LONG CREEPAGE TYPE
HIGH ISOLATION VOLTAGE
6 PIN OPTOCOUPLER

FEATURES

• HIGH ISOLATION VOLTAGE
  BV: 5 kV r.m.s. MIN
• LONG CREEPAGE AND CLEARANCE DISTANCE
  8 mm MIN
• HIGH COLLECTOR TO EMITTER VOLTAGE
  VCEO: 80 V MIN
• HIGH SPEED SWITCHING
  tr = 3 µs, tf = 5 µs TYP
• HIGH CURRENT TRANSFER RATIO
  CTR = 200% TYP
• 6 PIN DUAL IN-LINE PACKAGE

DESCRIPTION

PS2651and PS2652 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in a plastic DIP (Dual In-Line Package). PS2651 has a base pin and PS2652 has no base pin. Creepage distance and clearance of leads are over 8 millimeters. PS2651L2 and PS2652L2 are lead bending type (Gull-wing) for surface mounting.

APPLICATIONS

Interface circuit for various instrumentations and control equipment.

• AC LINE/DIGITAL LOGIC
• DIGITAL LOGIC INTERFACE
• TWISTED PAIR LINE RECEIVER
• TELEPHONE/TELEGRAPH LINE RECEIVER
• HIGH FREQUENCY POWER SUPPLY FEEDBACK CONTROL
• RELAY CONTACT MONITOR
• POWER SUPPLY MONITOR

ELECTRICAL CHARACTERISTICS (TA = 25°C)

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>PS2651, PS2651L2, PS2652, PS2652L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYMBOLS</td>
<td>PARAMETERS</td>
</tr>
<tr>
<td>Diode</td>
<td>VF Forward Voltage, IF = 10 mA</td>
</tr>
<tr>
<td></td>
<td>IR Reverse Current, Vb = 5 V</td>
</tr>
<tr>
<td></td>
<td>C Junction Capacitance, V = 0, f = 1.0 MHz</td>
</tr>
<tr>
<td>Transistor</td>
<td>ICEO Collector to Emitter Dark Current, VCE = 80 V, IF = 0</td>
</tr>
<tr>
<td></td>
<td>BCEO Collector to Emitter Breakdown Voltage, IC = 1 mA, IB = 0</td>
</tr>
<tr>
<td></td>
<td>BVEO Collector to Emitter Breakdown Voltage, IE = 100 µA, IB = 0</td>
</tr>
<tr>
<td>Coupled</td>
<td>CTR Current Transfer Ratio¹, IF = 5 mA, VCE = 5 V</td>
</tr>
<tr>
<td></td>
<td>VCE(sat) Collector Saturation Voltage, IF = 10 mA, IC = 2 mA</td>
</tr>
<tr>
<td></td>
<td>RI-2 Isolation Resistance, Vin-out = 1.0 k V</td>
</tr>
<tr>
<td></td>
<td>C1-2 Isolation Capacitance, V = 0, f = 1.0 MHz</td>
</tr>
<tr>
<td></td>
<td>tr Rise Time², VCC = 5 V, IC = 2 mA</td>
</tr>
<tr>
<td></td>
<td>tf Fall Time², VCC = 5 V, IC = 2 mA</td>
</tr>
</tbody>
</table>

1. CTR rank
   KD : 160 to 400 (%)
   LD : 80 to 240 (%)  
   MD : 50 to 120 (%)  

2. Test Circuit for Switching Time

California Eastern Laboratories
ABSOLUTE MAXIMUM RATINGS\(^1\) (\(T_A = 25^\circ C\))

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>PARAMETERS</th>
<th>UNITS</th>
<th>RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diode</td>
<td>(V_R) Reverse Voltage</td>
<td>V</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(I_F) Forward Current</td>
<td>mA</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>(P_D) Power Dissipation</td>
<td>mW</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>(I_F) (Peak) Peak Forward Current PW = 100 (\mu)s, Duty Cycle 1%</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>Transistor</td>
<td>(V_{CEO}) Collector to Emitter Voltage</td>
<td>V</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>(V_{ECO}) Emitter to Collector Voltage</td>
<td>V</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>(I_C) Collector Current</td>
<td>mA</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>(P_C) Power Dissipation</td>
<td>mW</td>
<td>150</td>
</tr>
<tr>
<td>Coupled</td>
<td>(BV) Isolation Voltage(^2)</td>
<td>V(_{r.m.s.})</td>
<td>5000</td>
</tr>
<tr>
<td></td>
<td>(T_{STG}) Storage Temperature</td>
<td>°C</td>
<td>-55 to +150</td>
</tr>
<tr>
<td></td>
<td>(T_{OP}) Operating Temperature</td>
<td>°C</td>
<td>-55 to +100</td>
</tr>
</tbody>
</table>

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at \(T_A = 25^\circ C\), RH = 60 % between input (Pin No. 1, 2, 3 Common) and output (Pin No. 4, 5, 6 Common).

TYPICAL PERFORMANCE CURVES (\(T_A = 25^\circ C\))

- **Diode Power Dissipation vs. Ambient Temperature**
- **Transistor Power Dissipation vs. Ambient Temperature**
- **Forward Current vs. Forward Voltage**
- **Collector Current vs. Collector to Emitter Voltage**
TYPICAL PERFORMANCE CURVES (TA = 25 °C)

**Collector to Emitter Dark Current vs. Ambient Temperature**

**Collector Current vs. Collector Saturation Voltage**

**Normalized Output Current vs. Ambient Temperature**

**Current Transfer Ratio (CTR) vs. Forward Current**

**Switching Time vs. Load Resistance**

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**Other Graphs and Tables:***

- Normalized Current Transfer Ratio (CTR) at different temperatures.
- Collector current vs. Collector Saturation Voltage for various bias conditions.
- Normalized output current vs. ambient temperature.
- Current transfer ratio (%) vs. forward current.
- Switching time vs. load resistance for different voltage and current levels.

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**Additional Notes:**

- Sample CTR at 290%.
- Switching time values for different load resistances.
**TYPICAL PERFORMANCE CURVES (T_a = 25 °C)**

**FREQUENCY RESPONSE**

- Voltage Gain, A_V (dB)

**CTR DEGRADATION**

- CTR Test condition

**OUTLINE DIMENSIONS** (Units in mm)

### PS2651, PS2652

- 10.16 MAX.
- 65 4
- 123
- 3.8 MAX
- 0.50 ± 0.10
- 0.25 M
- 2.8 MAX 4.25 MAX
- 0.35
- 1.34
- 2.54
- 2.54 MAX
- 10.16
- 7.62
- 6.5
- 0 to 15 °

### PS2651L2, PS2652L2

- 10.16 MAX.
- 64
- 13
- 11.8 ± 0.4
- 10.16
- 7.62
- 6.5
- 0.9 ± 0.25

**PIN CONNECTION** (Top View)

### PS2651, PS2651L2

1. Anode
2. Cathode
3. NC
4. Emitter
5. Collector
6. Base

### PS2652, PS2652L2

1. Anode
2. Cathode
3. NC
4. Emitter
5. Collector
6. NC

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