Description

The K3010 series consist of two infrared emitting diodes, connected in inverse parallel, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

Features

1. Current transfer ratio
   \[ \text{CTR} : \text{Min. 50\% at } I_F = \pm 1\text{mA} \ V_{CE} = 5\text{V} \]
2. High isolation voltage between input and output
   \[ \text{Viso} : 5000\text{Vrms} \]
3. Pb free and RoHS compliant
4. MSL class 1
5. Agency Approvals
   - UL Approved (No. E169586): UL1577
   - c-UL Approved (No. E169586)
   - VDE Approved (No. 101347): DIN EN60747-5-5
   - FIMKO Approved: EN60065, EN60950, EN60335
   - SEMKO Approved: EN60065, EN60950, EN60335
   - CQC Approved: GB8898-2011, GB4943.1-2011

Applications

- System appliances
- Limit Switches
- Sensors
- Programmable controllers applications for Low Input Photocouplers and High Vceo Photocouplers
- Telephone sets
- Telephone exchangers
- Thermostats
- Signal transmission between circuits of different potentials and impedances

Schematic

1. Anode, Cathode
2. Anode, Cathode
3. Emitter
4. Collector
K3010 Series
4PIN PHOTOTRANSISTOR PHOTOCOUPLER

● **Outside Dimension**

Unit: mm

1. Dual-in-line type.

2. Surface mount type.

3. Long creepage distance type

4. Long creepage distance for surface mount type.

TOLERANCE: ±0.2mm

● **Device Marking**

**Notes:**

- **COSMO**
  - 3010
  - 814
  - YWW

Y: Year code / WW: Week code
□: CTR rank

Cosmo Electronics Corp.
Document No. 69P10001.3

http://www.cosmo-ic.com
### 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>$I_F$</td>
<td>$\pm 50$</td>
<td>mA</td>
</tr>
<tr>
<td>Peak forward current</td>
<td>$I_{FM}$</td>
<td>$\pm 1$</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P_D$</td>
<td>70</td>
<td>mW</td>
</tr>
<tr>
<td>Collector-emitter voltage</td>
<td>$V_{CEO}$</td>
<td>80</td>
<td>V</td>
</tr>
<tr>
<td>Emitter-collector voltage</td>
<td>$V_{ECHO}$</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>$I_C$</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Collector power dissipation</td>
<td>$P_C$</td>
<td>150</td>
<td>mW</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>200</td>
<td>mW</td>
</tr>
<tr>
<td>Isolation voltage 1 minute</td>
<td>$V_{iso}$</td>
<td>5000</td>
<td>Vrms</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>$T_{opr}$</td>
<td>-55 to +115</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{stg}$</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature 10 seconds</td>
<td>$T_{sord}$</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

### 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>$V_F$</td>
<td>$I_F=\pm 20mA$</td>
<td>1.2</td>
<td>1.4</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Peak forward voltage</td>
<td>$V_{FM}$</td>
<td>$I_{FM}=\pm 0.5A$</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
<td>V</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>$C_t$</td>
<td>$V=0, f=1KHz$</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Collector dark current</td>
<td>$I_{CEO}$</td>
<td>$V_{CE}=20V$</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td>μA</td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current transfer ratio</td>
<td>CTR</td>
<td>$I_F=\pm 1mA, V_{CE}=5V$</td>
<td>50</td>
<td>-</td>
<td>600</td>
<td>%</td>
</tr>
<tr>
<td>Collector-emitter saturation</td>
<td>$V_{CE(sat)}$</td>
<td>$I_F=\pm 20mA, I_C=1mA$</td>
<td>-</td>
<td>0.1</td>
<td>0.3</td>
<td>V</td>
</tr>
<tr>
<td>Isolation resistance</td>
<td>$R_{iso}$</td>
<td>DC500V</td>
<td>$5x10^{10}$</td>
<td>$10^{11}$</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>Floating capacitance</td>
<td>$C_f$</td>
<td>$V=0, f=1MHz$</td>
<td>-</td>
<td>0.6</td>
<td>1.0</td>
<td>pF</td>
</tr>
<tr>
<td>Cut-off frequency</td>
<td>$f_C$</td>
<td>$V_{CC}=5V, I_C=2mA, R_L=100Ω$</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>KHz</td>
</tr>
<tr>
<td>Response time (Rise)</td>
<td>$t_r$</td>
<td>$V_{CE}=2V, I_C=2mA, R_L=100Ω$</td>
<td>-</td>
<td>5</td>
<td>20</td>
<td>μs</td>
</tr>
<tr>
<td>Response time (Fall)</td>
<td>$t_{r}$</td>
<td></td>
<td>-</td>
<td>4</td>
<td>20</td>
<td>μs</td>
</tr>
</tbody>
</table>
Classification table of current transfer ratio is shown below.

<table>
<thead>
<tr>
<th>K3010 Model No.</th>
<th>CTR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K3010 A</td>
<td>60 ~ 600</td>
</tr>
<tr>
<td>K3010 B</td>
<td>60 ~ 300</td>
</tr>
<tr>
<td>K3010 C</td>
<td>50 ~ 150</td>
</tr>
</tbody>
</table>

Fig.1 Current Transfer Ratio vs. Forward Current

Fig.2 Collector Power Dissipation vs. Ambient Temperature

Fig.3 Collector Dark Current vs. Ambient Temperature

Fig.4 Forward Current vs. Ambient Temperature

Fig.5 Forward Current vs. Forward Voltage
K3010 Series
4PIN PHOTOTRANISITOR
PHOTOCOUPLER

Fig.6 Collector Current vs. Collector-Emitter Voltage

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

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

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

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

Fig.11 Response Time (Fall) vs. Load Resistance
Test Circuit for Response Time
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

**K3010 X Y (Z)**

**Notes:**
- K3010 = Part No.
- X = Lead form option (1, 2, 3, 6)
- Y = CTR rank option (A~C)
- 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>2 (TLD)</td>
<td>surface mount type package + TLD tape &amp; reel option</td>
<td>2000 units per reel</td>
</tr>
<tr>
<td>2 (TRU)</td>
<td>surface mount type package + TRU tape &amp; reel option</td>
<td>2000 units per reel</td>
</tr>
<tr>
<td>6 (TLD)</td>
<td>long creepage distance for surface mount type package + TLD tape &amp; reel option</td>
<td>2000 units per reel</td>
</tr>
<tr>
<td>6 (TRU)</td>
<td>long creepage distance for surface mount type package + TRU tape &amp; reel option</td>
<td>2000 units per reel</td>
</tr>
</tbody>
</table>

### Recommended Pad Layout for Surface Mount Lead Form

1. Surface mount type.
   - 4 pin SMD
2. Long creepage distance for surface mount type.
   - 4 pin L

![Recommended Pad Layout](image_url)

Unit: mm
K3010 Series
4PIN PHOTOTRANSISTOR
PHOTOCOUPLER

- 4-pin SMD Carrier Tape & Reel

TOLERANCE: ±0.2mm

TLD
TRU

Direction of feed from reel
Direction of feed from reel

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● 4-pin L Carrier Tape & Reel

![Diagram of 4-pin L Carrier Tape & Reel]

TOLERANCE : ±0.2mm

Direction of feed from reel

Direction of feed from reel
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