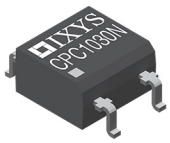
IXYS
INTEGRATED CIRCUITS DIVISION




# CPC1030N

## 350V Normally-Open Single-Pole 4-Pin SOP OptoMOS® Relay

| Parameter | Rating | Units |
|---|---|---|
| Blocking Voltage | 350 | $V_P$ |
| Load Current | 120 | $mA_{rms}$ / $mA_{DC}$ |
| On-Resistance (max) | 30 | Ω |

## Features

- $1500V_{rms}$ Input/Output Isolation
- Small 4-Pin SOP Package
- Low Drive Power Requirements
- High Reliability
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Tape & Reel Version Available
- Flammability Rating UL 94 V-0

## Applications

- Telecommunications
  - Telecom Switching
  - Tip/Ring Circuits
  - Modem Switching (Laptop, Notebook, Pocket Size)
  - Hook Switch
  - Dial Pulsing
  - Ground Start
  - Ringing Injection
- Instrumentation
- Multiplexers
- Data Acquisition
- Electronic Switching
- I/O Subsystems
- Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Security
- Aerospace
- Industrial Controls

## Description

The CPC1030N is a miniature single-pole, normally-open (1-Form-A) solid state relay in a 4-pin SOP package that employs optically coupled MOSFET technology to provide $1500V_{rms}$ of input to output isolation. The efficient MOSFET switches and photovoltaic die use IXYS Integrated Circuits Division's patented OptoMOS architecture while the optically coupled output is controlled by a highly efficient infrared LED.

IXYS Integrated Circuits Division's state of the art double-molded vertical construction packaging makes the CPC1030N one of the world's smallest relays. It offers board space savings of at least 20% over the competitor's larger 4-pin SOP relay.

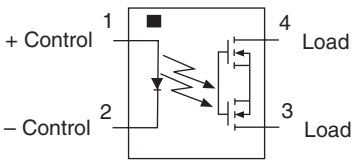
## Approvals

- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN/IEC 60950-1 Certified Component: TUV Certificate B 13 12 82667 003

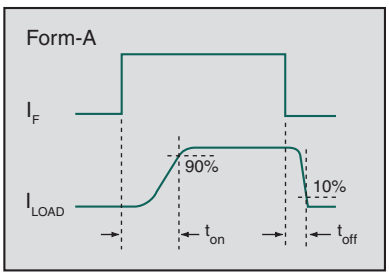
## Ordering Information

| Part # | Description |
|---|---|
| CPC1030N | 4-Pin SOP (100/tube) |
| CPC1030NTR | 4-Pin SOP (2000/reel) |

## Pin Configuration




**Switching Characteristics of Normally-Open Devices**



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## Absolute Maximum Ratings @ 25°C

| Parameter | Ratings | Units |
|---|---|---|
| Blocking Voltage | 350 | $V_P$ |
| Reverse Input Voltage | 5 | V |
| Input Control Current | 50 | mA |
| Peak (10ms) | 1 | A |
| Input Power Dissipation [1] | 70 | mW |
| Total Power Dissipation [2] | 400 | mW |
| Isolation Voltage, Input to Output | 1500 | $V_{rms}$ |
| Operational Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +125 | °C |

[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.*

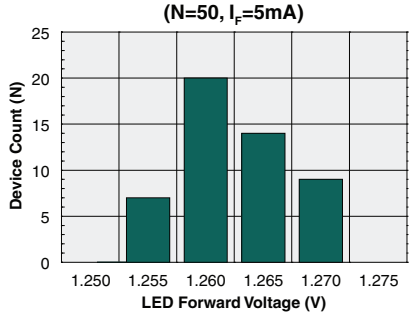
## Electrical Characteristics @ 25°C

| Parameter | Conditions | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Output Characteristics** | | | | | | |
| Load Current | | | | | | |
| Continuous [1] | - | $I_L$ | | | 120 | $mA_{rms}$ / $mA_{DC}$ |
| Peak | t=10ms | $I_{LPK}$ | - | - | ±350 | $mA_P$ |
| On-Resistance [2] | $I_L$=120mA | $R_{ON}$ | - | 19.5 | 30 | Ω |
| Off-State Leakage Current | $V_L$=350$V_P$ | $I_{LEAK}$ | - | - | 1 | µA |
| Switching Speeds | | | | | | |
| Turn-On | $I_F$=5mA, $V_L$=10V | $t_{on}$ | - | - | 2 | ms |
| Turn-Off | | $t_{off}$ | - | - | 1 | |
| Output Capacitance | $I_F$=0mA, $V_L$=50V, f=1MHz | $C_{OUT}$ | - | 9 | - | pF |
| **Input Characteristics** | | | | | | |
| Input Control Current to Activate [3] | $I_L$=120mA | $I_F$ | - | 0.6 | 2 | mA |
| Input Control Current to Deactivate | - | $I_F$ | 0.3 | - | - | mA |
| Input Voltage Drop | $I_F$=5mA | $V_F$ | 0.9 | 1.2 | 1.5 | V |
| Reverse Input Current | $V_R$=5V | $I_R$ | - | - | 10 | µA |
| **Input/Output Characteristics** | | | | | | |
| Capacitance Input to Output | $V_{IO}$=1V, f=1MHz | $C_{IO}$ | - | 1 | - | pF |

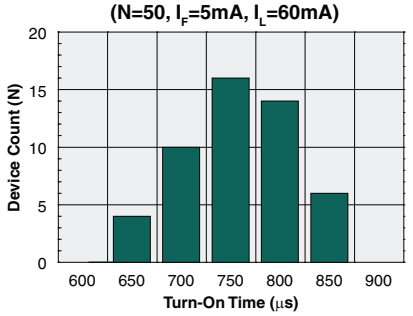
[1] Load current derates linearly from 120mA @ 25°C to 60mA @85°C.
[2] Measurement taken within 1 second of on-time.
[3] For applications requiring high temperature operation (greater than 60°C) a minimum LED drive current of 4mA is recommended.

## PERFORMANCE DATA*

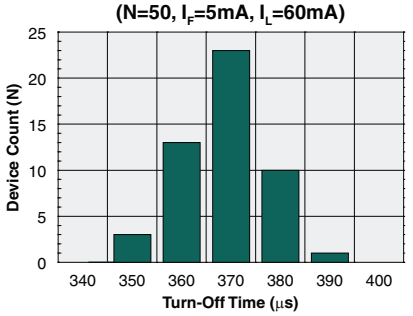
**Typical LED Forward Voltage Drop (N=50, $I_F$=5mA)**



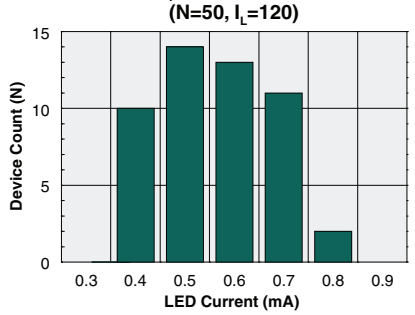

**Typical Turn-On Time Distribution (N=50, $I_F$=5mA, $I_L$=60mA)**



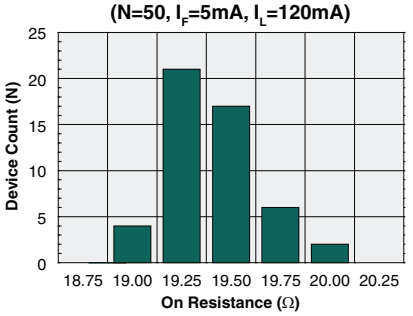

**Typical Turn-Off Time Distribution (N=50, $I_F$=5mA, $I_L$=60mA)**



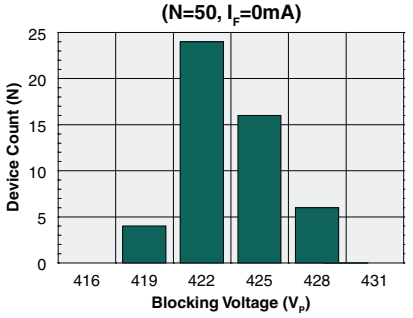

**Typical $I_F$ for Switch Operation (N=50, $I_L$=120)**



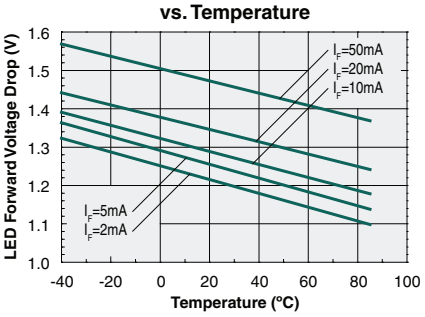

**Typical On-Resistance Distribution (N=50, $I_F$=5mA, $I_L$=120mA)**



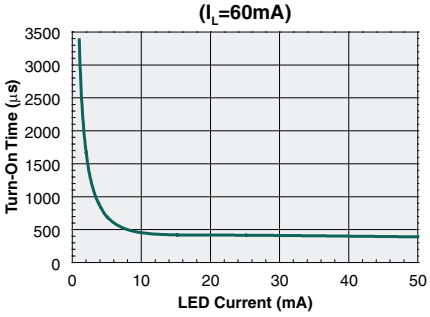

**Typical Blocking Voltage Distribution (N=50, $I_F$=0mA)**



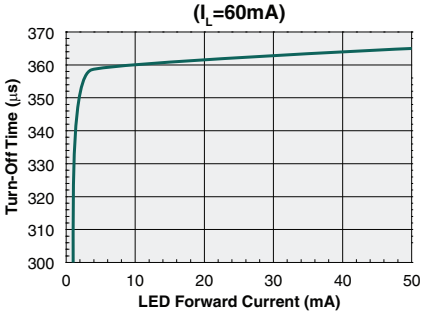

**Typical LED Forward Voltage Drop vs. Temperature**



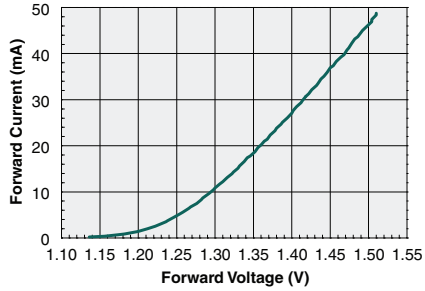

**Typical Turn-On Time vs. LED Forward Current ($I_L$=60mA)**



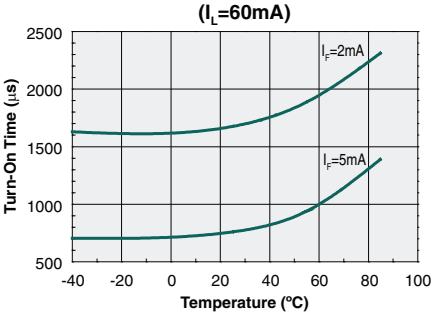

**Typical Turn-Off Time vs. LED Forward Current ($I_L$=60mA)**



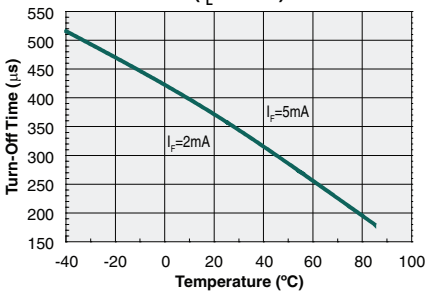

**LED Forward Voltage vs. LED Forward Current**




**Typical Turn-On Time vs. Temperature ($I_L$=60mA)**



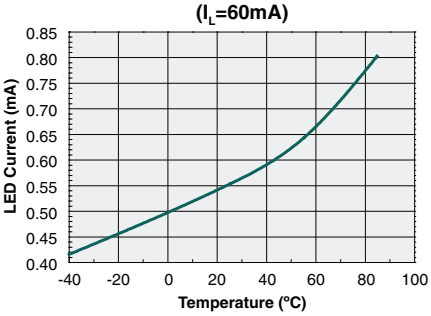

**Typical Turn-Off Time vs. Temperature ($I_L$=60mA)**



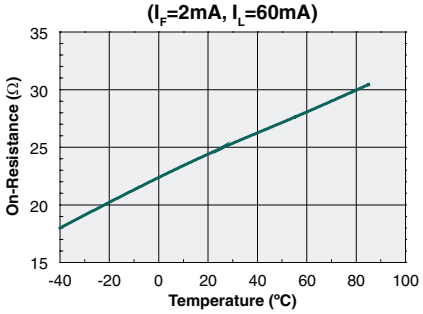

*Unless otherwise noted, data presented in these graphs is typical of device operation at 25ºC.
For guaranteed parameters not indicated in the written specifications, please contact our application department.

## PERFORMANCE DATA*

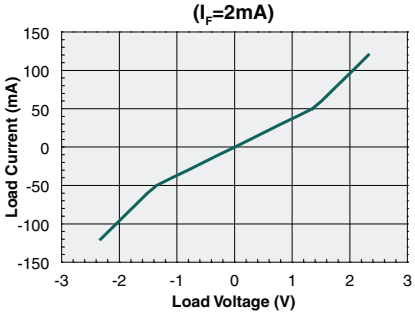
**Typical $I_F$ for Switch Operation vs. Temperature ($I_L$=60mA)**



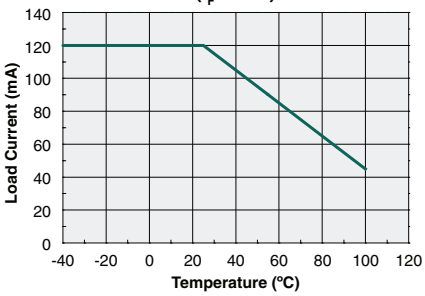

**Typical On-Resistance vs. Temperature ($I_F$=2mA, $I_L$=60mA)**



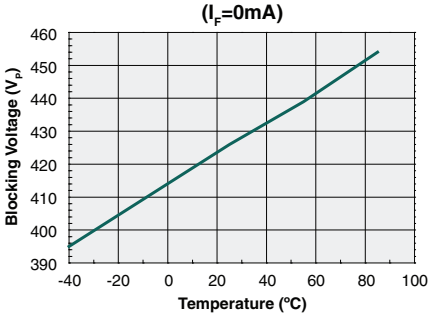

**Typical Load Current vs. Load Voltage ($I_F$=2mA)**



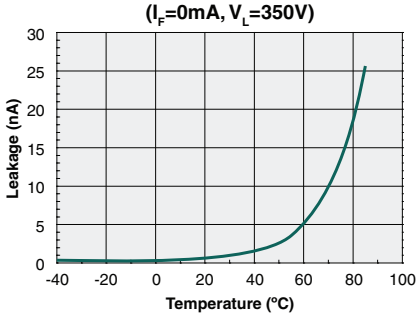

**Maximum Load Current vs. Temperature ($I_F$=4mA)**



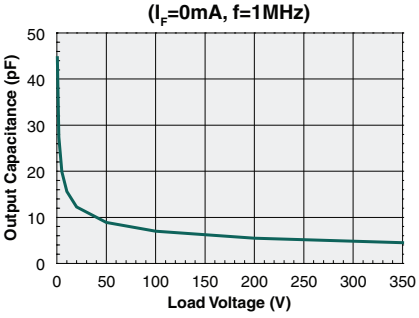

**Typical Blocking Voltage vs. Temperature ($I_F$=0mA)**



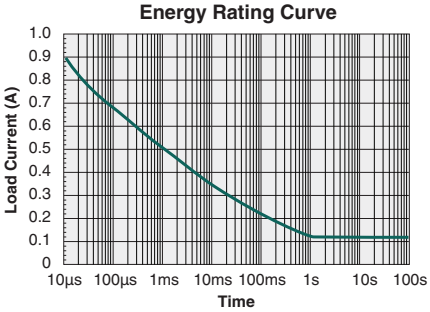

**Typical Leakage vs. Temperature Measured Across Pins 3&4 ($I_F$=0mA, $V_L$=350V)**




**Output Capacitance vs. Load Voltage ($I_F$=0mA, f=1MHz)**




**Energy Rating Curve**




*Unless otherwise noted, data presented in these graphs is typical of device operation at 25ºC.
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 ingression. IXYS Integrated Circuits Division 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**.

| Device | Moisture Sensitivity Level (MSL) Classification |
|---|---|
| CPC1030N | MSL 3 |

### 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)ºC 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.

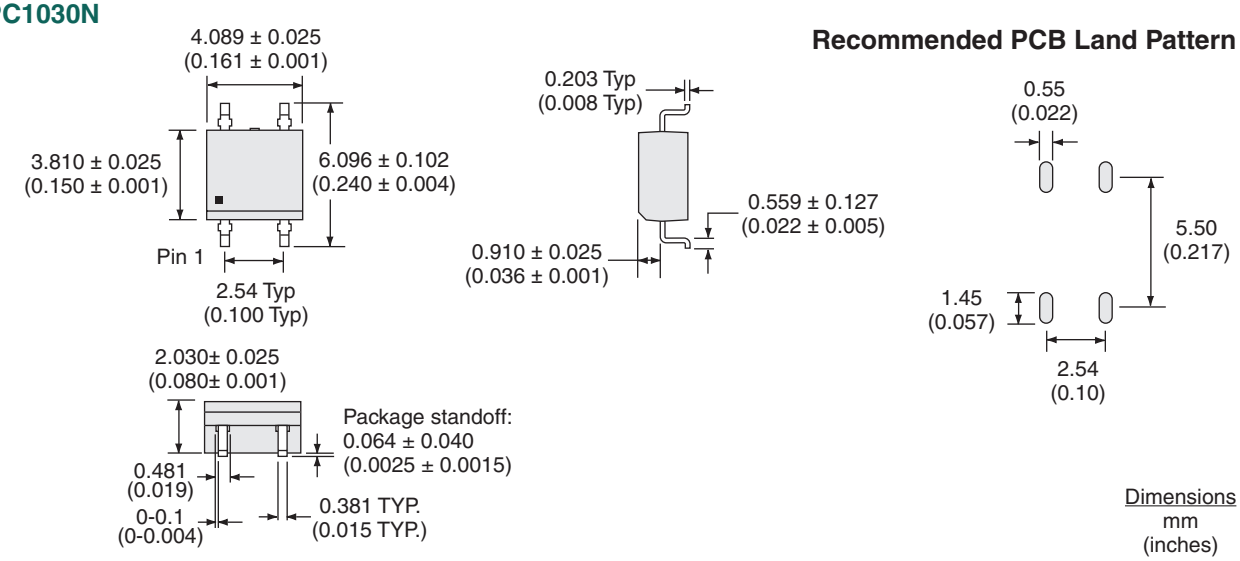
| Device | Classification Temperature ($T_c$) | Dwell Time ($t_p$) | Max Reflow Cycles |
|---|---|---|---|
| CPC1030N | 260ºC | 30 seconds | 3 |

### Board Wash

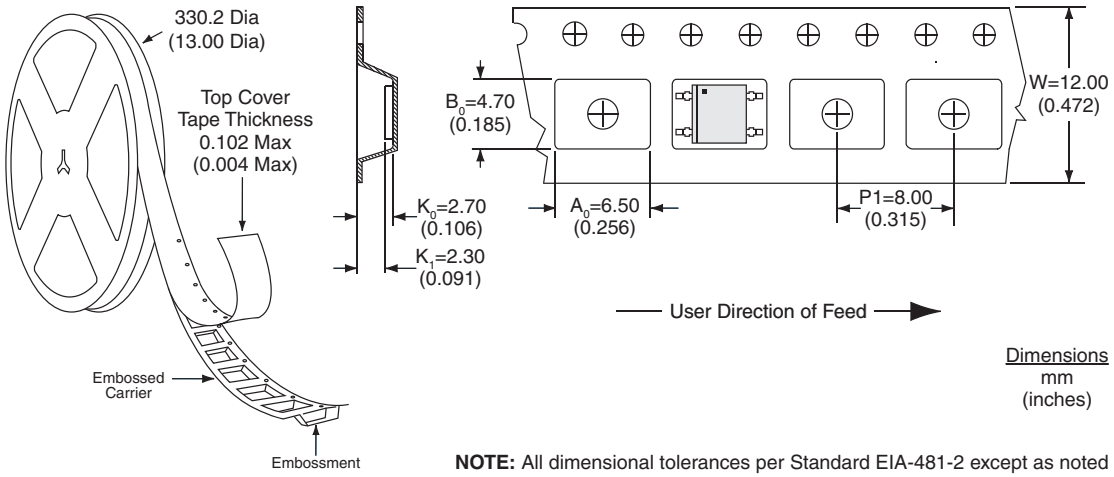
IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include, but are not limited to: 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

### CPC1030N




### CPC1030NTR Tape & Reel




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

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Specification: DS-CPC1030N-R17
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