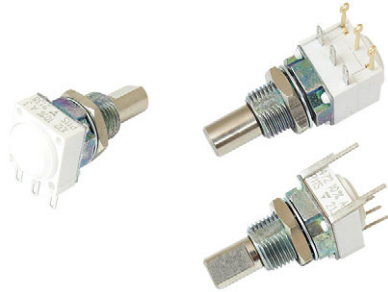


# 12.5 mm Modular High Torque Panel Potentiometer



## FEATURES

- Keep the setting under high mechanical constraints (vibrations, shocks, ...)
- High torque (8 Ncm) with smooth feeling during all potentiometer life
- Torque stability under high environmental constraints
- 12.5 mm square single turn panel control with 6.35 mm shaft diameters
- Custom designs upon request
- Compact, versatile, modular, and robust
- Tests according to CECC 41000 or IEC 60393-1
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## LINKS TO ADDITIONAL RESOURCES



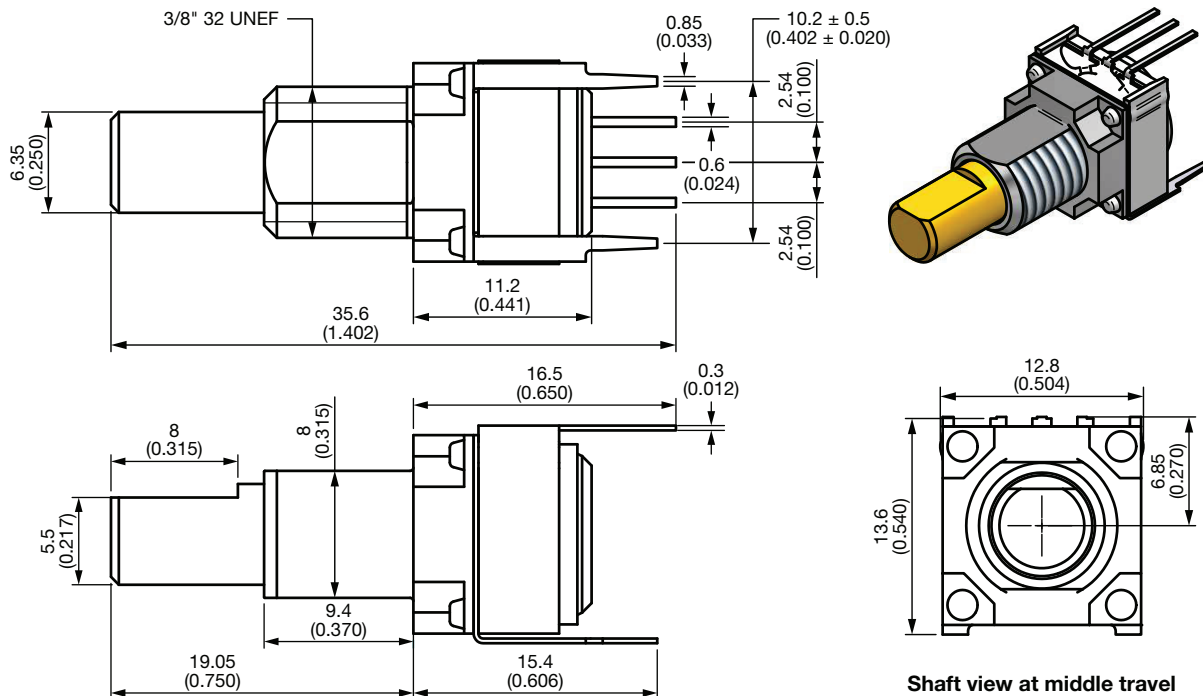
3D Models



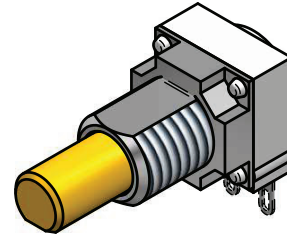
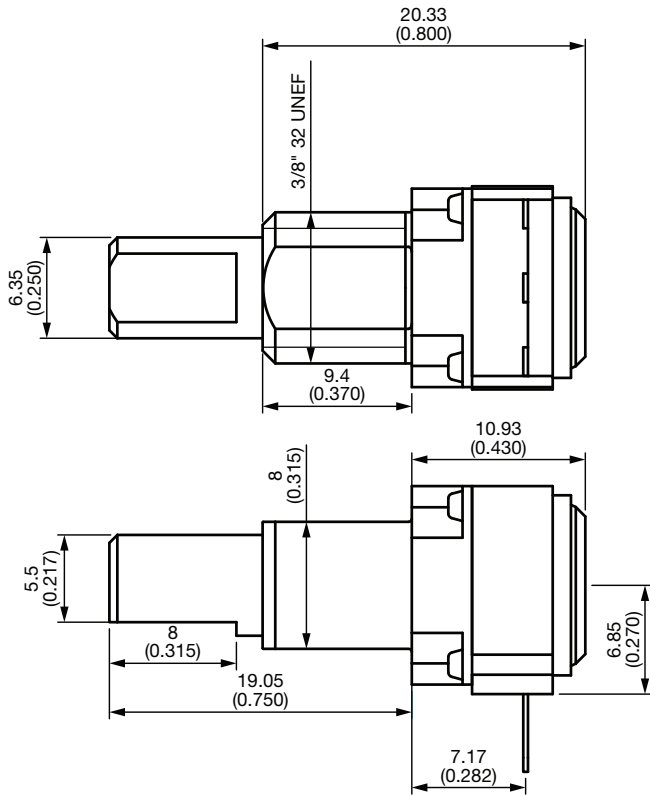
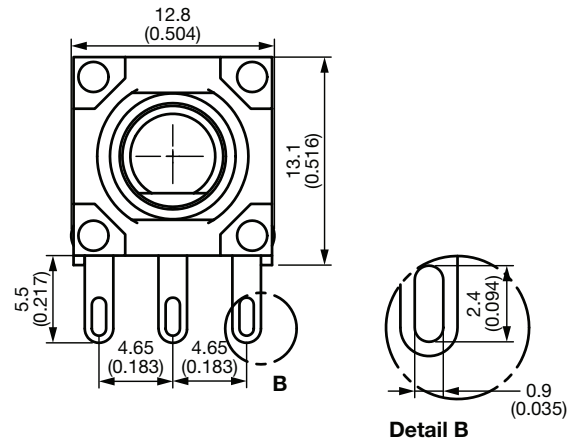
Capabilities and Custom Options

| QUICK REFERENCE DATA    |                 |
|-------------------------|-----------------|
| Multiple module         | Up to 7 modules |
| Switch module           | Yes             |
| Detent module           | n/a             |
| Special electrical laws | A: linear       |
| Sealing level           | IP 64           |
| Lifespan                | 50K cycles      |

## CONFIGURATION EXAMPLE - Dimensions in millimeters (inches) ± 0.5 mm (± 0.02")

**EXAMPLE: P11H1F0GHFW10102KA**


**CONFIGURATION EXAMPLE** - Dimensions in millimeters (inches)  $\pm 0.5$  mm ( $\pm 0.02$ " )

**EXAMPLE: P11H1F0GHFY00102KA**

**Shaft view at middle travel**

**CUSTOM CAPABILITIES**

P11H model can be fully customized:

- Custom shafts
- Switch option
- Connector and wire
- Special leads
- Special taper
- One to 7 modules
- ...

When special shafts are required (special shaft lengths, diameter etc.) a drawing is required.

Hardware supplied in separate bags.

**GENERAL SPECIFICATIONS**

| <b>ELECTRICAL (initial)</b>  |   |
|--|---|
| Resistive element  | Cermet element  |
| Electrical travel  | 270° ± 10°  |
| Resistance range <sup>(1)</sup>                                    | 1 kΩ, 4.7 kΩ, 10 kΩ, 47 kΩ, 100 kΩ, 100 Ω, 220 Ω, 50 Ω, 2.2 kΩ, 22 kΩ, 50 kΩ, 220 kΩ, 500 kΩ, 1 MΩ  |
| Tolerance  | 5 % (on request), ± 10 %, ± 20 %  |
| Taper standard law: A (linear)<br>(other custom laws upon request) | <p>The graph shows a linear relationship between Total Resistance (%) on the y-axis and Clockwise Shaft Rotation (%) on the x-axis. The y-axis ranges from 0 to 100 in increments of 20. The x-axis ranges from 0 to 100 in increments of 20. A blue line starts at (0,0) and ends at (100,100). A point 'A' is marked on the line at approximately (45, 45).</p>   |
| Circuit diagram  | <p>The circuit diagram shows a potentiometer with three terminals: (1) on the left, (2) in the middle (wiper), and (3) on the right. An arrow labeled (2) indicates clockwise (cw) rotation.</p>  |
| Power rating at 70 °C  | <p>1 W for single module or 0.5 W per module</p> <p>The graph shows Rated Power (W) on the y-axis versus Ambient Temperature (°C) on the x-axis. The y-axis ranges from 0 to 1.0 in increments of 0.5. The x-axis ranges from 0 to 125 in increments of 20. Two lines are shown: an orange line for a single module (1.0 W at 0-70°C) and a blue line for per-module power (0.5 W at 0-70°C). Both lines decrease linearly to 0 W at 125°C.</p> |
| Temperature coefficient (typical)                                  | ± 150 ppm   |
| Limiting element voltage   | 350 V   |
| End resistance (typical)   | 2 Ω   |
| Contact resistance variation (typical)                             | 2 % or 3 Ω  |
| Independent linearity (typical)                                    | ± 5 %   |
| Insulation resistance  | 10 <sup>6</sup> MΩ min.   |
| Dielectric strength  | 1500 V <sub>RMS</sub> min.  |
| Mechanical endurance   | 50 000 cycles   |

**Note**

<sup>(1)</sup> Consult Vishay Sfernice for other ohmic values



| MECHANICAL (initial)       |  |
|----------------------------|--|
| Mechanical travel          | 300° ± 5°                                      |
| Operating torque (typical) | 8 Ncm ± 3 Ncm (7.08 oz.-inch to 15.6 oz.-inch) |
| End stop torque            | 80 Ncm max. (6.8 lb-inch max.)                 |
| Tightening torque          | 250 Ncm max. (21 lb-inch max.)                 |
| Weight                     | 7 g to 9 g per module (0.25 oz. to 0.32 oz.)   |

| ENVIRONMENTAL               |                   |
|-----------------------------|-------------------|
| Operating temperature range | -55 °C to +125 °C |
| Climatic category           | 55 / 125 / 56     |
| Sealing                     | IP64              |

| MARKING   |
|---|
| Potentiometer module Vishay logo, SAP code of ohmic value and tolerance in %, variation law, manufacturing date (four digits), "3" for the lead 3 |

| PACKAGING |
|-----------|
| • Box     |

| PERFORMANCES            |  |  |                                   |
|-------------------------|--|--|-----------------------------------|
| TESTS                   | CONDITIONS   | TYPICAL VALUE AND DRIFTS   |                                   |
| Electrical endurance    | 1000 h at rated power<br>90'/30' at ambient temp. 70 °C      | $\Delta R_T/R_T$   | ± 2 %                             |
|                         |  | Contact resistance variation   | ± 4 %                             |
| Change of temperature   | 5 cycles, -55 °C to +125 °C, 30' per cycle                   | $\Delta R_T/R_T$<br>Operating torque                                   | ± 0.2 %<br>> 2 Ncm (2.8 oz.-inch) |
|                         | Severe stress: 90 cycles, -40 °C to +80 °C,<br>4 h per cycle | $\Delta$ Operating torque / torque (%)                                 | < 35 %                            |
| Damp heat, steady state | +40 °C, 93 % relative humidity, 56 days                      | $\Delta R_T/R_T$   | ± 2 %                             |
|                         |  | Insulation resistance<br>$\Delta$ Operating torque / torque (%)        | > 1000 M $\Omega$<br>< 20 %       |
| Mechanical endurance    | 50 000 cycles  | $\Delta R_T/R_T$   | ± 5 %                             |
|                         |  | Contact resistance variation<br>$\Delta$ Operating torque / torque (%) | ± 5 %<br>> 5 Ncm                  |
| Shock                   | 50 g, 11 ms<br>3 shocks - 3 directions                       | $\Delta R_T/R_T$   | ± 0.2 %                           |
|                         |  | $\Delta R_{1-2}/R_{1-2}$<br>$\Delta$ Operating torque / torque (%)     | ± 0.5 %<br>< 13 %                 |
| Vibration               | 10 Hz to 55 Hz<br>0.75 mm or 10 g, 6 h                       | $\Delta R_T/R_T$   | ± 0.2 %                           |
|                         |  | $\Delta V_{1-2}/V_{1-3}$<br>$\Delta$ Operating torque / torque (%)     | ± 0.5 %<br>< 11 %                 |

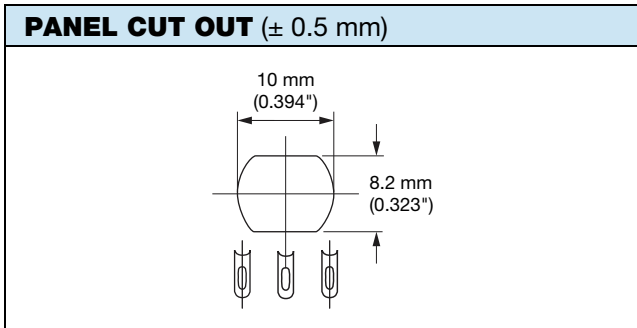
**Note**

- Nothing stated herein shall be construed as a guarantee of quality or durability

| ORDERING INFORMATION (part number) |                                 |         |   |                                 |             |  |   |   |                           |                 |   |   |   |   |   |   |   |
|------------------------------------|---------------------------------|---------|---|---------------------------------|-------------|--|---|---|---------------------------|-----------------|---|---|---|---|---|---|---|
| P                                  | 1                               | 1       | H   | 1                               | F           | 0  | G   | H   | F                         | W               | 1 | 0 | 1 | 0 | 3 | K | A |
| MODEL                              | NUMBER OF MODULES               | BUSHING | LOCATION PEG  | SHAFT                           | SHAFT STYLE | LEADS  | RESISTANCE CODE   | TOLERANCE   | TAPER OR SPECIAL          |                 |   |   |   |   |   |   |   |
| P11H                               | 1<br>2<br>3<br>4<br>5<br>6<br>7 | F       | A, B, C, D = see "Location Pegs" table<br>0 = without peg | GH<br><br>AP = particular shaft | F           | W10 = vertical mounting, PCB pin<br>Y00 = solder lugs<br><br>Other styles on request | 102 = 1 kΩ<br>472 = 4.7 kΩ<br>502 = 5 kΩ<br>103 = 10 kΩ<br>473 = 47 kΩ<br>104 = 100 kΩ<br>101 = 100 Ω<br>221 = 220 Ω<br>501 = 500 Ω<br>222 = 2.2 kΩ<br>223 = 22 kΩ<br>503 = 50 kΩ<br>224 = 220 kΩ<br>504 = 500 kΩ<br>105 = 1 MΩ | M = ± 20 %<br>K = ± 10 %<br><u>On request:</u><br>J = 5 % | A<br><br>Other on request |                 |   |   |   |   |   |   |   |
|                                    |                                 |         |   |                                 |             |  |   |   |                           | OR SPECIAL CODE |   |   |   |   |   |   |   |

| SPECIAL CODES GIVEN BY VISHAY  |
|--|
| Options available:   |
| <ul style="list-style-type: none"> <li>• Custom shaft</li> <li>• Specific linearity, interlinearity, taper</li> <li>• Multiple assemblies with various modules</li> <li>• Wires, connectors</li> <li>• Switch modules</li> <li>• PCB adding</li> <li>• Custom design on request</li> </ul> |

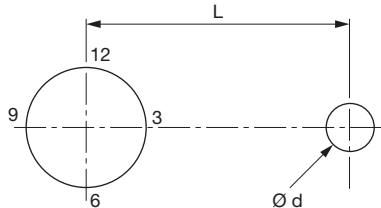
| STANDARD RESISTANCE ELEMENT DATA |                     |                      |                    |
|----------------------------------|---------------------|----------------------|--------------------|
| STANDARD RESISTANCE VALUES       | MAX. POWER AT 70 °C | MAX. WORKING VOLTAGE | MAX. WIPER CURRENT |
| Ω                                | W                   | V                    | mA                 |
| 1K                               | 1                   | 31.6                 | 31.6               |
| 4.7K                             | 1                   | 69                   | 14.5               |
| 10K                              | 1                   | 100                  | 10                 |
| 47K                              | 1                   | 21.7                 | 46.1               |
| 100K                             | 1                   | 31.6                 | 31.6               |
| 100                              | 1                   | 10                   | 100                |
| 220                              | 1                   | 14.8                 | 67.4               |
| 470                              | 1                   | 21.7                 | 46.1               |
| 500                              | 1                   | 22.4                 | 44.7               |
| 1K                               | 1                   | 31.6                 | 31.6               |
| 2.2K                             | 1                   | 46.9                 | 21.3               |
| 4.7K                             | 1                   | 69                   | 14.5               |
| 5K                               | 1                   | 70.7                 | 14.1               |
| 10K                              | 1                   | 100                  | 10.0               |
| 22K                              | 1                   | 148                  | 6.74               |
| 47K                              | 1                   | 217                  | 4.61               |
| 50K                              | 1                   | 224                  | 4.47               |
| 100K                             | 1                   | 316                  | 3.16               |
| 220K                             | 0.56                | 350                  | 1.59               |
| 470K                             | 0.26                | 350                  | 0.75               |
| 500K                             | 0.25                | 350                  | 0.70               |
| 1M                               | 0.12                | 350                  | 0.35               |



**LOCATING PEGS (anti-rotation lug)**

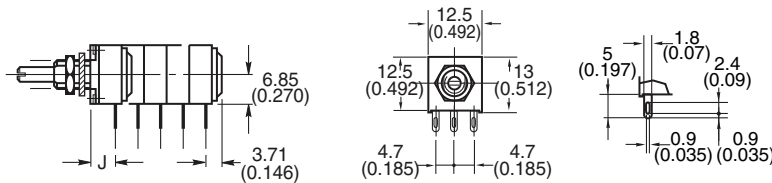
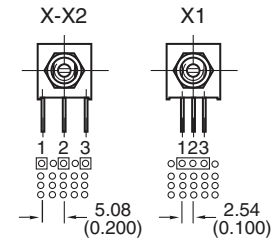
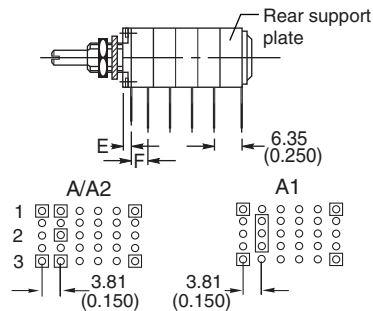
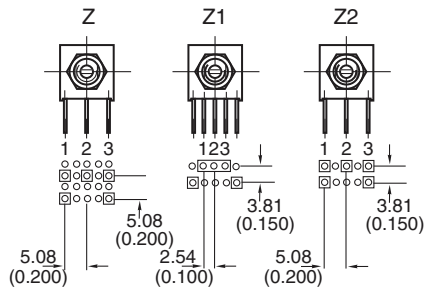
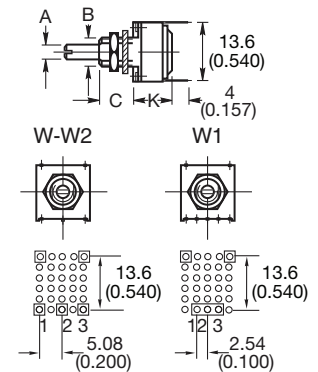
The locating peg is provided by a plate mounted on the bushing and positioned by the module sides. Four set positions are available, clock face orientation: 12, 3, 6, 9.

All P11 bushings have a double flat. When panel mounting holes have been punched accordingly, an anti-rotation lug is not necessary.

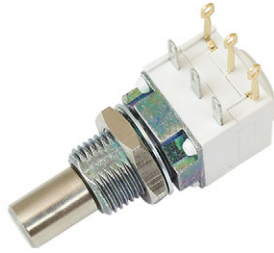


| CODE | VERSION | BUSHING | EFFECTIVE HIGH PEG |
|------|---------|---------|--------------------|
| A    | Ø d mm  | 2       | 0.7                |
|      | L mm    | 6.2     |                    |
| B    | Ø d mm  | 2       | 0.7                |
|      | L mm    | 7.75    |                    |
| C    | Ø d mm  | 3.5     | 1.1                |
|      | L mm    | 13.5    |                    |

Locating pegs are supplied in separate bags with nuts and washers.

**LEADS CONFIGURATION EXAMPLES (on request) - Dimensions in millimeters (inches)**
**SOLDER LUGS Y**

**PCB PIN OUT**

**HORIZONTAL MOUNTING**
**FRONT AND REAR SUPPORT PLATES**

**FRONT SUPPORT PLATE**

**VERTICAL MOUNTING**

**Note**

- Standard version: Y00 W10. Other styles on request

**P11 OPTION: ROTARY SWITCH MODULES**


- Rotary switches
- Current up to 2 A
- Actuation CW or CCW position
- Sealing IP 60

The position of each switch module is free. Leads finish: Gold plated RS and RSI rotary switches are housed in a standard P11 module size 12.7 mm x 12.7 mm x 5.08 mm (0.5" x 0.5" x 0.2"). They have the same terminal styles as the assembled electrical modules. An assembly can comprise one or more switch modules. Switch actuation is described as seen from the shaft end.

D: means actuation in maximum CCW position

F: means actuation in maximum CW position

The switch actuation travel is 25° with a total mechanical travel of 300° ± 5° and electrical travel of electrical modules is 238° ± 10°.

**RSD SINGLE POLE SWITCH, NORMALLY OPEN**

In full CCW position, the contact between 1 and 3 is open. It is made at the beginning of the travel in CW direction.

**RSF SINGLE POLE SWITCH, NORMALLY OPEN**

In full CW position, the contact between 1 and 3 is open. It is made at the beginning of the travel in CCW direction.

**RSID SINGLE POLE CHANGEOVER**

In full CCW position, the contact is made between 3 and 2, and open between 3 and 1. Switch actuation (CW direction) reverses these positions.

**RSIF SINGLE POLE CHANGEOVER**

In full CW position, the contact is made between 1 and 2, and open between 1 and 3. Switch actuation (CCW direction) reverses these positions.

**SWITCH SPECIFICATIONS**

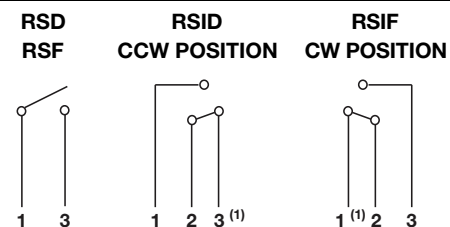
|  |                                |                       |
|--|--------------------------------|-----------------------|
| Switching power maximum                | 62.5 VA v<br>15 VA =           |                       |
| Switching current maximum              | 0.25 A 250 V v<br>0.5 A 30 V = |                       |
| Maximum current through element        | 2 A                            |                       |
| Contact resistance                     | 100 mΩ                         |                       |
| Dielectric strength                    | Terminal to terminal           | 1000 V <sub>RMS</sub> |
|  | Terminal to bushing            | 2000 V <sub>RMS</sub> |
| Maximum voltage operation              | 250 V v<br>30 V =              |                       |
| Insulation resistance between contacts | 10 <sup>6</sup> MΩ             |                       |
| Life at P <sub>max</sub> .             | 10 000 actuations              |                       |
| Minimal travel                         | 25°                            |                       |
| Operating temperature                  | -40 °C to +85 °C               |                       |

**RSD SPST:** single pole, open switch in CCW position - 2 pins

**RSF SPST:** single pole, open switch in CW position - 2 pins

**RSID SPDT:** single pole, changeover switch in CCW position - 3 pins

**RSIF SPDT:** single pole, changeover switch in CW position - 3 pins

**ELECTRICAL DIAGRAM**

**Note**

(1) Common

**ACCESSORIES**

|  |  |
|--|--|
| Additional Accessories (to order separately) | <a href="http://www.vishay.com/doc?51051">www.vishay.com/doc?51051</a> |
| Control knobs                                | <a href="http://www.vishay.com/doc?51101">www.vishay.com/doc?51101</a> |

**RELATED DOCUMENTS**
**APPLICATION NOTES**

|   |  |
|---|--|
| Potentiometers and Trimmers                                       | <a href="http://www.vishay.com/doc?51001">www.vishay.com/doc?51001</a> |
| Guidelines for Vishay Sfernice Resistive and Inductive Components | <a href="http://www.vishay.com/doc?52029">www.vishay.com/doc?52029</a> |
| Capabilities and Custom Options                                   | <a href="http://www.vishay.com/doc?48463">www.vishay.com/doc?48463</a> |



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