



**TRIMMER POTENTIOMETER PV32 SERIES
SPECIFICATION FOR SUPPLIED PRODUCT**

- CONTENTS -

1. Scope
2. Part number
3. Outline, dimensions and marking
4. Characteristics
 - 4.1 Electrical characteristics
 - 4.2 Mechanical characteristics
 - 4.3 Environmental characteristics
 - 4.4 Other characteristics
5. Test method
 - 5.1 Contact resistance variation
 - 5.2 Temperature coefficient of resistance
 - 5.3 Temperature cycle
 - 5.4 Humidity
 - 5.5 Vibration
 - 5.6 Shock
 - 5.7 Temperature load life
 - 5.8 High temperature exposure
 - 5.9 Low temperature operation
 - 5.10 Rotational life
 - 5.11 Resistance to soldering heat
 - 5.12 Immersion seal
 - 5.13 Terminal pull-strength
 - 5.14 Solderability
6. Caution
7. Caution for using
 - 7.1 Soldering
 - 7.2 Cleaning
 - 7.3 Adjusting
 - 7.4 Operating environmental conditions
 - 7.5 Storage conditions
 - 7.6 Circuit design
8. Note
9. Outline dimensions
10. Part number cross reference table

1. Scope

This product specification is applied to Murata made trimmer potentiometer **PV32** series.

2. Part number

Part number	Quantity (pcs/bag)	Adjustment direction	Terminal arrangement
PV32H###A01B00	100	Top	Triangular
PV32P###A01B00	100	Top	Triangular
PV32R###A01B00	100	Top	Straight
PV32S###A01B00	100	Side	Triangular
PV32T###A01B00	100	Side	Triangular
PV32N###A01B00	100	Side	Triangular
PV32Y###A01B00	100	Side	Triangular
PV32W###A01B00	100	Side	Straight
PV32F###A01B00	50	Rear	Triangular

Note-1).### : Resistance code

Resistance	Code	Resistance	Code	Resistance	Code	Resistance	Code
10ohm	100	20ohm	200	25ohm	250	50ohm	500
100ohm	101	200ohm	201	250ohm	251	500ohm	501
1kohm	102	2kohm	202	2.5kohm	252	5kohm	502
10kohm	103	20kohm	203	25kohm	253	50kohm	503
100kohm	104	200kohm	204	250kohm	254	500kohm	504
1Mohm	105	2Mohm	205			5Mohm	505

Note-2). Fill in your part number to 10.part number cross reference table.

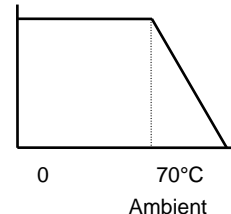
3. Outline, dimensions and marking

Please see 9. Outline dimensions.

4. Characteristics

4.1 Electrical characteristics

Item	Specification	Test method
Standard total resistance range	10 ohm ~ 5M ohm	-
Standard total resistance tolerance	±20% of standard total resistance value	-
Power rating	70°C ●●●● 0.5W 125°C ●●●● 0W * In case that the ambient temperature exceed 70°C, the derating curve is as Fig-1. However, in case of partial load, power rating reduces in proportion to 125°C the rotational angle of rotor.	-
Maximum working voltage	300 Vdc	-
Dielectric strength	600 Vac, 1 minute, less than 1mA	-
Maximum wiper current	100mA or below formula max., whichever is smaller. $I \leq (P/R)^{1/2}$ I : Wiper current (A) P : Power rating (W) R : Standard total Resistance (ohm)	-



4.1 Electrical characteristics

Item	Specification	Test method
Operating temperature range	-55°C ~ +125°C	-
Residual resistance	2ohm max.	-
Contact resistance variation (CRV)	3% of standard total resistance or 3ohm max., whichever is greater	5.1
Insulation resistance	1000Mohm min. (500Vdc)	-
Temperature coefficient of resistance (TCR)	±100ppm/°C	5.2

4.2 Mechanical characteristics

Item	Specification	Test method
Mechanical rotational angle	270° ± 5°	-
Effective electrical rotational angle	230° ± 5°	-
Rotational torque	1.96 ~ 19.6mN·m (Ref. ; 20~200gf·cm)	-
Stop strength	49mN·m (Ref. ; 500gf·cm) min.	-

4.3 Environmental characteristics

Item	Specification	Test method
Temperature cycle (Thermal shock)	Total resistance change : ±2% Voltage setting stability : ±1%	5.3
Humidity	Total resistance change : ±2% Voltage setting stability : ±1% Insulation resistance : 100Mohm min.	5.4
Vibration	Total resistance change : ±1% Voltage setting stability : ±1%	5.5
Shock	Total resistance change : ±1% Voltage setting stability : ±1%	5.6
Temperature load life	Total resistance change : ±2% Voltage setting stability : ±2% CRV : 4% of standard total resistance or 4ohm max., whichever is greater	5.7
High temperature exposure	Total resistance change : ±2% Voltage setting stability : ±1% CRV : 4% of standard total resistance or 4ohm max., whichever is greater	5.8
Low temperature exposure	Total resistance change : ±2% Voltage setting stability : ±1%	5.9
Rotational life	Total resistance change : ±4%	5.10
Resistance to soldering heat	Total resistance change : ±1%	5.11
Immersion seal	No more than 3 bubbles.	5.12
Terminal strength	No electrical intermittence.	5.13

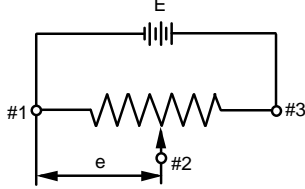
4.4 Other characteristics

Item	Specification	Test method
Solderability	More than 80 percent covered by a solder coating	5.14

*** Voltage setting stability**

The wiper shall be set at approximately 40% of the actual effective-electrical rotational angle. An adequate DC test potential shall be applied voltage E (stable DC voltage) between the terminal #1 and the terminal #3. The voltage between the terminal #1 and the terminal #3, and the voltage between the terminal #1 and the terminal #2, shall be measured and applied to the following formula.

[Test circuit]



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

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

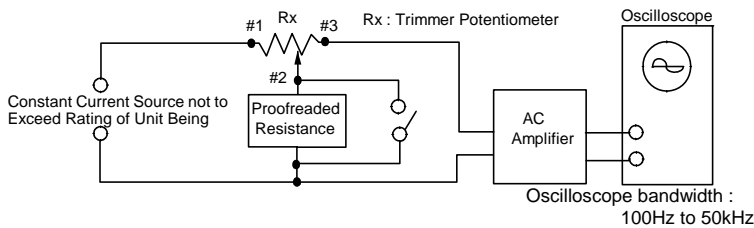
5. Test method

The tests and measurements shall be conducted under the condition of 15~35°C of temperature, 25~75% RH of relative humidity and 86~106 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, 50±2% of relative humidity and 86~106 kpa of atmospheric pressure. When the potentiometer is tested after soldering on PCB., it shall be tested after being kept in a room 15~35°C, 25~75%RH over 4 hours except " 5.11 Resistance to soldering heat ".

5.1 Contact resistance variation (CRV) (MIL-R-22097)

Contact resistance variation shall be measured with the measuring circuit shown in below, or its equivalent. The adjustment rotor shall be rotated in both directions through 90% of the actual effective-electrical rotational angle for a total of 6 cycles. Only the last 3 cycles shall 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 shall be such that the adjustment rotor completes 1 cycle for 5 seconds minimum to 2 minutes maximum. The test current used shall follow the value given in below unless otherwise limited by power rating.

[Measuring circuit]



[Test current]

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

5.2 Temperature coefficient of resistance (TCR) (MIL-R-22097)

The trimmer potentiometer shall be subjected to the following each temperature (see Table-1) for 30~45 minutes. Temperature coefficient of resistance shall be applied to the following formula.

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

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

[Table-1]

Sequence	*1	2	3	*4	5	6
Temp.(°C)	+25	-15	-55	+25	+65	+125

Note) * : Reference temperature

5.3 Temperature cycle (Thermal shock) (MIL-STD-202)

The trimmer potentiometer shall be subjected to Table-2 temperature for 5 cycles. The trimmer potentiometer shall be removed from the chamber, and maintained at a temperature of 25±5°C for 1~2 hours.

[Table-2] One cycle of temperature cycle.

Sequence	1	2	3	4
Temp.(°C)	-55±3	+25±2	+125±3	+25±2
Time (min.)	30	5 max.	30	5 max.

5.4 Humidity (MIL-STD-202)

The trimmer potentiometer shall be placed in a chamber at a temperature of $40\pm 2^{\circ}\text{C}$ and a humidity of 90~95% without loading for 250 ± 8 hours. The trimmer potentiometer shall be removed from the chamber, and maintained at a temperature of $25\pm 5^{\circ}\text{C}$ for $5\pm 1/6$ hours.

5.5 Vibration (MIL-STD-202)

The trimmer potentiometer shall be vibrated throughout the frequency range at the 196m/S^2 (peak). A complete frequency range, 10Hz to 2000Hz and back, shall be made within 15 minutes for a total of 4 sweeps in each of the three axis direction for a total of 12 sweeps.

5.6 Shock (MIL-STD-202)

The trimmer potentiometer shall be shocked at the 981m/S^2 (peak) and shall be subjected to 4 shocks in each of the three axis direction for a total of 12 shocks.

5.7 Temperature road life (MIL-STD-202)

Full rated continuous working voltage not exceeding the maximum rated voltage shall be applied intermittently between the terminal #1 and the 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 $70\pm 2^{\circ}\text{C}$. The trimmer potentiometer shall be removed from the chamber, and maintained at a temperature of $25\pm 5^{\circ}\text{C}$ for 1~2 hours.

5.8 High temperature exposure (MIL-R-22097)

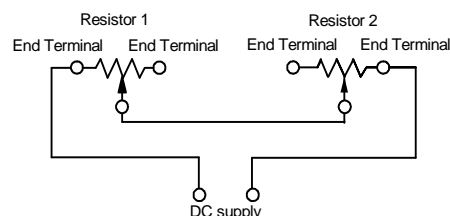
The trimmer potentiometer shall be placed in a chamber at a temperature of $125\pm 3^{\circ}\text{C}$ for 250 ± 8 hours without loading. The trimmer potentiometer shall be removed from the chamber, and maintained at a temperature of $25\pm 5^{\circ}\text{C}$ for 1~2 hours.

5.9 Low temperature operation (MIL-R-22097)

The trimmer potentiometer shall be placed in a chamber at a temperature of $-55\pm 3^{\circ}\text{C}$ for 1 hours without loading. Full rated continuous working voltage not exceeding the maximum rated voltage shall be applied for 45 minutes. The trimmer potentiometer shall be removed from the chamber, and maintained at a temperature of $25\pm 5^{\circ}\text{C}$ for approximately 24 hours.

5.10 Rotational life (MIL-R-22097)

Full rated continuous working voltage not exceeding the maximum rated voltage shall be applied with the circuit shown in the figure. The adjustment rotor shall be continuously cycled through not less than 90% of effective-electrical rotational angle, at the rate of 1 cycle for 5 seconds minimum to 2.5 minutes maximum for a total of 200 cycles.



5.11 Resistance to soldering heat (MIL-STD-202)

All terminals shall be immersed in a pot of molten solder at a temperature of $350\pm 10^{\circ}\text{C}$, for a period of 3 ± 0.5 seconds, to a point 3.2mm from the entry of the terminal into the trimmer potentiometer body. The trimmer potentiometer shall be removed from the chamber, and maintained at a temperature of $25\pm 5^{\circ}\text{C}$ for $3\pm 1/2$ hours.

5.12 Immersion seal (MIL-R-22097)

The trimmer potentiometer shall be completely submerged in the bath of tap water at a temperature of $85+5/-0^{\circ}\text{C}$ for 60 ± 5 seconds with no part at a depth of less than $25+20/-0\text{mm}$. During immersion, observation shall be made for any bubbles emanating from the trimmer potentiometer.

5.13 Terminal pull-strength (MIL-STD-202)

The trimmer potentiometer shall be holding. The force of 9.8N(Ref.;1kgf) shall be applied to each terminal in the direction of the axes of terminals and maintained for 10 ± 2 seconds.

5.14 Solderability

All terminals shall be immersed in the flux, for a period of 5 to 10 seconds, to within 1.3mm of the body of the trimmer potentiometer, and immersed in a pot of molten solder at a temperature of $260\pm 5^{\circ}\text{C}$, for a period of 5 ± 0.5 seconds.

6. **⚠ Caution**

- (1) Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.
 - 1) Aircraft equipment
 - 2) Aerospace equipment
 - 3) Undersea equipment
 - 4) Power plant control 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 in the above.
- (2) Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

7. **Caution for using**

7.1 **Soldering**

(1) **Standard soldering condition**

Flow soldering	Soldering iron
Pre-heat temp. : 150°C	Soldering temp. : 350±10°C max.
Soldering temp. : 260°C max.	Soldering time. : 3sec max.
Dipping time : 5sec max.	Wattage of iron : 40W max.

Before using other soldering conditions more 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.

- (2) To minimize mechanical stress when adjusting, the trimmer potentiometer shall 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.
- (4) This product should be designed with the object of connecting with soldering. Before connecting with other method, please consult with Murata factory representative prior to using.

7.2 **Cleaning**

Isopropyl-alcohol and Ethyl-alcohol are applicable solvents for cleaning. If you use any other types of solvents, please settle suitable cleaning conditions after confirming the specified characteristics by your sets.

7.3 **Adjusting**

- (1) Don't apply more than 9.8N(Ref.;1kgf) of twist and stress after mounted onto PCB to prevent contact intermittence.
- (2) Use a suitable screwdriver which fits adjustment slot to prevent damages of the slot.

Manufactures	Model Number	MURATA Model Number
ENGINEER INC.	No.DA-40	KMDR180

- (3) The tip, shape or profile of the adjustment screw driver can affect not only operability but excessive force to the product and displacement after adjustment. If any question, please contact us before using it.
- (4) 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.

7.4 Operating environmental conditions

- (1) 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. Cl₂, H₂S, NH₃, SO₂, NO_x, etc)
 - 2) In liquid. (Ex. Oil, Medical liquid, Organic solvent, etc)
 - 3) Direct sunlight.
 - 4) Static voltage nor electric/magnetic fields.
 - 5) Direct sea breeze.
 - 6) Other variations of the above.
- (2) When using a lock paint to fix slot position, please use adhesive resin without chlorine or sulfur (Three-bond "1401series").

7.5 Storage conditions

- (1) To ensure the solderability of the terminal, store that the temperature is -10°C~+40°C and the relative humidity is 30~85%RH, and use within six months after delivery. If you are going to use a product which has been stored for more than six months, check its solderability beforehand.
- (2) Do not store in or near corrosive gases.
- (3) Do not store under direct sunlight.

7.6 Circuit design

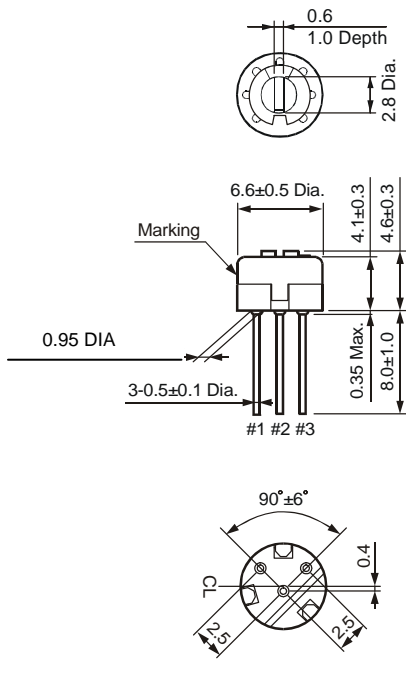
- (1) When using with partial load(rheostat), minimize the power depend on the resistance value.
- (2) Use trimmer potentiometer within 90% of the effective-electrical rotational angle to prevent a sudden change of resistance when excessive current is applied.
- (3) The maximum input voltage to a trimmer potentiometer should not exceed $(P \cdot R)^{1/2}$ or the maximum operating voltage, whichever is smaller.
P : Power rating (W) R : Standard total resistance value (ohm)
- (4) The maximum input current to a trimmer potentiometer should not exceed $(P/R)^{1/2}$ or the allowable wiper current, whichever is smaller.
P : Power rating (W) R : Standard total resistance value (ohm)

8. ⚠ Note

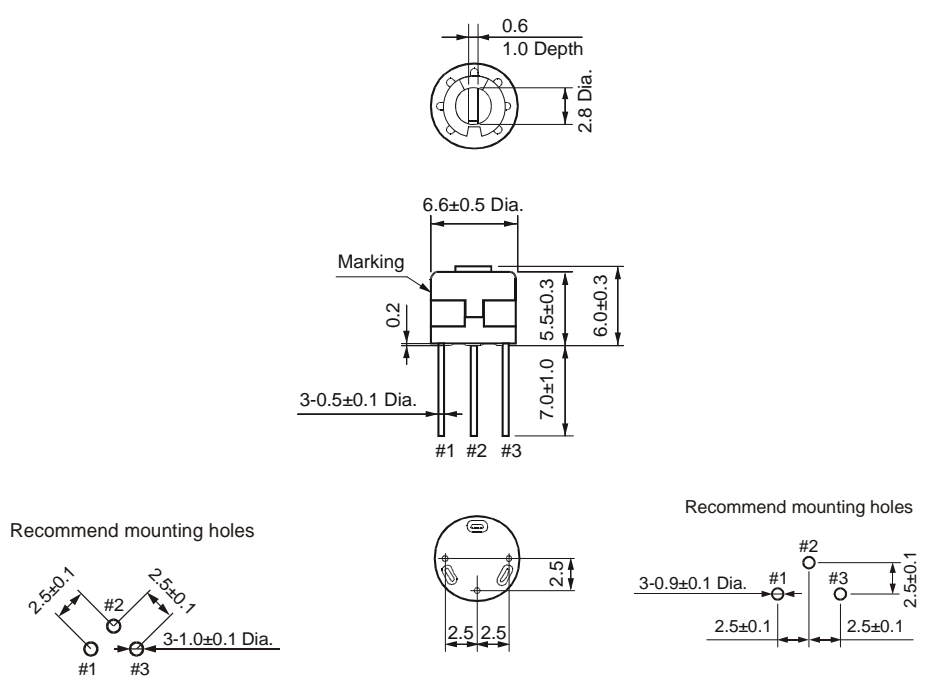
- (1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- (2) You are requested not to use our product deviating from the agreed specifications.
- (3) Please return one copy of this product specification with your signature of receipt. If the copy is not returned within three months, this product specification will be deemed to have been received.
- (4) We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

9. Outline dimensions

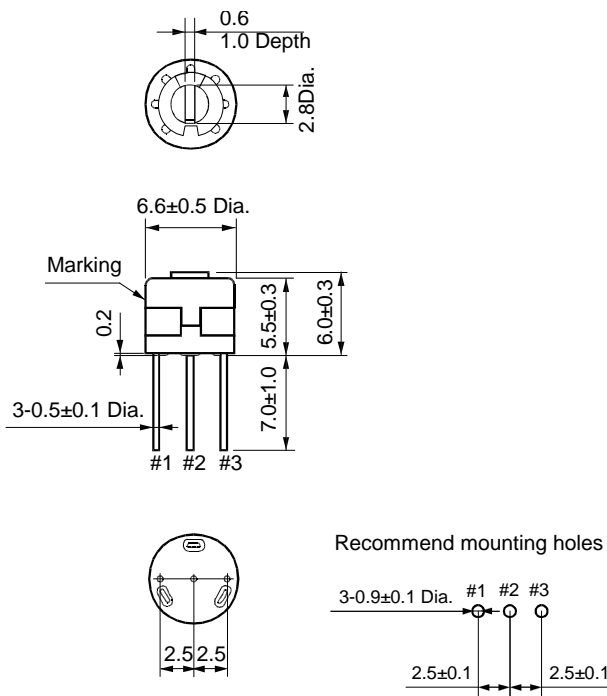
PV32H type (Top adjustment)



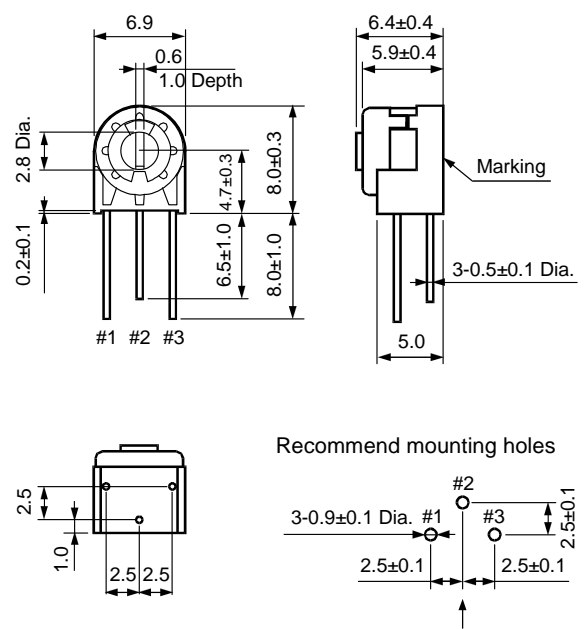
PV32P type (Top adjustment)



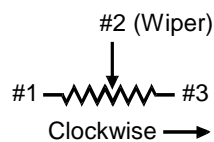
PV32R type (Top adjustment)



PV32S type (Side adjustment)



Circuit



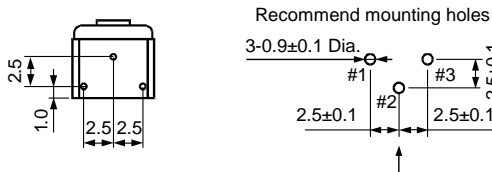
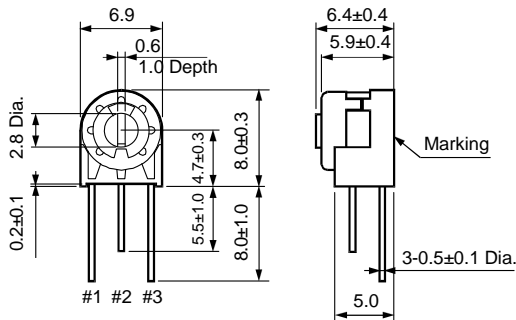
Note.

- 1. Marking
- 1-1. Part number
- 1-2. Resistance value
- 1-3. Lot number
- 1-4. Manufacture code
- 2. → Adj. direction

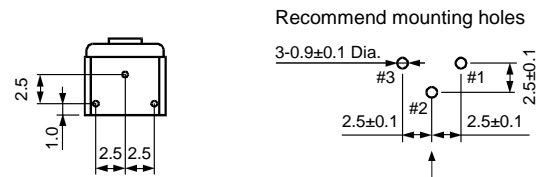
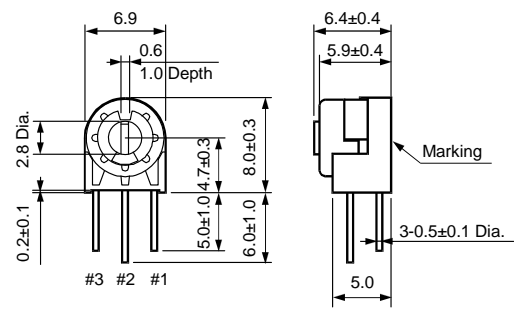
(in mm)
(Tolerance : ±0.3)

9. Outline dimensions

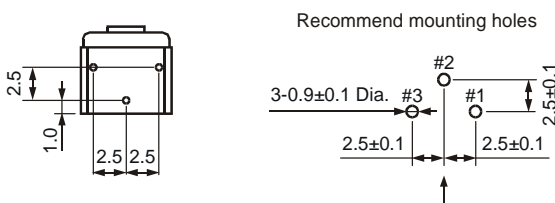
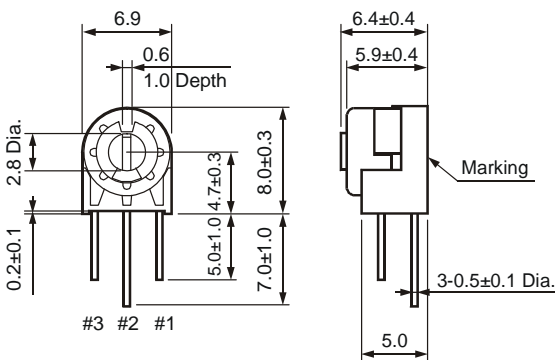
PV32T type (Side adjustment)



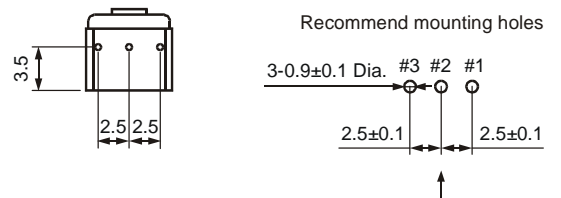
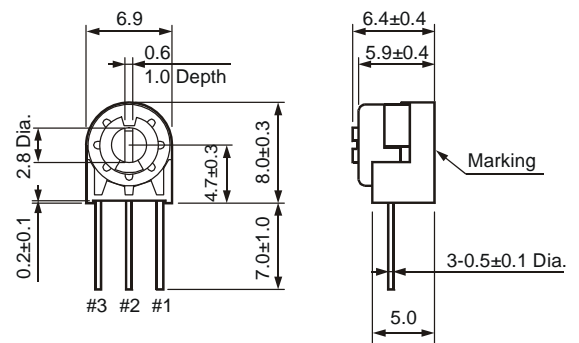
PV32N type (Side adjustment)



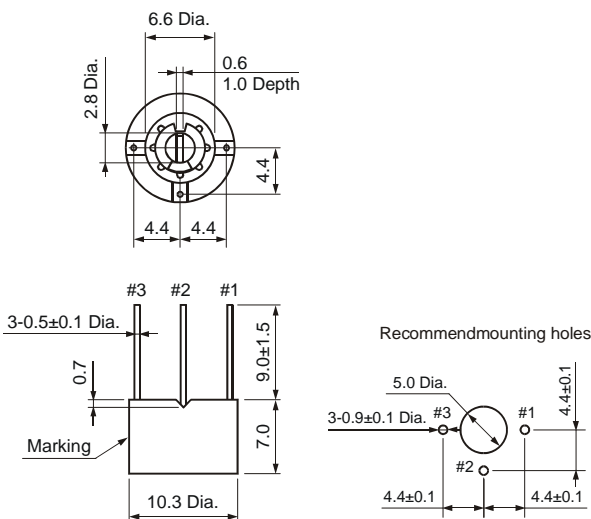
PV32Y type (Side adjustment)



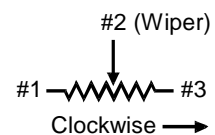
PV32W type (Side adjustment)



PV32F type (Rear adjustment)



Circuit



Note.

- 1. Marking
- 1-1. Part number
- 1-2. Resistance value
- 1-3. Lot number
- 1-4. Manufacture code
- 2. → Adj. direction

(in mm)
(Tolerance : ±0.3)

10.Part number cross reference table

PV32H type (Bulk)		PV32P type (Bulk)		PV32R type (Bulk)	
Customer part No.	Murata part No.	Customer part No.	Murata part No.	Customer part No.	Murata part No.
	PV32H100A01B00		PV32P100A01B00		PV32R100A01B00
	PV32H200A01B00		PV32P200A01B00		PV32R200A01B00
	PV32H250A01B00		PV32P250A01B00		PV32R250A01B00
	PV32H500A01B00		PV32P500A01B00		PV32R500A01B00
	PV32H101A01B00		PV32P101A01B00		PV32R101A01B00
	PV32H201A01B00		PV32P201A01B00		PV32R201A01B00
	PV32H251A01B00		PV32P251A01B00		PV32R251A01B00
	PV32H501A01B00		PV32P501A01B00		PV32R501A01B00
	PV32H102A01B00		PV32P102A01B00		PV32R102A01B00
	PV32H202A01B00		PV32P202A01B00		PV32R202A01B00
	PV32H252A01B00		PV32P252A01B00		PV32R252A01B00
	PV32H502A01B00		PV32P502A01B00		PV32R502A01B00
	PV32H103A01B00		PV32P103A01B00		PV32R103A01B00
	PV32H203A01B00		PV32P203A01B00		PV32R203A01B00
	PV32H253A01B00		PV32P253A01B00		PV32R253A01B00
	PV32H503A01B00		PV32P503A01B00		PV32R503A01B00
	PV32H104A01B00		PV32P104A01B00		PV32R104A01B00
	PV32H204A01B00		PV32P204A01B00		PV32R204A01B00
	PV32H254A01B00		PV32P254A01B00		PV32R254A01B00
	PV32H504A01B00		PV32P504A01B00		PV32R504A01B00
	PV32H105A01B00		PV32P105A01B00		PV32R105A01B00
	PV32H205A01B00		PV32P205A01B00		PV32R205A01B00
	PV32H505A01B00		PV32P505A01B00		PV32R505A01B00

PV32S type (Bulk)		PV32T type (Bulk)		PV32N type (Bulk)	
Customer part No.	Murata part No.	Customer part No.	Murata part No.	Customer part No.	Murata part No.
	PV32S100A01B00		PV32T100A01B00		PV32N100A01B00
	PV32S200A01B00		PV32T200A01B00		PV32N200A01B00
	PV32S250A01B00		PV32T250A01B00		PV32N250A01B00
	PV32S500A01B00		PV32T500A01B00		PV32N500A01B00
	PV32S101A01B00		PV32T101A01B00		PV32N101A01B00
	PV32S201A01B00		PV32T201A01B00		PV32N201A01B00
	PV32S251A01B00		PV32T251A01B00		PV32N251A01B00
	PV32S501A01B00		PV32T501A01B00		PV32N501A01B00
	PV32S102A01B00		PV32T102A01B00		PV32N102A01B00
	PV32S202A01B00		PV32T202A01B00		PV32N202A01B00
	PV32S252A01B00		PV32T252A01B00		PV32N252A01B00
	PV32S502A01B00		PV32T502A01B00		PV32N502A01B00
	PV32S103A01B00		PV32T103A01B00		PV32N103A01B00
	PV32S203A01B00		PV32T203A01B00		PV32N203A01B00
	PV32S253A01B00		PV32T253A01B00		PV32N253A01B00
	PV32S503A01B00		PV32T503A01B00		PV32N503A01B00
	PV32S104A01B00		PV32T104A01B00		PV32N104A01B00
	PV32S204A01B00		PV32T204A01B00		PV32N204A01B00
	PV32S254A01B00		PV32T254A01B00		PV32N254A01B00
	PV32S504A01B00		PV32T504A01B00		PV32N504A01B00
	PV32S105A01B00		PV32T105A01B00		PV32N105A01B00
	PV32S205A01B00		PV32T205A01B00		PV32N205A01B00
	PV32S505A01B00		PV32T505A01B00		PV32N505A01B00

10.Part number cross reference table

PV32Y type (Bulk)		PV32W type (Bulk)		PV32F type (Bulk)	
Customer part No.	Murata part No.	Customer part No.	Murata part No.	Customer part No.	Murata part No.
	PV32Y100A01B00		PV32W100A01B00		PV32F100A01B00
	PV32Y200A01B00		PV32W200A01B00		PV32F200A01B00
	PV32Y250A01B00		PV32W250A01B00		PV32F250A01B00
	PV32Y500A01B00		PV32W500A01B00		PV32F500A01B00
	PV32Y101A01B00		PV32W101A01B00		PV32F101A01B00
	PV32Y201A01B00		PV32W201A01B00		PV32F201A01B00
	PV32Y251A01B00		PV32W251A01B00		PV32F251A01B00
	PV32Y501A01B00		PV32W501A01B00		PV32F501A01B00
	PV32Y102A01B00		PV32W102A01B00		PV32F102A01B00
	PV32Y202A01B00		PV32W202A01B00		PV32F202A01B00
	PV32Y252A01B00		PV32W252A01B00		PV32F252A01B00
	PV32Y502A01B00		PV32W502A01B00		PV32F502A01B00
	PV32Y103A01B00		PV32W103A01B00		PV32F103A01B00
	PV32Y203A01B00		PV32W203A01B00		PV32F203A01B00
	PV32Y253A01B00		PV32W253A01B00		PV32F253A01B00
	PV32Y503A01B00		PV32W503A01B00		PV32F503A01B00
	PV32Y104A01B00		PV32W104A01B00		PV32F104A01B00
	PV32Y204A01B00		PV32W204A01B00		PV32F204A01B00
	PV32Y254A01B00		PV32W254A01B00		PV32F254A01B00
	PV32Y504A01B00		PV32W504A01B00		PV32F504A01B00
	PV32Y105A01B00		PV32W105A01B00		PV32F105A01B00
	PV32Y205A01B00		PV32W205A01B00		PV32F205A01B00
	PV32Y505A01B00		PV32W505A01B00		PV32F505A01B00