

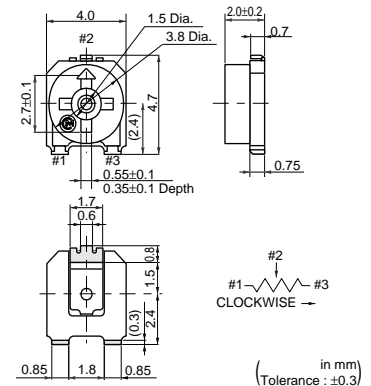
Trimmer Potentiometers



SMD Sealed Type 4mm Size PVM4 Series

■ Fetures

1. Available for flow and reflow soldering method while maintaining unique sealed construction.
2. Simple construction by 3 piece parts achieve high reliability.
3. Available for cleaning after soldering.
4. Plated termination achieve a high resistance to solder leaching.
5. High grade version is available (PVM4AxxxB01).



■ Applications

1. FDDs
2. HDDs
3. Measuring equipments
4. Encorders
5. Professional use cameras

Part Number	Power Rating (W)	Soldering Method	Number of Turns (Effective Rotation Angle)	Total Resistance Value	TCR (ppm/°C)
PVM4A101A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	100ohm ±25%	±250
PVM4A201A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	200ohm ±25%	±250
PVM4A301A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	300ohm ±25%	±250
PVM4A501A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	500ohm ±25%	±250
PVM4A102A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	1k ohm ±25%	±250
PVM4A202A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	2k ohm ±25%	±250
PVM4A302A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	3k ohm ±25%	±250
PVM4A502A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	5k ohm ±25%	±250
PVM4A103A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	10k ohm ±25%	±250
PVM4A203A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	20k ohm ±25%	±250
PVM4A303A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	30k ohm ±25%	±250
PVM4A503A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	50k ohm ±25%	±250
PVM4A104A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	100k ohm ±25%	±250
PVM4A204A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	200k ohm ±25%	±250
PVM4A304A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	300k ohm ±25%	±250
PVM4A504A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	500k ohm ±25%	±250
PVM4A105A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	1M ohm ±25%	±250
PVM4A205A01	0.1(70°C)	Flow/Reflow	1(240°±10°)	2M ohm ±25%	±250
PVM4A101B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	100ohm ±20%	±150
PVM4A201B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	200ohm ±20%	±100
PVM4A301B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	300ohm ±20%	±100
PVM4A501B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	500ohm ±20%	±100
PVM4A102B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	1k ohm ±20%	±100
PVM4A202B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	2k ohm ±20%	±100
PVM4A302B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	3k ohm ±20%	±100
PVM4A502B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	5k ohm ±20%	±100
PVM4A103B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	10k ohm ±20%	±100
PVM4A203B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	20k ohm ±20%	±100
PVM4A303B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	30k ohm ±20%	±100
PVM4A503B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	50k ohm ±20%	±100
PVM4A104B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	100k ohm ±20%	±150
PVM4A204B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	200k ohm ±20%	±150
PVM4A304B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	300k ohm ±20%	±150
PVM4A504B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	500k ohm ±20%	±150
PVM4A105B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	1M ohm ±20%	±150

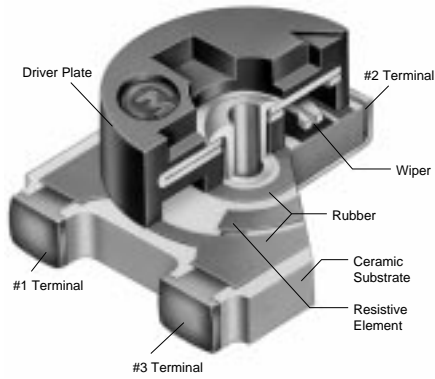
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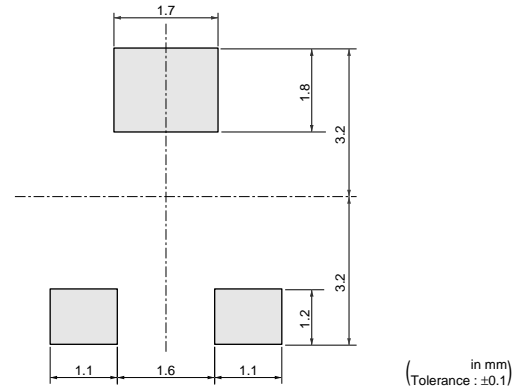
Part Number	Power Rating (W)	Soldering Method	Number of Turns (Effective Rotation Angle)	Total Resistance Value	TCR (ppm/°C)
PVM4A205B01	0.25(70°C)	Flow/Reflow	1(240°±10°)	2M ohm ±20%	±150

The last three digits express the individual specification codes. A01 for standard type and B01 for high-liability type.

Construction



Standard Land Dimension



Characteristics

Item	PVM4A□□□A01	PVM4A□□□B01
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 that the temperature is -10 to +40deg. C and the relative humidity is 30-85%RH.
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. The trimmer potentiometer should not be used under the following environmental conditions:
If you use the trimmer potentiometer in an environment other these listed below, please consult with Murata factory representative prior to

using.

- (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 depend 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. The maximum input current to a trimmer potentiometer should not exceed $(P/R)^{1/2}$ or the allowable wiper current, whichever is smaller.

■ Notice (Soldering and Mounting)

1. Soldering

- (1) Can be soldered by reflow soldering method, flow soldering method, and soldering iron. (In case of flow soldering, it is necessary to clean after soldering.)
- (2) Use our standard land dimension. Excessive land area causes displacement due to effect of the surface tension of the solder. Insufficient land area leads to insufficient soldering strength of the chip.
- (3) Standard soldering condition
 - (a) Reflow and flow soldering :
Refer to the standard temperature profile.
 - (b) Soldering iron:
 - >Temperature of tip 260deg.C max.
 - >Soldering time 3sec. max.
 - >Diameter 2mm dia. max.
 - >Wattage of iron 30W max.

Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. 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 100micro m to 150micro m and the dimension of land pattern should be used 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 the 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 (preferable 9.8N (Ref.; 1kgf) max.), 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

- (1) Isopropyl alcohol and Ethyl alcohol are available material for cleaning.
For other materials, please consult with Murata factory representative prior to using.
- (2) The total cleaning time by cold dipping method shall be less than 5 minutes.
The total cleaning time by hot dipping method shall be less than 2 minutes.
The total cleaning time by ultrasonic washing (conditions as below) method shall be less than 1 minutes.

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PVM4 Series Notice

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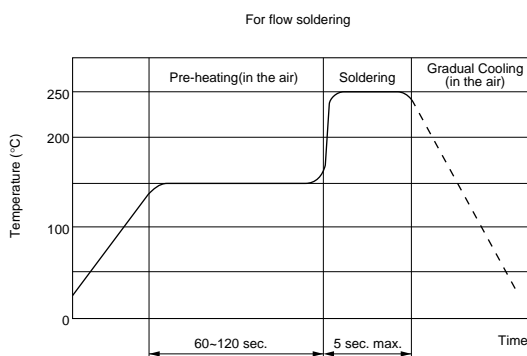
In case of the mixed conditions with hot dipping and ultrasonic washing, the cleaning time by hot dipping shall be less than 1 minutes and the cleaning time by ultrasonic washing shall be less than 1 minutes. In case of the mixed conditions with hot dipping, ultrasonic washing and vaper, the cleaning time by hot dipping shall be less than 1 minutes, the cleaning time by ultrasonic washing shall be less than 30 seconds and the cleaning time by vaper shall be less than 30 seconds.

If the trimmer potentiometer is cleaned by

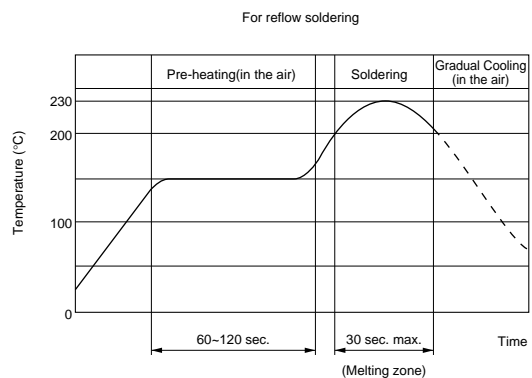
other conditions, the sealing construction may be damaged. Due to the ultra-sonic cleaning equipment peculiar self resonance point and the cleaning compatibility usually depends on the jig construction and/or the cleaning condition such as the depth of immersion, please check the cleaning equipment to determine the suitable conditions.

If the trimmer potentiometer is cleaned by other conditions, the trimmer potentiometer may be damaged.

Flow Soldering Standard Profile



Reflow Soldering Standard Profile



Notice (Handling)

- Use suitable screwdrivers that fit comfortably in driver slot. We recommend the below screwdriver.
* Recommended screwdriver for manual adjustment
VESSEL MFG.: NO. 9000-2.6x30
(Murata P/N : KMDR120)
We can supply above screwdrivers.
If you place order, please nominate Murata P/N.
- Don't apply more than 4.9N (Ref.; 500gf) of twist and stress after mounted onto PCB to prevent contact intermittence. If excessive force is

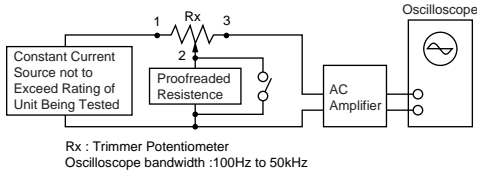
- applied, the trimmer potentiometer may not function.
- Please use within the effective rotational angle. The potentiometer dose not have a mechanical stop for over rotation. In case out of effective rotational angle, the trimmer potentiometer may not function.
- When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401series").


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 and PVM4A_A01 Series Specifications and Test Methods

The tests and measurements shall 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. In case when entertained a doubt in judgment obtained from results measured in accordance with the above mentioned conditions, the tests and measurements shall be conducted under the condition of 25±2°C of temperature and, 45 to 55% of relative humidity and 86 to 106 kpa of atmospheric pressure.

No.	Item	Test Methods																														
1	Total Resistance	<p>Measure total resistance between the resistance element and terminals (terminals #1 and #3) with the contact arm positioned against a stop. The positioning of the contact arm and terminal shall be the same for subsequent total resistance measurements on the same device.</p> <p>Use the test voltage specified in Table-1 for total resistance measurements. This voltage shall be used whenever a subsequent total resistance measurement is made.</p> <table border="1"> <thead> <tr> <th>Total resistance, Nominal (ohm)</th> <th>Maximum Test Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>10≤R≤100</td> <td>1.0</td> </tr> <tr> <td>100<R≤1k</td> <td>3.0</td> </tr> <tr> <td>1k<R≤10k</td> <td>10.0</td> </tr> <tr> <td>10k<R≤100k</td> <td>30.0</td> </tr> <tr> <td>100k<R</td> <td>100.0</td> </tr> </tbody> </table> <p>Table-1 Total resistance test voltage</p>	Total resistance, Nominal (ohm)	Maximum Test Voltage (V)	10≤R≤100	1.0	100<R≤1k	3.0	1k<R≤10k	10.0	10k<R≤100k	30.0	100k<R	100.0																		
Total resistance, Nominal (ohm)	Maximum Test Voltage (V)																															
10≤R≤100	1.0																															
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1k<R≤10k	10.0																															
10k<R≤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	<p>Contact resistance variation shall be measured with the measuring circuit shown in below, or its equivalent. The operating wiper shall 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 shall be such that the wiper completes 1 countin determining whether or not a contact resistance variation is observed at least twice in the same location. The test current shall follow the value given in Table-2 unless otherwise limited by the power rating.</p> <table border="1"> <thead> <tr> <th>Standard total resistance R (ohm)</th> <th>Test Current</th> </tr> </thead> <tbody> <tr> <td>100≤R<10k</td> <td>10mA Max.</td> </tr> <tr> <td>10k≤R<100k</td> <td>1mA Max.</td> </tr> <tr> <td>100≤R</td> <td>100μA Max.</td> </tr> </tbody> </table> <p>Table-2 Test current for CRV</p>  <p>Rx : Trimmer Potentiometer Oscilloscope bandwidth :100Hz to 50kHz</p> <p>Figure-1 CRV measuring circuit</p>	Standard total resistance R (ohm)	Test Current	100≤R<10k	10mA Max.	10k≤R<100k	1mA Max.	100≤R	100μA Max.																						
Standard total resistance R (ohm)	Test Current																															
100≤R<10k	10mA Max.																															
10k≤R<100k	1mA Max.																															
100≤R	100μA Max.																															
4	Humidity Exposure	<p>The wiper contact point shall be pre-setted at about 50% position of effective rotational angle. After that, the potentiometer shall be placed in a chamber at 40±2°C and 90 - 95% without loading for 500±12 hours. The resistance value shall be measured after keeping the potentiometer in a room for 5±1/6 hours.</p>																														
5	High Temperature Exposure	<p>The wiper contact point shall be pre-setted at about 50% position of effective rotational angle. After that, the potentiometer shall be placed in a chamber at 70±2°C without loading for 500±12 hours. The resistance value shall be measured after keeping the potentiometer in a room for 1.5±1/6 hours.</p>																														
6	Humidity Load Life	<p>The wiper contact point shall be pre-setted at about 50% position of effective rotational angle. After that, the potentiometer shall 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±12hours. The resistance value shall be measured after keeping the potentiometer in a room for 5±1/6 hours.</p>																														
7	Load Life	<p>The wiper contact point shall be pre-setted at about 50% position of effective rotational angle. After that, the potentiometer shall 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 shall be measured after keeping the potentiometer in a room for 1.5±1/6 hours.</p>																														
8	Temperature Cycle	<p>The wiper contact point shall be pre-setted at about 50% position of effective rotational angle. After that, the potentiometer shall be subjected to Table-3, Table-4 temperature for 5 cycles. The resistance value shall be measured after keeping the potentiometer in a room for 1.5±10 minutes.</p> <table border="1"> <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>10Max.</td> <td>30±3</td> <td>10Max.</td> </tr> </tbody> </table> <p>Table-3 PVZ</p> <table border="1"> <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>10Max.</td> <td>30±3</td> <td>10Max.</td> </tr> </tbody> </table> <p>Table-4 PVA3/PVS3/PVM4A□□□A01</p>	Sequence	1	2	3	4	Temp. (°C)	-25±3	+25±2	+85±3	+25±2	Time (min.)	30±3	10Max.	30±3	10Max.	Sequence	1	2	3	4	Temp. (°C)	-55±3	+25±2	+125±3	+25±2	Time (min.)	30±3	10Max.	30±3	10Max.
Sequence	1	2	3	4																												
Temp. (°C)	-25±3	+25±2	+85±3	+25±2																												
Time (min.)	30±3	10Max.	30±3	10Max.																												
Sequence	1	2	3	4																												
Temp. (°C)	-55±3	+25±2	+125±3	+25±2																												
Time (min.)	30±3	10Max.	30±3	10Max.																												

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SMD Open Type and PVM4A_A01 Series Specifications and Test Methods

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No.	Item	Test Methods																				
9	Temperature Coefficient of Resistance	<p>The trimmer potentiometer shall be subjected to the following each temperature (see Table-5, Table-6) for 30 to 45 minutes. The resistance value shall be measured in the chamber.</p> $TCR = \frac{R_2 - R_1}{R_1 (T_2 - T_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ <p> T₁ : Reference temperature in degrees celsius T₂ : Test temperature in degrees celsius R₁ : Resistance at reference temperature in ohm R₂ : Resistance at test temperature in ohm </p> <table border="1" style="display: inline-table; margin-right: 20px;"> <tr><th>Sequence</th><th>1*</th><th>2</th><th>3*</th><th>4</th></tr> <tr><th>Temp. (°C)</th><td>+25±2</td><td>-25±3</td><td>+25±2</td><td>+85±3</td></tr> </table> <p>Note)*: Norm Temp.</p> <p style="text-align: center;">Table-5 PVZ</p> <table border="1" style="display: inline-table;"> <tr><th>Sequence</th><th>1</th><th>2</th><th>3*</th><th>4</th></tr> <tr><th>Temp. (°C)</th><td>+25±2</td><td>-55±3</td><td>+25±2</td><td>+125±3</td></tr> </table> <p style="text-align: center;">Table-6 PVA3/PVS3/PVM4A□□□A01</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																		
10	Rotational Life	<p>The wiper shall 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 shall be measured after keeping the potentiometer in a room for 10±5 minutes.</p>																				