



| Parameter           | Rating | Units                                |
|---------------------|--------|--------------------------------------|
| Blocking Voltage    | 350    | V <sub>p</sub>                       |
| Load Current        | 120    | mA <sub>rms</sub> / mA <sub>DC</sub> |
| On-Resistance (max) | 30     | Ω                                    |

### Features

- 0.4mm Distance Through Insulation (Supplementary Isolation Requirement of EN60950)
- 1500V<sub>rms</sub> Input/Output Isolation
- Low Drive Power Requirements (TTL/CMOS Compatible)
- No Moving Parts
- High Reliability
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Small 4-Pin SOP Package
- Machine Insertable, Wave Solderable
- Tape & Reel Version Available

### 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 CPC1231N is a miniature single-pole, normally closed (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-to-output isolation. The optically coupled outputs, which use patented OptoMOS architecture, are controlled by a highly efficient GaAIAs infrared LED.

The device is compliant with supplementary isolation in accordance with EN/IEC 60950-1.

IXYS Integrated Circuits Division's state of the art double molded vertical construction packaging enables the CPC1231N to be one of the world's smallest 4-pin relays, which offers board space savings approaching 20% over the competitor's larger 4-pin SOP relay.

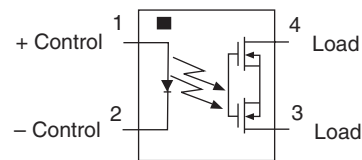
### Approvals

- UL 1577 Approved Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN 60950 Certified Component: TUV Certificate B 10 05 49410 006

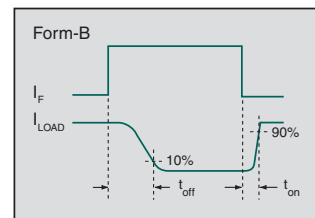
### Ordering Information

| Part #     | Description           |
|------------|-----------------------|
| CPC1231N   | 4-Pin SOP (100/tube)  |
| CPC1231NTR | 4-Pin SOP (2000/reel) |

### Pin Configuration



### Switching Characteristics of Normally Closed Devices



**Absolute Maximum Ratings @ 25°C**

| Parameter                            | Ratings     | Units            |
|--------------------------------------|-------------|------------------|
| Blocking Voltage                     | 350         | V <sub>P</sub>   |
| Reverse Input Voltage                | 5           | V                |
| Input Control Current<br>Peak (10ms) | 50          | mA               |
|                                      | 1           | A                |
| Input Power Dissipation              | 150         | mW               |
| Total Power Dissipation <sup>1</sup> | 400         | mW               |
| Capacitance, Input to Output         | 1           | pF               |
| Isolation Voltage, Input to Output   | 1500        | V <sub>rms</sub> |
| Operational Temperature              | -40 to +85  | °C               |
| Storage Temperature                  | -40 to +125 | °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.*

<sup>1</sup> Derate linearly 3.33 mW / °C

**Electrical Characteristics @ 25°C**

| Parameter                                       | Conditions   | Symbol            | Min | Typ | Max  | Units                                |
|---|--|-------------------|-----|-----|------|--------------------------------------|
| <b>Output Characteristics</b>                   |  |                   |     |     |      |                                      |
| Load Current<br>Continuous <sup>1</sup><br>Peak | -  | I <sub>L</sub>    | -   | -   | 120  | mA <sub>rms</sub> / mA <sub>DC</sub> |
|   | t = 10ms   | I <sub>LPK</sub>  | -   | -   | ±350 | mA <sub>P</sub>                      |
| On-Resistance <sup>2</sup>                      | I <sub>L</sub> =120mA                                  | R <sub>ON</sub>   | -   | 25  | 30   | Ω                                    |
| Off-State Leakage Current                       | I <sub>F</sub> =2mA, V <sub>L</sub> =350V <sub>P</sub> | I <sub>LEAK</sub> | -   | -   | 5    | μA                                   |
| Switching Speeds<br>Turn-On<br>Turn-Off         | I <sub>F</sub> =5mA, V <sub>L</sub> =10V               | t <sub>on</sub>   | -   | -   | 2    | ms                                   |
|   |  | t <sub>off</sub>  | -   | -   | 2    |                                      |
| Output Capacitance                              | V <sub>L</sub> =50V, f=1MHz                            | C <sub>OUT</sub>  | -   | 25  | -    | pF                                   |
| <b>Input Characteristics</b>                    |  |                   |     |     |      |                                      |
| Input Control Current to Activate <sup>3</sup>  | I <sub>L</sub> =120mA                                  | I <sub>F</sub>    | -   | 0.6 | 2    | mA                                   |
| Input Voltage Drop                              | I <sub>F</sub> =5mA                                    | V <sub>F</sub>    | 0.9 | 1.2 | 1.4  | V                                    |
| Reverse Input Current                           | V <sub>R</sub> =5V                                     | I <sub>R</sub>    | -   | -   | 10   | μA                                   |

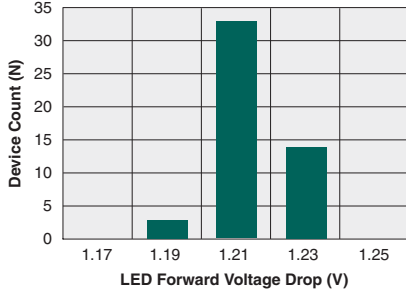
<sup>1</sup> Load current derates linearly from 120mA @ 25°C to 80mA @ 85°C.

<sup>2</sup> Measurement taken within 1 second of on-time.

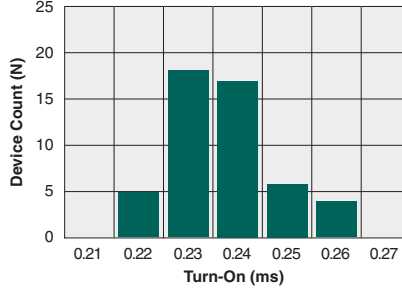
<sup>3</sup> For applications requiring high temperature operation (greater than 60°C) a LED drive current of 5mA is recommended.

PERFORMANCE DATA\*

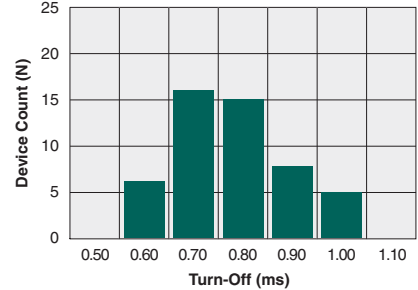
Typical LED Forward Voltage Drop  
(N=50,  $I_F=5\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



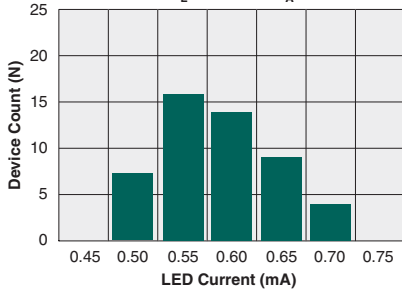
Typical Turn-On Time  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=120\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



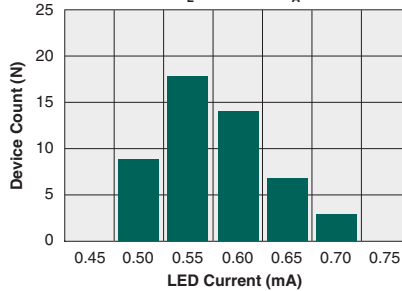
Typical Turn-Off Time  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=120\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



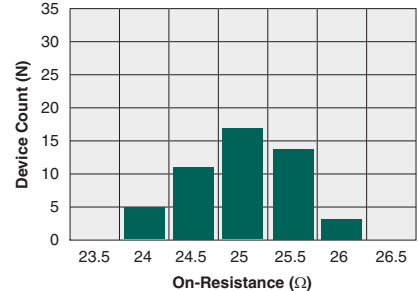
Typical  $I_F$  for Switch Operation  
(N=50,  $I_L=120\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



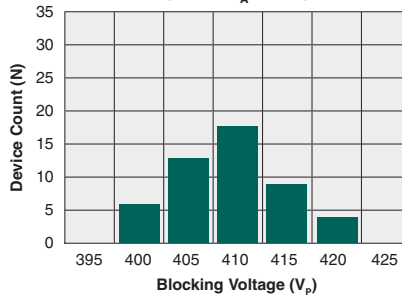
Typical  $I_F$  for Switch Dropout  
(N=50,  $I_L=120\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



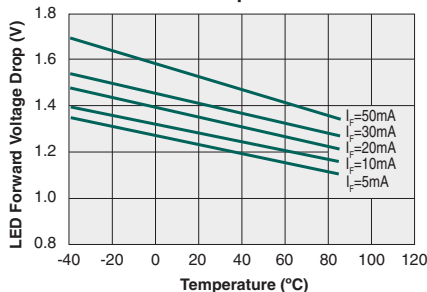
Typical On-Resistance Distribution  
(N=50,  $I_L=120\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



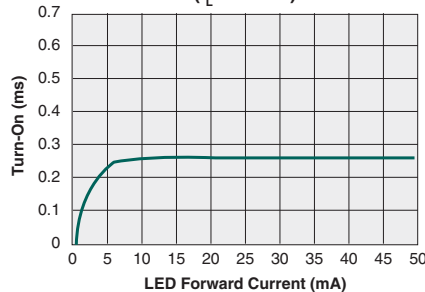
Typical Blocking Voltage Distribution  
(N=50,  $T_A=25^\circ\text{C}$ )



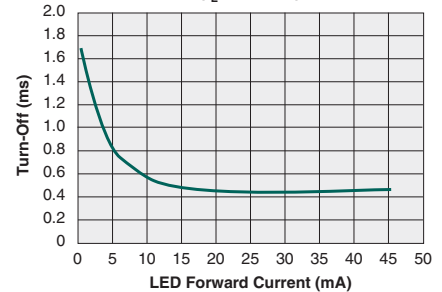
Typical LED Forward Voltage Drop vs. Temperature



Typical Turn-On vs. LED Forward Current  
( $I_L=120\text{mA}$ )

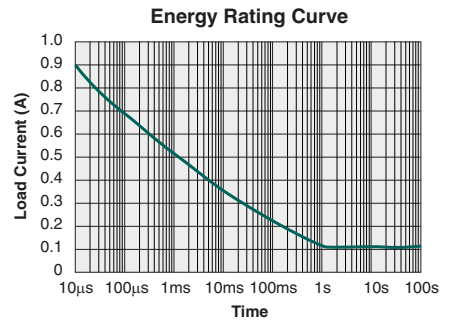
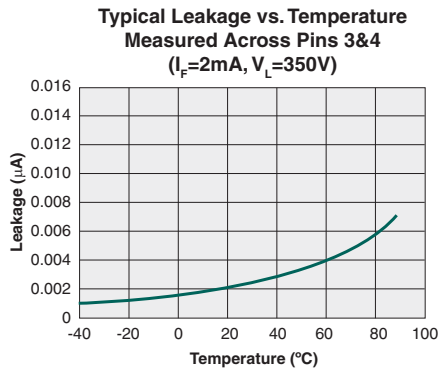
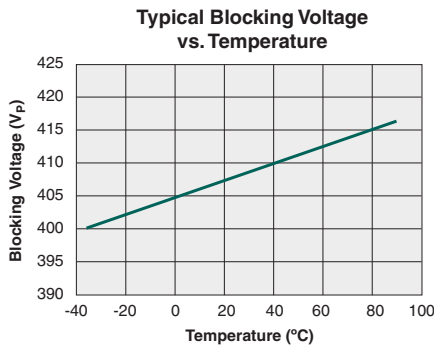
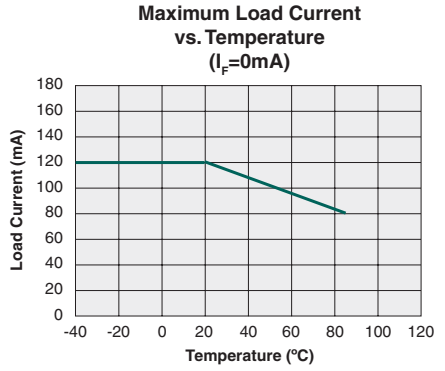
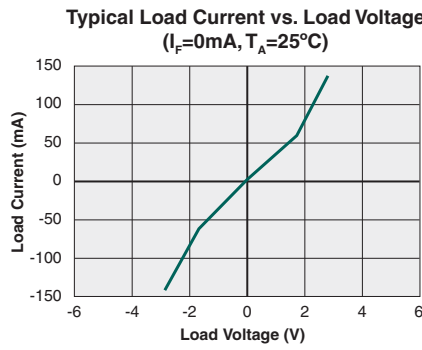
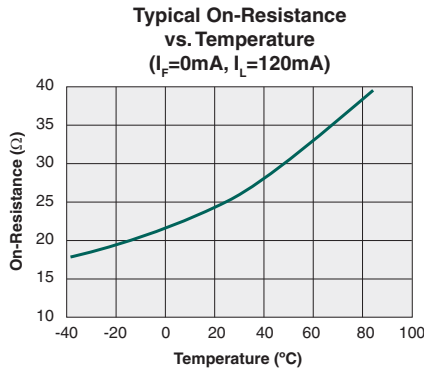
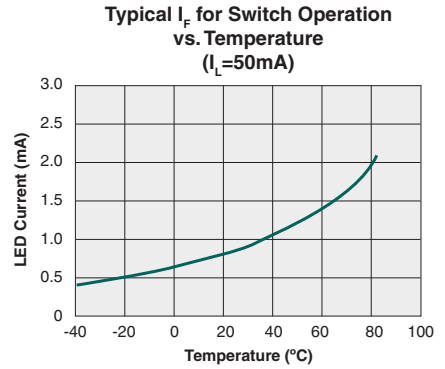
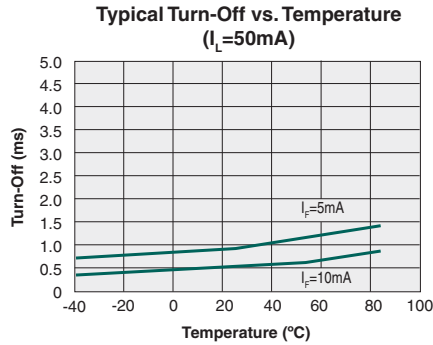
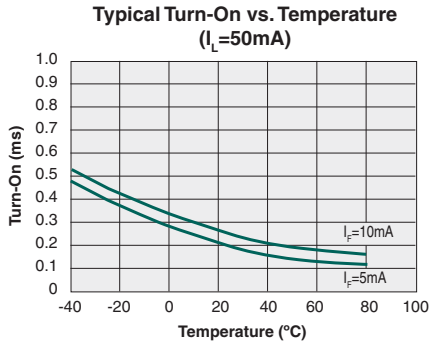


Typical Turn-Off vs. LED Forward Current  
( $I_L=120\text{mA}$ )



\*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

**PERFORMANCE DATA\***



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**Manufacturing Information**

**Moisture Sensitivity**



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. IXYS Integrated Circuits Division classified all of 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) rating** 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) Rating |
|----------|---|
| CPC1231N | MSL 3                                   |

**ESD Sensitivity**



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

**Reflow Profile**

This product has a maximum body temperature and time rating as shown below. All other guidelines of **J-STD-020** must be observed.

| Device   | Maximum Temperature x Time |
|----------|----------------------------|
| CPC1231N | 260°C for 30 seconds       |

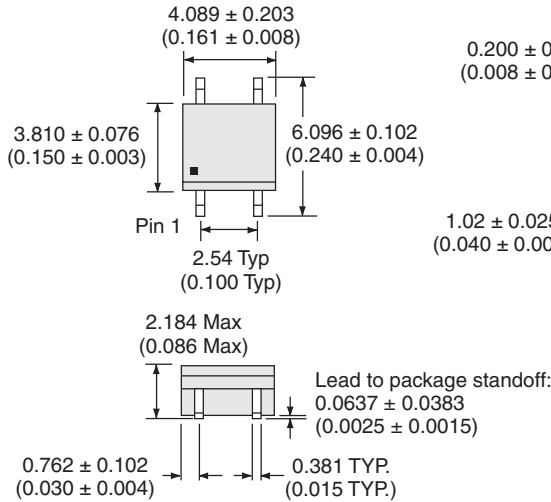
**Board Wash**

IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since IXYS Integrated Circuits Division employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a short drying bake could be necessary if a wash is used after solder reflow processes. Chlorine- or Fluorine-based solvents or fluxes should not be used. Cleaning methods that employ ultrasonic energy should not be used.

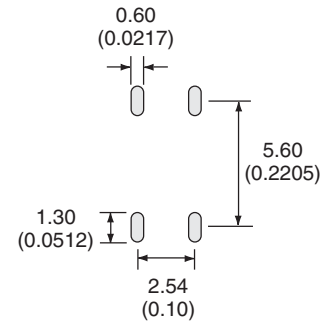


**MECHANICAL DIMENSIONS**

**CPC1231N**

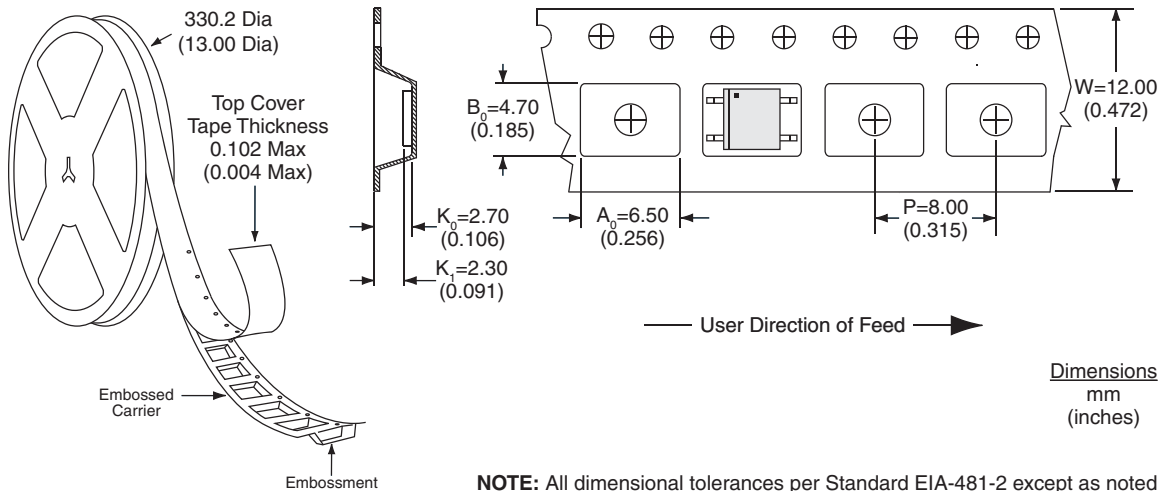


**Recommended PCB Land Pattern**



Dimensions  
mm  
(inches)

**CPC1231NTR Tape & Reel**



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

**For additional information please visit our website at: [www.ixysic.com](http://www.ixysic.com)**

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