k ohm ±30%           | ±500         |
| PVF2A503A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 50k ohm ±30%           | ±500         |
| PVF2A104A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 100k ohm ±30%          | ±500         |
| PVF2A204A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 200k ohm ±30%          | ±500         |
| PVF2A504A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 500k ohm ±30%          | ±500         |
| PVF2A105A11 | 0.001(50°C)      | Reflow/Soldering Iron | 1(210°±10°)                                | 1M ohm ±30%            | ±500         |

Operating Temperature Range: -25 to 60 °C

### ■ Construction



### ■ Standard Land Pattern



(Tolerance: ±0.10 in mm)

### ■ Characteristics

|                          |                         |
|--------------------------|-------------------------|
| Temperature Cycle        | ΔTR : ±5%               |
| Humidity                 | ΔTR : ±15, -2%          |
| Vibration                | ΔV.S.S. : ±5%           |
| Shock (100G)             | ΔV.S.S. : ±5%           |
| Temperature Load Life    | ΔTR : +2, -10%          |
| Low Temperature Exposure | ΔTR : ±3%               |
| Rotational Life          | ΔTR : ±10% (100 cycles) |

ΔTR : Total Resistance Change  
 ΔV.S.S.: Voltage Setting Stability

## PVF2 Series Notice

3

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.
3. If the trimmer potentiometer is used in DC and high humidity conditions, please connect wiper (#2) for plus and resistive element (#1 or #3) for minus.

### ■ Notice (Soldering and Mounting)

#### 1. Soldering

- (1) Soldering condition  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
- (2) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
- (3) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.
- (4) Cannot be soldered using the flow soldering method. If you use the flow soldering method, the trimmer potentiometer may not function.

#### 2. Mounting

- (1) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
- (2) Do not apply excessive force (preferably 4.9N (Ref.; 500gf) max.), when the trimmer potentiometer is mounted to the PCB.
- (3) Do not warp and/or bend PC board to prevent trimmer potentiometer from breakage.

#### 3. Cleaning

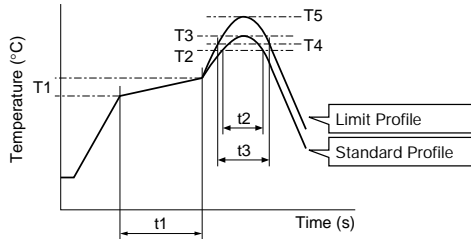
- (1) Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please consult with a Murata factory representative prior to using.

## PVF2 Series Notice

### ■ Soldering Profile

#### ● Reflow Soldering Profile

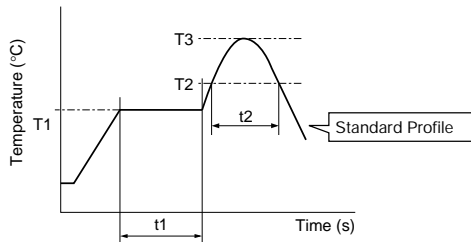
1. Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu)



| Series      | Standard Profile |           |            |           |                       |                 | Limit Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|---------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow | Pre-heating   |           | Heating    |           | Peak Temperature (T5) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 | Temp. (T1)    | Time (t1) | Temp. (T4) | Time (t3) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  | °C              | sec.          | °C        | sec.       | °C        | Time                  |                 |
| <b>PVF2</b> | 150 to 180       | 60 to 120 | 200        | 30        | 230 max.              | 1               | 150 to 180    | 60 to 120 | 200        | 30        | 230 max.              | 1               |

2. Soldering profile for Eutectic solder (63Sn/37Pb)

(Limit profile: refer to 1)



| Series      | Standard Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  |                 |
| <b>PVF2</b> | 150              | 60 to 120 | 183        | 30        | 230 max.              | 1               |

#### ● Soldering Iron

| Series      | Standard Condition                |                |                             |                         |
|-------------|-----------------------------------|----------------|-----------------------------|-------------------------|
|             | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Soldering Iron |
|             | °C                                | sec.           | W                           | Time                    |
| <b>PVF2</b> | 260                               | 3 max.         | 30 max.                     | 1                       |

#### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot.
- Do not apply more than 4.9N (Ref. 500gf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.
- The rotational torque at the position of the adjustment range should not exceed the stop strength.
- When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401 series").

#### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.

# Trimmer Potentiometers



## SMD Sealed Type 3mm Size PVG3 Series

### ■ Features

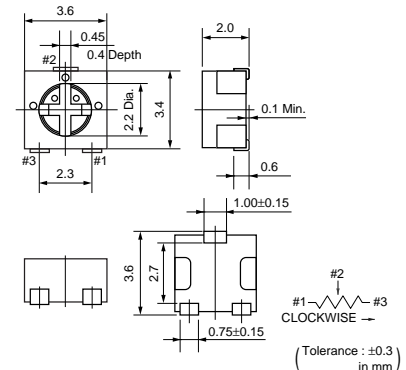
1. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
2. Driver plate with cross-slot is suitable for automatic adjustment.
3. Rotor with large diameter and deep groove improves driver insertion.
4. J-hook, Gull wing terminal shape, rear and through hole terminal shape.
5. 3mm and 4mm land pattern can be used without change. (Gull wing is suitable for 4mm size land pattern.)
6. Heat resistance performance enables high temperature peak re-flow soldering.

### ■ Applications

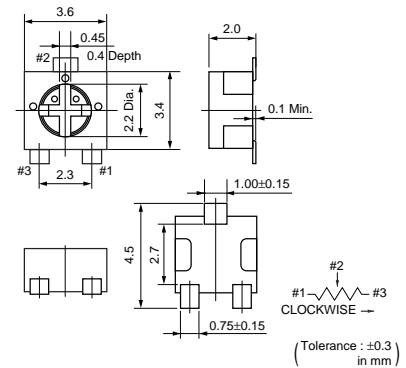
- |                         |                               |
|-------------------------|-------------------------------|
| 1. Small sensors        | 2. Optical Transceiver Module |
| 3. Copier               | 4. Printer                    |
| 5. Compact Power Supply | 6. Wireless Radio module      |



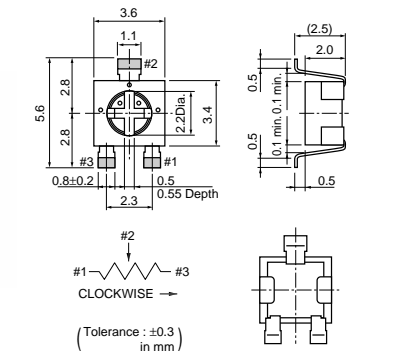
PVG3A



PVG3G



PVG3K



| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVG3□100C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 10ohm ±20%             | ±150         |
| PVG3□200C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10)                                 | 20ohm ±20%             | ±150         |
| PVG3□500C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 50ohm ±20%             | ±150         |
| PVG3□101C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 100ohm ±20%            | ±150         |
| PVG3□201C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 200ohm ±20%            | ±150         |
| PVG3□501C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 500ohm ±20%            | ±150         |
| PVG3□102C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 1k ohm ±20%            | ±150         |
| PVG3□202C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 2k ohm ±20%            | ±150         |
| PVG3□502C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 5k ohm ±20%            | ±150         |
| PVG3□103C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 10k ohm ±20%           | ±150         |
| PVG3□203C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 20k ohm ±20%           | ±150         |
| PVG3□503C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 50k ohm ±20%           | ±150         |

Continued on the following page. ↗

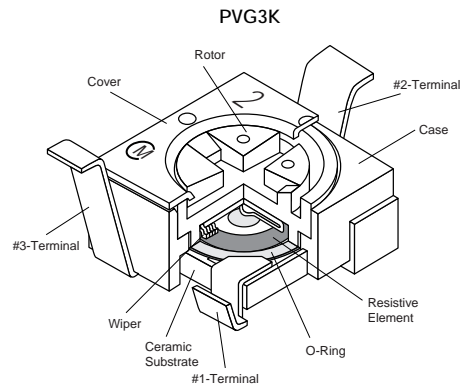
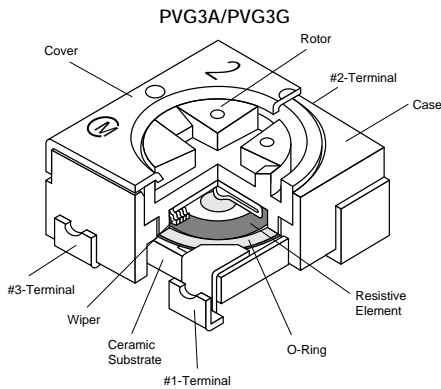
Continued from the preceding page.

| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVG3□104C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 100k ohm ±20%          | ±150         |
| PVG3□204C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 200k ohm ±20%          | ±150         |
| PVG3□504C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 500k ohm ±20%          | ±150         |
| PVG3□105C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 1M ohm ±20%            | ±150         |
| PVG3□205C01 | 0.25(70°C)       | Reflow/Soldering Iron | 1(210°±10°)                                | 2M ohm ±20%            | ±150         |

Operating Temperature Range: -55 to 125 °C

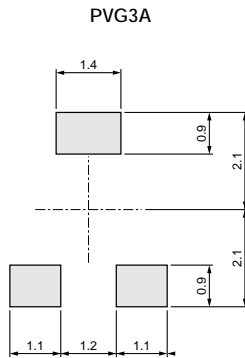
The blank column is filled with the code of adjustment direction and lead type A (top, J-hook), G (top, gull-wing), or K (rear).

### Construction

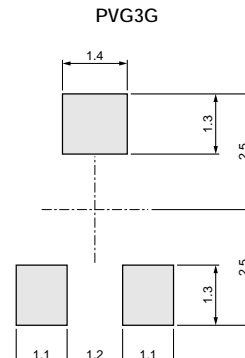


4

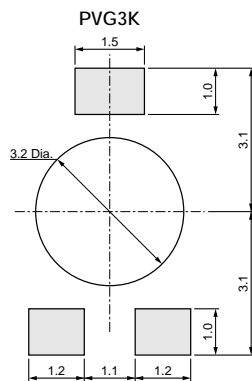
### Standard Land Pattern



(Tolerance : ±0.1 in mm)



(Tolerance : ±0.1 in mm)



(Tolerance : ±0.1 in mm)

Continued on the following page. ↗

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## ■ Characteristics

|                           |  |
|---------------------------|--|
| Temperature Cycle         | $\Delta TR$ : $\pm 2\%$<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Humidity                  | $\Delta TR$ : $\pm 2\%$<br>$\Delta V.S.S.$ : $\pm 1\%$<br>IR : 10M ohm min.  |
| Vibration (20G)           | $\Delta TR$ : $\pm 1\%$<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Shock (100G)              | $\Delta TR$ : $\pm 1\%$<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Temperature Load Life     | $\Delta TR$ : $\pm 3\%$ or 3 ohm max., whichever is greater<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Low Temperature Exposure  | $\Delta TR$ : $\pm 2\%$<br>$\Delta V.S.S.$ : $\pm 2\%$   |
| High Temperature Exposure | $\Delta TR$ : $\pm 3\%$<br>$\Delta V.S.S.$ : $\pm 2\%$   |
| Rotational Life           | $\Delta TR$ : $R \leq 100 \text{ kohm} \dots \pm 3\%$ or 2 ohm max., whichever is greater<br>$R > 100 \text{ kohm} \dots +0/-10\%$ (50 cycles) |

$\Delta TR$  : Total Resistance Change  
 $\Delta V.S.S.$ : Voltage Setting Stability  
 IR : Insulation Resistance  
 R : Standard Total Resistance

## PVG3 Series Notice

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.

### ■ Notice (Soldering and Mounting)

#### 1. Soldering

- (1) Soldering conditions  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
- (2) Cannot be soldered using the flow soldering method. If you use the flow soldering method, the trimmer potentiometer may not function.
- (3) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.
- (4) Apply the appropriate amount of solder paste.  
If the amount of solder paste applied to the land is insufficient, the required adhesive strength cannot be obtained. If an excessive amount of solder paste is applied, solder bridging or flux overflow to the resistive element surface can occur.

#### 2. Mounting

- (1) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
- (2) Do not apply excessive force, preferably 4.9N max. (Ref. 500gf) when the trimmer potentiometer is mounted to the PCB.
- (3) Do not warp and/or bend PC board to prevent trimmer potentiometer from breakage.
- (4) In chip placers, the size of the cylindrical pick-up nozzle should be outer dimension 2.5-3.0mm dia. and inner dimension 2.0-2.5mm dia.

#### 3. Cleaning

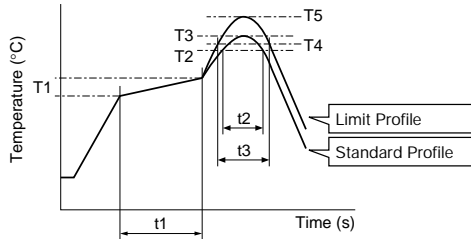
Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please consult with a Murata factory representative prior to using.

## PVG3 Series Notice

### ■ Soldering Profile

#### ● Reflow Soldering Profile

##### 1. Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu)

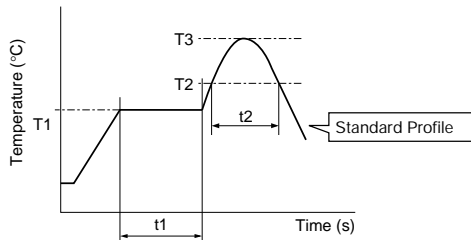


| Series      | Standard Profile |           |            |           |                       |                 | Limit Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|---------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow | Pre-heating   |           | Heating    |           | Peak Temperature (T5) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 | Temp. (T1)    | Time (t1) | Temp. (T4) | Time (t3) |                       |                 |
|             | °C               | sec.      | °C         | sec.      | °C                    | Time            | °C            | sec.      | °C         | sec.      | °C                    | Time            |
| <b>PVG3</b> | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 1               | 150 to 180    | 60 to 120 | 230        | 30 to 50  | 260 +5/-0             | 2               |

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##### 2. Soldering profile for Eutectic solder (63Sn/37Pb)

(Limit profile: refer to 1)



| Series      | Standard Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 |
|             | °C               | sec.      | °C         | sec.      | °C                    | Time            |
| <b>PVG3</b> | 150              | 60 to 120 | 183        | 30        | 230                   | 1               |

### ● Soldering Iron

| Series      | Standard Condition                |                |                             |                         |
|-------------|-----------------------------------|----------------|-----------------------------|-------------------------|
|             | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Soldering Iron |
|             | °C                                | sec.           | W                           | Time                    |
| <b>PVG3</b> | 350±10                            | 3 max.         | 30 max.                     | 1                       |

### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot.
  - \* Recommended screwdriver for manual adjustment  
TORAY INDUSTRIES, INC.: SA-2225  
(Murata P/N: KMDR070)
  - \* Recommended screwdriver bit for automatic adjustment  
TORAY INDUSTRIES, INC.: JB-2225  
(Murata P/N: KMBT070)
 We can supply the screwdrivers above.  
 If you place order, please specify the Murata P/N.
- Do not apply more than 9.8N (Ref. 1kgf) of twist and stress after mounting onto PCB to prevent contact intermittence.

- When adjusting with an adjustment tool, the applied force to the adjustment screw should not exceed 4.9N (Ref. 500gf). If excessive force is applied, the trimmer potentiometer may not function due to damage.
- The rotational torque at the position of the adjustment range should not exceed the stop strength.
- When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401 series") and evaluate performance with your product. Lock paint may cause corrosion or electrical contact problems.

### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.



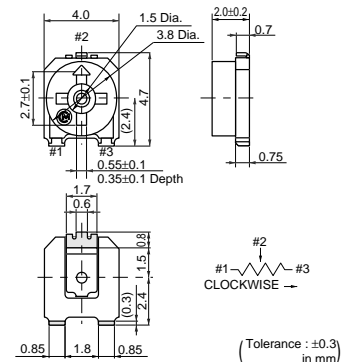
# Trimmer Potentiometers



## SMD Sealed Type 4mm Size PVM4 Series

### ■ Features

1. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
2. Available for flow and reflow soldering method while maintaining unique sealed construction.
3. Simple construction by 3-piece parts achieves high reliability.
4. Large diameter slot of rotor improves driver insertion.
5. Available for cleaning after soldering
6. High grade version is available (PVM4AxxxD01).



### ■ Applications

1. Security
2. OA, FA equipments
3. Measuring equipments
4. Professional cameras
5. Encoders
6. Sensors

| Part Number | Power Rating (W) | Soldering Method           | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|----------------------------|--|------------------------|--------------|
| PVM4A101C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 100ohm ±25%            | ±250         |
| PVM4A201C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 200ohm ±25%            | ±250         |
| PVM4A301C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 300ohm ±25%            | ±250         |
| PVM4A501C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 500ohm ±25%            | ±250         |
| PVM4A102C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 1k ohm ±25%            | ±250         |
| PVM4A202C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 2k ohm ±25%            | ±250         |
| PVM4A302C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 3k ohm ±25%            | ±250         |
| PVM4A502C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 5k ohm ±25%            | ±250         |
| PVM4A103C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 10k ohm ±25%           | ±250         |
| PVM4A203C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 20k ohm ±25%           | ±250         |
| PVM4A303C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 30k ohm ±25%           | ±250         |
| PVM4A503C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 50k ohm ±25%           | ±250         |
| PVM4A104C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 100k ohm ±25%          | ±250         |
| PVM4A204C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 200k ohm ±25%          | ±250         |
| PVM4A304C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 300k ohm ±25%          | ±250         |
| PVM4A504C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 500k ohm ±25%          | ±250         |
| PVM4A105C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 1M ohm ±25%            | ±250         |
| PVM4A205C01 | 0.1(70°C)        | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 2M ohm ±25%            | ±250         |
| PVM4A101D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 100ohm ±20%            | ±100         |
| PVM4A201D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 200ohm ±20%            | ±100         |
| PVM4A301D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 300ohm ±20%            | ±100         |
| PVM4A501D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 500ohm ±20%            | ±100         |
| PVM4A102D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 1k ohm ±20%            | ±200         |
| PVM4A202D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 2k ohm ±20%            | ±200         |
| PVM4A302D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 3k ohm ±20%            | ±200         |
| PVM4A502D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 5k ohm ±20%            | ±200         |
| PVM4A103D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 10k ohm ±20%           | ±150         |
| PVM4A203D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 20k ohm ±20%           | ±150         |
| PVM4A303D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 30k ohm ±20%           | ±150         |
| PVM4A503D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 50k ohm ±20%           | ±150         |
| PVM4A104D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 100k ohm ±20%          | ±150         |
| PVM4A204D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 200k ohm ±20%          | ±150         |
| PVM4A304D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 300k ohm ±20%          | ±150         |

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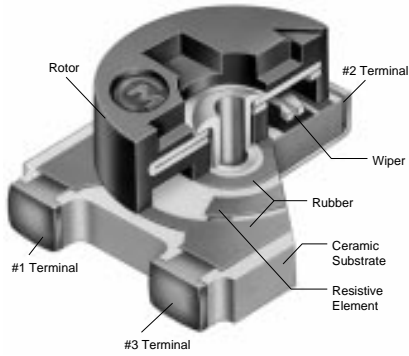
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| Part Number | Power Rating (W) | Soldering Method           | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|----------------------------|--|------------------------|--------------|
| PVM4A504D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 500k ohm ±20%          | ±150         |
| PVM4A105D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 1M ohm ±20%            | ±150         |
| PVM4A205D01 | 0.25(70°C)       | Flow/Reflow/Soldering Iron | 1(240°±10°)                                | 2M ohm ±20%            | ±150         |

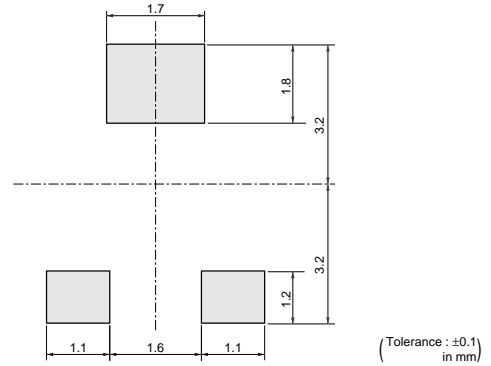
Operating Temperature Range: -55 to 125 °C

The last three digits express the individual specification codes. C01 for standard type and D01 for high-liability type.

### Construction



### Standard Land Pattern



### Characteristics

| Item                      | PVM4A□□□C01                   | PVM4A□□□D01                   |
|---------------------------|-------------------------------|-------------------------------|
| Humidity Exposure         | Res. Change: ±3%              | Res. Change: ±2%              |
| High Temperature Exposure | Res. Change: ±3%              | Res. Change: ±2%              |
| Humidity Load Life        | Res. Change: ±3%              | Res. Change: ±3%              |
| Temperature Load Life     | Res. Change: ±3%              | Res. Change: ±3%              |
| Temperature Cycle         | Res. Change: ±3%              | Res. Change: ±2%              |
| Rotational Life           | Res. Change: ±10% (20 cycles) | Res. Change: ±5% (100 cycles) |

## PVM4 Series Notice

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.

### ■ Notice (Soldering and Mounting)

1. Soldering
  - (1) Can be soldered by reflow soldering method, flow soldering method, and soldering iron.
  - (2) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
  - (3) Soldering condition  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
  - (4) Apply the appropriate amount of solder paste.  
The thickness of solder paste should be printed from 100 micro m to 150 micro m and the dimension of land pattern used should be Murata's standard land pattern at reflow soldering.  
Insufficient amounts of solder can lead to insufficient soldering strength on PCB.  
Excessive amounts of solder may cause bridging between the terminals.

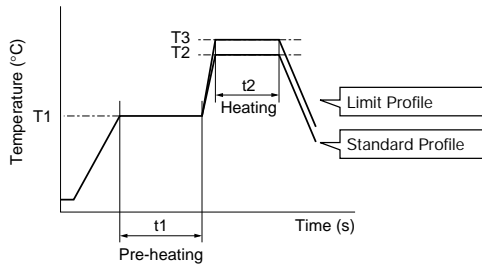
- (5) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.
2. Mounting
  - (1) Do not apply excessive force, preferably 9.8N max. (Ref. 1kgf) when the trimmer potentiometer is mounted to the PCB.
  - (2) Do not warp and/or bend PC board to prevent trimmer potentiometer from breakage.
  - (3) In chip placers, the recommended size of the cylindrical pick-up nozzle should be outer dimension 4.0mm dia. and inner dimension 2.0mm dia.
3. Cleaning  
Isopropyl alcohol and Ethyl alcohol are available materials for cleaning.  
For other materials, please consult with a Murata factory representative prior to using.

## PVM4 Series Notice

### ■ Soldering Profile

#### ● Flow Soldering Profile

Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu), Eutectic solder (63Sn/37Pb)

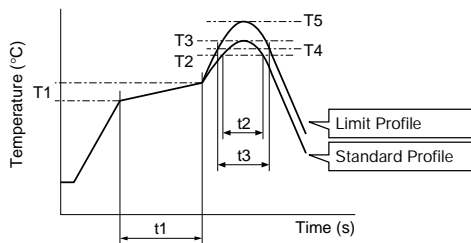


| Series      | Standard Profile |           |            |           |               | Limit Profile |           |            |           |               |
|-------------|------------------|-----------|------------|-----------|---------------|---------------|-----------|------------|-----------|---------------|
|             | Pre-heating      |           | Heating    |           | Cycle of Flow | Pre-heating   |           | Heating    |           | Cycle of Flow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |               | Temp. (T1)    | Time (t1) | Temp. (T3) | Time (t2) |               |
| °C          | sec.             | °C        | sec.       | Time      | °C            | sec.          | °C        | sec.       | Time      |               |
| <b>PVM4</b> | 150              | 60 to 120 | 250        | 5 max.    | 1             | 150           | 60 to 120 | 265±3      | 5 max.    | 2             |

#### ● Reflow Soldering Profile

1. Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu)

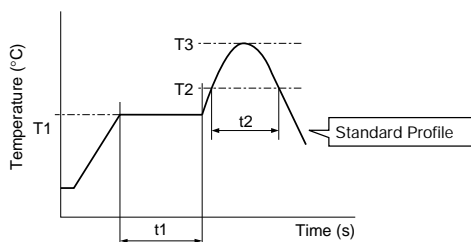
5



| Series      | Standard Profile |           |            |           |                       |                 | Limit Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|---------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow | Pre-heating   |           | Heating    |           | Peak Temperature (T5) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 | Temp. (T1)    | Time (t1) | Temp. (T4) | Time (t3) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  | °C              | sec.          | °C        | sec.       | °C        | Time                  |                 |
| <b>PVM4</b> | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180    | 60 to 120 | 230        | 30 to 50  | 260 +5/-0             | 2               |

2. Soldering profile for Eutectic solder (63Sn/37Pb)

(Limit profile: refer to 1)



| Series      | Standard Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  |                 |
| <b>PVM4</b> | 150              | 60 to 120 | 183        | 30        | 230                   | 1               |

#### ● Soldering Iron

| Series      | Standard Condition                |                |                             |                         |
|-------------|-----------------------------------|----------------|-----------------------------|-------------------------|
|             | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Soldering Iron |
|             | °C                                | sec.           | W                           | Time                    |
| <b>PVM4</b> | 350±10                            | 3 max.         | 30 max.                     | 1                       |

## PVM4 Series Notice

### ■ Notice (Handling)

1. Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdriver below.  
\* Recommended screwdriver for manual adjustment  
VESSEL MFG.: NO. 9000-2.6x30  
(Murata P/N: KMDR120)  
We can supply the screwdrivers above.  
If you place order, please specify the Murata P/N.
2. Do not apply more than 4.9N (Ref. 500gf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.
3. Please use within the effective rotational angle.  
The potentiometer does not have a mechanical stop for over rotation. In cases out of effective rotational angle, the trimmer potentiometer may not function.
4. When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401 series") and evaluate performance with your product. Lock paint may cause corrosion or electrical contact problems.

### ■ Notice (Other)

1. Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2. Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.

# Trimmer Potentiometers



## SMD Sealed Type Multi-turn PVG5 Series

### ■ Features

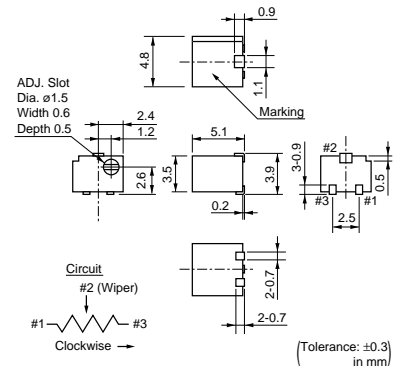
1. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
2. Available with reflow soldering method
3. Available for ultrasonic cleaning after soldering
4. Clutch mechanism prevents excessive wiper rotation.
5. Both Top and side adjustment directions
6. Ultra smaller volume (1/5-1/2) than leaded multi-turn potentiometer.

### ■ Applications

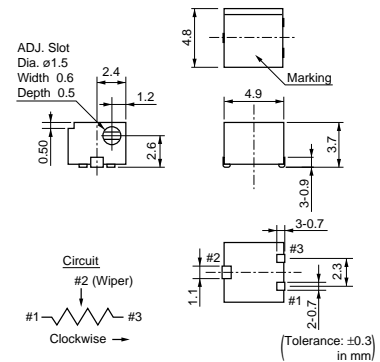
1. Measuring instruments
2. OA equipment
3. Medical equipment
4. Power supply
5. Sensors
6. Base station for cellular phone



PVG5A



PVG5H



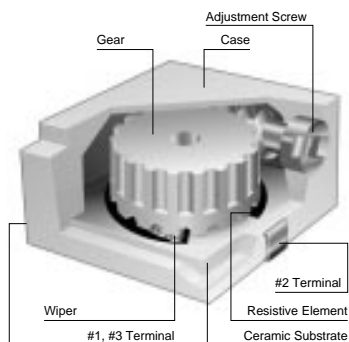
6

| Part Number | Power Rating (W) | Soldering Method      | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|-----------------------|--|------------------------|--------------|
| PVG5□100C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 10ohm ±10%             | ±150         |
| PVG5□200C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 20ohm ±10%             | ±150         |
| PVG5□500C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 50ohm ±10%             | ±150         |
| PVG5□101C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 100ohm ±10%            | ±150         |
| PVG5□201C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 200ohm ±10%            | ±150         |
| PVG5□501C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 500ohm ±10%            | ±150         |
| PVG5□102C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 1k ohm ±10%            | ±150         |
| PVG5□202C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 2k ohm ±10%            | ±150         |
| PVG5□502C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 5k ohm ±10%            | ±150         |
| PVG5□103C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 10k ohm ±10%           | ±150         |
| PVG5□203C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 20k ohm ±10%           | ±150         |
| PVG5□503C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 50k ohm ±10%           | ±150         |
| PVG5□104C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 100k ohm ±10%          | ±150         |
| PVG5□204C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 200k ohm ±10%          | ±150         |
| PVG5□504C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 500k ohm ±10%          | ±150         |
| PVG5□105C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 1M ohm ±10%            | ±150         |
| PVG5□205C03 | 0.25(70°C)       | Reflow/Soldering Iron | 11   | 2M ohm ±10%            | ±150         |

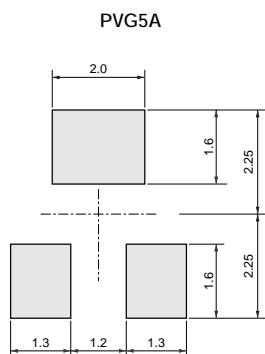
Operating Temperature Range: -55 to 125 °C

The blank column is filled with the code of adjustment direction A (top) or H (side).

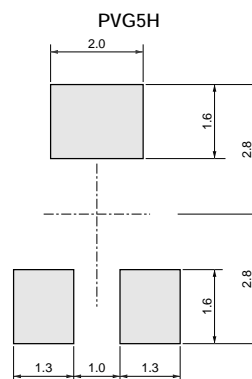
## Construction



## Standard Land Pattern



(Tolerance: ±0.1 in mm)



(Tolerance: ±0.1 in mm)

## Characteristics

|                           |  |
|---------------------------|--|
| Temperature Cycle         | $\Delta TR$ : ±2%<br>$\Delta V.S.S.$ : ±1%                                     |
| Humidity                  | $\Delta TR$ : ±2%<br>IR : 10M ohm min.   |
| Vibration (20G)           | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%                                     |
| Shock (100G)              | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%                                     |
| Temperature Load Life     | $\Delta TR$ : ±3% or 3 ohm max., whichever is greater<br>$\Delta V.S.S.$ : ±1% |
| Low Temperature Exposure  | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%                                     |
| High Temperature Exposure | $\Delta TR$ : ±2%<br>$\Delta V.S.S.$ : ±1%                                     |
| Rotational Life           | $\Delta TR$ : ±3% or 3 ohm max., whichever is greater (100 cycles)             |

$\Delta TR$  : Total Resistance Change  
 $\Delta V.S.S.$ : Voltage Setting Stability  
 IR : Insulation Resistance

## PVG5 Series Notice

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.

### ■ Notice (Soldering and Mounting)

#### 1. Soldering

- (1) Soldering condition  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.
- (2) Cannot be soldered using the flow soldering method. If you use the flow soldering method, the trimmer potentiometer may not function.
- (3) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.
- (4) Insufficient amounts of solder can lead to insufficient soldering strength on PCB.  
Excessive amounts of solder may cause bridging between the terminals.

#### 2. Mounting

- (1) Use our standard land dimension. Excessive land area causes displacement due to the effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
- (2) Do not apply excessive force, preferably 9.8N max. (Ref. 1kgf) when the trimmer potentiometer is mounted to the PCB.
- (3) Do not warp and/or bend PC board to prevent trimmer potentiometer from breakage.
- (4) In chip placers, the recommended size of the cylindrical pick-up nozzle should be outer dimension 4.0mm dia. and inner dimension 2.0mm dia.

#### 3. Cleaning

Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please consult with a Murata factory representative prior to using.

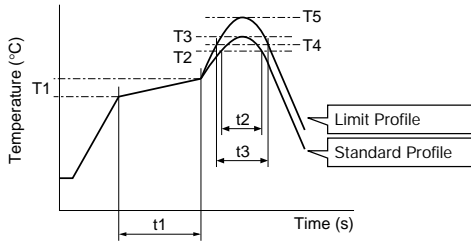


# PVG5 Series Notice

## ■ Soldering Profile

### ● Reflow Soldering Profile

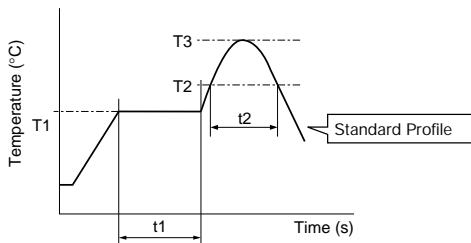
1. Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu)



| Series      | Standard Profile |           |            |           |                       |                 | Limit Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|---------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow | Pre-heating   |           | Heating    |           | Peak Temperature (T5) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 | Temp. (T1)    | Time (t1) | Temp. (T4) | Time (t3) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  | °C              | sec.          | °C        | sec.       | °C        | Time                  |                 |
| <b>PVG5</b> | 150 to 180       | 60 to 120 | 220        | 30 to 60  | 245±3                 | 2               | 150 to 180    | 60 to 120 | 230        | 30 to 50  | 260 +5/-0             | 2               |

2. Soldering profile for Eutectic solder (63Sn/37Pb)

(Limit profile: refer to 1)



| Series      | Standard Profile |           |            |           |                       |                 |
|-------------|------------------|-----------|------------|-----------|-----------------------|-----------------|
|             | Pre-heating      |           | Heating    |           | Peak Temperature (T3) | Cycle of Reflow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |                       |                 |
| °C          | sec.             | °C        | sec.       | °C        | Time                  |                 |
| <b>PVG5</b> | 150              | 60 to 120 | 183        | 30        | 230                   | 1               |

### ● Soldering Iron

| Series      | Standard Condition                |                |                             |                         |
|-------------|-----------------------------------|----------------|-----------------------------|-------------------------|
|             | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Soldering Iron |
|             | °C                                | sec.           | W                           | Time                    |
| <b>PVG5</b> | 350±10                            | 3 max.         | 30 max.                     | 1                       |

### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdrivers below.  
 \* Recommended screwdrivers for manual adjustment <PVG5 series>  
 VESSEL MFG.: NO.9000-1.3x30  
 (Murata P/N: KMDR130)  
 We can supply the screwdrivers above.  
 If you place order, please specify Murata P/N.
- Do not apply more than 9.8N (Ref. 1kgf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.

- When adjusting with a screwdriver, do not apply excessive force, preferable 4.9N max. (Ref 500gf).
- When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401 series") and evaluate performance with your product. Lock paint may cause corrosion or electrical problems.

### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.

# Trimmer Potentiometers



## Lead Sealed Type Single-turn PV32 Series

### ■ Features

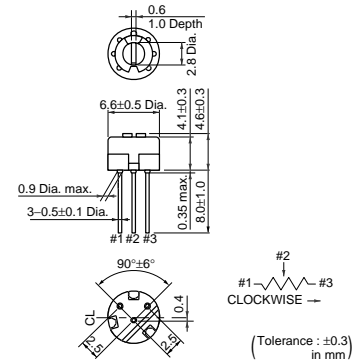
1. 6 standard terminal styles
2. Round shaped body enables smaller area mount than same 6mm square potentiometer.
3. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
4. Available for ultrasonic cleaning after soldering
5. Flammability: UL94V-0

### ■ Applications

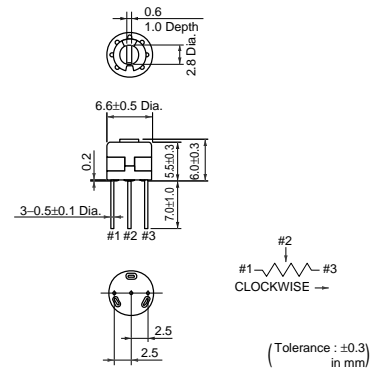
- |                 |                         |
|-----------------|-------------------------|
| 1. HDTVs        | 2. Professional cameras |
| 3. CATV         | 4. FAX                  |
| 5. Printers     | 6. Sensors              |
| 7. Power supply |                         |



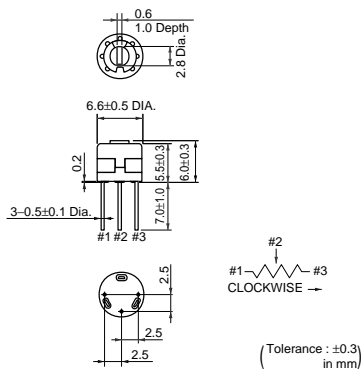
PV32H



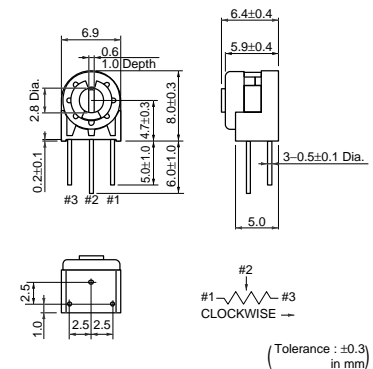
PV32R



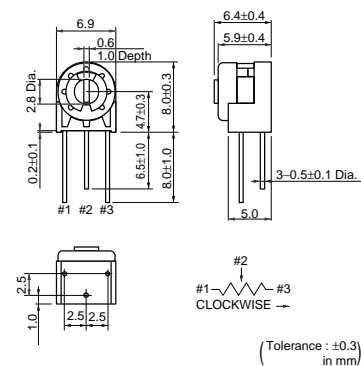
PV32P



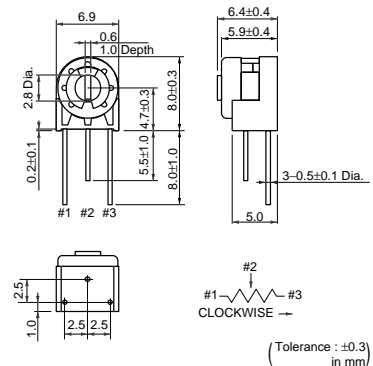
PV32N



PV32S



PV32T



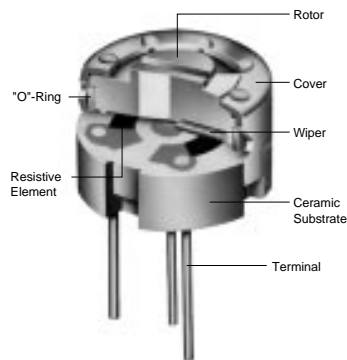
| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV32□100A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 10ohm ±20%             | ±100         |
| PV32□200A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 20ohm ±20%             | ±100         |
| PV32□250A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 25ohm ±20%             | ±100         |
| PV32□500A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 50ohm ±20%             | ±100         |
| PV32□101A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 100ohm ±20%            | ±100         |
| PV32□201A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 200ohm ±20%            | ±100         |
| PV32□251A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 250ohm ±20%            | ±100         |
| PV32□501A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 500ohm ±20%            | ±100         |
| PV32□102A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 1k ohm ±20%            | ±100         |
| PV32□202A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 2k ohm ±20%            | ±100         |
| PV32□252A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 2.5k ohm ±20%          | ±100         |
| PV32□502A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 5k ohm ±20%            | ±100         |
| PV32□103A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 10k ohm ±20%           | ±100         |
| PV32□203A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 20k ohm ±20%           | ±100         |
| PV32□253A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 25k ohm ±20%           | ±100         |
| PV32□503A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 50k ohm ±20%           | ±100         |
| PV32□104A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 100k ohm ±20%          | ±100         |
| PV32□204A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 200k ohm ±20%          | ±100         |
| PV32□254A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 250k ohm ±20%          | ±100         |
| PV32□504A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 500k ohm ±20%          | ±100         |
| PV32□105A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 1M ohm ±20%            | ±100         |
| PV32□205A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 2M ohm ±20%            | ±100         |
| PV32□505A01 | 0.5(70°C)        | Flow/Soldering Iron | 1(230°±5°)                                 | 5M ohm ±20%            | ±100         |

Operating Temperature Range: -55 to 125 °C

The blank column is filled with the code of adjustment direction and lead type (H, P, R, N, S and T).

The order quantity should be an integral multiple of the "Minimum Quantity".

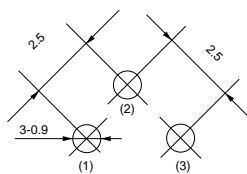
## Construction



7

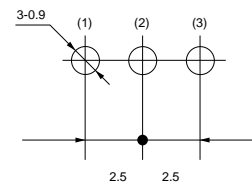
## Standard Mounting Holes

PV32H



(Tolerance: ±0.1 in mm)

PV32R



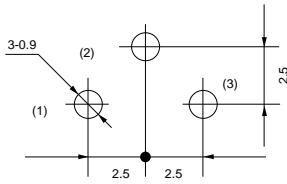
(Tolerance: ±0.1 in mm)

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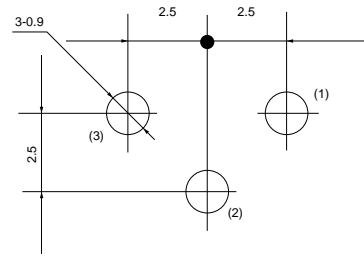
### Standard Mounting Holes

PV32P/PV32S



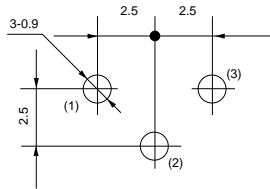
(Tolerance: ±0.1  
in mm)

PV32N



(Tolerance: ±0.1  
in mm)

PV32T



(Tolerance: ±0.1  
in mm)

### Characteristics

|                           |   |
|---------------------------|---|
| Temperature Cycle         | $\Delta$ TR : ±2%<br>$\Delta$ V.S.S.: ±1% |
| Humidity                  | $\Delta$ TR : ±2%<br>IR : 100M ohm min.   |
| Vibration (20G)           | $\Delta$ TR : ±1%<br>$\Delta$ V.S.S.: ±1% |
| Shock (100G)              | $\Delta$ TR : ±1%<br>$\Delta$ V.S.S.: ±1% |
| Temperature Load Life     | $\Delta$ TR : ±2%<br>$\Delta$ V.S.S.: ±2% |
| Low Temperature Exposure  | $\Delta$ TR : ±2%<br>$\Delta$ V.S.S.: ±1% |
| High Temperature Exposure | $\Delta$ TR : ±2%<br>$\Delta$ V.S.S.: ±1% |
| Rotational Life           | $\Delta$ TR : ±4% (200 cycles)            |

$\Delta$ TR : Total Resistance Change  
 $\Delta$ V.S.S.: Voltage Setting Stability  
 IR : Insulation Resistance

## PV32 Series Notice

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.

### ■ Notice (Soldering and Mounting)

#### 1. Soldering

- (1) Soldering condition  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
- (2) To minimize mechanical stress when adjusting, the trimmer potentiometer should be mounted onto PCB without gap.
- (3) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.

#### 2. Mounting

- (1) Use PCB hole to meet the pin of the trimmer potentiometer. If the trimmer potentiometer installs into insufficient PCB hole, the trimmer potentiometer may be damaged by mechanical stress.
- (2) Do not apply excessive force, preferably 9.8N max. (Ref. 1kgf) when the trimmer potentiometer is mounted to the PCB.

#### 3. Cleaning

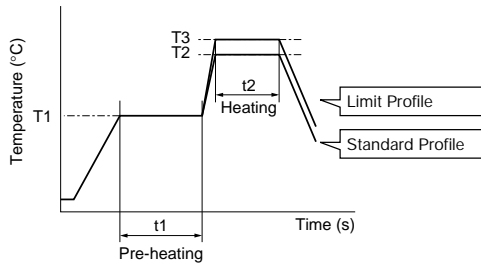
Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please consult with a Murata factory representative prior to using.

## PV32 Series Notice

### ■ Soldering Profile

#### ● Flow Soldering Profile

Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu), Eutectic solder (63Sn/37Pb)



| Series      | Standard Profile |           |            |           |               | Limit Profile |           |            |           |               |
|-------------|------------------|-----------|------------|-----------|---------------|---------------|-----------|------------|-----------|---------------|
|             | Pre-heating      |           | Heating    |           | Cycle of Flow | Pre-heating   |           | Heating    |           | Cycle of Flow |
|             | Temp. (T1)       | Time (t1) | Temp. (T2) | Time (t2) |               | Temp. (T1)    | Time (t1) | Temp. (T3) | Time (t2) |               |
| °C          | sec.             | °C        | sec.       | Time      | °C            | sec.          | °C        | sec.       | Time      |               |
| <b>PV32</b> | 150              | 60 to 120 | 250        | 5 max.    | 1             | 150           | 60 to 120 | 260        | 3 max.    | 1             |

#### ● Soldering Iron

| Series      | Standard Condition                |                |                             |                         |
|-------------|-----------------------------------|----------------|-----------------------------|-------------------------|
|             | Temperature of Soldering Iron Tip | Soldering Time | Soldering Iron Power Output | Cycle of Soldering Iron |
|             | °C                                | sec.           | W                           | Time                    |
| <b>PV32</b> | 350±10                            | 3 max.         | 30 max.                     | 1                       |

#### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdrivers below.  
 \* Recommended screwdriver for manual adjustment <PV32 series>  
 ENGINEER INC.: DA-40  
 (Murata P/N: KMDR180)  
 We can supply the screwdrivers above.  
 If you place an order, please specify the Murata P/N.
- Do not apply more than 9.8N (Ref. 1kgf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.
- When adjusting with an adjustment tool, the applied force to the adjustment screw should not exceed 4.9N (Ref. 500gf). If excessive force is applied, the trimmer potentiometer may not function due to damage.
- The rotational torque at the position of the adjustment range should not exceed the stop strength.
- When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401 series") and evaluate performance with your product. Lock paint may cause corrosion or electrical contact problems.

#### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.

# Trimmer Potentiometers



## Lead Sealed Type Multi-turn PV12/PV37/PV36 Series

### PV12 Series

#### ■ Features

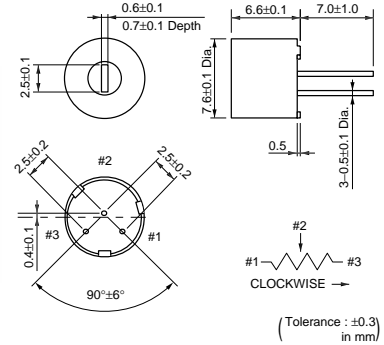
1. The unique inner gear system recognizes the position of the center of the shaft of the potentiometer.
2. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
3. Available for ultrasonic cleaning after soldering
4. Clutch mechanism prevents excessive wiper rotation.

#### ■ Applications

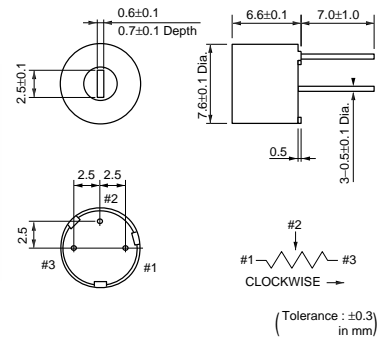
- |                             |                         |
|-----------------------------|-------------------------|
| 1. HDTVs                    | 2. Professional cameras |
| 3. CATV                     | 4. FAX                  |
| 5. Printers                 | 6. Sensors              |
| 7. Switching power supplies |                         |



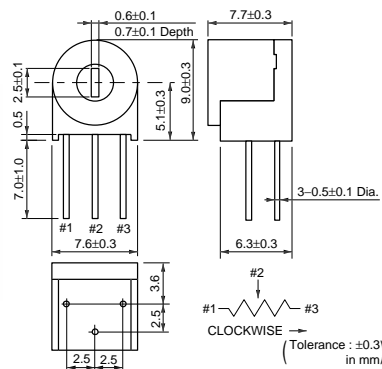
PV12H



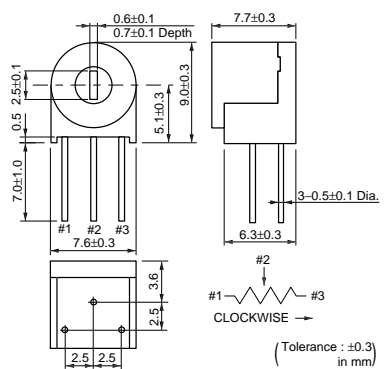
PV12P



PV12S



PV12T



| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV12□100A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 10ohm ±10%             | ±100         |
| PV12□200A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 20ohm ±10%             | ±100         |
| PV12□500A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 50ohm ±10%             | ±100         |
| PV12□101A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 100ohm ±10%            | ±100         |
| PV12□201A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 200ohm ±10%            | ±100         |
| PV12□501A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 500ohm ±10%            | ±100         |
| PV12□102A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 1k ohm ±10%            | ±100         |
| PV12□202A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 2k ohm ±10%            | ±100         |
| PV12□502A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 5k ohm ±10%            | ±100         |
| PV12□103A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 10k ohm ±10%           | ±100         |

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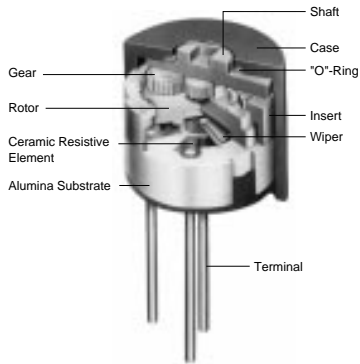
| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV12□203A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 20k ohm ±10%           | ±100         |
| PV12□503A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 50k ohm ±10%           | ±100         |
| PV12□104A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 100k ohm ±10%          | ±100         |
| PV12□204A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 200k ohm ±10%          | ±100         |
| PV12□504A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 500k ohm ±10%          | ±100         |
| PV12□105A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 1M ohm ±10%            | ±100         |
| PV12□205A01 | 0.5(70°C)        | Flow/Soldering Iron | 4  | 2M ohm ±10%            | ±100         |

Operating Temperature Range: -55 to 125 °C

The blank column is filled with the code of adjustment direction and lead type (H, P, T and S).

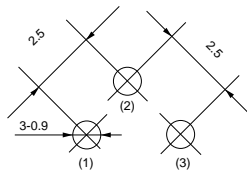
The order quantity should be an integral multiple of the "Minimum Quantity".

## Construction



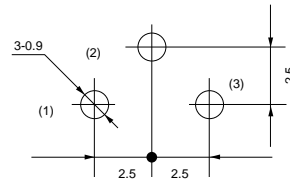
## Standard Mounting Holes

PV12H



(Tolerance: ±0.1 in mm)

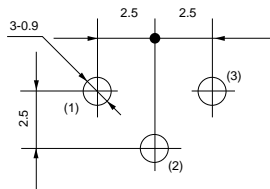
PV12P/PV12S



(Tolerance: ±0.1 in mm)

8

PV12T



(Tolerance: ±0.1 in mm)



## ■ Characteristics

|                           |  |
|---------------------------|--|
| Temperature Cycle         | $\Delta TR$ : $\pm 2\%$<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Humidity                  | $\Delta TR$ : $\pm 2\%$<br>IR : 100M ohm min.            |
| Vibration (20G)           | $\Delta TR$ : $\pm 1\%$<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Shock (100G)              | $\Delta TR$ : $\pm 1\%$<br>$\Delta V.S.S.$ : $\pm 1\%$   |
| Temperature Load Life     | $\Delta TR$ : $\pm 3\%$<br>$\Delta V.S.S.$ : $\pm 2\%$   |
| Low Temperature Exposure  | $\Delta TR$ : $\pm 3\%$<br>$\Delta V.S.S.$ : $\pm 1.5\%$ |
| High Temperature Exposure | $\Delta TR$ : $\pm 3\%$<br>$\Delta V.S.S.$ : $\pm 1.5\%$ |
| Rotational Life           | $\Delta TR$ : $\pm 3\%$ (200 cycles)                     |

$\Delta TR$  : Total Resistance Change  
 $\Delta V.S.S.$ : Voltage Setting Stability  
 IR : Insulation Resistance

## PV37 Series

### ■ Features

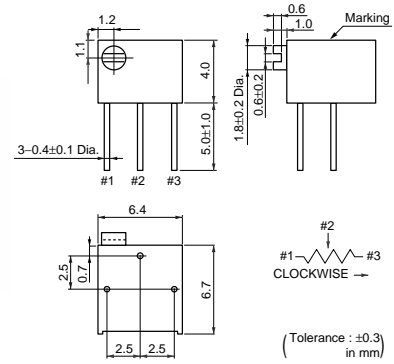
1. Smaller volume (about one-third) than 25-turns potentiometer
2. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
3. Available for ultrasonic cleaning after soldering
4. Clutch mechanism prevents excessive wiper rotation.
5. 5 standard terminal styles
6. Both top and side adjustment directions

### ■ Applications

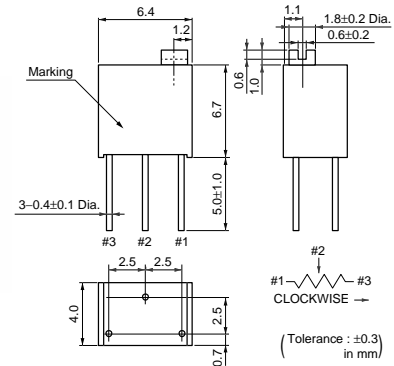
1. Measuring instruments
2. OA equipment
3. Medical equipment
4. Power supply
5. Base station for cellular phone



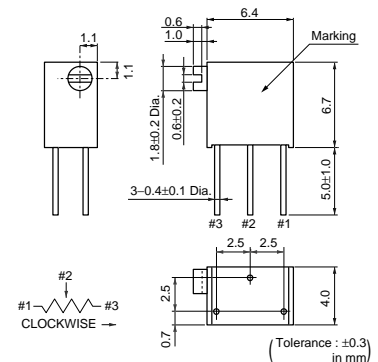
PV37P



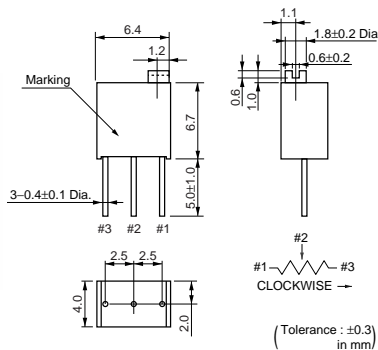
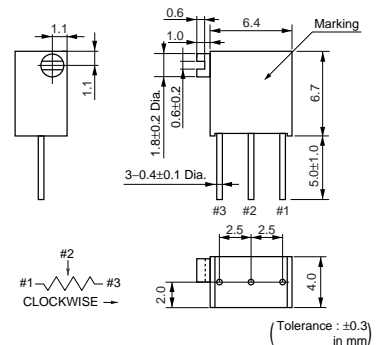
PV37W



PV37X



PV37Z



PV37Y

| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV37□100C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 10ohm ±10%             | ±150         |
| PV37□200C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 20ohm ±10%             | ±150         |
| PV37□500C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 50ohm ±10%             | ±150         |

Continued from the preceding page.

| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV37□101C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 100ohm ±10%            | ±150         |
| PV37□201C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 200ohm ±10%            | ±150         |
| PV37□501C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 500ohm ±10%            | ±150         |
| PV37□102C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 1k ohm ±10%            | ±150         |
| PV37□202C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 2k ohm ±10%            | ±150         |
| PV37□502C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 5k ohm ±10%            | ±150         |
| PV37□103C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 10k ohm ±10%           | ±150         |
| PV37□203C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 20k ohm ±10%           | ±150         |
| PV37□253C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 25k ohm ±10%           | ±150         |
| PV37□503C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 50k ohm ±10%           | ±150         |
| PV37□104C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 100k ohm ±10%          | ±150         |
| PV37□204C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 200k ohm ±10%          | ±150         |
| PV37□254C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 250k ohm ±10%          | ±150         |
| PV37□504C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 500k ohm ±10%          | ±150         |
| PV37□105C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 1M ohm ±10%            | ±150         |
| PV37□205C01 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 2M ohm ±10%            | ±150         |
| PV37□100C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 10ohm ±10%             | ±150         |
| PV37□200C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 20ohm ±10%             | ±150         |
| PV37□500C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 50ohm ±10%             | ±150         |
| PV37□101C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 100ohm ±10%            | ±150         |
| PV37□201C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 200ohm ±10%            | ±150         |
| PV37□501C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 500ohm ±10%            | ±150         |
| PV37□102C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 1k ohm ±10%            | ±150         |
| PV37□202C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 2k ohm ±10%            | ±150         |
| PV37□502C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 5k ohm ±10%            | ±150         |
| PV37□103C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 10k ohm ±10%           | ±150         |
| PV37□203C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 20k ohm ±10%           | ±150         |
| PV37□253C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 25k ohm ±10%           | ±150         |
| PV37□503C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 50k ohm ±10%           | ±150         |
| PV37□104C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 100k ohm ±10%          | ±150         |
| PV37□204C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 200k ohm ±10%          | ±150         |
| PV37□254C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 250k ohm ±10%          | ±150         |
| PV37□504C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 500k ohm ±10%          | ±150         |
| PV37□105C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 1M ohm ±10%            | ±150         |
| PV37□205C31 | 0.25(85°C)       | Flow/Soldering Iron | 12   | 2M ohm ±10%            | ±150         |

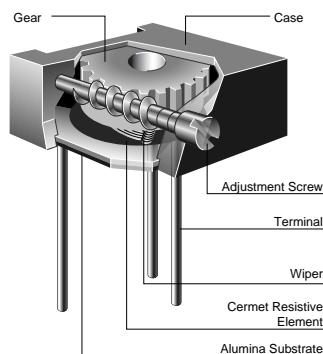
Operating Temperature Range: -55 to 125 °C

The blank column is filled with the code of adjustment direction and lead type (P, X, Y, W and Z).

The order quantity should be an integral multiple of the "Minimum Quantity".

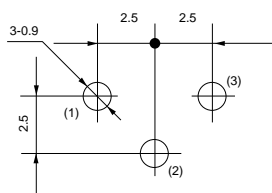
The last three digits express the individual specification codes. C01 for standard type and C31 for radial taping type (PV37Y/PV37Z series only).

## Construction



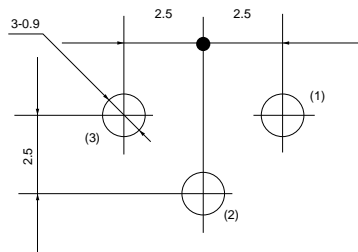
## ■ Standard Mounting Holes

PV37P



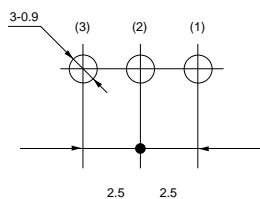
(Tolerance: ±0.1  
in mm)

PV37W/PV37X



(Tolerance: ±0.1  
in mm)

PV37Y/PV37Z



(Tolerance: ±0.1  
in mm)

## ■ Characteristics

|                           |  |
|---------------------------|--|
| Temperature Cycle         | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%   |
| Humidity                  | $\Delta TR$ : ±2%<br>IR : 100M ohm min.  |
| Vibration (20G)           | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%   |
| Shock (100G)              | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%   |
| Temperature Load Life     | $\Delta TR$ : ±2%<br>$\Delta V.S.S.$ : ±1%   |
| Low Temperature Exposure  | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%   |
| High Temperature Exposure | $\Delta TR$ : ±2%<br>$\Delta V.S.S.$ : ±1%   |
| Rotational Life           | $\Delta TR$ : $R \leq 100 \text{ ohm} \cdots \pm 3\%$<br>$R > 100 \text{ ohm} \cdots \pm 2\%$ (200 cycles) |

$\Delta TR$  : Total Resistance Change  
 $\Delta V.S.S.$ : Voltage Setting Stability  
 IR : Insulation Resistance  
 R : Standard Total Resistance

## PV36 Series

### ■ Features

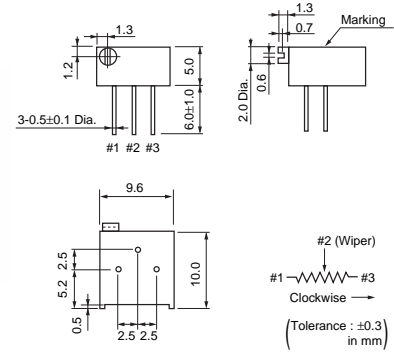
1. High resolution 25-turns enables precision adjustment easily.
2. Sealed construction protects the interior from dust and liquid, which achieves stable performance.
3. Available for ultrasonic cleaning after soldering
4. Clutch mechanism prevents excessive wiper rotation.
5. 5 standard terminal styles
6. Both top and side adjustment directions.

### ■ Applications

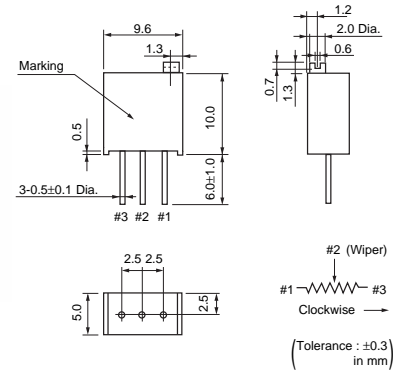
1. Measuring instruments
2. OA equipment
3. Medical equipment
4. Power supply
5. Base station for cellular phone



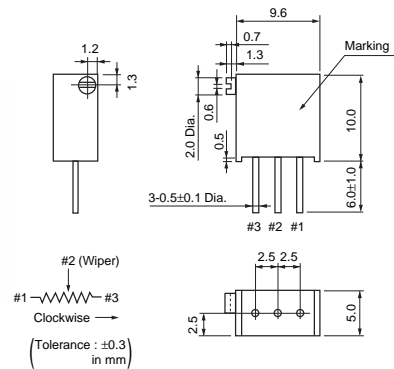
PV36P



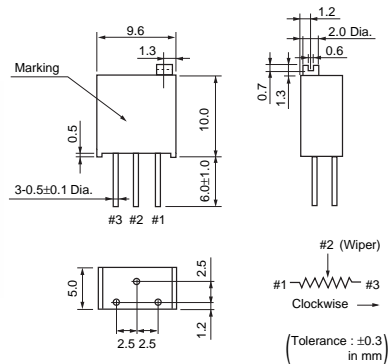
PV36W



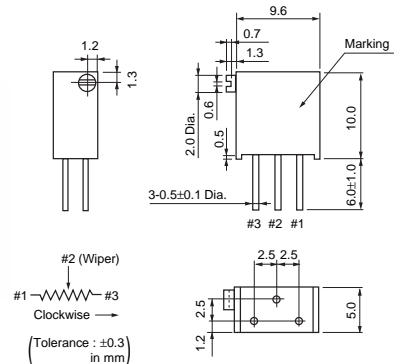
PV36X



PV36Y



PV36Z



| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV36□100C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 10ohm ±10%             | ±150         |
| PV36□200C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 20ohm ±10%             | ±150         |
| PV36□500C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 50ohm ±10%             | ±150         |

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| Part Number | Power Rating (W) | Soldering Method    | Number of Turns (Effective Rotation Angle) | Total Resistance Value | TCR (ppm/°C) |
|-------------|------------------|---------------------|--|------------------------|--------------|
| PV36□101C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 100ohm ±10%            | ±150         |
| PV36□201C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 200ohm ±10%            | ±100         |
| PV36□501C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 500ohm ±10%            | ±100         |
| PV36□102C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 1k ohm ±10%            | ±100         |
| PV36□202C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 2k ohm ±10%            | ±100         |
| PV36□502C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 5k ohm ±10%            | ±100         |
| PV36□103C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 10k ohm ±10%           | ±100         |
| PV36□203C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 20k ohm ±10%           | ±100         |
| PV36□253C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 25k ohm ±10%           | ±100         |
| PV36□503C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 50k ohm ±10%           | ±100         |
| PV36□104C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 100k ohm ±10%          | ±100         |
| PV36□204C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 200k ohm ±10%          | ±100         |
| PV36□254C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 250k ohm ±10%          | ±100         |
| PV36□504C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 500k ohm ±10%          | ±100         |
| PV36□105C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 1M ohm ±10%            | ±100         |
| PV36□205C01 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 2M ohm ±10%            | ±100         |
| PV36□100C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 10ohm ±10%             | ±150         |
| PV36□200C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 20ohm ±10%             | ±150         |
| PV36□500C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 50ohm ±10%             | ±150         |
| PV36□101C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 100ohm ±10%            | ±150         |
| PV36□201C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 200ohm ±10%            | ±100         |
| PV36□501C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 500ohm ±10%            | ±100         |
| PV36□102C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 1k ohm ±10%            | ±100         |
| PV36□202C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 2k ohm ±10%            | ±100         |
| PV36□502C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 5k ohm ±10%            | ±100         |
| PV36□103C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 10k ohm ±10%           | ±100         |
| PV36□203C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 20k ohm ±10%           | ±100         |
| PV36□253C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 25k ohm ±10%           | ±100         |
| PV36□503C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 50k ohm ±10%           | ±100         |
| PV36□104C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 100k ohm ±10%          | ±100         |
| PV36□204C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 200k ohm ±10%          | ±100         |
| PV36□254C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 250k ohm ±10%          | ±100         |
| PV36□504C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 500k ohm ±10%          | ±100         |
| PV36□105C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 1M ohm ±10%            | ±100         |
| PV36□205C31 | 0.5(70°C)        | Flow/Soldering Iron | 25   | 2M ohm ±10%            | ±100         |

Operating Temperature Range: -55 to 125 °C

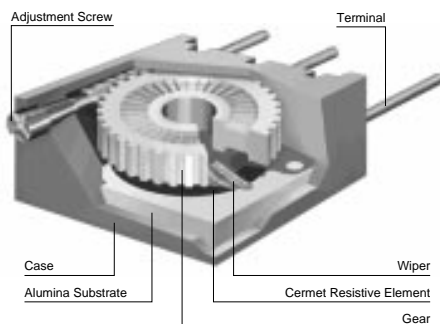
The blank column is filled with the code of adjustment direction and lead type (P, X, Y, W and Z).

The order quantity should be an integral multiple of the "Minimum Quantity".

The last three digits express the individual specification codes. C01 for standard type and C31 for radial taping type (PV36W/PV36X series only).

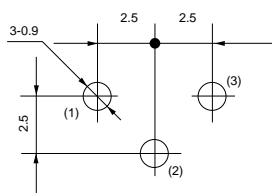
## Construction

8



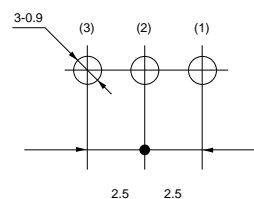
## Standard Mounting Holes

PV36P



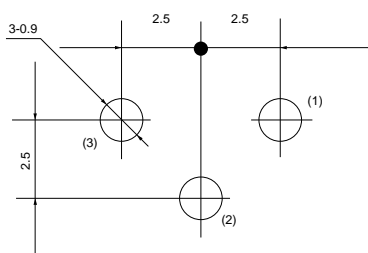
(Tolerance: ±0.1 in mm)

PV36W/X



(Tolerance: ±0.1 in mm)

PV36Y/Z



(Tolerance: ±0.1 in mm)

## Characteristics

|                           |   |
|---------------------------|---|
| Temperature Cycle         | $\Delta TR$ : ±2%<br>$\Delta V.S.S.$ : ±1%  |
| Humidity                  | $\Delta TR$ : ±2%<br>IR : 100M ohm min.   |
| Vibration (20G)           | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%  |
| Shock (100G)              | $\Delta TR$ : ±1%<br>$\Delta V.S.S.$ : ±1%  |
| Temperature Load Life     | $\Delta TR$ : ±3%<br>$\Delta V.S.S.$ : ±1%  |
| Low Temperature Exposure  | $\Delta TR$ : ±2%<br>$\Delta V.S.S.$ : ±1%  |
| High Temperature Exposure | $\Delta TR$ : ±3%<br>$\Delta V.S.S.$ : ±1%  |
| Rotational Life           | $\Delta TR$ : $R \leq 1k \text{ ohm}$ , $R \geq 500k \text{ ohm}$ ... ±5%<br>1k ohm < $R < 500k \text{ ohm}$ ... ±3% (200 cycles) |

$\Delta TR$  : Total Resistance Change  
 $\Delta V.S.S.$ : Voltage Setting Stability  
 IR : Insulation Resistance  
 R : Standard Total Resistance

## PV12/PV37/PV36 Series Notice

### ■ Notice (Operating and Storage Conditions)

1. Store in temperatures of -10 to +40 deg. C and relative humidity of 30-85%.
2. Do not store in or near corrosive gases.
3. Use within six months after delivery.
4. Open the package just before using.
5. Do not store under direct sunlight.
6. If you use the trimmer potentiometer in an environment other than listed below, please consult with a Murata factory representative prior to using.  
The trimmer potentiometer should not be used under the following environmental conditions:

- (1) Corrosive gaseous atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
- (2) In liquid  
(Ex. Oil, Medical liquid, Organic solvent, etc.)
- (3) Dusty/dirty atmosphere
- (4) Direct sunlight
- (5) Static voltage nor electric/magnetic fields
- (6) Direct sea breeze
- (7) Other variations of the above

### ■ Notice (Rating)

1. When using with partial load (rheostat), minimize the power depending on the resistance value.
2. The maximum input voltage to a trimmer potentiometer should not exceed  $(P \cdot R)^{1/2}$  or the maximum operating voltage, whichever is smaller.

### ■ Notice (Soldering and Mounting)

#### 1. Soldering

- (1) Soldering condition  
Refer to the temperature profile.  
If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
- (2) To minimize mechanical stress when adjusting, the trimmer potentiometer should be mounted onto PCB without gap.
- (3) The soldering iron should not come in contact with the case of the trimmer potentiometer. If such contact does occur, the trimmer potentiometer may be damaged.

#### 2. Mounting

- (1) Use PCB hole to meet the pin of the trimmer potentiometer. If the trimmer potentiometer installs into insufficient PCB hole, the trimmer potentiometer may be damaged by mechanical stress.
- (2) Do not apply excessive force, preferably 9.8N max. (Ref. 1kgf) when the trimmer potentiometer is mounted to the PCB.

#### 3. Cleaning

Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please consult with a Murata factory representative prior to using.

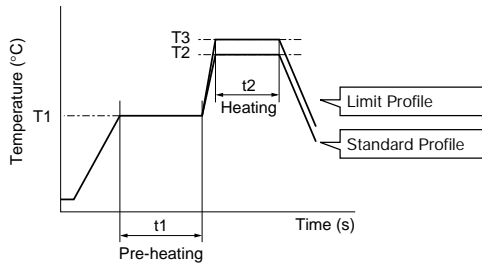


## PV12/PV37/PV36 Series Notice

### ■ Soldering Profile

#### ● Flow Soldering Profile

Soldering profile for Lead-free solder (96.5Sn/3.0Ag/0.5Cu), Eutectic solder (63Sn/37Pb)



| Series                                    | Standard Profile |                   |                  |                   |               | Limit Profile    |                   |                  |                   |               |
|---|------------------|-------------------|------------------|-------------------|---------------|------------------|-------------------|------------------|-------------------|---------------|
|   | Pre-heating      |                   | Heating          |                   | Cycle of Flow | Pre-heating      |                   | Heating          |                   | Cycle of Flow |
|   | Temp. (T1)<br>°C | Time (t1)<br>sec. | Temp. (T2)<br>°C | Time (t2)<br>sec. |               | Temp. (T1)<br>°C | Time (t1)<br>sec. | Temp. (T3)<br>°C | Time (t2)<br>sec. |               |
| <b>PV12</b><br><b>PV37</b><br><b>PV36</b> | 150              | 60 to 120         | 250              | 5 max.            | 1             | 150              | 60 to 120         | 260              | 3 max.            | 1             |

#### ● Soldering Iron

| Series | Standard Condition                        |                        |                                  |                                 |
|--------|---|------------------------|----------------------------------|---------------------------------|
|        | Temperature of Soldering Iron Tip<br>°C   | Soldering Time<br>sec. | Soldering Iron Power Output<br>W | Cycle of Soldering Iron<br>Time |
|        | <b>PV12</b><br><b>PV37</b><br><b>PV36</b> | 350±10                 | 3 max.                           | 30 max.                         |

#### ■ Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdrivers below.  
 \* Recommended screwdriver for manual adjustment  
 ENGINEER INC.: DA-40  
 (Murata P/N: KMDR180)  
 We can supply the screwdrivers above.  
 If you place order, please specify the Murata P/N.
- Do not apply more than 9.8N (Ref. 1kgf) of twist and stress after mounting onto PCB to prevent contact intermittence. If excessive force is applied, the trimmer potentiometer may not function.
- When adjusting with an adjustment tool, the applied force to the adjustment screw should not exceed 4.9N (Ref. 500gf). If excessive force is applied, the trimmer potentiometer may not function due to damage.
- When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401 series") and evaluate performance with your product. Lock paint may cause corrosion or electrical contact problems.

#### ■ Notice (Other)

- Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Murata cannot guarantee trimmer potentiometer integrity when used under conditions other than those specified in this document.

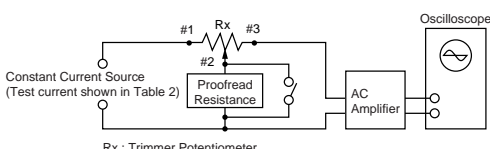
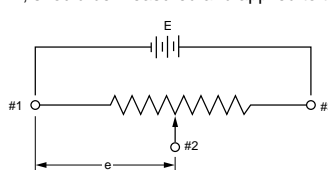
## SMD Open Type (PVZ2/A2/Z3)/SMD Sealed Type (PVM4A\_C01 Series) Specifications and Test Methods

The tests and measurements should be conducted under the condition of 15 to 35°C of temperature, 25 to 75% of relative humidity and 86 to 106 kpa of atmospheric pressure unless otherwise specified. If questionable results occur that have been measured in accordance with the above mentioned conditions, the tests and measurements should be conducted under the condition of 25±2°C of temperature, 45 to 55% of relative humidity and 86 to 106 kpa of atmospheric pressure.

| No.                               | Item                                  | Test Methods  |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
|-----------------------------------|---------------------------------------|---|-----------------------------------|--------------|---------------|-----------|----------------|------------|----------|------------|-------|-------|-------------|------|---------|------|---------|------------|-------|-------|-------|--------|------------|-------|-------|--------|-------|-------------|------|---------|------|---------|
| 1                                 | Residual Resistance                   | Position the contact arm at the extreme counterclockwise limit of mechanical travel and measure the resistance between the contact arm and the corresponding end terminal. Then, position the contact arm at the extreme clockwise limit of mechanical travel and measure the resistance between the contact arm and the corresponding end terminal. During this test, take suitable precautions to ensure that the rated current of the resistance element is not exceeded.  |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 2                                 | Contact Resistance                    | <p>Contact resistance variation should be measured with the measuring circuit shown below, or its equivalent. The operating wiper should be rotated in both directions through 90% of the actual effective-electrical travel for a total of 6 cycles.</p> <p>The rate of rotation of the operating wiper should be such that the wiper completes 1 count in determining whether or not a contact resistance variation is observed at least twice in the same location. The test current should follow the value given in Table 2 unless otherwise limited by the power rating.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Standard Total Resistance R (ohm)</th> <th>Test Current</th> </tr> </thead> <tbody> <tr> <td>100 ≤ R &lt; 10k</td> <td>20mA max.</td> </tr> <tr> <td>10k ≤ R &lt; 100k</td> <td>1mA max.</td> </tr> <tr> <td>100k ≤ R</td> <td>100µA max.</td> </tr> </tbody> </table> <p style="text-align: center;">Table 2: Test current for CRV</p> <div style="text-align: center;"> <p style="font-size: small;">Rx : Trimmer Potentiometer<br/>Oscilloscope bandwidth: 100Hz to 50kHz</p> <p>Figure 1: CRV measuring circuit</p> </div>  | Standard Total Resistance R (ohm) | Test Current | 100 ≤ R < 10k | 20mA max. | 10k ≤ R < 100k | 1mA max.   | 100k ≤ R | 100µA max. |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Standard Total Resistance R (ohm) | Test Current                          |   |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 100 ≤ R < 10k                     | 20mA max.                             |   |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 10k ≤ R < 100k                    | 1mA max.                              |   |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 100k ≤ R                          | 100µA max.                            |   |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 3                                 | Humidity Exposure                     | The wiper contact point should be preset at about 50% position of effective rotational angle. After that, the potentiometer should be placed in a chamber at 40±2°C and 90 - 95% without loading for 500±12 hours. The resistance value should be measured after keeping the potentiometer in a room for 5±1/6 hours.   |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 4                                 | High Temperature Exposure             | The wiper contact point should be preset at about 50% position of effective rotational angle. After that, the potentiometer should be placed in a chamber at 70±2°C without loading for 500±12 hours. The resistance value should be measured after keeping the potentiometer in a room for 1.5±1/6 hours.  |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 5                                 | Humidity Load Life                    | The wiper contact point should be preset at about 50% position of effective rotational angle. After that, the potentiometer should be placed in a chamber at 40±2°C and 90 - 95% with loading the 1/2 rated voltage between #1 and #2 terminals, intermittently 1.5 hours ON and 0.5 hours OFF for 1000±12 hours. The resistance value should be measured after keeping the potentiometer in a room for 5±1/6 hours.  |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 6                                 | Load Life                             | The wiper contact point should be preset at about 50% position of effective rotational angle. After that, the potentiometer should be placed in a chamber at 70±2°C (50±2°C for PVZ) with loading the 1/2 rated voltage between #1 and #2 terminals, intermittently 1.5 hours ON and 0.5 hours OFF for 1000±12 hours. The resistance value should be measured after keeping the potentiometer in a room for 1 to 2 hours.   |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 7                                 | Temperature Cycle                     | <p>The wiper contact point should be preset at about 50% position of effective rotational angle. After that, the potentiometer should be subjected to Table 3, Table 4 temperature for 5 cycles. The resistance value should be measured after keeping the potentiometer in a room for 1 to 2 hours.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sequence</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>-25±3</td> <td>+25±2</td> <td>+85±3</td> <td>+25±2</td> </tr> <tr> <td>Time (min.)</td> <td>30±3</td> <td>10 max.</td> <td>30±3</td> <td>10 max.</td> </tr> </tbody> </table> <p style="text-align: center;">Table 3: PVZ</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sequence</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>-55±3</td> <td>+25±2</td> <td>+125±3</td> <td>+25±2</td> </tr> <tr> <td>Time (min.)</td> <td>30±3</td> <td>10 max.</td> <td>30±3</td> <td>10 max.</td> </tr> </tbody> </table> <p style="text-align: center;">Table 4: PVA2/PVM4A□□□C01</p>  | Sequence                          | 1            | 2             | 3         | 4              | Temp. (°C) | -25±3    | +25±2      | +85±3 | +25±2 | Time (min.) | 30±3 | 10 max. | 30±3 | 10 max. | Sequence   | 1     | 2     | 3     | 4      | Temp. (°C) | -55±3 | +25±2 | +125±3 | +25±2 | Time (min.) | 30±3 | 10 max. | 30±3 | 10 max. |
| Sequence                          | 1                                     | 2   | 3                                 | 4            |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Temp. (°C)                        | -25±3                                 | +25±2   | +85±3                             | +25±2        |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Time (min.)                       | 30±3                                  | 10 max.   | 30±3                              | 10 max.      |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Sequence                          | 1                                     | 2   | 3                                 | 4            |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Temp. (°C)                        | -55±3                                 | +25±2   | +125±3                            | +25±2        |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Time (min.)                       | 30±3                                  | 10 max.   | 30±3                              | 10 max.      |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 8                                 | Temperature Coefficient of Resistance | <p>The trimmer potentiometer should be subjected to each of the following temperatures (see Table 5, Table 6) for 30 to 40 minutes. The resistance value should be measured in the chamber.</p> $TCR = \frac{R_2 - R_1}{R_1 (T_2 - T_1)} \times 10^6 \text{ (ppm/°C)}$ <p style="font-size: small;">             T<sub>1</sub> : Reference temperature in degrees celsius<br/>             T<sub>2</sub> : Test temperature in degrees celsius<br/>             R<sub>1</sub> : Resistance at reference temperature in ohm<br/>             R<sub>2</sub> : Resistance at test temperature in ohm         </p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sequence</th> <th>1*</th> <th>2</th> <th>3*</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>+25±2</td> <td>-25±3</td> <td>+25±2</td> <td>+85±3</td> </tr> </tbody> </table> <p style="text-align: center;">Table 5: PVZ</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sequence</th> <th>1*</th> <th>2</th> <th>3*</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>+25±2</td> <td>-55±3</td> <td>+25±2</td> <td>+125±3</td> </tr> </tbody> </table> <p style="text-align: center;">Table 6: PVA2/PVM4A□□□C01</p> <p style="font-size: small;">Note*: Norm temp.</p> | Sequence                          | 1*           | 2             | 3*        | 4              | Temp. (°C) | +25±2    | -25±3      | +25±2 | +85±3 | Sequence    | 1*   | 2       | 3*   | 4       | Temp. (°C) | +25±2 | -55±3 | +25±2 | +125±3 |            |       |       |        |       |             |      |         |      |         |
| Sequence                          | 1*                                    | 2   | 3*                                | 4            |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Temp. (°C)                        | +25±2                                 | -25±3   | +25±2                             | +85±3        |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Sequence                          | 1*                                    | 2   | 3*                                | 4            |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| Temp. (°C)                        | +25±2                                 | -55±3   | +25±2                             | +125±3       |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |
| 9                                 | Rotational Life                       | The wiper should be rotated over 90% of the effective rotational angle without loading at a speed of 10 cycles per minute, for 10 cycles continuously. The resistance value should be measured after keeping the potentiometer in a room for 10±5 minutes.  |                                   |              |               |           |                |            |          |            |       |       |             |      |         |      |         |            |       |       |       |        |            |       |       |        |       |             |      |         |      |         |

## SMD Sealed Type (PVF2/G3/M4A\_D01/G5)/Lead Sealed Type (PV32/12/37/36) Specifications and Test Methods

The following describes trimmer potentiometer testing conducted by Murata Manufacturing Co., Ltd. in accordance with MIL-R-22097 (Military specification for variable resistors, non-wirewound) and MIL-STD-202 (Test methods for electronic and electrical component parts).

| No.                               | Item                                  | Test Methods   |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
|-----------------------------------|---------------------------------------|--|-----------------------------------|--------------------------|----------------------|----------------------------|-------------------|------|-------------------|------------------|---------------------|------|----------------------------|-------|---------------------|----------------------------|--------------------|-------|------------------|------|-------------|------|
| 1                                 | Total Resistance                      | <p>Measure total resistance between the resistance element and terminals (#1 and #3) with the contact arm positioned against a stop. The positioning of the contact arm and terminal should be the same for subsequent total resistance measurements on the same device. Use the test voltage specified in Table 1 for total resistance measurements. This voltage should be used for all subsequent total resistance measurements.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Total Resistance, Nominal (ohm)</th> <th style="font-size: small;">Maximum Test Voltage (V)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>10 \leq R \leq 100</math></td> <td style="text-align: center;">1.0</td> </tr> <tr> <td style="text-align: center;"><math>100 &lt; R \leq 1k</math></td> <td style="text-align: center;">3.0</td> </tr> <tr> <td style="text-align: center;"><math>1k &lt; R \leq 10k</math></td> <td style="text-align: center;">10.0</td> </tr> <tr> <td style="text-align: center;"><math>10k &lt; R \leq 100k</math></td> <td style="text-align: center;">30.0</td> </tr> <tr> <td style="text-align: center;"><math>100k &lt; R</math></td> <td style="text-align: center;">100.0</td> </tr> </tbody> </table> <p style="text-align: center; font-size: x-small;">Table 1: Total resistance test voltage</p>  | Total Resistance, Nominal (ohm)   | Maximum Test Voltage (V) | $10 \leq R \leq 100$ | 1.0                        | $100 < R \leq 1k$ | 3.0  | $1k < R \leq 10k$ | 10.0             | $10k < R \leq 100k$ | 30.0 | $100k < R$                 | 100.0 |                     |                            |                    |       |                  |      |             |      |
| Total Resistance, Nominal (ohm)   | Maximum Test Voltage (V)              |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $10 \leq R \leq 100$              | 1.0                                   |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $100 < R \leq 1k$                 | 3.0                                   |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $1k < R \leq 10k$                 | 10.0                                  |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $10k < R \leq 100k$               | 30.0                                  |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $100k < R$                        | 100.0                                 |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| 2                                 | Residual Resistance                   | <p>Position the contact arm at the extreme counterclockwise limit of mechanical travel and measure the resistance between the contact arm and the corresponding end terminal. Then, position the contact arm at the extreme clockwise limit of mechanical travel and measure the resistance between the contact arm and the corresponding end terminal. During this test, take suitable precautions to ensure that the rated current of the resistance element is not exceeded.</p>  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| 3                                 | Contact Resistance Variation          | <p>Contact resistance variation should be measured with the measuring circuit shown in Figure 1, or its equivalent. The adjustment rotor (screw) should be rotated in both directions through 90% of the actual effective-electrical rotational angle (number of turns) for a total of 6 cycles. Only the last 3 cycles should count in determining whether or not a contact resistance variation is observed at least twice in the same location, exclusive of the roll-on or roll-off points where the contact arm moves from the termination, on or off, the resistance element. The rate of rotation of the adjustment rotor (screw) should be such that the adjustment rotor (screw) completes 1 cycle for 5 seconds minimum to 2 minutes maximum. The test current used should follow the value given in Table 2 unless otherwise limited by power rating.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Standard Total Resistance R (ohm)</th> <th style="font-size: small;">Test Current</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>R \leq 100</math></td> <td style="text-align: center;">20mA</td> </tr> <tr> <td style="text-align: center;"><math>100 &lt; R &lt; 500</math></td> <td style="text-align: center;">10mA</td> </tr> <tr> <td style="text-align: center;"><math>500 \leq R &lt; 1k</math></td> <td style="text-align: center;">4mA</td> </tr> <tr> <td style="text-align: center;"><math>1k \leq R &lt; 2k</math></td> <td style="text-align: center;">2mA</td> </tr> <tr> <td style="text-align: center;"><math>2k \leq R &lt; 50k</math></td> <td style="text-align: center;">1mA</td> </tr> <tr> <td style="text-align: center;"><math>50k \leq R &lt; 200k</math></td> <td style="text-align: center;">200µA</td> </tr> <tr> <td style="text-align: center;"><math>200k \leq R &lt; 1M</math></td> <td style="text-align: center;">100µA</td> </tr> <tr> <td style="text-align: center;"><math>1M \leq R &lt; 2M</math></td> <td style="text-align: center;">50µA</td> </tr> <tr> <td style="text-align: center;"><math>2M \leq R</math></td> <td style="text-align: center;">30µA</td> </tr> </tbody> </table> <p style="text-align: center; font-size: x-small;">Table 2: Test current for CRV</p> <div style="text-align: right; margin-top: 10px;">  <p style="font-size: x-small; margin-top: 5px;">Rx : Trimmer Potentiometer<br/>Oscilloscope bandwidth : 100Hz to 50kHz</p> <p style="text-align: center; font-weight: bold;">Figure 1: CRV measuring circuit</p> </div> | Standard Total Resistance R (ohm) | Test Current             | $R \leq 100$         | 20mA                       | $100 < R < 500$   | 10mA | $500 \leq R < 1k$ | 4mA              | $1k \leq R < 2k$    | 2mA  | $2k \leq R < 50k$          | 1mA   | $50k \leq R < 200k$ | 200µA                      | $200k \leq R < 1M$ | 100µA | $1M \leq R < 2M$ | 50µA | $2M \leq R$ | 30µA |
| Standard Total Resistance R (ohm) | Test Current                          |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $R \leq 100$                      | 20mA                                  |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $100 < R < 500$                   | 10mA                                  |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $500 \leq R < 1k$                 | 4mA                                   |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $1k \leq R < 2k$                  | 2mA                                   |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $2k \leq R < 50k$                 | 1mA                                   |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $50k \leq R < 200k$               | 200µA                                 |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $200k \leq R < 1M$                | 100µA                                 |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $1M \leq R < 2M$                  | 50µA                                  |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| $2M \leq R$                       | 30µA                                  |  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| 4                                 | Temperature Coefficient of Resistance | <p>The trimmer potentiometer should be subjected to each of the following temperatures (see Table 3) for 30-45 minutes. Temperature coefficient of resistance should be applied to the following formula.</p> $TCR = \frac{R_2 - R_1}{R_1 (T_2 - T_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ <p style="font-size: x-small; margin-left: 20px;"> <math>T_1</math> : Reference temperature in degrees celsius<br/> <math>T_2</math> : Test temperature in degrees celsius<br/> <math>R_1</math> : Resistance at reference temperature ohm<br/> <math>R_2</math> : Resistance at test temperature in ohm                 </p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; width: 80%;"> <thead> <tr> <th style="font-size: x-small;">Sequence</th> <th style="font-size: x-small;">1*</th> <th style="font-size: x-small;">2</th> <th style="font-size: x-small;">3</th> <th style="font-size: x-small;">4*</th> <th style="font-size: x-small;">5</th> <th style="font-size: x-small;">6</th> </tr> </thead> <tbody> <tr> <td style="font-size: x-small;">Temperature (°C)</td> <td style="text-align: center;">+25</td> <td style="text-align: center;">-15</td> <td style="text-align: center;">Min. operating Temperature</td> <td style="text-align: center;">+25</td> <td style="text-align: center;">+65</td> <td style="text-align: center;">Max. operating Temperature</td> </tr> </tbody> </table> <p style="font-size: x-small; margin-left: 20px;">Note*: Reference temperature</p> <p style="text-align: center; font-size: x-small;">Table 3: Test temperatures</p>  | Sequence                          | 1*                       | 2                    | 3                          | 4*                | 5    | 6                 | Temperature (°C) | +25                 | -15  | Min. operating Temperature | +25   | +65                 | Max. operating Temperature |                    |       |                  |      |             |      |
| Sequence                          | 1*                                    | 2  | 3                                 | 4*                       | 5                    | 6                          |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| Temperature (°C)                  | +25                                   | -15  | Min. operating Temperature        | +25                      | +65                  | Max. operating Temperature |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |
| 5                                 | Voltage Setting Stability             | <p>The wiper should be set at approximately 40% of the actual effective-electrical rotational angle (number of turns). An adequate DC test potential should be applied between terminal #1 and terminal #3. The voltage between terminal #1 and terminal #3, and the voltage between terminal #1 and terminal #2, should be measured and applied to the following formula.</p> $\text{Voltage setting stability} = \left( \frac{e'}{E} - \frac{e}{E} \right) \times 100 \text{ (\%)}$ <p style="font-size: x-small; margin-left: 20px;"> <math>e</math> : Before test<br/>                     (The voltage between terminal #1 and terminal #2)<br/> <math>e'</math> : After test<br/>                     (The voltage between terminal #1 and terminal #2)                 </p> <div style="text-align: right; margin-top: 10px;">  <p style="text-align: center; font-weight: bold;">Figure 2</p> </div>  |                                   |                          |                      |                            |                   |      |                   |                  |                     |      |                            |       |                     |                            |                    |       |                  |      |             |      |

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## SMD Sealed Type (PVF2/G3/M4A\_D01/G5)/Lead Sealed Type (PV32/12/37/36) Specifications and Test Methods

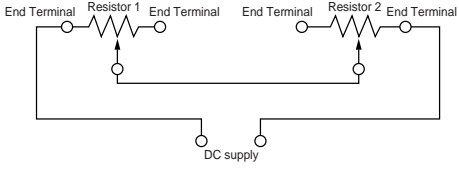
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| No.         | Item   | Test Methods   |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
|-------------|--|--|-----------------|--------|---|---|---|------------|----------------------|-------|-----------------|-------|-------------|----|--------|----|--------|
| 6           | Temperature Cycle  | <p>The trimmer potentiometer should be subjected to Table 4 temperature for 5 cycles. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 1-2 hours.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sequence</th> <th style="text-align: center;">1</th> <th style="text-align: center;">2</th> <th style="text-align: center;">3</th> <th style="text-align: center;">4</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Temp. (°C)</td> <td style="text-align: center;">PV□□ series<br/>-55±3</td> <td style="text-align: center;">+25±2</td> <td style="text-align: center;">+125±3<br/>+60±3</td> <td style="text-align: center;">+25±2</td> </tr> <tr> <td style="text-align: center;">Time (min.)</td> <td style="text-align: center;">30</td> <td style="text-align: center;">5 max.</td> <td style="text-align: center;">30</td> <td style="text-align: center;">5 max.</td> </tr> </tbody> </table> <p style="text-align: center; margin-top: 5px;">Table 4: One cycle of temperature cycle.</p> | Sequence        | 1      | 2 | 3 | 4 | Temp. (°C) | PV□□ series<br>-55±3 | +25±2 | +125±3<br>+60±3 | +25±2 | Time (min.) | 30 | 5 max. | 30 | 5 max. |
| Sequence    | 1  | 2  | 3               | 4      |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| Temp. (°C)  | PV□□ series<br>-55±3                                       | +25±2  | +125±3<br>+60±3 | +25±2  |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| Time (min.) | 30   | 5 max.   | 30              | 5 max. |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| 7           | Humidity   | <p>1) PV12, PV32, PVM4A□□□D01 series<br/>The trimmer potentiometer should be placed in a chamber at a temperature of 40±2°C and a humidity of 90-95% without loading for 250±8 hours (500±12 hours for PVM4A□□□D01 series). The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 5±1/6 hours.</p> <p>2) PVF2 series<br/>The trimmer potentiometer should be placed in a chamber at 60±2°C and 90-95% without loading for 1000±12 hours. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 5±1/6 hours</p> <p>2) PVG3, PVG5, PV36, PV37 series<br/>The trimmer potentiometer should be subjected to the programmed humidity environment for 10cycle (see Figure 3). The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 1.5±1/2 hours.</p> <div style="text-align: center;"> <p style="text-align: center;">Figure 3</p> </div>  |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| 8           | Vibration  | <p>1) PV□□ series<br/>The trimmer potentiometer should be vibrated throughout the frequency range at the 20G level. A complete frequency range, 10Hz to 2000Hz and back, should be made within 15 minutes for a total of 4 sweeps in each of the three axis directions for a total of 12 sweeps.</p> <p>2) PVF2 series<br/>The trimmer potentiometer should be subjected to vibration at 0.3 inch amplitude. The frequency should be varied uniformly between the approximate limits of 10Hz and 55Hz. This motion should be applied for period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).</p>  |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| 9           | Shock  | <p>1) PV□□ series<br/>The trimmer potentiometer should be shocked at the 100G level and should be subjected to 4 shocks in each of the three axis directions for a total of 12 shocks.</p> <p>2) PVM4A□□□D01 series<br/>The trimmer potentiometer should be shocked at the 100G level and should be subjected to 3 shocks in each of the six axis directions for a total of 18 shocks.</p>   |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| 10          | Temperature Road Life                                      | Full rated continuous working voltage not exceeding the maximum rated voltage should be applied intermittently between terminal #1 and terminal #3 of the trimmer potentiometer, 1.5 hours on and 0.5 hours off, for a total of 1000±12 hours, at a temperature of 70±2°C (85±2°C for PV37 series, 50±2°C for PVF2 series). The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 1 to 2 hours.  |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| 11          | High Temperature Exposure (Except for PVF2)                | The trimmer potentiometer should be placed in a chamber at a temperature of 125±3°C 250±8 hours without loading. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 1 to 2 hours.   |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |
| 12          | Low Temperature Exposure (Except for PVF2 and PVM4A□□□D01) | The trimmer potentiometer should be placed in a chamber at a temperature of -55±3°C for 1 hours without loading. Full rated continuous working voltage not exceeding the maximum rated voltage should be applied for 45 minutes. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for approximately 24 hours.   |                 |        |   |   |   |            |                      |       |                 |       |             |    |        |    |        |

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## SMD Sealed Type (PVF2/G3/M4A\_D01/G5)/Lead Sealed Type (PV32/12/37/36) Specifications and Test Methods

Continued from the preceding page.

| No. | Item   | Test Methods  |
|-----|--|---|
| 13  | Low Temperature Operation<br>(Only for PVF2 and PVM4A□□□D01) | The trimmer potentiometer should be placed in a chamber at a temperature of $-25\pm 3^{\circ}\text{C}$ ( $-55\pm 3^{\circ}\text{C}$ for PVM4A□□□D01 series) $48\pm 4$ hours without loading. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of $25\pm 5^{\circ}\text{C}$ for 1-2 hours.  |
| 14  | Rotational Life  | <p>1) PV□□ series<br/>Full rated continuous working voltage not exceeding the maximum rated voltage should be applied with the circuit shown in the figure. The adjustment rotor (screw) should be continuously cycled through not less than 90% of effective-electrical rotational angle (number of turns), at the rate of 1 cycle for 5 seconds minimum to 2.5 minutes maximum for total of 200 cycles.</p> <div style="text-align: center;">  <p>Figure 4</p> </div> <p>2) PVG3, PVG5 series<br/>The adjustment rotor (screw) should be continuously cycled though not less than 90% of effective-electrical rotational angle (number of turns), at the rate of 1 cycle for 5 seconds minimum to 2.5 minutes maximum for a total of 50 (100 for PVG5) cycles, without loading.</p> <p>3) PVF2, PVM4A□□□D01 series<br/>The wiper should be rotated over 90% of the effective rotational angle without loading at a speed of 10 cycles per minute, for 100 cycles continuously.</p> |

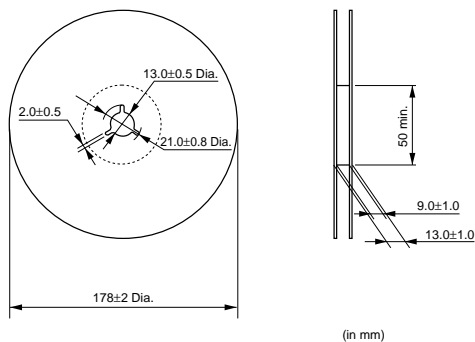
## Packaging

### Minimum Quantity

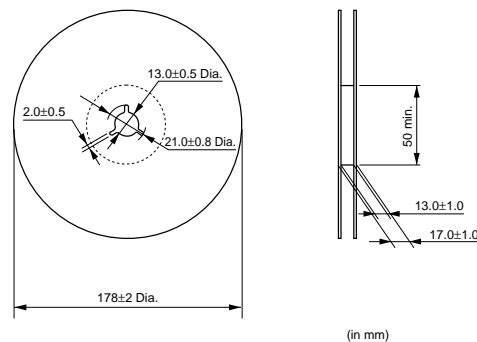
| Part Number | Minimum Quantity (pcs.) |             |           |          |      |      |
|-------------|-------------------------|-------------|-----------|----------|------|------|
|             | ø180mm reel             | ø330mm reel | Ammo Pack | Magazine | Bulk | Tray |
| PVZ2A       | 3000                    | 12000       | —         | —        | 1000 | —    |
| PVZ2R       | 3000                    | —           | —         | —        | 1000 | —    |
| PVA2        | 3000                    | —           | —         | —        | 1000 | —    |
| PVZ3A       | 2000                    | 8000        | —         | —        | 1000 | —    |
| PVZ3G       | 2500                    | —           | —         | —        | 1000 | —    |
| PVZ3K       | 1500                    | —           | —         | —        | 1000 | —    |
| PVG3A/G     | 1000                    | —           | —         | —        | 500  | —    |
| PVG3K       | 500                     | —           | —         | —        | —    | —    |
| PVM4        | 500                     | 3000        | —         | —        | 500  | —    |
| PVF2A       | 500                     | —           | —         | —        | 100  | —    |
| PVG5A       | 250                     | —           | —         | —        | 100  | —    |
| PVG5H       | 500                     | —           | —         | —        | 100  | —    |
| PV32        | —                       | —           | —         | —        | 300  | —    |
| PV12        | —                       | —           | —         | —        | 50   | —    |
| PV36W       | —                       | —           | 1000      | 1000     | 100  | —    |
| PV36Y       | —                       | —           | —         | 1000     | 100  | —    |
| PV36X       | —                       | —           | 1000      | 800      | 100  | —    |
| PV36Z/P     | —                       | —           | —         | 800      | 100  | —    |
| PV37Y/Z     | —                       | —           | 1000      | —        | 100  | —    |
| PV37W/X/P   | —                       | —           | —         | —        | 100  | —    |

### Dimensions of Reel

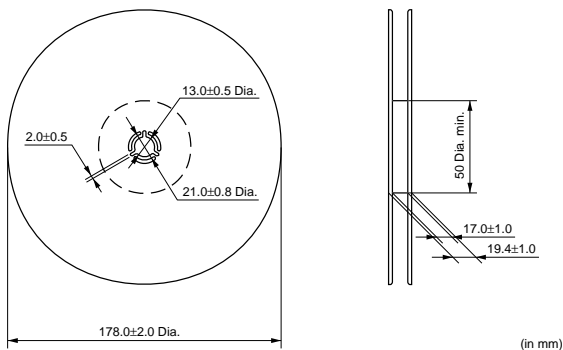
PVZ2A/PVA2/PVZ3A/PVZ3G/PVF2



PVZ2R/PVZ3K/PVM4/PVG3/PVG5H



PVG5A



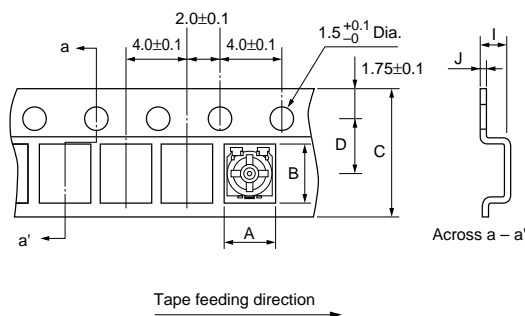
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## Packaging

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### Dimensions of Plastic Tape

#### PVZ2 / PVA2 / PVZ3 / PVF2

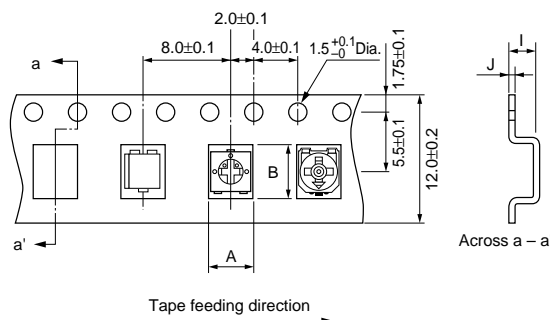


| Part Number | A       | B       | C        | D       | I        | J       |
|-------------|---------|---------|----------|---------|----------|---------|
| PVZ2A       | 2.4±0.2 | 3.1±0.1 | 8.0±0.2  | 3.5±0.1 | 1.1±0.1  | 0.2±0.1 |
| PVZ2R       |         | 5.1±0.2 | 12.0±0.2 | 5.5±0.1 | 1.0±0.1  | 0.3±0.1 |
| PVA2        |         | 3.1±0.1 | 8.0±0.2  | 3.5±0.1 | 1.1±0.1  | 0.2±0.1 |
| PVZ3A       | 3.3±0.2 | 3.8±0.2 |          |         | 1.95±0.1 |         |
| PVZ3G       |         | 5.8±0.2 |          |         | 1.3±0.1  |         |
| PVZ3K       | 2.3±0.2 | 2.3±0.2 | 8.0±0.2  | 5.5±0.1 | 2.3±0.1  | 0.3±0.1 |
| PVF2        |         | 2.3±0.2 | 8.0±0.2  | 3.5±0.1 | 2.3±0.1  |         |

• The side containing terminals #1 and #3 faces the plastic tape pilot holes.

(in mm)

#### PVG3A / PVG3G / PVM4 / PVG5H



| Part Number | A       | B       | I        | J       |
|-------------|---------|---------|----------|---------|
| PVG3A       | 4.0±0.1 | 4.0±0.1 | 2.1±0.1  | 0.3±0.1 |
| PVG3G       |         | 4.9±0.1 |          |         |
| PVM4        | 4.5±0.2 | 5.5±0.2 | 2.15±0.1 | 0.3±0.1 |
| PVG5H       | 5.4±0.2 | 5.8±0.2 | 4.0±0.1  | 0.4±0.1 |

• The side containing terminals #1 and #3 faces the plastic tape pilot holes (except PVG3).

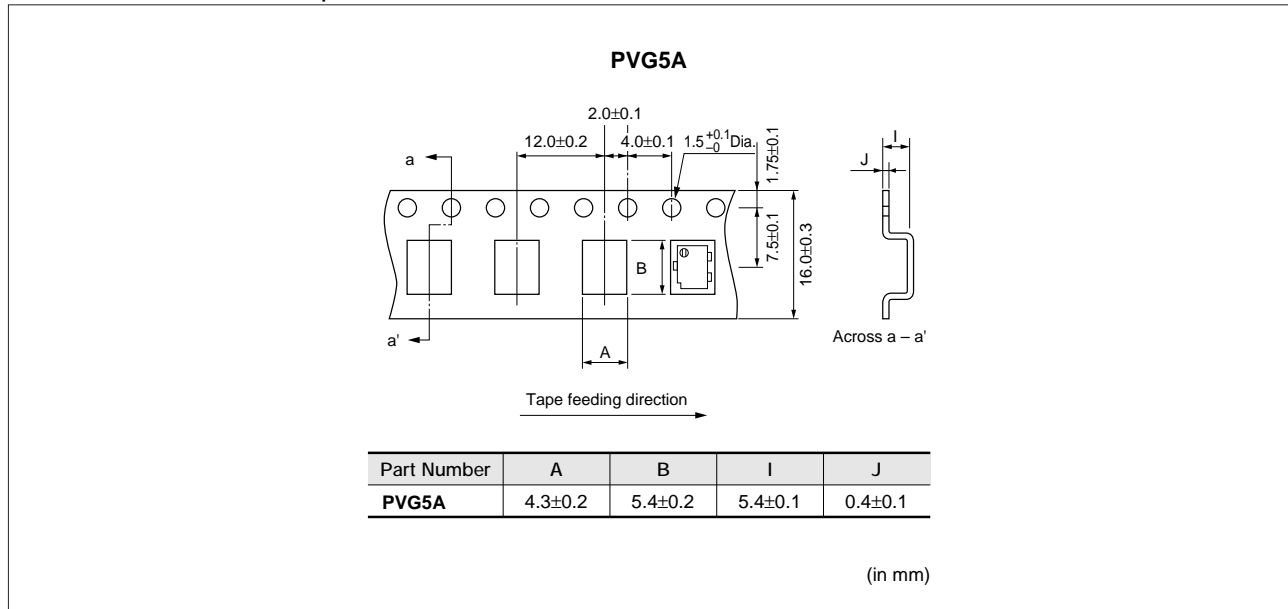
(in mm)

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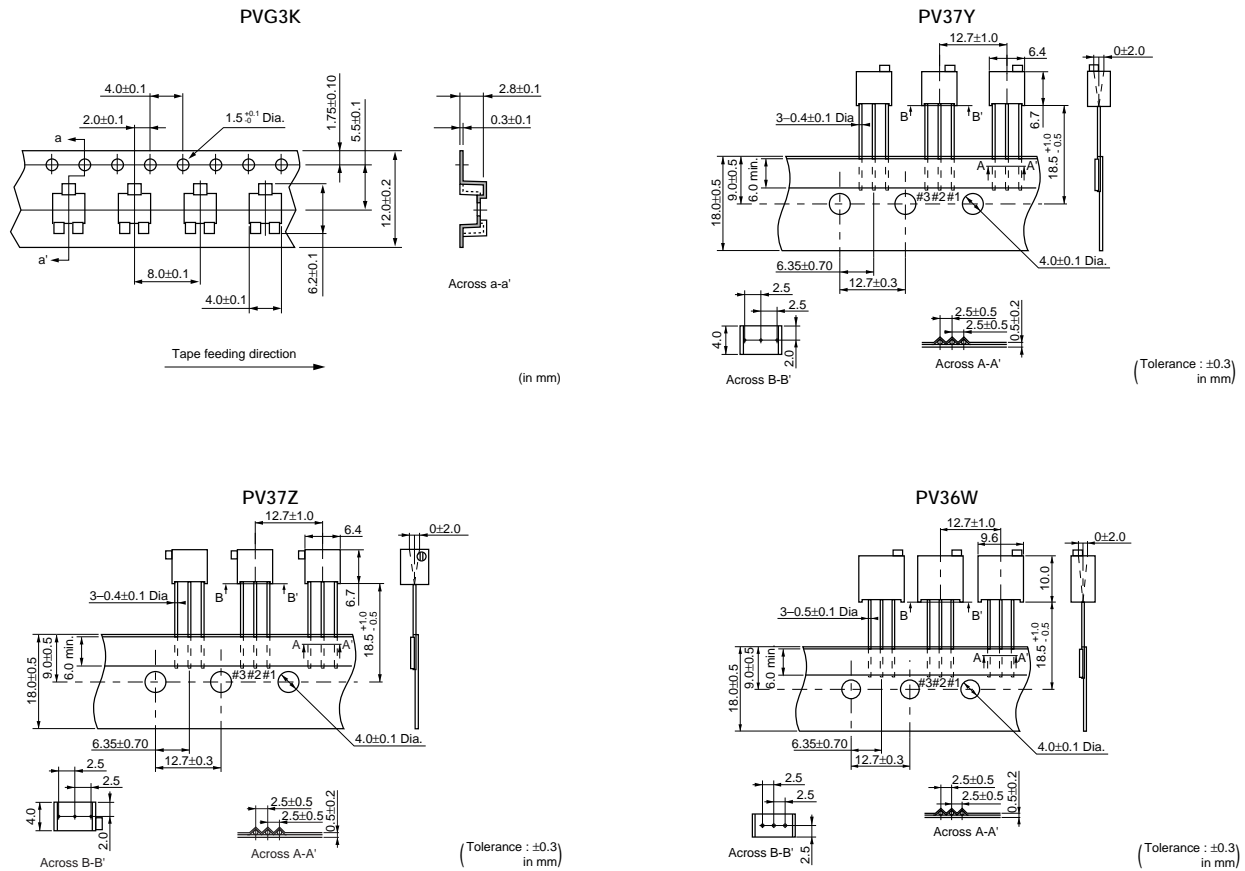
## Packaging

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### Dimensions of Plastic Tape



### Dimensions of Radial Taping



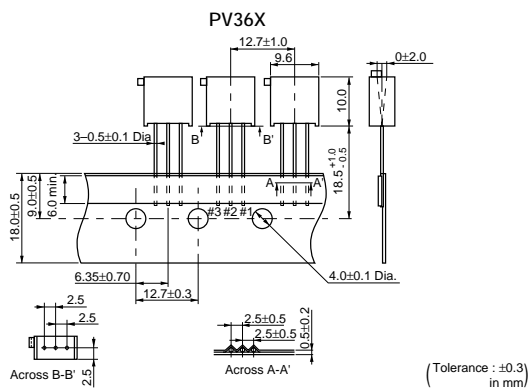
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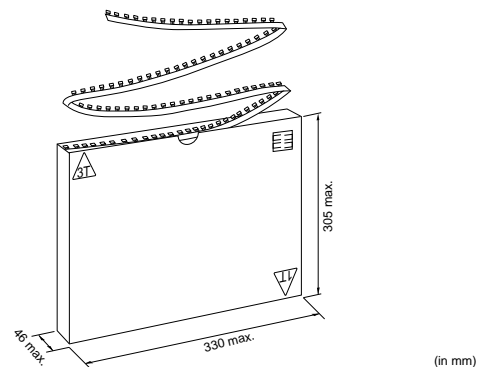
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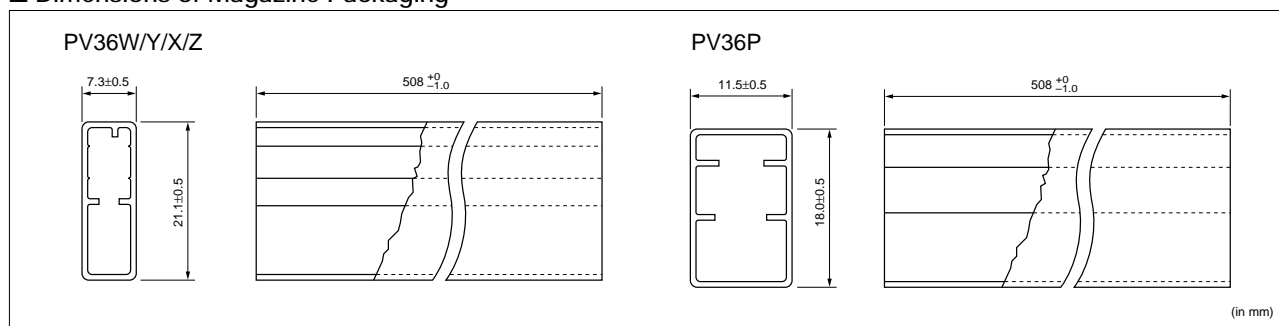
### ■ Dimensions of Radial Taping



### ■ Dimensions of Ammo Pack



### ■ Dimensions of Magazine Packaging



## Recommended Adjustment Tools/Qualified Standards

### Recommended Adjustment Tools

| Trimmer Potentiometer Series | Manufacturers          | Model Number   | MURATA Model Number | Blade                |
|------------------------------|------------------------|----------------|---------------------|----------------------|
| <b>PVZ2/PVA2</b>             | MURATA MFG.            | KMDR190        | KMDR190             | + Cross              |
| <b>PVZ3</b>                  | VESSEL MFG.            | No.9000+1.7×30 | KMDR080             | + Cross              |
| <b>PVG3</b>                  | TORAY INDUSTRIES, INC. | SA-2225        | KMDR070             | - Minus (round edge) |
| <b>PVM4</b>                  | VESSEL MFG.            | No.9000-2.6×30 | KMDR120             | - Minus              |
| <b>PVG5</b>                  | VESSEL MFG.            | No.9000-1.3×30 | KMDR130             | - Minus              |
|                              | ENGINEER INC.          | DA-54          |                     | - Minus              |
| others                       | VESSEL MFG.            | No.9000-1.8×30 | KMDR110             | - Minus              |
|                              | ENGINEER INC.          | DA-40          | KMDR180             | - Minus (both ends)  |
|                              |                        | DA-55          |                     | - Minus              |

### For Automatic Adjustment

| Trimmer Potentiometer Series | Manufacturers         | Model Number | MURATA Model Number | Blade                |
|------------------------------|-----------------------|--------------|---------------------|----------------------|
| <b>PVZ3</b><br><b>PVG3</b>   | TORAY INDUSTRIES, INC | JB-2225      | KMBT070             | - Minus (round edge) |

### Qualified Standards

The products listed here have been produced by the ISO9001 and ISO/TS16949 certified factory.

| MURATA FACTORY                  | Qualified Date  | Standard                       | Qualified Number |
|---------------------------------|-----------------|--------------------------------|------------------|
| Sabae Murata Mfg.Co.,Ltd.       | August 14, 1997 | UNDERWRITERS LABORATORIES INC. | A5704            |
| Wuxi Murata Electronis Co.,Ltd. | May 12, 1999    | UNDERWRITERS LABORATORIES INC. | A7924            |

\* No ODCs (Ozone Depleting Chemicals) are used on all Murata's trimmer potentiometers.

**⚠Note:**

1. Export Control

<For customers outside Japan>

No muRata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

<For customers in Japan>

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

- |                             |  |
|-----------------------------|--|
| ① Aircraft equipment        | ② Aerospace equipment  |
| ③ Undersea equipment        | ④ Power plant equipment  |
| ⑤ Medical equipment         | ⑥ Transportation equipment (vehicles, trains, ships, etc.)   |
| ⑦ Traffic signal equipment  | ⑧ Disaster prevention / crime prevention equipment   |
| ⑨ Data-processing equipment | ⑩ Application of similar complexity and/or reliability requirements to the applications listed above |

3. Product specifications in this catalog are as of July 2008. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4. Please read rating and ⚠ CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.



<http://www.murata.com/>

**Head Office**  
1-10-1, Higashi Kotari, Nagaokakyo-shi, Kyoto 617-8555, Japan  
Phone: 81-75-951-9111

**International Division**  
3-29-12, Shibuya, Shibuya-ku, Tokyo 150-0002, Japan  
Phone: 81-3-5469-6123 Fax: 81-3-5469-6155 E-mail: [intl@murata.co.jp](mailto:intl@murata.co.jp)