CT817 Series
DC Input 4-Pin Phototransistor Optocoupler

Features
- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- External Creepage ≥ 7.5mm (S/SL Type)
- External Creepage ≥ 8.0mm (SLM Type)
- Operating temperature range - 55 °C to 110 °C
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

Description
The CT817 series consists of a photo transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead DIP package different lead forming options.

Applications
- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

Note: Different lead forming options available. See package dimension.

Package Outline

Schematic

CT Micro
Proprietary & Confidential
Page 1
## Absolute Maximum Rating at 25°C

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Ratings</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{ISO}$</td>
<td>Isolation voltage (AC, 1 minute)</td>
<td>5000</td>
<td>$V_{RMS}$</td>
<td></td>
</tr>
<tr>
<td>$P_{TOT}$</td>
<td>Total power dissipation</td>
<td>200</td>
<td>mW</td>
<td></td>
</tr>
<tr>
<td>$T_{OPR}$</td>
<td>Operating temperature</td>
<td>-55 ~ +110</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>Storage temperature</td>
<td>-55 ~ +150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>$T_{SOL}$</td>
<td>Soldering temperature</td>
<td>260</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

**Emitter**

- $I_F$: Forward current  
  - Ratings: 60 mA  
- $I_{F(TRANS)}$: Peak transient current  
  - (≤1μs P.W,300pps)  
  - Ratings: 1 A  
- $V_R$: Reverse voltage  
  - Ratings: 6 V  
- $P_D$: Emitter power dissipation  
  - Ratings: 100 mW

**Detector**

- $P_D$: Detector power dissipation  
  - Ratings: 150 mW  
- $B_{VCEO}$: Collector-Emitter Breakdown Voltage  
  - Ratings: 35 V  
- $B_{VECO}$: Emitter-Collector Breakdown Voltage  
  - Ratings: 6 V  
- $I_C$: Collector Current  
  - Ratings: 50 mA
# Electrical Characteristics

$T_A = 25^\circ C$ (unless otherwise specified)

## Emitter Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_F$</td>
<td>Forward voltage</td>
<td>$I_F = 10mA$</td>
<td></td>
<td>1.24</td>
<td>1.4</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$I_R$</td>
<td>Reverse Current</td>
<td>$V_R = 6V$</td>
<td></td>
<td></td>
<td>5</td>
<td>$\mu A$</td>
<td></td>
</tr>
<tr>
<td>$C_{IN}$</td>
<td>Input Capacitance</td>
<td>$f = 1MHz$</td>
<td></td>
<td>10</td>
<td>30</td>
<td>pF</td>
<td></td>
</tr>
</tbody>
</table>

## Detector Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_{VCEO}$</td>
<td>Collector-Emitter Breakdown</td>
<td>$I_C = 100\mu A$</td>
<td>35</td>
<td></td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$B_{VCEO}$</td>
<td>Emitter-Collector Breakdown</td>
<td>$I_E = 100\mu A$</td>
<td>6</td>
<td></td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$I_{CEO}$</td>
<td>Collector-Emitter Dark Current</td>
<td>$V_{CE} = 20V, I_F = 0mA$</td>
<td></td>
<td></td>
<td>100</td>
<td>nA</td>
<td></td>
</tr>
</tbody>
</table>

## Transfer Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>Current Transfer Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT817</td>
<td></td>
<td>50</td>
<td>-</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT817A</td>
<td></td>
<td>80</td>
<td>-</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT817B</td>
<td></td>
<td>130</td>
<td>-</td>
<td>260</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT817C</td>
<td></td>
<td>200</td>
<td>-</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT817D</td>
<td></td>
<td>300</td>
<td>-</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{CE(SAT)}$</td>
<td>Collector-Emitter Saturation Voltage</td>
<td>$I_F = 20mA, I_C = 1mA$</td>
<td></td>
<td>0.1</td>
<td>0.2</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$R_{IO}$</td>
<td>Isolation Resistance</td>
<td>$V_{ID} = 500V_{DC}$</td>
<td>$5 \times 10^{10}$</td>
<td>-</td>
<td>-</td>
<td>$\Omega$</td>
<td></td>
</tr>
<tr>
<td>$C_{IO}$</td>
<td>Isolation Capacitance</td>
<td>$f = 1MHz$</td>
<td></td>
<td>0.25</td>
<td>1</td>
<td>pF</td>
<td></td>
</tr>
</tbody>
</table>

## Switching Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t_r$</td>
<td>Rise Time</td>
<td>$I_C = 2mA, V_{CE} = 2V$</td>
<td></td>
<td>6</td>
<td>18</td>
<td>$\mu s$</td>
<td></td>
</tr>
<tr>
<td>$t_f$</td>
<td>Fall Time</td>
<td>$R_L = 100\Omega$</td>
<td></td>
<td>8</td>
<td>18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CT817 Series
DC Input 4-Pin Phototransistor Optocoupler

Typical Characteristic Curves

- **Forward Current vs. Ambient Temperature**
- **Forward Current vs. Forward Voltage**
- **Detector Power Dissipation vs. Ambient Temperature**
- **Collector Dark Current vs. Ambient Temperature**
- **Normalized CTR vs. Forward Current**
- **Collector Current vs. Ambient Temperature**
CT817 Series
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Normalized CTR vs Ambient Temperature

Collector-Emitter Saturation Voltage vs. Collector Current

Forward Current vs. Collector-Emitter Saturation Voltage

Switching Speed vs. Load Resistance

Voltage Gain vs. Frequency

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11
Test Circuit

Figure 12: Switching Time Test Circuits
Package Dimension  *Dimensions in mm unless otherwise stated*

**Standard DIP – Through Hole**

**Gullwing (400mil) Lead Forming – Through Hole (M Type)**
CT817 Series
DC Input 4-Pin Phototransistor Optocoupler

Surface Mount Lead Forming (S Type)

Surface Mount (Low Profile) Lead Forming (SL Type)
Surface Mount (Gullwing) Lead Forming (SLM Type)
CT817 Series
DC Input 4-Pin Phototransistor Optocoupler

Recommended Solder Mask *Dimensions in mm unless otherwise stated*

Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming

Surface Mount (Gullwing) Lead Forming

Marking Information

Note:
CT : Denotes “CT Micro”
817 : Part Number
V : VDE Option
R : CTR Rank
Y : Fiscal Year
WW : Work Week
K : Manufacturing Code
CT817 Series
DC Input 4-Pin Phototransistor Optocoupler

Ordering Information

CT817X(V)(Y)(Z)-HG

X = Part No. (X=A, B, C, D or None)
V = VDE Option ( V or None)
Y = Lead form option (S, SL, M, SLM or none)
Z = Tape and reel option (T1, T2, T3, T4 or none)
H = Lead frame option (H: Iron, None: Copper)
G= Material option (G: Green, None: Non-green)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Standard 4 Pin Dip</td>
<td>100 Units/Tube</td>
</tr>
<tr>
<td>M</td>
<td>Gullwing (400mil) Lead Forming</td>
<td>100 Units/Tube</td>
</tr>
<tr>
<td>S(T1)</td>
<td>Surface Mount Lead Forming – With Option 1 Taping</td>
<td>1500 Units/Reel</td>
</tr>
<tr>
<td>S(T2)</td>
<td>Surface Mount Lead Forming – With Option 2 Taping</td>
<td>1500 Units/Reel</td>
</tr>
<tr>
<td>S(T3)</td>
<td>Surface Mount Lead Forming – With Option 3 Taping</td>
<td>1000 Units/Reel</td>
</tr>
<tr>
<td>S(T4)</td>
<td>Surface Mount Lead Forming – With Option 4 Taping</td>
<td>1000 Units/Reel</td>
</tr>
<tr>
<td>SL(T1)</td>
<td>Surface Mount (Low Profile) Lead Forming– With Option 1 Taping</td>
<td>1500 Units/Reel</td>
</tr>
<tr>
<td>SL(T2)</td>
<td>Surface Mount (Low Profile) Lead Forming – With Option 2 Taping</td>
<td>1500 Units/Reel</td>
</tr>
<tr>
<td>SL(T3)</td>
<td>Surface Mount (Low Profile) Lead Forming– With Option 3 Taping</td>
<td>1000 Units/Reel</td>
</tr>
<tr>
<td>SL(T4)</td>
<td>Surface Mount (Low Profile) Lead Forming – With Option 4 Taping</td>
<td>1000 Units/Reel</td>
</tr>
<tr>
<td>SLM(T1)</td>
<td>Surface Mount (Gullwing) Lead Forming– With Option 1 Taping</td>
<td>1500 Units/Reel</td>
</tr>
<tr>
<td>SLM(T2)</td>
<td>Surface Mount (Gullwing) Lead Forming – With Option 2 Taping</td>
<td>1500 Units/Reel</td>
</tr>
</tbody>
</table>
Carrier Tape Specifications

Dimensions in mm unless otherwise stated

Option S(T1) & SL(T1)

Input Direction

Option S(T2) & SL(T2)

Input Direction
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DC Input 4-Pin Phototransistor Optocoupler

Option S(T3) & SL(T3)

Input Direction

Option S(T4) & SL(T4)

Input Direction
Option SLM(T1)

Input Direction

Option SLM(T2)

Input Direction
Wave soldering (follow the JEDEC standard JESD22-A111)

One time soldering is recommended within the condition of temperature.
Temperature: 260±0/-5°C.
Time: 10 sec.
Preheat temperature: 25 to 140°C.
Preheat time: 30 to 80 sec.

Iron soldering (follow the standard MIL-STD 202G, Method 210F)

Allow single lead soldering in every single process.
One time soldering is recommended. Temperature: 350±10°C
Time: 5 sec max.
Reflow Profile

<table>
<thead>
<tr>
<th>Profile Feature</th>
<th>Pb-Free Assembly Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Min. (Tsmin)</td>
<td>150°C</td>
</tr>
<tr>
<td>Temperature Max. (Tmax)</td>
<td>200°C</td>
</tr>
<tr>
<td>Time (ts) from (Tsmin to Tmax)</td>
<td>60-120 seconds</td>
</tr>
<tr>
<td>Ramp-up Rate (tl to tp)</td>
<td>3°C/second max.</td>
</tr>
<tr>
<td>Liquidous Temperature (TL)</td>
<td>217°C</td>
</tr>
<tr>
<td>Time (tl) Maintained Above (TL)</td>
<td>60 – 150 seconds</td>
</tr>
<tr>
<td>Peak Body Package Temperature</td>
<td>260°C +0°C / -5°C</td>
</tr>
<tr>
<td>Time (tp) within 5°C of 260°C</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Ramp-down Rate (TP to TL)</td>
<td>6°C/second max.</td>
</tr>
<tr>
<td>Time 25°C to Peak Temperature</td>
<td>8 minutes max.</td>
</tr>
</tbody>
</table>
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