

**Microelectronic Power IC**

HEXFET® Power MOSFET Photovoltaic Relay  
 Single-Pole, Normally-Open, 0-300V AC/DC, 150mA

**General Description**

The PVA33 Series AC Relay (PVA) is a single-pole, normally open, solid-state replacement for electromechanical relays used for general purpose switching of analog signals. It utilizes International Rectifier's HEXFET power MOSFETs as the output switches, 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.

The PVA33 Series overcomes the limitations of both conventional electromechanical and reed relays by offering the solid state advantages of long life, fast operating speed, low pick up power, bounce-free operation, low thermal offset voltages and miniature package. These advantages allow product improvement and design innovations in many applications such as process control, multiplexing, automatic test equipment and data acquisition.

The PVA33 can switch analog signals from thermocouple level to 300 Volts peak AC or DC polarity. Signal frequencies into the RF range are easily controlled and switching rates up to 500Hz are achievable. The extremely small thermally generated offset voltages allow increased measurement accuracies.

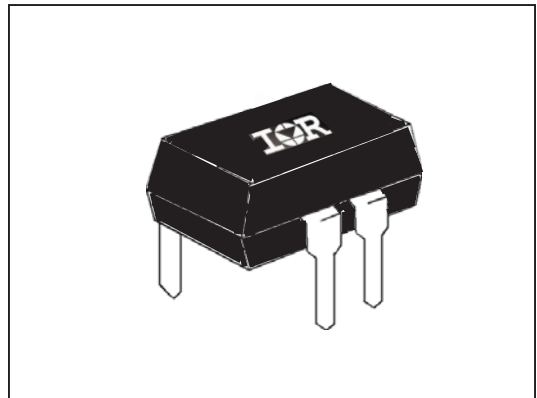
These relays are packaged in 8-pin, molded DIP packages and available with either thru-hole or surface-mount ("gull-wing") leads, in plastic shipping tubes.

**Applications**

- Process Control
- Data Acquisition
- Test Equipment
- Multiplexing and Scanning

**Features**

- Bounce-Free Operation
- 10<sup>10</sup> Off-State Resistance
- 1,000 V/μsec dv/dt
- 0.2 μV Thermal Offset
- 5 mA Input Sensitivity
- 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**

|               |               |
|---------------|---------------|
| PVA2352NPbF   |               |
| PVA3324NPbF   | thru-hole     |
| PVA3354NPbF   |               |
|               |               |
| PVA2352NS PbF | surface-mount |
| PVA3324NS PbF | (gull-wing)   |
| PVA3354NS PbF |               |

*(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>PVA2352N</b> | <b>PVA3324N</b> | <b>PVA3354N</b> | <b>Units</b> |
|--|-----------------|-----------------|-----------------|--------------|
| Minimum Control Current (see figures 1 and 2)                          |                 |                 |                 | DC           |
| For 60mA Continuous Load Current                                       | –               | 1               | –               | mA@25°C      |
| For 170mA Continuous Load Current                                      | 2               | 2               | 2               | mA@25°C      |
| For 100mA Continuous Load Current                                      | 5               | 2               | 5               | mA@85°C      |
| Maximum Control Current for Off-State Resistance at 25°C               | 10              |                 |                 | μA(DC)       |
| Control Current Range (Caution: current limit input LED. See figure 6) | 2.0 to 25       |                 |                 | mA(DC)       |
| Maximum Reverse Voltage  | 6.0             |                 |                 | V(DC)        |

| <b>OUTPUT CHARACTERISTICS</b>   | <b>PVA2352N</b>         | <b>PVA3324N</b>           | <b>PVA3354N</b> | <b>Units</b>        |
|---|-------------------------|---------------------------|-----------------|---------------------|
| Operating Voltage Range   | 0 to ± 200              | 0 to ± 300                |                 | V <sub>(PEAK)</sub> |
| Maximum Load Current 40°C   LED 5mA                                     | 150                     |                           |                 | mA(DC)              |
| Max. On-state Resistance 25°C (Pulsed) (fig. 4) 50 mA Load, 5mA Control | 24                      |                           |                 | Ω                   |
| Min. Off-state Resistance @ 25°C (see figure 5)                         | 10 <sup>8</sup> @160VDC | 10 <sup>10</sup> @ 240VDC |                 | Ω                   |
| Response Time @25°C (see figures 7 and 8)                               |                         |                           |                 |                     |
| Max. T <sub>(on)</sub> @ 12mA Control, 50 mA Load, 100 VDC              | 100                     |                           |                 | μs                  |
| Max. T <sub>(off)</sub> @ 12mA Control, 50 mA Load, 100 VDC             | 110                     |                           |                 | μs                  |
| Max. Thermal Offset Voltage @ 5.0mA Control                             | 0.2                     |                           |                 | μvolts              |
| Min. Off-State dv/dt  | 1000                    |                           |                 | V/μs                |
| Typical Output Capacitance (see figure 10)                              | 6                       |                           |                 | pF @ 50V            |

| <b>GENERAL CHARACTERISTICS</b>  | <b>(PVA2352N, PVA3324N<br/>and PVA3354N)</b> | <b>Units</b>     |
|---|--|------------------|
| Dielectric Strength: Input-Output   | 4000   | V <sub>RMS</sub> |
| Insulation Resistance: Input-Output @ 90V <sub>DC</sub>                     | 10 <sup>12</sup> @ 25°C - 50% RH             | Ω                |
| Maximum Capacitance: Input-Output   | 1.0  | pF               |
| Max. Pin Soldering Temperature (1.6mm below seating plane, 10 seconds max.) | +260   |                  |
| Ambient Temperature Range:  |  | °C               |
| Operating   | -40 to +85                                   |                  |
| Storage   | -40 to +100                                  |                  |

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.

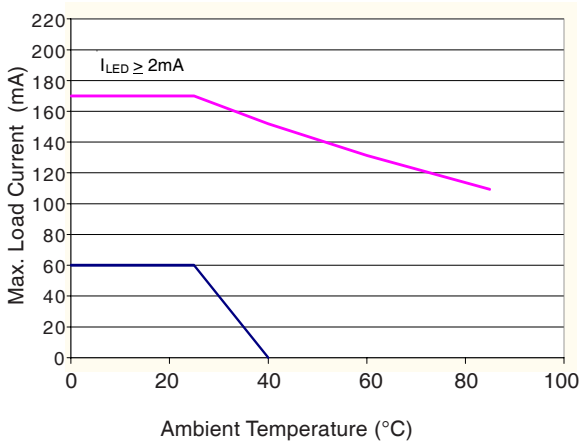


Figure 1. Current Derating Curves (PVA3324N)

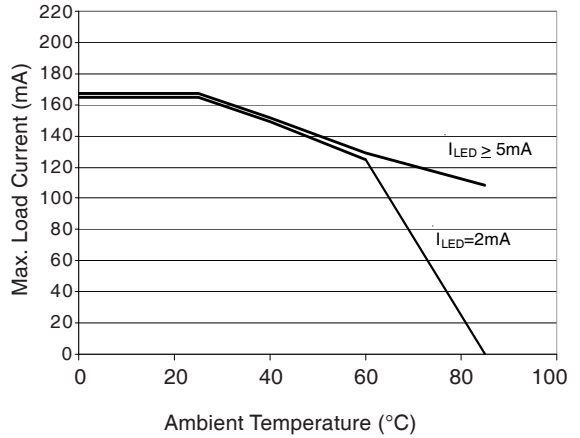


Figure 2. Current Derating Curves (PVA3354N, PVA2352N)

$I_{LED} = 1mA$

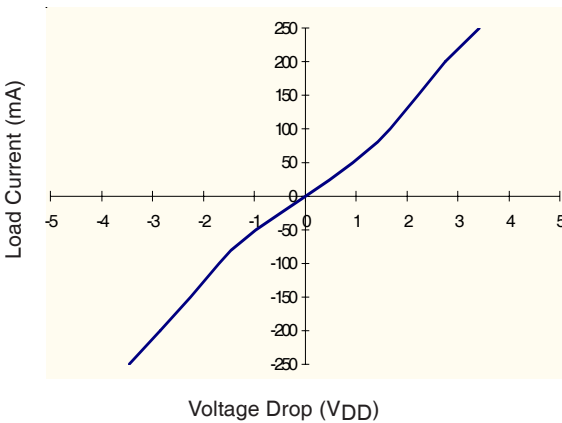


Figure 3. Typical On Characteristics

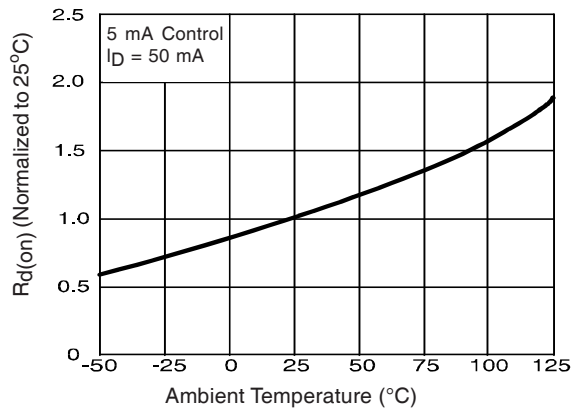


Figure 4. Typical On-Resistance

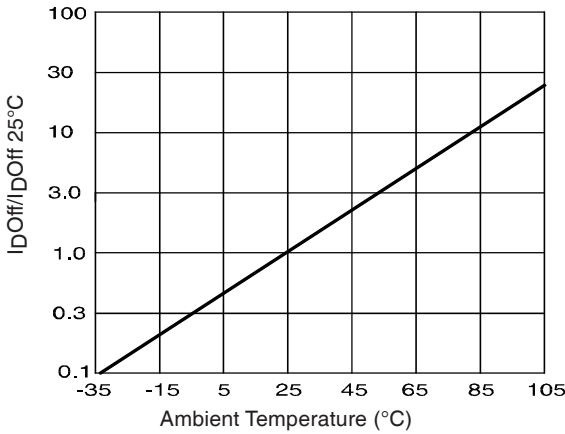


Figure 5. Typical Normalized Off-State Leakage

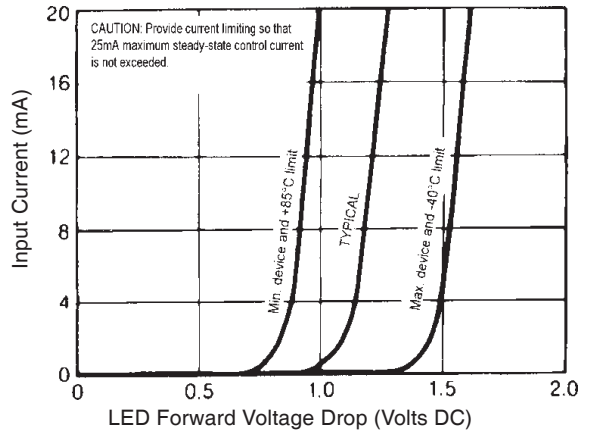


Figure 6. Input Characteristics (Current Controlled)

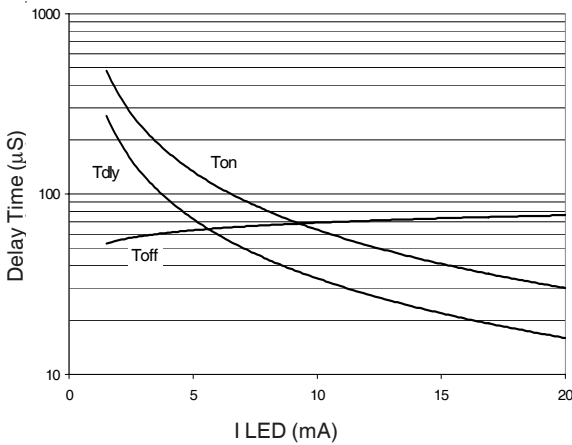


Figure 7. Typical Delay Times

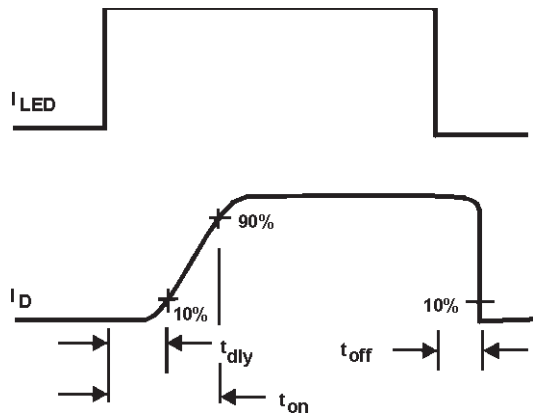


Figure 8. Delay Time Definitions

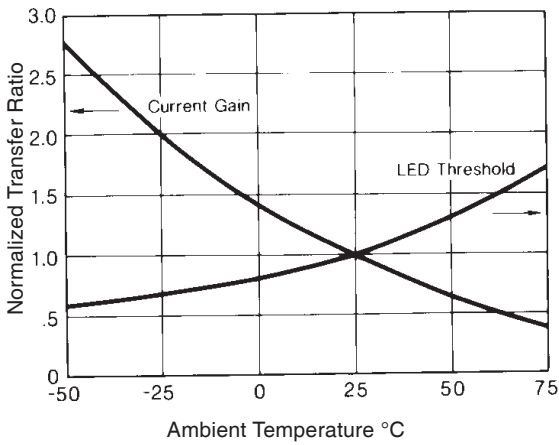


Figure 9. Typical Control Threshold and Transfer Ratio

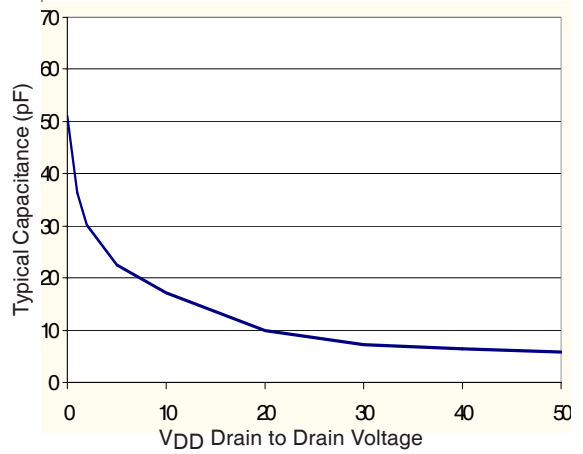
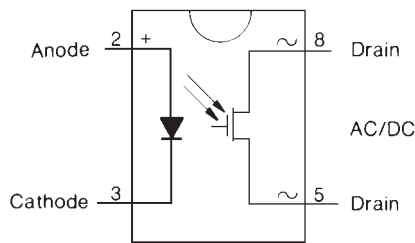
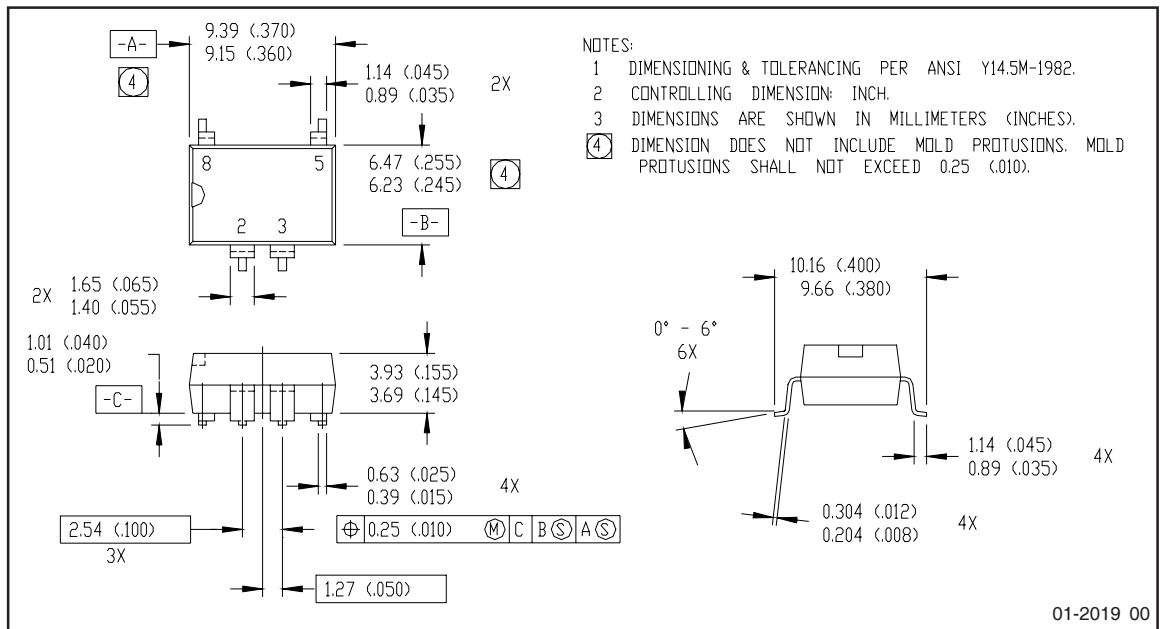
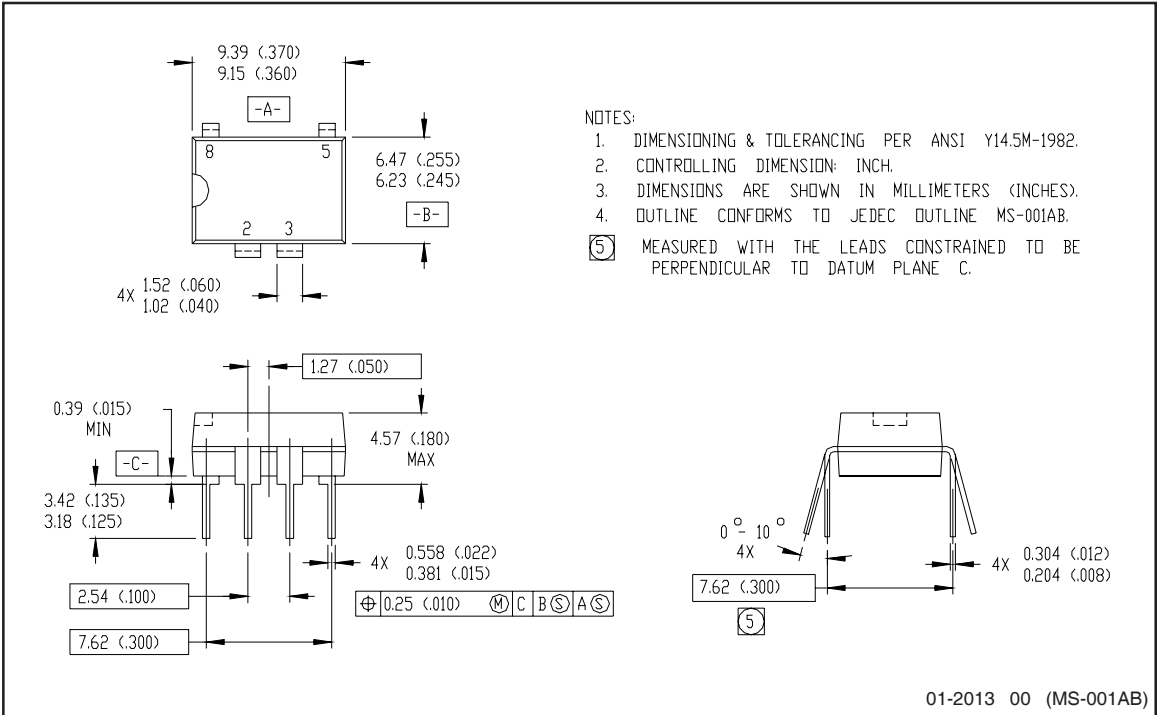


Figure 10. Typical Output Capacitance

## Wiring Diagram



Case Outlines



Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>

**Qualification information<sup>†</sup>**

|                            |  |  |
|----------------------------|--|--|
| Qualification level        | Industrial<br>(per JEDEC JESD471 <sup>††</sup> guidelines) |  |
| Moisture Sensitivity Level | PVA2352NPbF  | N/A  |
|                            | PVA3324NPbF  |  |
|                            | PVA3354NPbF  |  |
|                            | PVA2352NSPbF   | MSL4<br><br>(per JEDEC J-STD-020E & JEDEC J-STD-033C <sup>††</sup> ) |
|                            | PVA3324NSPbF   |  |
| PVA3354NSPbF               |  |  |
| RoHS compliant             | Yes  |  |

<sup>†</sup> Qualification standards can be found at International Rectifier’s web site: <http://www.irf.com/product-info/reliability>

<sup>††</sup> Applicable version of JEDEC standard at the time of product release

**Revision History**

| Date      | Comments   |
|-----------|--|
| 4/24/2015 | <ul style="list-style-type: none"> <li>• Added Qualification Information Table on page 7</li> <li>• Updated data sheet with new IR corporate template</li> </ul> |