

## PVO402P

Microelectronic Power IC  
HEXFET® Power MOSFET Relay  
Single Pole, Normally Open + Ring Detector  
0-400V, 120mA AC/DC

### General Description

The PVO402P Photovoltaic Relay is a dual-pole, normally open solid-state relay plus ring detector. By integrating these two functions in one package it can replace two discrete components, i.e., a relay and an AC-input opto-coupler. The relay portion of PVO402P utilizes International Rectifier's HEXFET power MOSFET as the 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. The ring detector portion of PVO402P has two LEDs in inverse parallel connection as the input sensing element and a silicon NPN photo-transistor as the output switch.

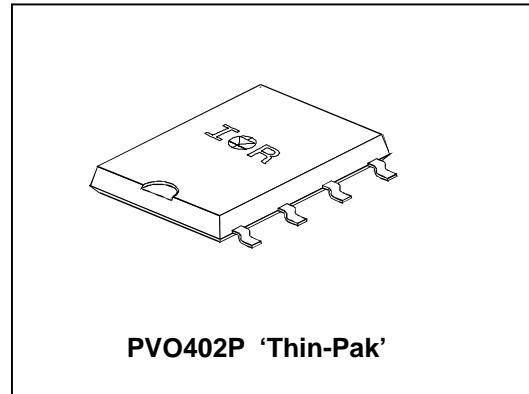
PVO402P is ideally suited for PCMCIA fax/modem cards. Its extremely low profile allows it to be used in Type II cards whose outer shells are only 5mm thick. PVO402P Relays are packaged in an 8-pin, molded 'Thin-Pak' DIP package with 'gull-wing' surface mount terminals. It is available in plastic shipping tubes or on tape-and-reel. Please refer to Part Identification (opposite) for details.

### Applications

- On/Off Hook switch
- Dial pulsing
- Ringer injection
- Ring detection
- Loop current detection

### Features

- HEXFET Power MOSFET output
- Bounce-free operation
- 3,750 V<sub>RMS</sub> I/O Isolation
- Linear AC/DC operation
- Solid-State reliability
- UL recognized and BABT certified



### Part Identification

PVO402P surface-mount, plastic shipping tube  
PVO402P-T surface-mount, tape and reel

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

**RELAY**

INPUT CHARACTERISTICS	Limits	Units
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	7.0	V

OUTPUT CHARACTERISTICS	Limits	Units
Operating Voltage Range	0 to $\pm 400$	$V_{(\text{DC or AC peak})}$
Maximum Load Current @ $T_A = +40^{\circ}\text{C}$ 5mA Control (see figure 1)	120	mA
Maximum On-State Resistance @ $T_A = +25^{\circ}\text{C}$ For 50mA pulsed load, 5mA Control (see figure 4)	35	$\Omega$
Maximum Off-State Leakage @ $T_A = +25^{\circ}\text{C}$ , $\pm 400\text{V}$ (see figure 5)	1.0	$\mu\text{A}$
Maximum Turn-On Time @ $T_A = +25^{\circ}\text{C}$ (see figure 7) For 50mA, 100 $V_{\text{DC}}$ Load, 5mA Control	2.0	ms
Maximum Turn-Off Time @ $T_A = +25^{\circ}\text{C}$ (see figure 7) For 50mA, 100 $V_{\text{DC}}$ Load, 5mA Control	0.5	ms
Maximum Output Capacitance @ 50 $V_{\text{DC}}$	12	pF

**DETECTOR**

INPUT CHARACTERISTICS	Limits	Units
Minimum Control Current @ $I_C = 2\text{mA}$ , $V_{\text{CE}} = 0.5\text{V}$	6.0	mA
Maximum Control Current for Off-State Leakage $I_C = 1\mu\text{A}$ , $V_{\text{CE}} = 5\text{V}$ @ $T_A = +25^{\circ}\text{C}$	5	$\mu\text{A}$
Control Current Range (Caution: current limit input LED, see figure 6)	6.0 to 25	mA

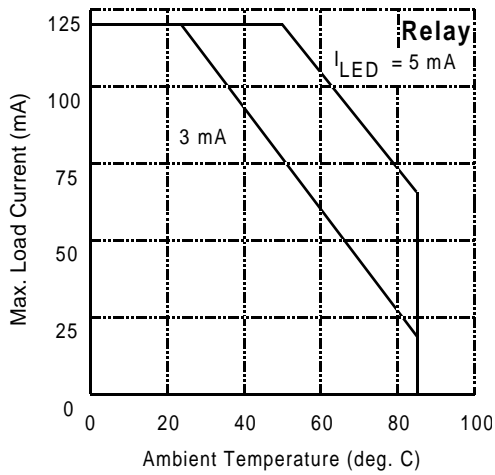
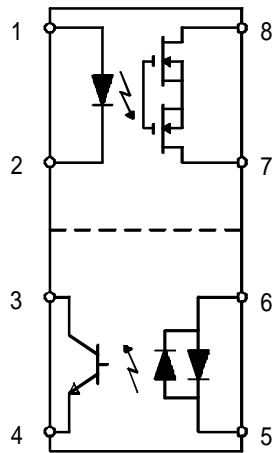
  

OUTPUT CHARACTERISTICS	Limits	Units
Minimum Collector-Emitter Breakdown Voltage @ $I_C = 10\mu\text{A}$	20	$V_{\text{DC}}$
Minimum Current Transfer Ratio @ $I_{\text{LED}} = 6\text{mA}$ , $V_{\text{CE}} = 5\text{V}$ (see figure 9)	33	%
Maximum Saturation Voltage @ $I_{\text{LED}} = 16\text{mA}$ , $I_C = 2\text{mA}$	0.5	V
Maximum Leakage Current @ $I_{\text{LED}} = 0\text{mA}$ , $V_{\text{CE}} = 5\text{V}$	500	nA
Maximum Power Dissipation @ $T_A = +25^{\circ}\text{C}$ (derate linearly 2.0mW/ $^{\circ}\text{C}$ )	150	mW

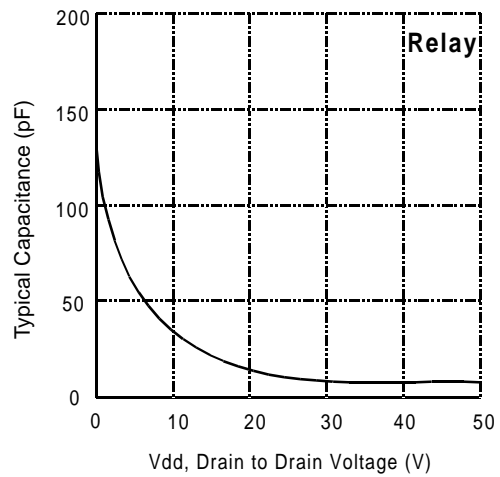
**COMBINED**

GENERAL CHARACTERISTICS	Limits	Units
Minimum Dielectric Strength, Input-Output	3750	$V_{\text{RMS}}$
Minimum Dielectric Strength, Relay-Detector	1000	$V_{\text{DC}}$
Minimum Insulation Resistance, Input-Output @ $T_A = +25^{\circ}\text{C}$ , 50%RH, 100 $V_{\text{DC}}$	$10^{12}$	$\Omega$
Maximum Capacitance, Input-Output	3.0	pF
Maximum Pin Soldering Temperature (10 seconds maximum)	+260	$^{\circ}\text{C}$
Ambient Temperature Range:	Operating Storage	

**Connection Diagram**



**Figure 1. Current Derating Curve**



**Figure 2. Typical Output Capacitance**

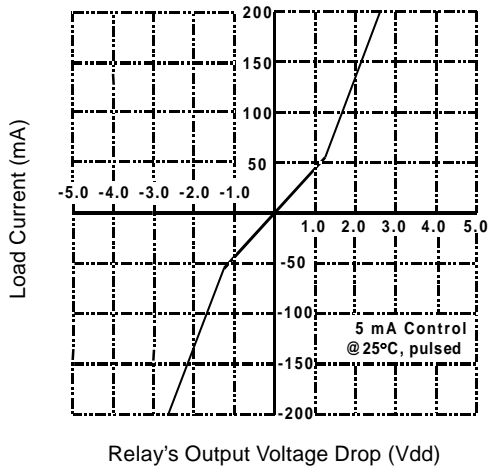


Figure 3. Linearity Characteristics

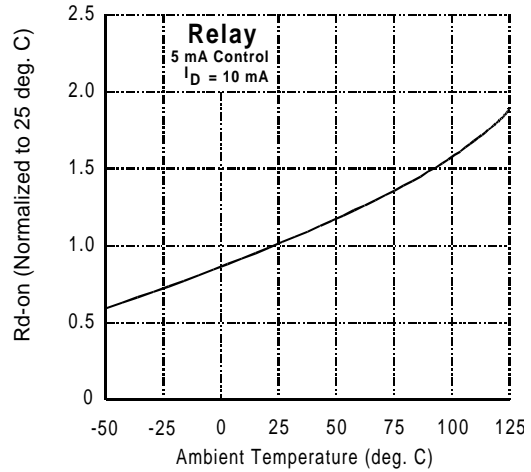


Figure 4. Typical Normalized On-Resistance

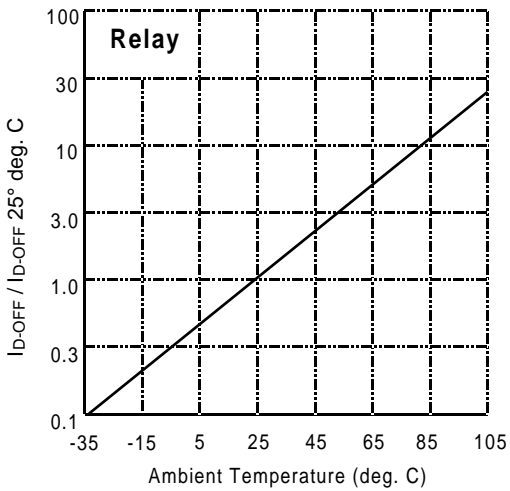


Figure 5. Typical Normalized Off-State Leakage

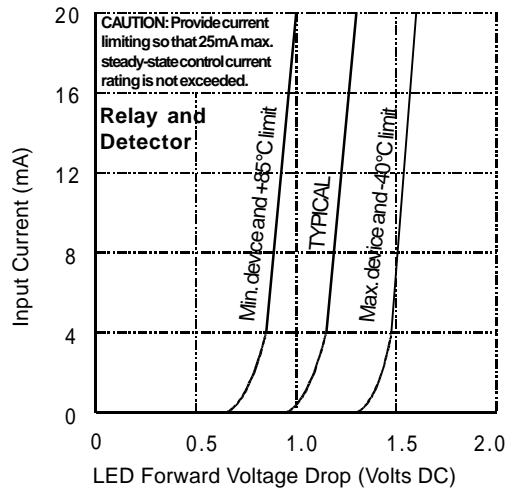
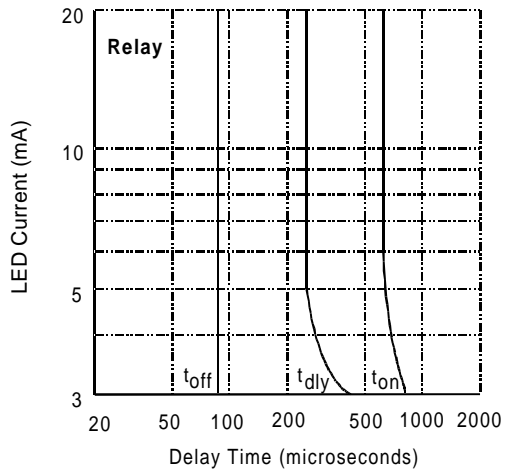
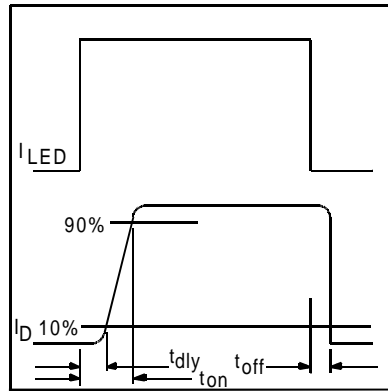


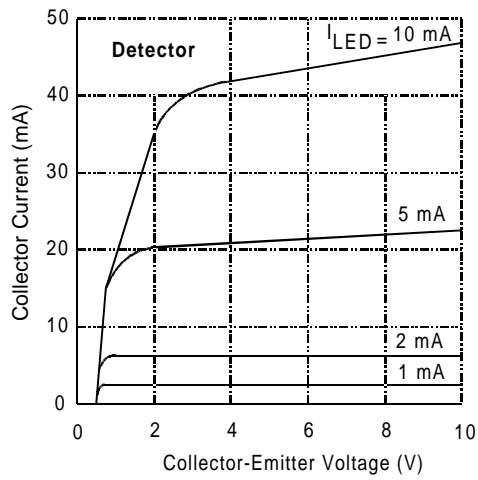
Figure 6. Input Characteristics (Current Controlled)



**Figure 7. Typical Delay Times**



**Figure 8. Delay Time Definitions**



**Figure 9. Typical Transfer Characteristics**

Case Outline

