

**Microelectronic Power IC**

HEXFET® Power MOSFET Photovoltaic Relay  
 Single-Pole, Normally-Open, 0-20V, 4.0A AC / 6.0A DC

**General Description**

The PVN012A Series Photovoltaic Relay at 50 milliohms features the lowest possible on-state resistance in a miniature package — lower than a comparable reed relay.

The PVN012A is a single-pole, normally open solid-state relay. It utilizes a HEXFET® MOSFET 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, miniaturization, magnetic insensitivity and ruggedness. They are ideally suited for switching high currents or low level signals without distortion or injection of electrical noise.

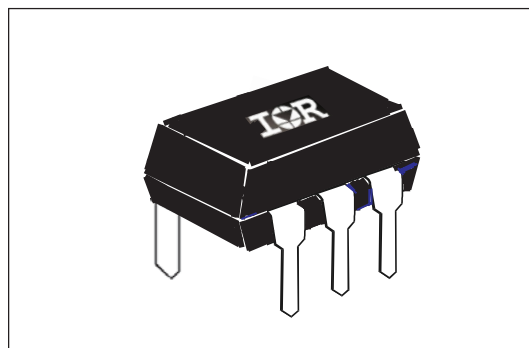
Series PVN012A relays are packaged in a 6-lead molded DIP package with either thru-hole or surface mount (gull-wing) terminals. They are available in standard plastic shipping tubes or on tape-and-reel. Please refer to part identification information.

**Applications**

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

**Features**

- 50mΩ On-Resistance
- Bounce-free Operation
- 4.0 - 6.0 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**

PVN012APbF	thru-hole
PVN012ASPbF	surface-mount
PVN012AS-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)	5.0	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)	5.0 to 25.0	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 or AC peak)
Maximum Continuous Load Current @ $40^{\circ}\text{C}$ , 10mA Control (see figure 1)		
A Connection	4.0	A (DC or AC)
B Connection	4.5	A (DC)
C Connection	6.0	A (DC)
Maximum Pulsed Load Current @ $25^{\circ}\text{C}$ , 10mA Control (100 ms @ 10% duty cycle)		
A Connection	8.0	A (DC or AC)
B Connection	9.0	A (DC)
C Connection	15.0	A (DC)
Typical Thermal Resistance ( $T_{thja}$ , Junction-to-Ambient)		
A Connection	85.1	( $^{\circ}\text{C}/\text{W}$ )
B Connection	122.9	( $^{\circ}\text{C}/\text{W}$ )
C Connection	89.7	( $^{\circ}\text{C}/\text{W}$ )
Maximum On-State Resistance @ $25^{\circ}\text{C}$ , 10mA Control 100mA pulsed load, (see figs. 3 & 4)		
A Connection	50	m $\Omega$
B Connection	25	m $\Omega$
C Connection	15	m $\Omega$
Maximum Off-State Leakage @ $T_A = +25^{\circ}\text{C}$ , $\pm 20\text{V}_{\text{DC}}$	1.0	$\mu\text{A}$
Maximum Turn-On Time @ $T_A = +25^{\circ}\text{C}$ (see figure 7), for 1A, 20 $\text{V}_{\text{DC}}$ load, 10mA Control	3.0	ms
Maximum Turn-Off Time @ $T_A = +25^{\circ}\text{C}$ (see figure 7), for 1A, 20 $\text{V}_{\text{DC}}$ load, 10mA Control	0.5	ms
Typical Output Capacitance @ $20\text{V}_{\text{DC}}$ (see figure 2)	400	pF

<b>GENERAL CHARACTERISTICS</b>	<b>Limits</b>	<b>Units</b>
Minimum Dielectric Strength, Input-Output	4000	$\text{V}_{\text{RMS}}$
Minimum Insulation Resistance, Input-Output	$10^{12}$	$\Omega$
Maximum Capacitance, Input-Output, $V_d = 0\text{V}$ , $f = 1\text{MHz}$	1.0	pF
Maximum Pin Soldering Temperature	+260	
Ambient Temperature Range:		$^{\circ}\text{C}$
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.

## Connection Diagrams

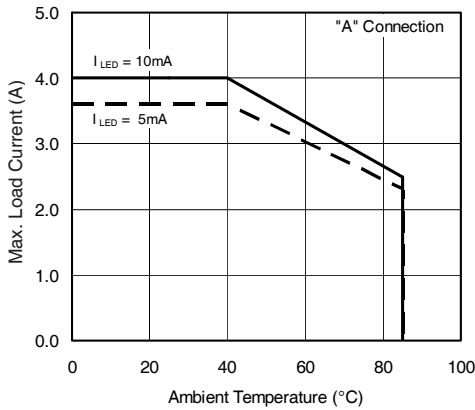
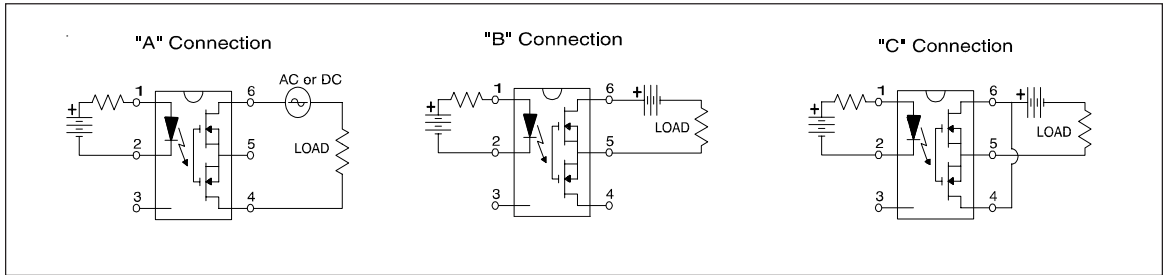


Figure 1. Current Derating Curves\*

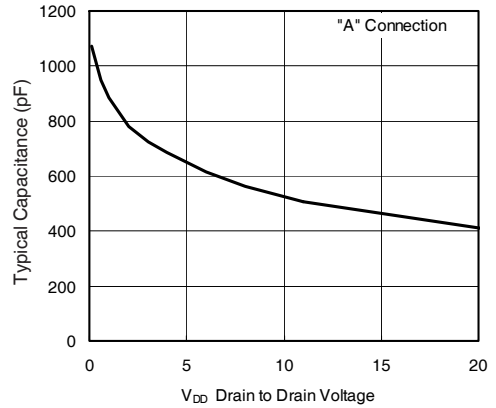


Figure 2. Typical Output Capacitance

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

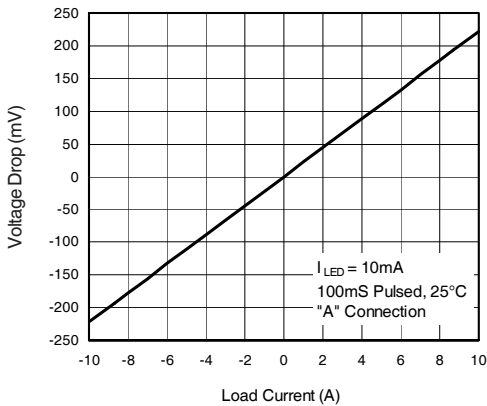


Figure 3. Linearity Characteristics

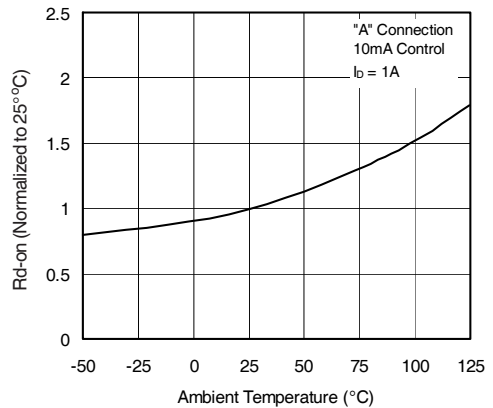


Figure 4. Typical Normalized On-Resistance

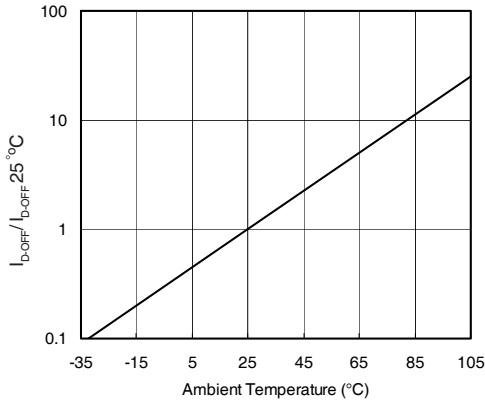


Figure 5. Typical Normalized Off-State Leakage

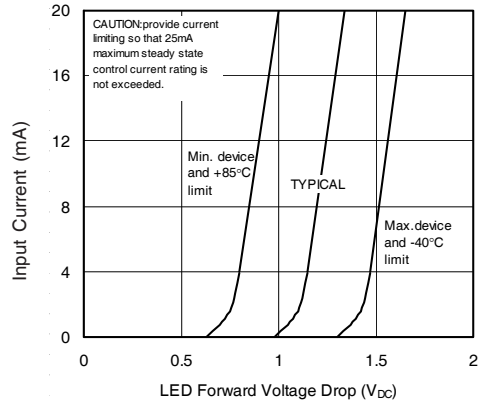


Figure 6. Input Characteristics (Current Controlled)

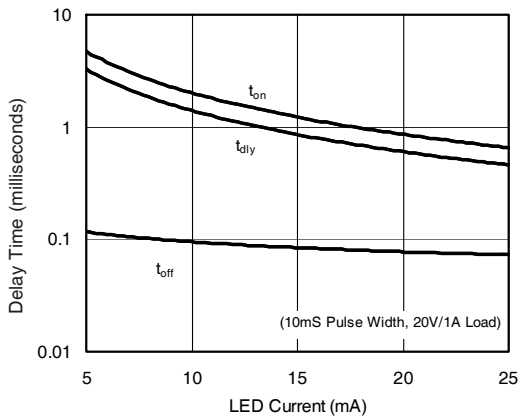


Figure 7. Typical Delay Times

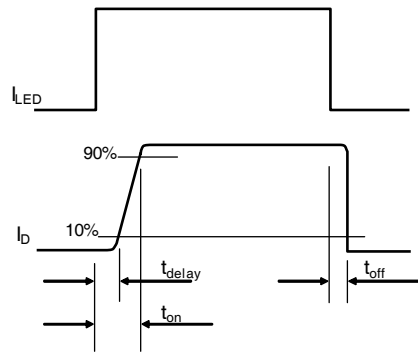
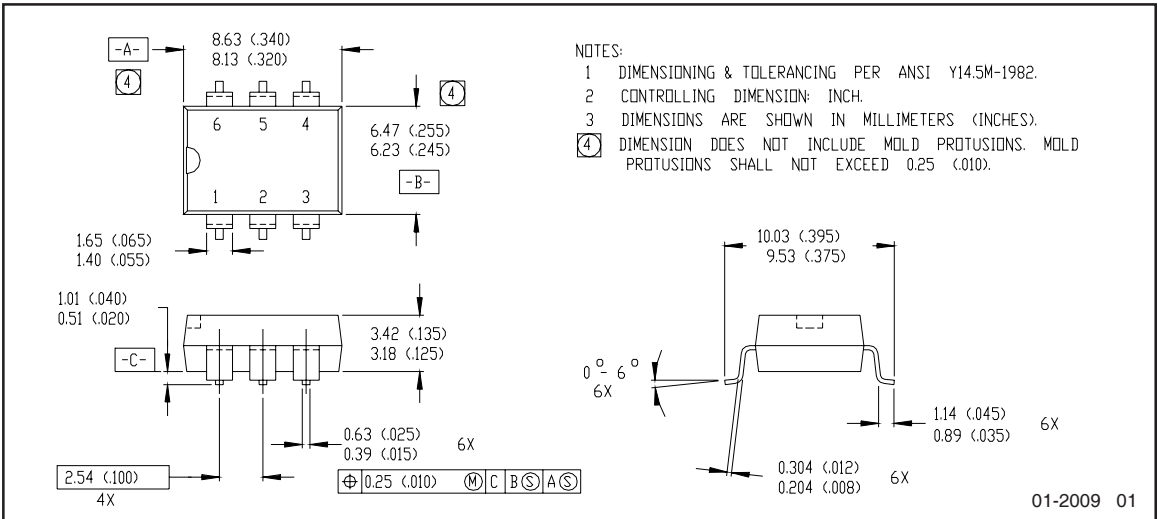
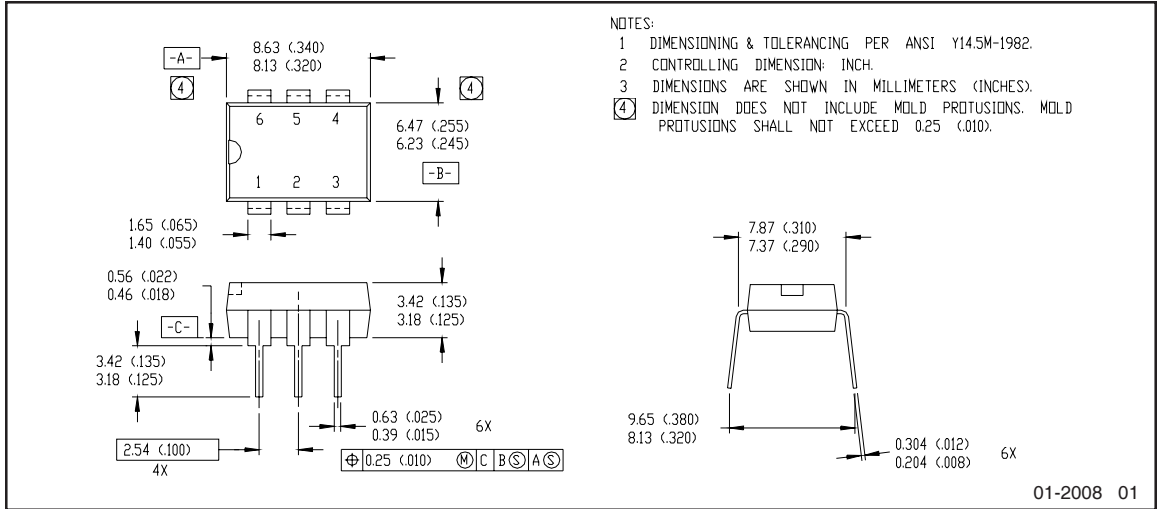


Figure 8. Delay Time Definitions

### Case Outlines



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

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

Qualification level	Industrial (per JEDEC JESD471 <sup>††</sup> guidelines)	
Moisture Sensitivity Level	PVN012APbF	N/A
	PVN012ASPbF	MSL4
	PVN012AS-TPbF	(per JEDEC J-STD-020E & JEDEC J-STD-033C <sup>††</sup> )
RoHS compliant	Yes	

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

†† Applicable version of JEDEC standard at the time of product release

**Revision History**

Date	Comments
5/11/2015	<ul style="list-style-type: none"> <li>• Added Qualification Information Table on page 6</li> <li>• Updated data sheet with new IR corporate template</li> </ul>

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