

## Series PVN013PbF

Microelectronic Power IC

HEXFET® Power MOSFET Photovoltaic Relay  
Single Pole, Normally Open, 0-20V, 2.5A AC/ 4.5A DC

### General Description

The PVN013 Series Photovoltaic Relay at 100 milliohms features the lowest possible on-state resistance in a miniature package — lower than a comparable reed relay.

The PVN013 is a single-pole, normally open solid-state relay. It utilizes a GenerationV HEXFET output switch, driven by an integrated circuit photovoltaic generator of novel construction. The output switch is controlled by radiation from a GaAlAs light emitting diode (LED) which is optically isolated from the photovoltaic generator.

These units exceed the performance capabilities of electromechanical relays in life, sensitivity, stable on-resistance, low off-state leakage, miniaturization, magnetic insensitivity and ruggedness. They are ideally suited for switching high currents or low level signals without distortion or injection of electrical noise.

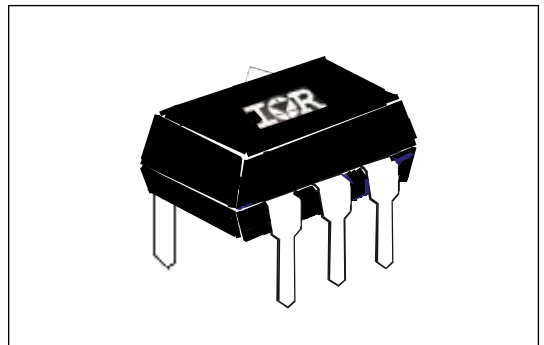
Series PVN013 Relays are packaged in a 6-lead molded DIP package with either thru-hole or surface mount (gull-wing) terminals. They are available in standard plastic shipping tubes or on tape-and-reel. Please refer to part identification information opposite.

### Applications

- Portable Electronics
- Industrial Control
- Computers and Peripheral Devices
- Audio Equipment
- Power Supplies and Power Distribution
- Instrumentation

### Features

- 100mΩ On-Resistance
- Extremely low off-state leakage
- Bounce-free operation
- 2.5 - 4.5 Amp capacity
- Linear AC/DC operation
- 4,000 V<sub>RMS</sub> I/O isolation
- Solid-State reliability
- UL recognized
- ESD Tolerance:
  - 4000V Human Body Model
  - 500V Machine Model



### Part Identification

|              |                              |
|--------------|------------------------------|
| PVN013PbF    | thru-hole                    |
| PVN013SPbF   | surface-mount                |
| PVN013S-TPbF | surface-mount, tape and reel |

*(HEXFET is the registered trademark for International Rectifier Power MOSFETs)*

**Electrical Specifications** ( $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$  unless otherwise specified)

| <b>INPUT CHARACTERISTICS</b>                                                   | <b>Limits</b> | <b>Units</b> |
|--------------------------------------------------------------------------------|---------------|--------------|
| Minimum Control Current (see figure 1)                                         | 3.0           | mA           |
| Maximum Control Current for Off-State Resistance @ $T_A = +25^{\circ}\text{C}$ | 0.4           | mA           |
| Control Current Range (Caution: current limit input LED, see figure 6)         | 3.0 to 25     | mA           |
| Maximum Reverse Voltage                                                        | 6.0           | V            |

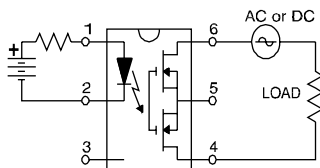
| <b>OUTPUT CHARACTERISTICS</b>                                                                              | <b>Limits</b> | <b>Units</b>                           |
|------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------|
| Operating Voltage Range                                                                                    | 0 to $\pm 20$ | $V_{(DC \text{ or } AC \text{ peak})}$ |
| Maximum Continuous Load Current @ $T_A = +40^{\circ}\text{C}$ , 5mA Control (see figure 1)                 |               |                                        |
| A Connection                                                                                               | 2.5           | A (DC or AC)                           |
| B Connection                                                                                               | 3.0           | A (DC)                                 |
| C Connection                                                                                               | 4.5           | A (DC)                                 |
| Maximum Pulsed Load Current @ $T_A = +25^{\circ}\text{C}$ , (100 ms @ 10% duty cycle)                      |               |                                        |
| A Connection                                                                                               | 6.0           | A (DC or AC)                           |
| Maximum On-State Resistance @ $T_A = +25^{\circ}\text{C}$ , for 1A pulsed load, 5mA Control (see figure 4) |               |                                        |
| A Connection                                                                                               | 100           | m $\Omega$                             |
| B Connection                                                                                               | 65            |                                        |
| C Connection                                                                                               | 40            |                                        |
| Maximum Off-State Leakage @ $T_A = +25^{\circ}\text{C}$ , $\pm 16V_{DC}$                                   | 10            | nA                                     |
| Maximum Turn-On Time @ $T_A = +25^{\circ}\text{C}$ (see figure 7), for 1A, 20 $V_{DC}$ load, 5mA Control   | 5.0           | ms                                     |
| Maximum Turn-Off Time @ $T_A = +25^{\circ}\text{C}$ (see figure 7), for 1A, 20 $V_{DC}$ load, 5mA Control  | 0.5           | ms                                     |
| Maximum Output Capacitance @ 20 $V_{DC}$ (see figure 2)                                                    | 300           | pF                                     |

| <b>GENERAL CHARACTERISTICS</b>                                                                   | <b>Limits</b> | <b>Units</b>       |
|--------------------------------------------------------------------------------------------------|---------------|--------------------|
| Minimum Dielectric Strength, Input-Output                                                        | 4000          | $V_{RMS}$          |
| Minimum Insulation Resistance, Input-Output, @ $T_A = +25^{\circ}\text{C}$ , 50%RH, 100 $V_{DC}$ | $10^{12}$     | $\Omega$           |
| Maximum Capacitance, Input-Output                                                                | 1.0           | pF                 |
| Maximum Pin Soldering Temperature (10 seconds maximum)                                           | +260          | $^{\circ}\text{C}$ |
| Ambient Temperature Range:                                                                       | Operating     |                    |
|                                                                                                  | Storage       |                    |

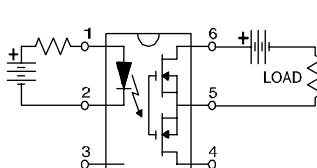
International Rectifier does not recommend the use of this product in aerospace, avionics, military or life support applications. Users of this International Rectifier product in such applications assume all risks of such use and indemnify International Rectifier against all damages resulting from such use.

## Connection Diagrams

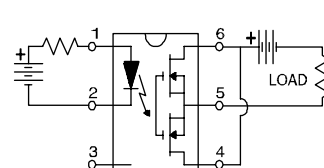
"A" Connection



"B" Connection



"C" Connection



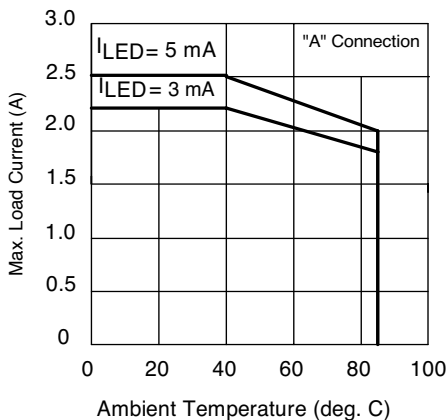


Figure 1. Current Derating Curves\*

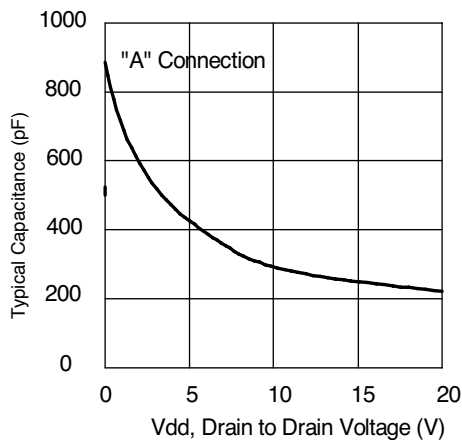


Figure 2. Typical Output Capacitance

\* Derating of 'B' and 'C' connection at +85°C will be 70% of that specified at +40°C and is linear from +40°C to +85°C.

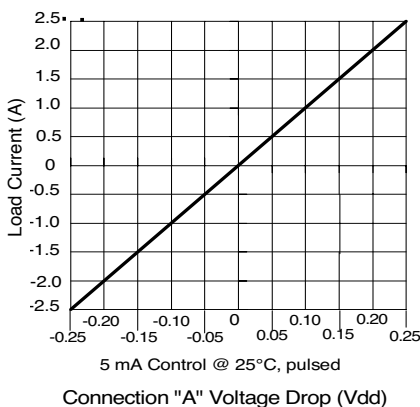


Figure 3. Linearity Characteristics

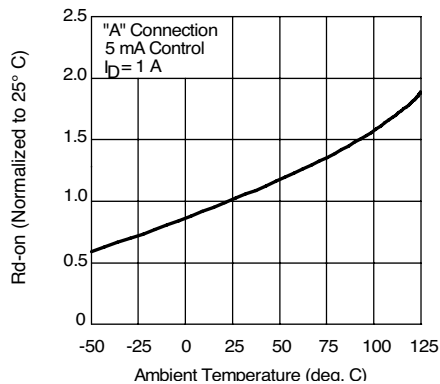


Figure 4. Typical Normalized On-Resistance

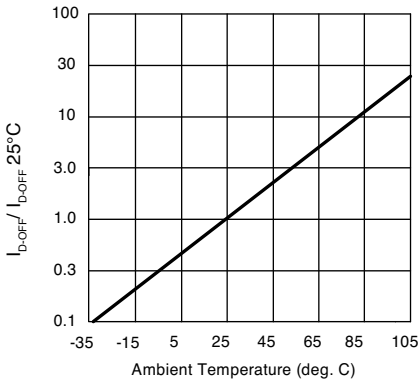


Figure 5. Typical Normalized Off-State Leakage

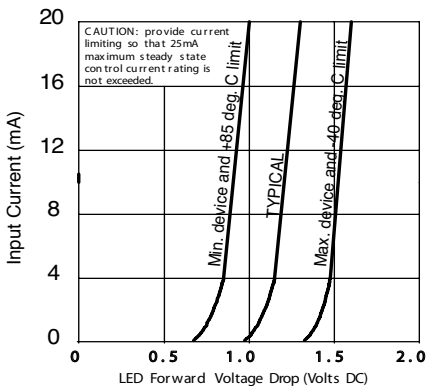


Figure 6. Input Characteristics (Current Controlled)

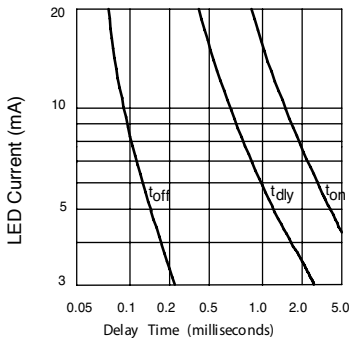


Figure 7. Typical Delay Times

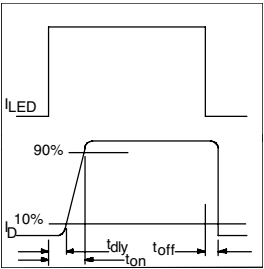
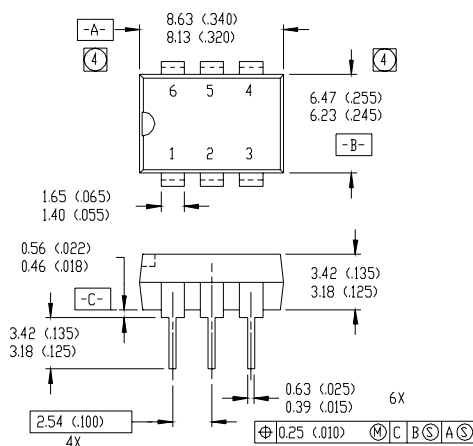


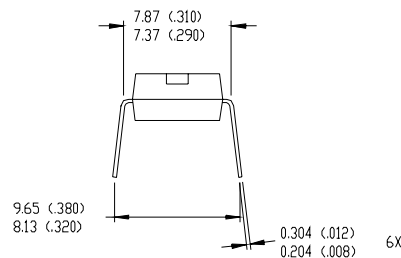
Figure 8. Delay Time Definitions

## Case Outlines

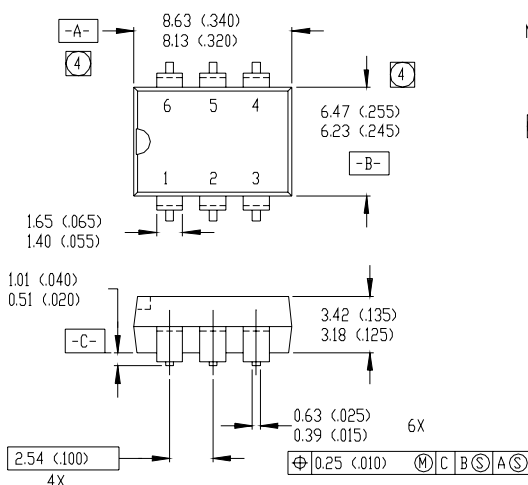


NOTES.

- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.  
2 CONTROLLING DIMENSION: INCH.  
3 DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).  
4 DIMENSION DOES NOT INCLUDE MOLD PROTUSIONS. MOLD  
PROTUSIONS SHALL NOT EXCEED 0.25 (0.01).

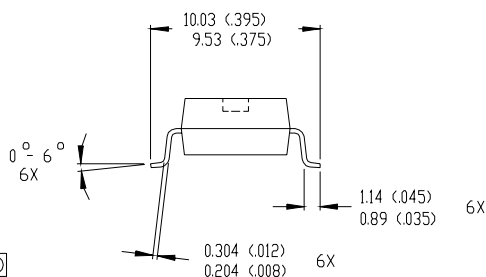


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