KPS2805 Series
4PIN SSOP PHOTOTRANSISTOR
PHOTOCOUPLER

- Description

The KPS2805 series consist of two infrared emitting diodes, connected in inverse parallel, optically coupled to a phototransistor detector. They are packaged in a 4-pin SSOP package. The input-output isolation voltage is rated at 3750Vrms.

- Features

1. Pb free and RoHS compliant
2. High isolation voltage ($V_{ISO}=3750\text{Vrms}$)
3. Small and thin package (4pin SSOP, pin pitch 1.27mm)
4. High collector to emitter voltage ($V_{CEO}=80\text{V}$).
5. AC input response
6. High-speed switching $t_r=3\mu\text{s}$ (typ.), $t_f=5\mu\text{s}$ (typ.)
7. MSL class 1
8. Agency Approvals:
   • UL Approved (No. E169586): UL1577
   • c-UL Approved (No. E169586)
   • VDE Approved (No. 40010469): DIN EN60747-5-5
   • FIMKO Approved: EN60065, EN60950
   • SEMKO Approved: EN60065, EN60950
   • CQC Approved: GB8898-2011, GB4943.1-2011

- Applications

• Programmable logic controllers
• Measuring instruments
• Hybrid IC

- Schematic

1. Anode/ Cathode
2. Anode/ Cathode
3. Emitter
4. Collector
KPS2805 Series
4PIN SSOP PHOTOTRANSISTOR
PHOTOCOUPLER

- Outside Dimension

Unit: mm

- Device Marking

Notes:

2805
YWW

Y: Year code / WW: Week code

TOLERANCE: ±0.2mm
### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward current</td>
<td>IF</td>
<td>±50 mA</td>
<td>mA</td>
</tr>
<tr>
<td>Peak forward current(*1)</td>
<td>IFP</td>
<td>±1 A</td>
<td></td>
</tr>
<tr>
<td>Power dissipation</td>
<td>PD</td>
<td>60 mW</td>
<td></td>
</tr>
<tr>
<td>Power dissipation derating</td>
<td>PD/℃</td>
<td>0.6 mW/℃</td>
<td></td>
</tr>
<tr>
<td>Collector-Emitter voltage</td>
<td>VCEO</td>
<td>80 V</td>
<td></td>
</tr>
<tr>
<td>Emitter-Collector voltage</td>
<td>VECO</td>
<td>6 V</td>
<td></td>
</tr>
<tr>
<td>Collector current</td>
<td>IC</td>
<td>50 mA</td>
<td></td>
</tr>
<tr>
<td>Collector power dissipation</td>
<td>PC</td>
<td>160 mW</td>
<td></td>
</tr>
<tr>
<td>Collector power dissipation derating</td>
<td>PC/℃</td>
<td>1.2 mW/℃</td>
<td></td>
</tr>
<tr>
<td>Isolation voltage 1 minute(*2)</td>
<td>Viso</td>
<td>3750 Vrms</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-55 to +115 ℃</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-55 to +125 ℃</td>
<td></td>
</tr>
</tbody>
</table>

*1 PW=100μs,Duty Cycle=1%.
*2 AC voltage for 1minute at T =25 ℃,RH=60% between input and output.

### Electro-optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>VF</td>
<td>IF=±5mA</td>
<td>–</td>
<td>1.1</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>Ct</td>
<td>V=0, f=1MHz</td>
<td>–</td>
<td>60</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector dark current</td>
<td>ICEO</td>
<td>VCE=80V, IE=0mA</td>
<td>–</td>
<td>–</td>
<td>100 nA</td>
<td></td>
</tr>
<tr>
<td>Current transfer ratio</td>
<td>CTR</td>
<td>IF=±5mA, VCE=5V</td>
<td>50</td>
<td>-</td>
<td>600 %</td>
<td></td>
</tr>
<tr>
<td>CTR ratio*1</td>
<td>CTR1/CTR2</td>
<td>IF=5mA, VCE=5V</td>
<td>0.3</td>
<td>1.0</td>
<td>3.0</td>
<td>%</td>
</tr>
<tr>
<td>Collector-Emitter saturation voltage</td>
<td>VCE(sat)</td>
<td>IF=±10mA, IC=2mA</td>
<td>–</td>
<td>–</td>
<td>0.3 V</td>
<td></td>
</tr>
<tr>
<td>Isolation resistance</td>
<td>Riso</td>
<td>DC500V</td>
<td>5x10¹⁰</td>
<td>10¹¹</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>Floating capacitance</td>
<td>Cf</td>
<td>V=0, f=1MHz</td>
<td>–</td>
<td>0.4</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Response time (Rise) (*3)</td>
<td>tr</td>
<td>Vce=5V, IC=2mA, RL=100Ω</td>
<td>–</td>
<td>3</td>
<td>18</td>
<td>μs</td>
</tr>
<tr>
<td>Response time (Fall) (*3)</td>
<td>tf</td>
<td>Vce=5V, IC=2mA, RL=100Ω</td>
<td>–</td>
<td>5</td>
<td>18</td>
<td>μs</td>
</tr>
</tbody>
</table>

*3 Test Circuit for Switching Time
### Classification table of current transfer ratio

<table>
<thead>
<tr>
<th>CTR Rank.</th>
<th>CTR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPS28050E</td>
<td>50 TO 600</td>
</tr>
<tr>
<td>KPS28050C</td>
<td>200 TO 400</td>
</tr>
</tbody>
</table>

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### Fig.1 Current Transfer Ratio vs. Forward Current

![Graph showing current transfer ratio vs. forward current.](image)

### Fig.2 Collector Power Dissipation vs. Ambient Temperature

![Graph showing collector power dissipation vs. ambient temperature.](image)

### Fig.3 Collector Dark Current vs. Ambient Temperature

![Graph showing collector dark current vs. ambient temperature.](image)

### Fig.4 Forward Current vs. Ambient Temperature

![Graph showing forward current vs. ambient temperature.](image)

### Fig.5 Forward Current vs. Forward Voltage

![Graph showing forward current vs. forward voltage.](image)
Fig. 6 Collector Current vs. Collector-Emitter Voltage

- Collector Current $I_C$ (mA)
  - $I_F = \pm 5mA$
  - $I_F = \pm 10mA$
  - $I_F = \pm 20mA$
  - $I_F = \pm 30mA$

- Collector-Emitter Voltage $V_{CE}$ (V)
  - $Ta = 25^\circ C$

Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature

- Relative Current Transfer Ratio (%)
- Ambient Temperature $Ta$ ($^\circ C$)

Fig. 8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

- Collector-Emitter Saturation Voltage $V_{CE}$ (V)
- Ambient Temperature $Ta$ ($^\circ C$)

Fig. 9 Collector-Emitter Saturation Voltage vs. Forward Current

- Collector-Emitter Saturation Voltage $V_{CE}$ (V)
- Forward Current $I_F$ (mA)

Fig. 10 Response Time (Rise) vs. Load Resistance

- Response Rise Time (us)
- Load Resistance $R_L$ (KΩ)

Fig. 11 Response Time (Fall) vs. Load Resistance

- Response Fall Time (us)
- Load Resistance $R_L$ (KΩ)
● Test Circuit for Response Time

![Test Circuit Diagram]

$V_{cc}$

$I_{F}$

$R_L$

$V_{ce}$

$V_{F}$

$R$

$I_F$

$V_{ce}$

$90\%$

$10\%$

$tr$

$tf$
- Recommended Soldering Conditions

(a) Infrared reflow soldering:
- Peak reflow soldering: 260°C or below (package surface temperature)
- Time of peak reflow temperature: 10 sec
- Time of temperature higher than 230°C: 30-60 sec
- Time to preheat temperature from 180~190°C: 60-120 sec
- Time(s) of reflow: Two
- Flux: Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow

(b) Wave soldering:
- Temperature: 260°C or below (molten solder temperature)
- Time: 10 seconds or less
- Preheating conditions: 120°C or below (package surface temperature)
- Time(s) of reflow: One
- Flux: Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(c) Cautions:
- Fluxes: Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.
Numbering System

KPS2805 Y (Z)

Notes:
KPS2805 = Part No.
Y = CTR rank option (C, E)
Z = Tape and reel option (TLD, TRU)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Packing quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLD</td>
<td>TLD tape &amp; reel option</td>
<td>3000 units per reel</td>
</tr>
<tr>
<td>TRU</td>
<td>TRU tape &amp; reel option</td>
<td>3000 units per reel</td>
</tr>
</tbody>
</table>

Recommended Pad Layout for Surface Mount Lead Form

Unit: mm
KPS2805 Series
4PIN SSOP PHOTOTRANSISTOR PHOTOCOUPLER

- 4-pin SSOP Carrier Tape & Reel
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