

Knob Potentiometer with Switch



The P16S is a revolutionary concept in panel mounted potentiometers. This unique design consists of a knob driving and incorporating a cermet potentiometer. Only the mounting hardware and terminals are situated on the back side of the panel reducing to a minimum the required clearance.

FEATURES

- **P16S** - Version for military, professional and industrial applications (cermet): 1 W at 40 °C
- **PA16S** - Version for professional audio applications (conductive plastic): 0.5 W at 40 °C
- Compact (integrated)
- Detent and electric cut off at beginning of travel
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Custom knob on request
- Test according to CECC 41000 or IEC 60393-1
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

| DIMENSIONS in millimeters (± 0.5 mm) | | |
|--|--|--|
| <p>P16SNP</p> <p>Thickness nut 2 mm washer 1.5 mm</p> | <p>P16SNM</p> <p>Thickness nut 2 mm washer 1.5 mm</p> | <p>PANEL CUTOUT</p> <p>Panel thickness max.: 3 mm</p> |
| | | |

| ELECTRICAL SPECIFICATIONS | | P16S | PA16S |
|---|--|--|---------------------------------------|
| Resistive Element | | Cermet | Conductive plastic |
| Electrical Travel | | 220° ± 10° | 220° ± 10° |
| Power Rating Chart | | | |
| Circuit Diagram | | | |
| Taper | | | |
| Resistance Range | Linear Law Logarithmic Laws | 22 Ω to 10 MΩ 100 Ω to 2.2 MΩ | 1 kΩ to 1 MΩ 470 Ω to 500 kΩ |
| Standard Series e3 | | 1 - 2.2 - 4.7 and on request 1 - 2 - 5 | 1 - 2.2 - 4.7 |
| Tolerance | Standard On Request | ± 20 % ± 10 % | ± 20 % ± 10 % (1 kΩ to 100 kΩ) |
| Power Rating | Linear Logarithmic | 1 W at + 40 °C 0.5 W at + 40 °C | 0.5 W at + 40 °C 0.25 W at + 40 °C |
| Temperature Coefficient (Typical) | | ± 150 ppm | ± 500 ppm |
| Dielectric Strength (RMS) | | 2500 V | 2500 V |
| Limiting Element Voltage (Linear Law) | | 350 V | 350 V |
| Contact Resistance Variation | | 3 % Rn or 3 Ω | 2 % Rn or 3 Ω |
| End Resistance (Typical) | | 1 Ω | 1 Ω |
| Insulation Resistance (500 V_{DC}) | | 10 ⁶ MΩ | 10 ⁶ MΩ |



| MECHANICAL SPECIFICATIONS | |
|-----------------------------------|-----------------|
| Mechanical Travel | 300° ± 5° |
| Operating Torque | 2 Ncm typical |
| End Stop Torque | 25 Ncm maximum |
| Tightening Torque of Mounting Nut | 250 Ncm maximum |
| Unit Weight | 4.5 g typical |

| ENVIRONMENTAL SPECIFICATIONS | | |
|------------------------------|-----------------------------------|--------------------|
| | METALLIC KNOB | PLASTIC KNOB |
| Temperature Range | - 40 °C to + 125 °C | - 40 °C to + 85 °C |
| Climatic Category | 40/100/56 | 40/85/56 |
| Sealing | Sealed container and panel sealed | |
| Protection Grades | IP67 | |

| SWITCH ELECTRICAL AND MECHANICAL SPECIFICATIONS | | |
|---|---|-------------|
| ON/OFF Switch | Actuation in counter clockwise position (between terminal a and terminal b) | |
| Switching Current | P16S | 100 mA max. |
| | PA16S | 1 mA max. |
| Switch Actuation Torque | 4 Ncm min. | |
| Switch Actuation Travel | 30° ± 5° | |
| Dielectric Strength Terminal to Terminal (RMS) | 1000 V | |
| Insulation Resistance between Contacts | 10 ⁶ MΩ | |
| Switch Mechanical Endurance | 10 000 cycles | |
| 1 Cycle | ON-OFF-ON | |

| MARKING |
|--|
| <ul style="list-style-type: none"> Ohmic value code, tolerance, code and taper Manufacturing date code |

| CONTROL KNOB |
|--|
| Black metallic knob (NM). Black plastic knob (NP). For white and blue color see ordering information. Other dimensions, shapes, colors of control knobs are manufactured on request - please consult Vishay. Other reference marks (shapes, colors) and legends can be printed on plastic knob on request - please consult Vishay. |

| PACKAGING |
|---|
| <ul style="list-style-type: none"> Carton box of 20 pieces |

| STANDARD RESISTANCE ELEMENT DATA | | | | | | | | | | | | |
|----------------------------------|---------------------|--------------|-------------------------|---------------------|--------------|-------------------------|--------------------------|--------------|-------------------------|---------------------|--------------|-------------------------|
| STANDARD RESISTANCE VALUES | P16S CERMET | | | | | | PA16S CONDUCTIVE PLASTIC | | | | | |
| | LINEAR TAPER | | | LOGARITHMIC TAPER | | | LINEAR TAPER | | | LOGARITHMIC TAPER | | |
| | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER |
| Ω | W | V | mA | W | V | mA | W | V | mA | W | V | mA |
| 22 | 1 | 4.69 | 213 | | | | | | | | | |
| 47 | 1 | 6.85 | 146 | | | | | | | | | |
| 100 | 1 | 10 | 100 | 0.5 | 7.1 | 71 | | | | | | |
| 220 | 1 | 14.8 | 67.4 | 0.5 | 10.5 | 48 | | | | | | |
| 470 | 1 | 21.7 | 46.1 | 0.5 | 15.3 | 32.6 | | | | 0.25 | 10.8 | 23.1 |
| 1K | 1 | 31.6 | 31.6 | 0.5 | 22.4 | 22.4 | 0.5 | 22.4 | 22.4 | 0.25 | 15.8 | 16 |
| 2.2K | 1 | 46.9 | 21.3 | 0.5 | 33.2 | 15.1 | 0.5 | 33.2 | 15.1 | 0.25 | 23.5 | 11 |
| 4.7K | 1 | 68.5 | 14.6 | 0.5 | 48.5 | 10.3 | 0.5 | 48.5 | 10.3 | 0.25 | 34.3 | 7 |
| 10K | 1 | 100 | 10 | 0.5 | 70.7 | 7.07 | 0.5 | 70.7 | 7.07 | 0.25 | 50 | 5 |
| 22K | 1 | 148 | 6.74 | 0.5 | 105 | 4.77 | 0.5 | 105 | 4.77 | 0.25 | 74 | 3.4 |
| 47K | 1 | 217 | 4.61 | 0.5 | 153 | 3.26 | 0.5 | 153 | 3.26 | 0.25 | 108 | 2.3 |
| 100K | 1 | 316 | 3.16 | 0.5 | 224 | 2.24 | 0.5 | 224 | 2.24 | 0.25 | 158 | 1.6 |
| 220K | 0.56 | 350 | 1.59 | 0.5 | 332 | 1.51 | 0.5 | 332 | 1.51 | 0.25 | 235 | 1.1 |
| 470K | 0.26 | 350 | 0.75 | 0.26 | 350 | 0.74 | 0.26 | 350 | 0.74 | 0.25 | 343 | 0.7 |
| 1M | 0.12 | 350 | 0.35 | 0.12 | 350 | 0.35 | 0.12 | 350 | 0.35 | | | |
| 2.2M | 0.05 | 350 | 0.16 | 0.056 | 350 | 0.16 | | | | | | |
| 4.7M | 0.02 | 350 | 0.07 | | | | | | | | | |
| 10M | 0.01 | 350 | 0.012 | | | | | | | | | |



| PERFORMANCE | | | | |
|-------------------------|---|---------------------------|------------------------------|---|
| TESTS | CONDITIONS | TYPICAL VALUES AND DRIFTS | | |
| | | $\Delta R_T/R_T$ (%) | $\Delta R_{1-2}/R_{1-2}$ (%) | OTHER |
| Electrical Endurance | 1000 h at rated power 90'/30' cycle at + 40 °C | ± 5 % | - | Insulation resistance: > 10 ⁴ MΩ Contact res. variation: < 2 % Rn |
| Damp Heat, Steady State | 56 days 40 °C, 93 % HR | ± 2 % | ± 1 % | Insulation resistance: > 10 ⁴ MΩ |
| Mechanical Endurance | 50 000 cycles | ± 5 % | - | Contact res. variation: < 2 % Rn |
| Shock | 50 g's at 11 ms 3 successive shocks in 3 dimensions | ± 0.2 % | ± 0.5 % | - |
| Vibration | 10 Hz to 55 Hz 0.75 mm or 10 g's during 6 h | ± 0.2 % | - | $\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 0.5 \%$ |

| ORDERING INFORMATION | | | | | | | | | | | | | | | | | |
|---|--|---|---|---|---|---|---|---|---|---|-------------------------------|---|--|--|--|--|--|
| P | 1 | 6 | S | N | P | 2 | 2 | 3 | M | A | B | 1 | 5 | | | | |
| MODEL | STYLE | | | OHMIC VALUE | | | TOLERANCE | | TAPER | | PACKAGING CODE | | SPECIAL NUMBER | | | | |
| P16S = Cermet PA16S = Conductive plastic | NM : Metallic black NP : Plastic black WM : Metallic white WP : Plastic white BP : Plastic blue | | | 223 = 22 kΩ for ohmic value range see electrical specification | | | M = ± 20 % On request: K = ± 10 % | | A : Linear L : Clockwise logarithmic F : Inverse clockwise logarithmic | | B15 = Box of 20 pieces | | (If applicable) Given by Vishay for custom design | | | | |

| PART NUMBER DESCRIPTION (for information only) | | | | | | | | |
|---|-------|-------------|-----------|-------|---------|-----------|---------|----------------|
| P16S | NP | 22 kΩ | 20 % | A | | BO20 | | e3 |
| MODEL | STYLE | OHMIC VALUE | TOLERANCE | TAPER | SPECIAL | PACKAGING | SPECIAL | LEAD (Pb)-FREE |



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