● Part Numbering

Trimmer Potentiometers

(Part Number) **PV** **Z3** **A** **103** **C01** **R00**
❶ ❷ ❸ ❹ ❺ ❻

❶Product ID

Product ID	
PV	Trimmer Potentiometers

❷Series

❸Adjustment Direction /Lead Type

Code	Series	Code	Adjustment Direction/ Lead Type
Z2	SMD Open 2mm Size Carbon Resistive Element	**A**	Top
		R	Rear
A2	SMD Open 2mm Size	**A**	Top
Z3	SMD Open 3mm Size 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 11-turns	**A**	Top
		H	Side
32	Lead Sealed 6mm Round 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 4-turns	**H**	Top, Triangle
		P	Top, Triangle
		T	Side, Triangle
		S	Side, Triangle
36	Lead Sealed 10mm Square 25-turns	**W**	Top, Inline
		Y	Top, Triangle
		P	Side, Triangle
		X	Side, Inline
		Z	Side, Triangle
37	Lead Sealed 6mm Square 12-turns	**W**	Top, Triangle
		Y	Top, Inline
		P	Side, Triangle
		X	Side, Triangle
		Z	Side, Inline

❹Total 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.

Ex.)

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

❺Individual 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/ PV36/PV37	**C01**	Standard Type
PV36/PV37	**C01**	Standard Type
	C31	Radial Taping
PVG5	**C03**	Standard Type

❻Packaging

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

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

Trimmer Potentiometers

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

PV12 Series

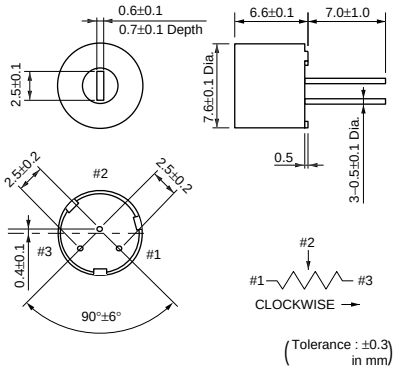
■ Features

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.

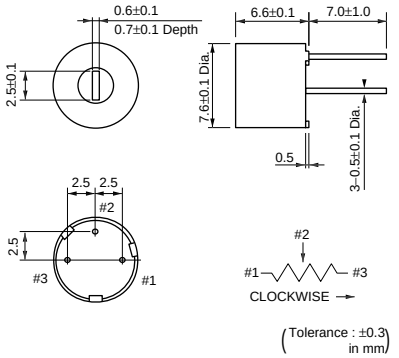
■ Applications

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

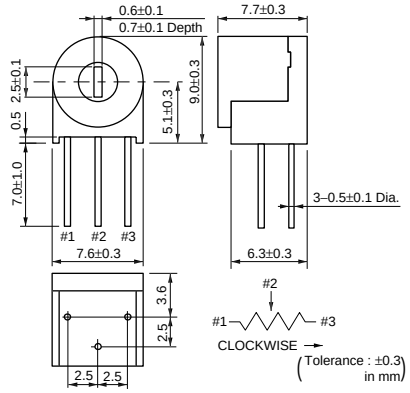
PV12H



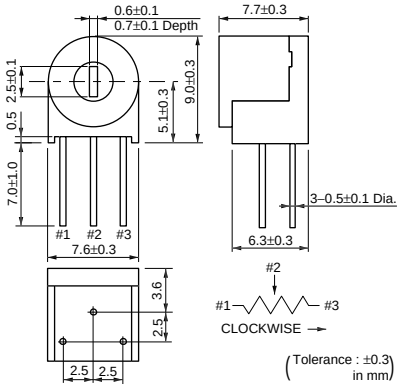
PV12P



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

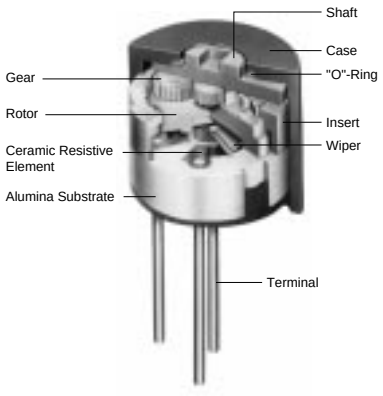
Continued on the following page.

Continued from the preceding page.

Part Number	Power Rating (W)	Soldering Method	Number of Turns (Effective Rotation Angle)	Total Resistance Value	TCR (ppm/°C)
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

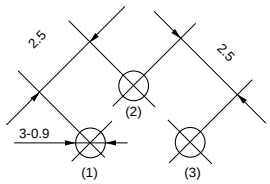
Operating Temperature Range: -55 to 125 °C
The blank column is filled with the code of adjustment direction and lead type (H, P, T and S).
The order quantity should be an integral multiple of the "Minimum Quantity".

■ Construction



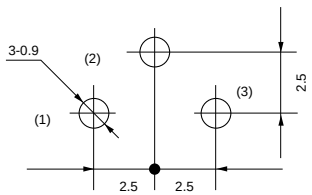
■ Standard Mounting Holes

PV12H



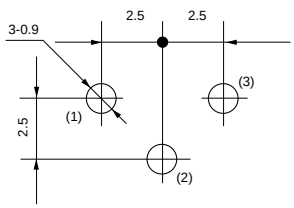
(Tolerance: ±0.1 in mm)

PV12P/PV12S



(Tolerance: ±0.1 in mm)

PV12T



(Tolerance: ±0.1 in mm)

8

■ Characteristics

Temperature Cycle	ΔTR : ±2% ΔV.S.S.: ±1%
Humidity	ΔTR : ±2% IR : 100M ohm min.
Vibration (20G)	ΔTR : ±1% ΔV.S.S.: ±1%
Shock (100G)	ΔTR : ±1% ΔV.S.S.: ±1%
Temperature Load Life	ΔTR : ±3% ΔV.S.S.: ±2%
Low Temperature Exposure	ΔTR : ±3% ΔV.S.S.: ±1.5%
High Temperature Exposure	ΔTR : ±3% ΔV.S.S.: ±1.5%
Rotational Life	ΔTR : ±3% (200 cycles)

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

PV37 Series

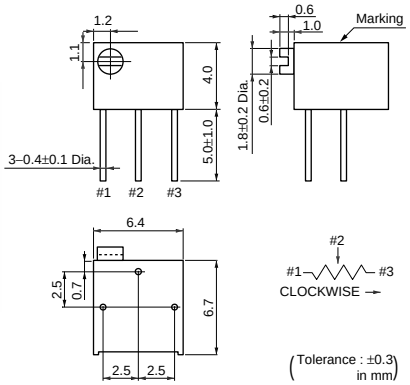
■ Features

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

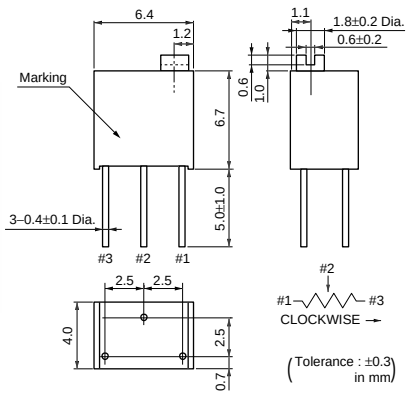
■ Applications

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

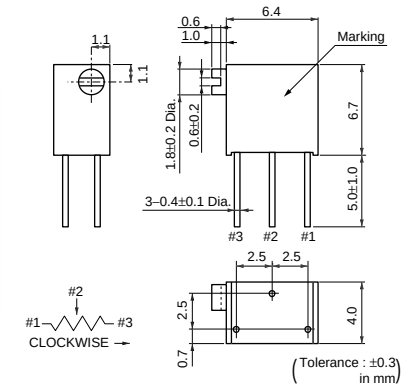
PV37P



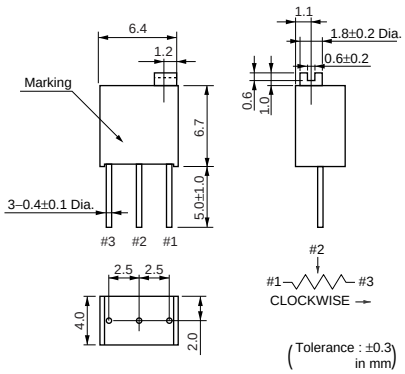
PV37W



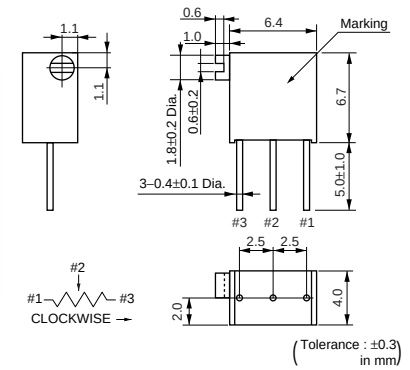
PV37X



PV37Y



PV37Z



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

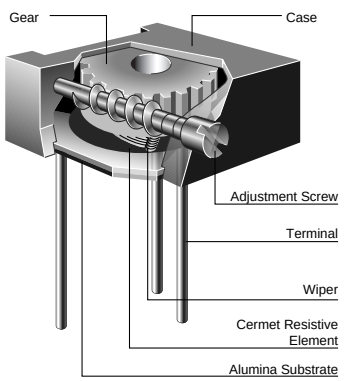
Continued on the following page.

Continued from the preceding page.

Part Number	Power Rating (W)	Soldering Method	Number of Turns (Effective Rotation Angle)	Total Resistance Value	TCR (ppm/°C)
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).

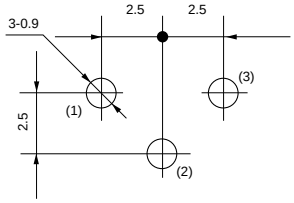
■ Construction



8

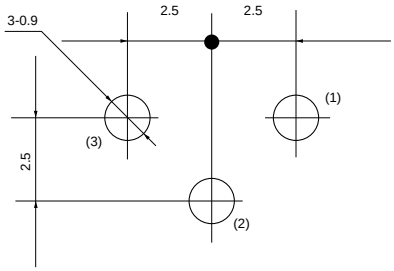
■ Standard Mounting Holes

PV37P



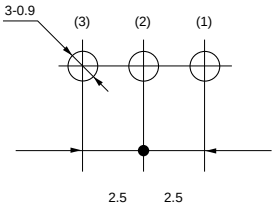
(Tolerance: ±0.1 in mm)

PV37W/PV37X



(Tolerance: ±0.1 in mm)

PV37Y/PV37Z



(Tolerance: ±0.1 in mm)

■ Characteristics

Temperature Cycle	ΔTR : ±1% ΔV.S.S.: ±1%
Humidity	ΔTR : ±2% IR : 100M ohm min.
Vibration (20G)	ΔTR : ±1% ΔV.S.S.: ±1%
Shock (100G)	ΔTR : ±1% ΔV.S.S.: ±1%
Temperature Load Life	ΔTR : ±2% ΔV.S.S.: ±1%
Low Temperature Exposure	ΔTR : ±1% ΔV.S.S.: ±1%
High Temperature Exposure	ΔTR : ±2% ΔV.S.S.: ±1%
Rotational Life	ΔTR : R≦100 ohm ··· ±3% R>100 ohm ··· ±2% (200 cycles)

ΔTR : Total Resistance Change
ΔV.S.S.: Voltage Setting Stability
IR : Insulation Resistance
R : Standard Total Resistance

8

PV36 Series

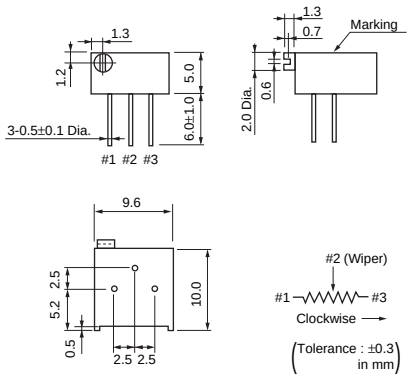
■ Features

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.

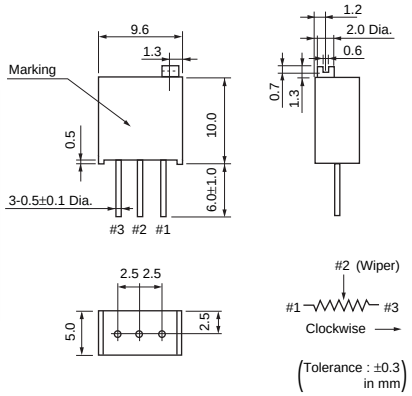
■ Applications

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

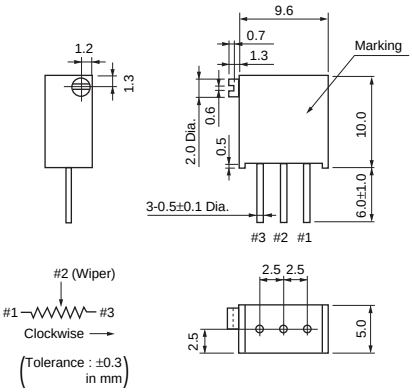
PV36P



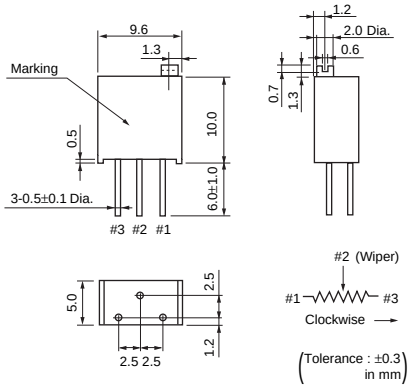
PV36W



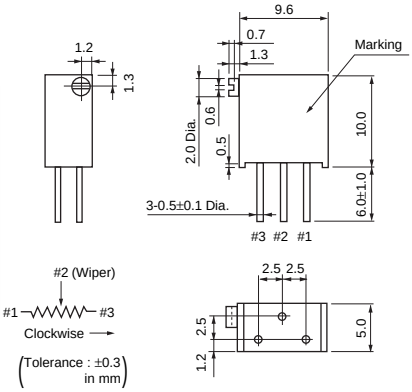
PV36X



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

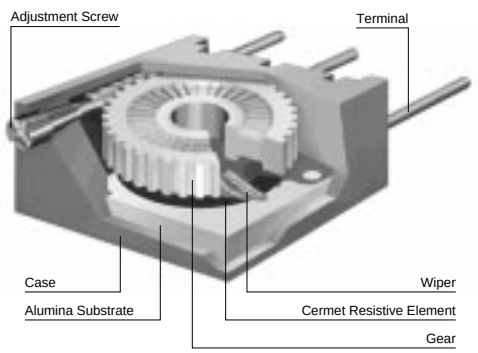
Continued on the following page.

Continued from the preceding page.

Part Number	Power Rating (W)	Soldering Method	Number of Turns (Effective Rotation Angle)	Total Resistance Value	TCR (ppm/°C)
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

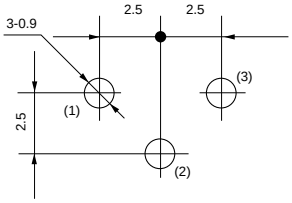
Operating Temperature Range: -55 to 125 °C
The blank column is filled with the code of adjustment direction and lead type (P, X, Y, W and Z).
The order quantity should be an integral multiple of the "Minimum Quantity".
The last three digits express the individual specification codes. C01 for standard type and C31 for radial taping type (PV36W/PV36X series only).

■ Construction



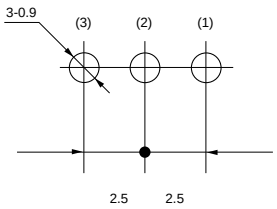
■ Standard Mounting Holes

PV36P



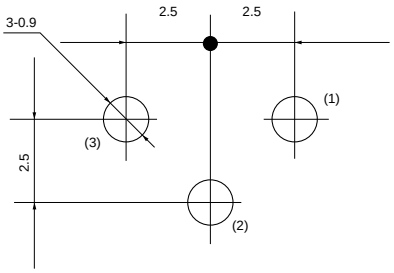
(Tolerance: ±0.1 in mm)

PV36W/X



(Tolerance: ±0.1 in mm)

PV36Y/Z



(Tolerance: ±0.1 in mm)

■ Characteristics

Temperature Cycle	ΔTR : ±2% ΔV.S.S.: ±1%
Humidity	ΔTR : ±2% IR : 100M ohm min.
Vibration (20G)	ΔTR : ±1% ΔV.S.S.: ±1%
Shock (100G)	ΔTR : ±1% ΔV.S.S.: ±1%
Temperature Load Life	ΔTR : ±3% ΔV.S.S.: ±1%
Low Temperature Exposure	ΔTR : ±2% ΔV.S.S.: ±1%
High Temperature Exposure	ΔTR : ±3% ΔV.S.S.: ±1%
Rotational Life	ΔTR : R≦1k ohm, R≧500k ohm ··· ±5% 1k ohm<R<500k ohm ··· ±3% (200 cycles)

ΔTR : Total Resistance Change
ΔV.S.S.: Voltage Setting Stability
IR : Insulation Resistance
R : Standard Total Resistance

8

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•R)^1/2 or the maximum operating voltage, whichever is smaller.

■ Notice (Soldering and Mounting)

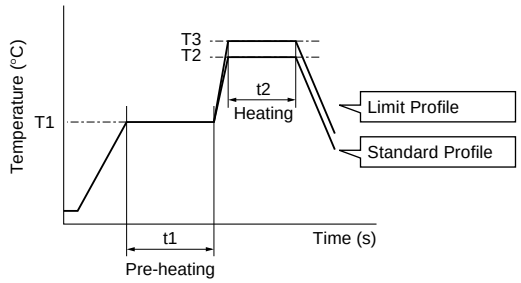
1. Soldering
   (1) Soldering condition
   Refer to the temperature profile.
   If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer potentiometer may deviate from the specified characteristics.
   (2) To minimize mechanical stress when adjusting, 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 potentimeter 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)	Time (t1)	Temp. (T2)	Time (t2)		Temp. (T1)	Time (t1)	Temp. (T3)	Time (t2)	
	°C	sec.	°C	sec.	Time	°C	sec.	°C	sec.	Time
PV12 PV37 PV36	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
PV12 PV37 PV36	350±10	3 max.	30 max.	1

■ Notice (Handling)

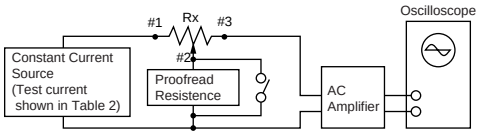
1. Use suitable screwdrivers that fit comfortably in driver slot. We recommend the screwdrivers below.
   * Recommended screwdriver for manual adjustment
     ENGINEER INC.: DA-40
     (Murata P/N: KMDR180)
   We can supply the screwdrivers above.
   If you place order, please specify the Murata P/N.
2. 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.
3. 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.
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 corroison 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.

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.

<table>
<tr><th>No.</th><th>Item</th><th>Test Methods</th></tr>
<tr><td>1</td><td>Residual Resistance</td><td>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.</td></tr>
<tr><td>2</td><td>Contact Resistance</td><td>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.
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.
<table><tr><th>Standard Total Resistance R (ohm)</th><th>Test Current</th></tr><tr><td>100≦R<10k</td><td>20mA max.</td></tr><tr><td>10k≦R<100k</td><td>1mA max.</td></tr><tr><td>100k≦R</td><td>100μA max.</td></tr></table>Table 2: Test current for CRV
 

Rx : Trimmer Potentiometer
Oscilloscope bandwidth: 100Hz to 50kHz
Figure 1: CRV measuring circuit</td></tr>
<tr><td>3</td><td>Humidity Exposure</td><td>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.</td></tr>
<tr><td>4</td><td>High Temperature Exposure</td><td>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.</td></tr>
<tr><td>5</td><td>Humidity Load Life</td><td>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.</td></tr>
<tr><td>6</td><td>Load Life</td><td>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.</td></tr>
<tr><td>7</td><td>Temperature Cycle</td><td>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.
<table><tr><th>Sequence</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><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></table>Table 3: PVZ
<table><tr><th>Sequence</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><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></table>Table 4: PVA2/PVM4A□□□C01</td></tr>
<tr><td>8</td><td>Temperature Coefficient of Resistance</td><td>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.
$TCR=\frac{R_2-R_1}{R_1(T_2-T_1)}\times 10^6$ (ppm/°C)
T_1 : Reference temperature in degrees celsius
T_2 : Test temperature in degrees celsius
R_1 : Resistance at reference temperature in ohm
R_2 : Resistance at test temperature in ohm
<table><tr><th>Sequence</th><th>1*</th><th>2</th><th>3*</th><th>4</th></tr><tr><td>Temp. (°C)</td><td>+25±2</td><td>-25±3</td><td>+25±2</td><td>+85±3</td></tr></table>Table 5: PVZ
<table><tr><th>Sequence</th><th>1*</th><th>2</th><th>3*</th><th>4</th></tr><tr><td>Temp. (°C)</td><td>+25±2</td><td>-55±3</td><td>+25±2</td><td>+125±3</td></tr></table>Table 6: PVA2/PVM4A□□□C01
Note*: Norm temp.</td></tr>
<tr><td>9</td><td>Rotational Life</td><td>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.</td></tr>
</table>

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. 1 — Total Resistance

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.

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

Table 1: Total resistance test voltage

No. 2 — 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.

No. 3 — Contact Resistance Variation

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.

Standard Total Resistance R (ohm)	Test Current
R≦100	20mA
100<R<500	10mA
500≦R<1k	4mA
1k≦R<2k	2mA
2k≦R<50k	1mA
50k≦R<200k	200μA
200k≦R<1M	100μA
1M≦R<2M	50μA
2M≦R	30μA

Table 2: Test current for CRV

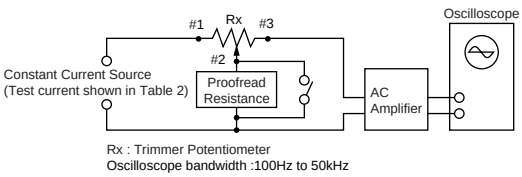


Figure 1: CRV measuring circuit

No. 4 — Temperature Coefficient of Resistance

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.

$$TCR=\frac{R_2-R_1}{R_1(T_2-T_1)}\times 10^6\ (ppm/°C)$$

T_1 : Reference temperature in degrees celsius
T_2 : Test temperature in degrees celsius
R_1 : Resistance at reference temperature ohm
R_2 : Resistance at test temperature in ohm

Sequence	1*	2	3	4*	5	6
Temperature (°C)	+25	-15	Min. operating Temperature	+25	+65	Max. operating Temperature

Note*: Reference temperature

Table 3: Test temperatures

No. 5 — Voltage Setting Stability

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.

$$\text{Voltage setting stability}=\left(\frac{e'}{E}-\frac{e}{E}\right)\times 100\ (\%)$$

e : Before test
(The voltage between terminal #1 and terminal #2)
e': After test
(The voltage between terminal #1 and terminal #2)

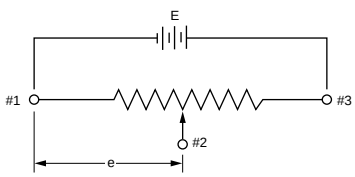


Figure 2

Continued on the following page.

SMD Sealed Type (PVF2/G3/M4A_D01/G5)/Lead Sealed Type (PV32/12/37/36) Specifications and Test Methods

Continued from the preceding page.

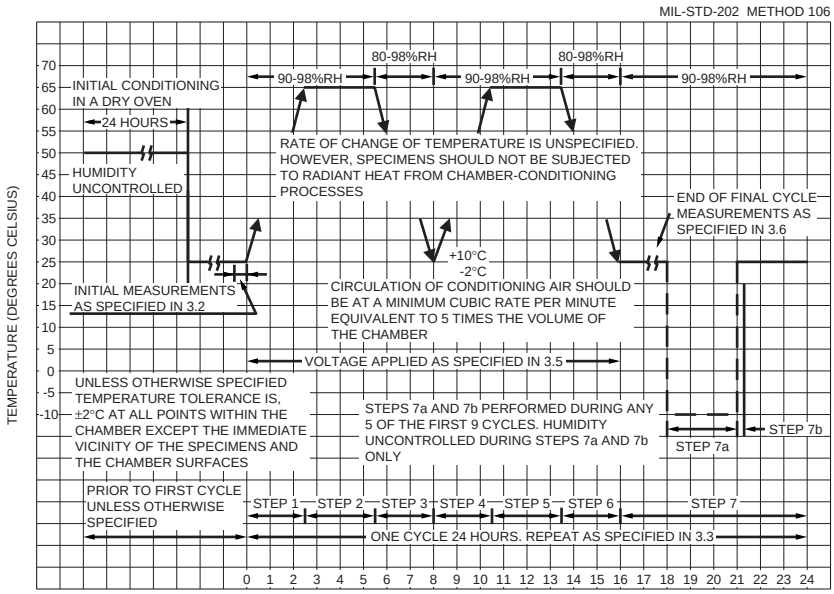
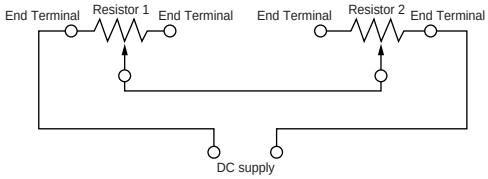
<table>
<tr><th>No.</th><th>Item</th><th>Test Methods</th></tr>
<tr><td>6</td><td>Temperature Cycle</td><td>The trimmer potentiometer should be subjected to Table 4 temperature for 5 cycles. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 1-2 hours.
<table>
<tr><td colspan="2">Sequence</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td rowspan="2">Temp. (°C)</td><td>PV□□ series</td><td>-55±3</td><td rowspan="2">+25±2</td><td>+125±3</td><td rowspan="2">+25±2</td></tr>
<tr><td>PVF2 series</td><td>-25±3</td><td>+60±3</td></tr>
<tr><td colspan="2">Time (min.)</td><td>30</td><td>5 max.</td><td>30</td><td>5 max.</td></tr>
</table>
Table 4: One cycle of temperature cycle.</td></tr>
<tr><td>7</td><td>Humidity</td><td>1) PV12, PV32, PVM4A□□□D01 series
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.
2) PVF2 series
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
2) PVG3, PVG5, PV36, PV37 series
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.


Figure 3</td></tr>
<tr><td>8</td><td>Vibration</td><td>1) PV□□ series
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.
2) PVF2 series
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).</td></tr>
<tr><td>9</td><td>Shock</td><td>1) PV□□ series
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.
2) PVM4A□□□D01 series
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.</td></tr>
<tr><td>10</td><td>Temperature Road Life</td><td>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.</td></tr>
<tr><td>11</td><td>High Temperature Exposure (Except for PVF2)</td><td>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.</td></tr>
<tr><td>12</td><td>Low Temperature Exposure (Except for PVF2 and PVM4A□□□D01)</td><td>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.</td></tr>
</table>

Continued on the following page.

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 (Only for PVF2 and PVM4A□□□D01)	The trimmer potentiometer should be placed in a chamber at a temperature of -25±3°C (-55±3°C for PVM4A□□□ D01 series) 48±4 hours without loading. The trimmer potentiometer should be removed from the chamber, and maintained at a temperature of 25±5°C for 1-2 hours.
14	Rotational Life	1)PV□□ series 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.  Figure 4 2) PVG3, PVG5 series 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. 3) PVF2, PVM4A□□□D01 series 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.