

### General Description

The PVI Photovoltaic Isolator generates an electrically isolated DC voltage upon receipt of a DC input signal. The input of the PVI is a light-emitting diode (LED) which is optically coupled to, but electrically isolated from, the output. A GaAlAs LED is used for high output and maximum stability. The infrared emission from the LED energizes, by photovoltaic action, a series connection of silicon PN junctions. A unique alloyed junction stack which is edge-illuminated is used to form the output photovoltaic generators. This novel structure produces extremely high operating efficiency. Units are available with a single 5-volt output or dual 5-volt outputs which can be series connected to produce 10 volts.

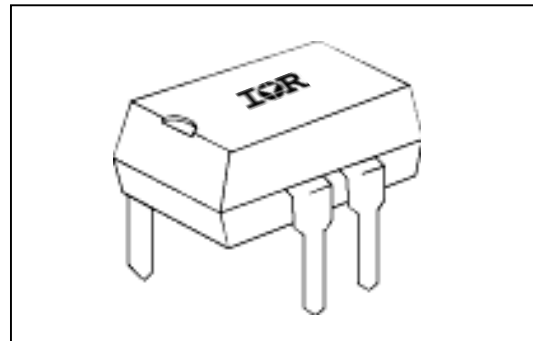
A PVI can serve as an isolator, a coupler and as an isolated voltage source. As an isolator, the PVI can serve as the key component in a solid state relay circuits. The PVI is ideally suited for driving power MOSFETs and IGBTs or sensitive gate SCRs to form solid state relays.

As a coupler, the PVI can sense a low-level DC signal and transmit a voltage signal to an electrically remote circuit. As a voltage source, the PVI can function as a 'DC transformer' by providing an isolated, low-current DC source for biasing or supplying power to low quiescent current electronic devices.

Conventional optocouplers merely modulate the resistance of an output device such as a transistor, diode or resistor. Such optocouplers require a separate voltage source to detect the presence of an input signal. In contrast, a PVI actually transmits (and transforms) energy across the isolation barrier and directly generates an output voltage. This DC voltage, available at a 2500VAC isolation level, gives circuit designers a new and uniquely useful electronic component.

### Features

- Isolated Voltage Source ■
- MOSFET Driver ■
- Up to 10 $\mu$ A Output ■
- Fast Response ■
- GaAlAs LED ■
- 2500V (RMS) Isolation ■
- 8-pin DIP Package ■
- Single or Dual Output ■



### Part Identification

| Part Number | Outputs | Output Voltage | Output Current |
|-------------|---------|----------------|----------------|
| PVI5050     | 1       | 5.0V           | 5 $\mu$ A      |
| PVI5080     | 1       | 5.0V           | 8 $\mu$ A      |
| PVI1050     | 2       | 5.0/10.0V      | 10/5 $\mu$ A   |

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

| INPUT CHARACTERISTICS                                    | PVI Series | Units             |
|--|------------|-------------------|
| Input Current Range (see figure 6)                       | 2.0 to 50  | mA (DC)           |
| Maximum Forward Voltage Drop @ 10mA, 25°C (see figure 7) | 1.4        | V (DC)            |
| Maximum Reverse Voltage                                  | 7.0        | V(DC)             |
| Maximum Reverse Current @ -7.0V (DC), 25°C               | 100        | $\mu\text{A(DC)}$ |
| Maximum Pulsed Input Current @ 25°C (see figure 8)       | 1.0        | A(peak)           |

| OUTPUT CHARACTERISTICS                     | PVI Series      | Units             |
|--|-----------------|-------------------|
| Maximum Forward Voltage @ 10 $\mu\text{A}$ | 8.0 per channel | $V_{(DC)}$        |
| Maximum Reverse Current @ -10VDC           | 10              | $\mu\text{A(DC)}$ |

| COUPLED CHARACTERISTICS   | PVI5050                 | PVI5080         | PVI1050   | Units              |               |
|---|-------------------------|-----------------|---|--------------------|---------------|
| Minimum Open Circuit Voltage @ 10mA, 25°C (see figures 1 to 4)  | 5.0V                    |                 | 5.0V/channel<br>10V series                              | V (DC)             |               |
| Minimum Short Circuit Current @ 10mA, 25°C (see figures 1 to 3) | 5 $\mu\text{A}$         | 8 $\mu\text{A}$ | 5.0 $\mu\text{A}$ /channel<br>10 $\mu\text{A}$ parallel | $\mu\text{A (DC)}$ |               |
| Maximum Capacitance (Input/Output)                              | 1.0                     |                 | 2.0   | pF                 |               |
| Maximum Turn-On Time @ 20mA Input, 25°C<br>(see figure 9)       | $R_L=5.0\text{M}\Omega$ | 30              | 30  | 30                 | $\mu\text{s}$ |
|   | $R_L=1.0\text{M}\Omega$ | 40              | 40  | 40                 | $\mu\text{s}$ |
| Maximum Turn-Off Time @ 20mA Input, 25°C<br>(see figure 9)      | $R_L=5.0\text{M}\Omega$ | 400             | 400   | 400                | $\mu\text{s}$ |
|   | $R_L=1.0\text{M}\Omega$ | 100             | 100   | 100                | $\mu\text{s}$ |
| Insulation Resistance @ 90VDC (Input/Output)                    | $10^{12}$               |                 |   | $\Omega$           |               |
| Dielectric Strength   | Input/Output            | 2500            |   | V(RMS)             |               |
|   | Between Outputs         | N/A             |   | 1200<br>V(DC)      |               |

| GENERAL CHARACTERISTICS   | PVI Series | Units              |
|---|------------|--------------------|
| Ambient Temperature Range   | Operating  | -40 to +100        |
|   | Storage    | -40 to +100        |
| Maximum Lead Temperature (1.6mm below seating plane for 10 seconds) | 280        | $^{\circ}\text{C}$ |

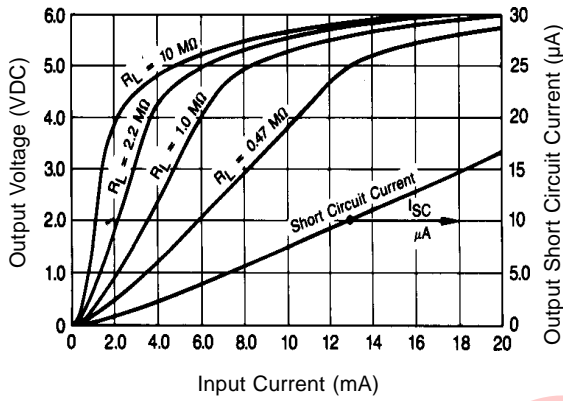


Figure 1. PVI5050 Typical Output Characteristics

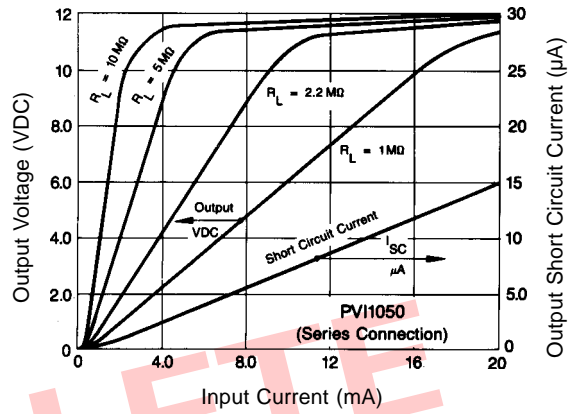


Figure 2. PVI1050 Typical Output Characteristics

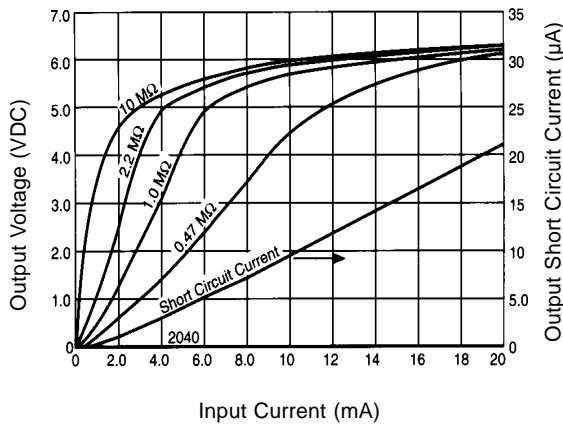


Figure 3. PVI5080 Typical Output Characteristics

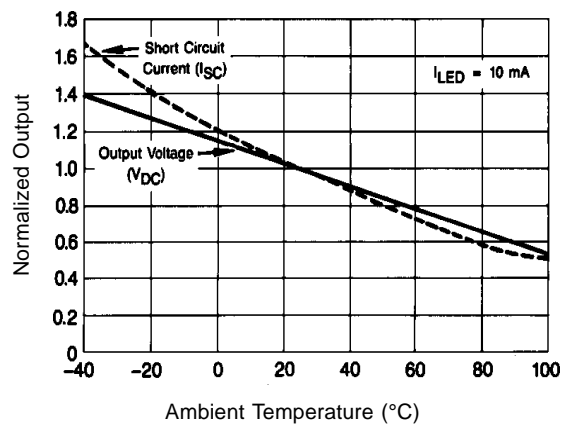


Figure 4. Typical Variation of Output

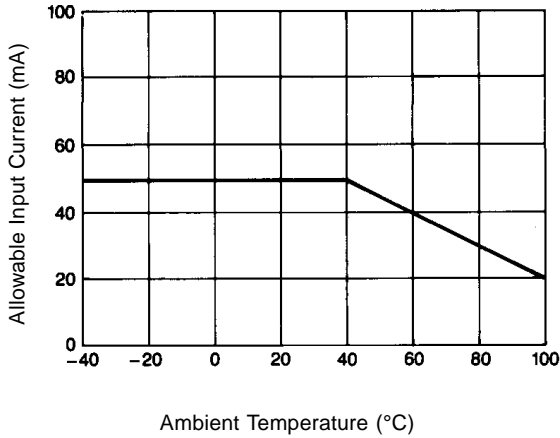


Figure 6. Input Current Derating

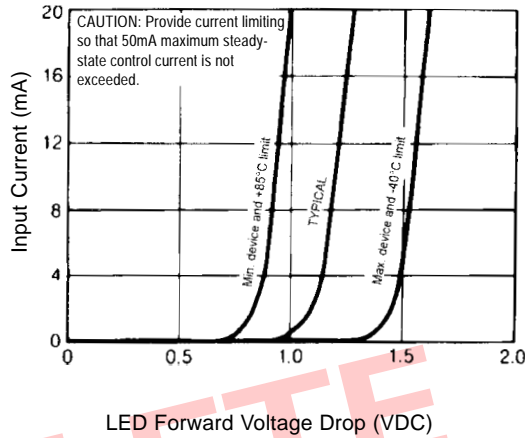


Figure 7. Input Characteristics

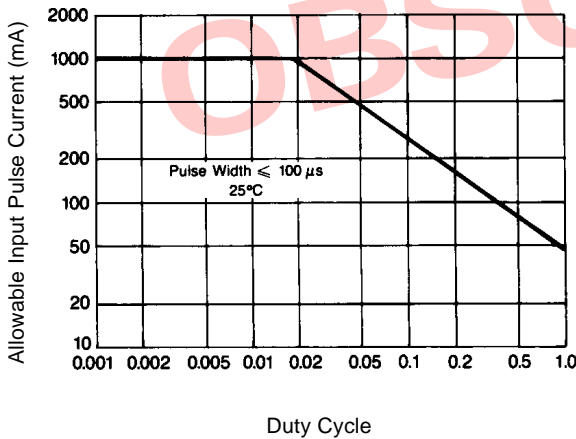


Figure 8. Input Pulse Capability

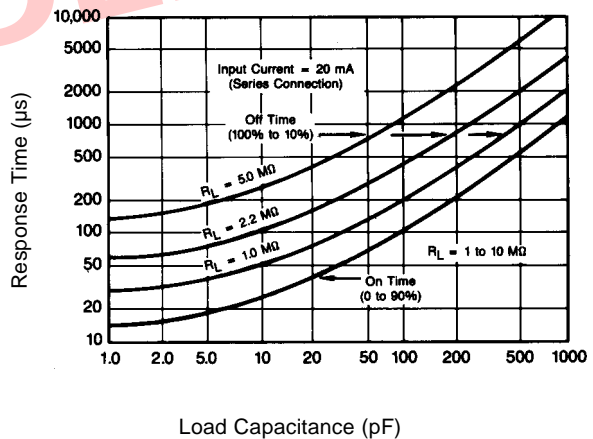
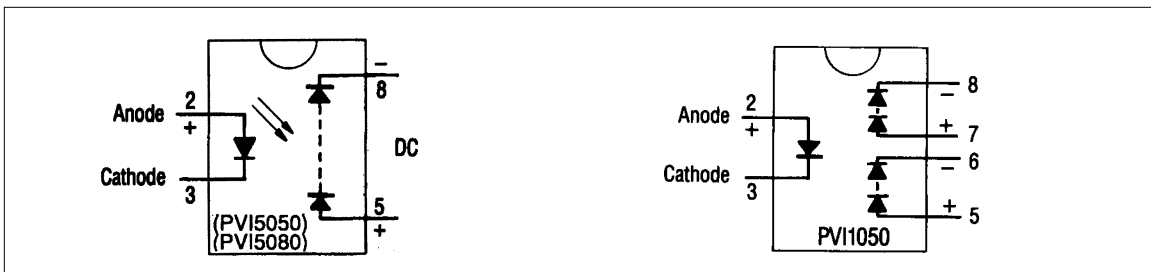


Figure 9. PVI1050 (PVI5050) Typical Response Time

**Wiring Diagram**



**Application Note:**

The outputs of the PVI1050 (pins 5-6 and 7-8) may be placed in series connection to produce a 10-volt output with a 5 $\mu$ A minimum short circuit current. Alternatively, the two outputs of the PVI1050 may be connected in parallel to produce a 5.0-volt output with a 10 $\mu$ A minimum short circuit current.

The two outputs of the PVI1050 may be applied separately with a maximum 1200VDC between the outputs. Input-to-output isolation to either output is 2500V (RMS).

**Case Outline**

