CPC1117N
60V Normally-Closed Single-Pole
4-Pin SOP OptoMOS® Relay

Parameter | Rating | Units
---|---|---
Blocking Voltage | 60 | V<sub>p</sub>
Load Current | 150 | mA<sub>rms</sub> / mA<sub>DC</sub>
On-Resistance (max) | 16 | Ω
LED Current to Operate | 1 | mA

Description
The CPC1117N is a miniature normally-closed single-pole (1-Form-B) solid state relay in a 4-pin SOP package that employs optically coupled MOSFET technology to provide 1500V<sub>rms</sub> of input/output isolation. The efficient MOSFET switches and photovoltaic die use IXYS Integrated Circuits’ patented OptoMOS architecture. The optically coupled output is controlled by the input's highly efficient infrared LED.

Features
- Designed for use in security systems complying with EN50130-4
- Only 1mA of LED current required to operate
- 1500V<sub>rms</sub> Input/Output Isolation
- Small 4-Pin SOP Package
- High Reliability
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Immune to radiated EM fields
- Tape & Reel Version Available
- Flammability Rating UL 94 V-0

Applications
- Security
  - Passive Infrared Detectors (PIR)
  - Data Signalling
  - Sensor Circuitry
- Instrumentation
- Multiplexers
- Data Acquisition
- Electronic Switching
- I/O Subsystems
- Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Aerospace
- Industrial Controls

Approvals
- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN/IEC 60950-1 Certified Component: Certificate available on our website

Ordering Information
<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC1117N</td>
<td>4-Pin SOP (100/tube)</td>
</tr>
<tr>
<td>CPC1117NTR</td>
<td>4-Pin SOP (2000/reel)</td>
</tr>
</tbody>
</table>

Pin Configuration

Switching Characteristics of Normally-Closed Devices
### Absolute Maximum Ratings @ 25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ratings</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking Voltage</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Input Voltage</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Input Control Current Peak (10ms)</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Input Power Dissipation ¹</td>
<td>70</td>
<td>mW</td>
</tr>
<tr>
<td>Total Power Dissipation ²</td>
<td>400</td>
<td>mW</td>
</tr>
<tr>
<td>Isolation Voltage, Input to Output</td>
<td>1500</td>
<td>V&lt;sub&gt;ms&lt;/sub&gt;</td>
</tr>
<tr>
<td>Operational Temperature</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
</tbody>
</table>

¹ Derate linearly 1.33 mW / °C
² Derate linearly 3.33 mW / °C

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Typical values are characteristic of the device at +25°C, and are the result of engineering evaluations. They are provided for information purposes only, and are not part of the manufacturing testing requirements.

### Electrical Characteristics @ 25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak</td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=0mA, t=10ms</td>
<td>I&lt;sub&gt;L&lt;/sub&gt;</td>
<td>-</td>
<td>-</td>
<td>150 mA&lt;sub&gt;rms&lt;/sub&gt; / mA&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>On-Resistance ²</td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=0mA, I&lt;sub&gt;L&lt;/sub&gt;=120mA</td>
<td>R&lt;sub&gt;ON&lt;/sub&gt;</td>
<td>-</td>
<td>5</td>
<td>16 Ω</td>
</tr>
<tr>
<td>Off-State Leakage Current</td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=1mA, V&lt;sub&gt;L&lt;/sub&gt;=60V</td>
<td>I&lt;sub&gt;LEAK&lt;/sub&gt;</td>
<td>-</td>
<td>-</td>
<td>1 µA</td>
</tr>
<tr>
<td>Switching Speeds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-On</td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=2mA, V&lt;sub&gt;L&lt;/sub&gt;=10V</td>
<td>t&lt;sub&gt;on&lt;/sub&gt;</td>
<td>-</td>
<td>0.316</td>
<td>10 ms</td>
</tr>
<tr>
<td>Turn-Off</td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=2mA, V&lt;sub&gt;L&lt;/sub&gt;=10V</td>
<td>t&lt;sub&gt;off&lt;/sub&gt;</td>
<td>-</td>
<td>1.55</td>
<td>10 ms</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=0.5mA, V&lt;sub&gt;L&lt;/sub&gt;=50V, f=1MHz</td>
<td>C&lt;sub&gt;OUT&lt;/sub&gt;</td>
<td>-</td>
<td>10</td>
<td>- pF</td>
</tr>
<tr>
<td><strong>Input Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Control Current to Activate</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>(Output Open)</td>
<td></td>
<td>I&lt;sub&gt;F&lt;/sub&gt;</td>
<td>-</td>
<td>0.16</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Input Control Current to Deactivate</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>(Output Closed)</td>
<td></td>
<td>I&lt;sub&gt;F&lt;/sub&gt;</td>
<td>0.1</td>
<td>0.14</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Input Voltage Drop</td>
<td></td>
<td>V&lt;sub&gt;F&lt;/sub&gt;</td>
<td>0.9</td>
<td>1.2</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Input Current</td>
<td></td>
<td>V&lt;sub&gt;R&lt;/sub&gt;</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>µA</td>
</tr>
</tbody>
</table>

¹ Load current derates linearly from 150mA @ 25°C to 100mA @ 85°C.
² Measurement taken within 1 second of on-time.
³ For applications requiring high temperature operation (greater than 60°C) a minimum LED drive current of 3mA is recommended.
PERFORMANCE DATA*

*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C. For guaranteed parameters not indicated in the written specifications, please contact our application department.
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For guaranteed parameters not indicated in the written specifications, please contact our application department.
Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingress. IXYS Integrated Circuits classifies its plastic encapsulated devices for moisture sensitivity according to the latest version of the joint industry standard, IPC/JEDEC J-STD-020, in force at the time of product evaluation. We test all of our products to the maximum conditions set forth in the standard, and guarantee proper operation of our devices when handled according to the limitations and information in that standard as well as to any limitations set forth in the information or standards referenced below.

Failure to adhere to the warnings or limitations as established by the listed specifications could result in reduced product performance, reduction of operable life, and/or reduction of overall reliability.

This product carries a Moisture Sensitivity Level (MSL) classification as shown below, and should be handled according to the requirements of the latest version of the joint industry standard IPC/JEDEC J-STD-033.

<table>
<thead>
<tr>
<th>Device</th>
<th>Moisture Sensitivity Level (MSL) Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC1117N</td>
<td>MSL 3</td>
</tr>
</tbody>
</table>

ESD Sensitivity

This product is ESD Sensitive, and should be handled according to the industry standard JESD-625.

Soldering Profile

Provided in the table below is the Classification Temperature ($T_c$) of this product and the maximum dwell time the body temperature of this device may be ($T_c - 5\degree$C or greater. The classification temperature sets the Maximum Body Temperature allowed for this device during lead-free reflow processes. For through-hole devices, and any other processes, the guidelines of J-STD-020 must be observed.

<table>
<thead>
<tr>
<th>Device</th>
<th>Classification Temperature ($T_c$)</th>
<th>Dwell Time ($t_p$)</th>
<th>Max Reflow Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPC1117N</td>
<td>260\degree C</td>
<td>30 seconds</td>
<td>3</td>
</tr>
</tbody>
</table>

Board Wash

IXYS Integrated Circuits recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include, but are not limited to: using a low pressure wash and providing a follow up bake cycle sufficient to remove any moisture trapped within the device due to the washing process. Due to the variability of the wash parameters used to clean the board, determination of the bake temperature and duration necessary to remove the moisture trapped within the package is the responsibility of the user (assembler). Cleaning or drying methods that employ ultrasonic energy may damage the device and should not be used. Additionally, the device must not be exposed to flux or solvents that are Chlorine- or Fluorine-based.
Mechanical Dimensions

CPC1117N

Recommended PCB Land Pattern

Dimensions

mm (inches)

0.60 (0.024)

1.54 (0.061)

3.85 (0.152)

2.54 (0.10)

2.54 Typ (0.10)

Embossment

Carrier

User Direction of Feed

Dimensions

mm (inches)

3.302 Dia (13.00 Dia)

Top Cover

Tape Thickness

0.102 Max (0.004 Max)

Embossed

Carried

Embossment

NOTE: All dimensional tolerances per Standard EIA-481-2 except as noted

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Specification: DS-CPC1117N-R10
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