



Parameter	Rating	Units
Blocking Voltage	350	V <sub>p</sub>
Load Current	120	mA <sub>rms</sub> / mA <sub>DC</sub>
On-Resistance (max)	50	Ω

### Features

- 1500V<sub>rms</sub> Input/Output Isolation
- Low Drive Power Requirements
- High Reliability
- No EMI/RFI Generation
- Small 4-Pin SOP Package
- 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
- Industrial Controls

### Description

The CPC1150N is a miniature single-pole, normally-closed (1-Form-B) solid state relay that uses optically coupled MOSFET technology to provide 1500V<sub>rms</sub> of input to output isolation.

Its optically coupled output, which uses the patented OptoMOS architecture, is controlled by a highly efficient infrared LED.

State of the art double-molded vertical construction packaging enables the CPC1150N to be one of the world's smallest 4-pin solid state relays. It offers board space savings over the competitor's larger 4-pin SOP relay.

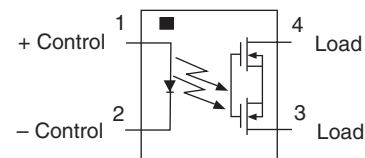
### Approvals

- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1172007
- TUV EN 62368-1: Certificate # B 082667 0008

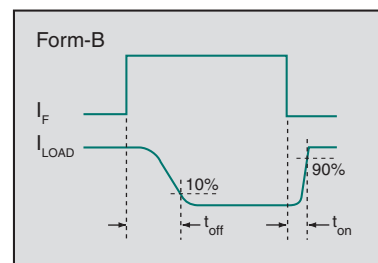
### Ordering Information

Part #	Description
CPC1150N	4-Pin SOP (100/tube)
CPC1150NTR	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	50	mA
Peak (10ms)	1	A
Input Power Dissipation <sup>1</sup>	70	mW
Total Power Dissipation <sup>2</sup>	400	mW
Isolation Voltage, Input to Output	1500	V <sub>rms</sub>
Operational Temperature, Ambient	-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.

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.

<sup>1</sup> Derate linearly 1.33 mW / °C

<sup>2</sup> Derate output power linearly 3.33 mW / °C

**Electrical Characteristics @ 25°C**

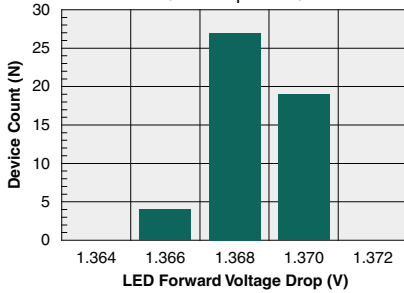
Parameter	Conditions	Symbol	Min	Typ	Max	Units
<b>Output Characteristics</b>						
Blocking Voltage	I <sub>L</sub> =1μA	V <sub>DRM</sub>	350	-	-	V
Load Current						
Continuous <sup>1</sup>	-	I <sub>L</sub>	-	-	120	mA <sub>rms</sub> / mA <sub>DC</sub>
Peak	t=10ms	I <sub>LPK</sub>	-	-	±350	mA <sub>P</sub>
On-Resistance	I <sub>L</sub> =120mA	R <sub>ON</sub>	-	-	50	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						
Turn-On	I <sub>F</sub> =5mA, V <sub>L</sub> =10V	t <sub>on</sub>	-	-	1	ms
Turn-Off		t <sub>off</sub>	-	-	2	
Output Capacitance	I <sub>F</sub> =2mA, V <sub>L</sub> =50V, f=1MHz	C <sub>OUT</sub>	-	25	-	pF
<b>Input Characteristics</b>						
Input Control Current to Activate <sup>2</sup>	I <sub>L</sub> =120mA	I <sub>F</sub>	-	0.6	2	mA
Input Control Current to Deactivate	-	I <sub>F</sub>	0.3	0.55	-	mA
Input Voltage Drop	I <sub>F</sub> =5mA	V <sub>F</sub>	0.9	1.36	1.5	V
Reverse Input Current	V <sub>R</sub> =5V	I <sub>R</sub>	-	-	10	μA
<b>Common Characteristics</b>						
Capacitance, Input to Output	V <sub>IO</sub> =0V, f=1MHz	C <sub>IO</sub>	-	1	-	pF

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

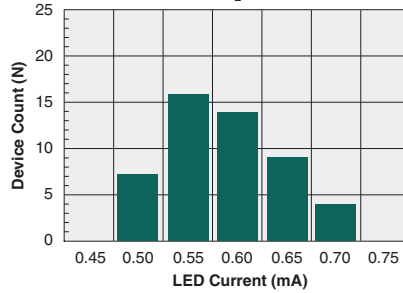
<sup>2</sup> For applications requiring high temperature operation (greater than 60°C) a minimum LED drive current of 4mA is recommended.

**PERFORMANCE DATA\***

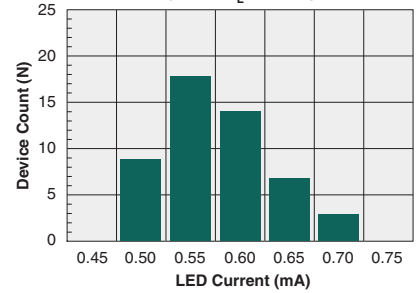
**Typical LED Forward Voltage Drop**  
(N=50,  $I_F=5\text{mA}$ )



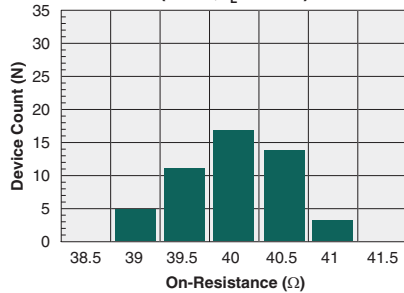
**Typical  $I_F$  for Switch Operation**  
(N=50,  $I_L=90\text{mA}$ )



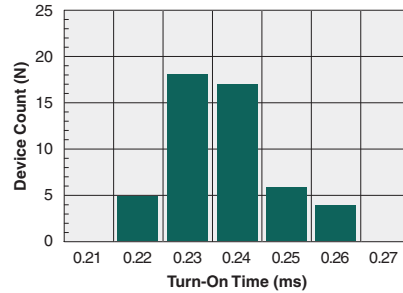
**Typical  $I_F$  for Switch Dropout**  
(N=50,  $I_L=90\text{mA}$ )



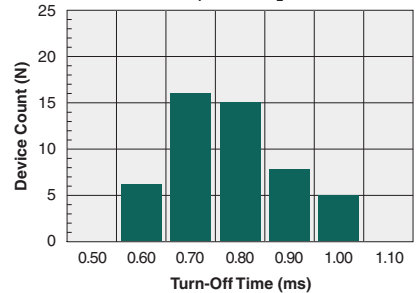
**Typical On-Resistance Distribution**  
(N=50,  $I_L=90\text{mA}$ )



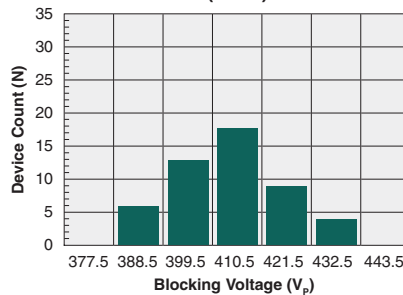
**Typical Turn-On Time**  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=90\text{mA}$ )



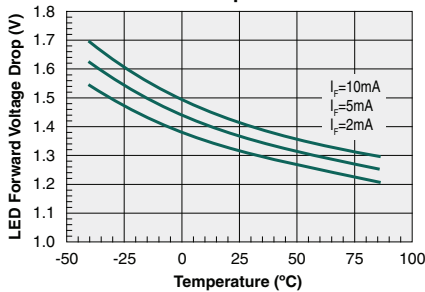
**Typical Turn-Off Time**  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=90\text{mA}$ )



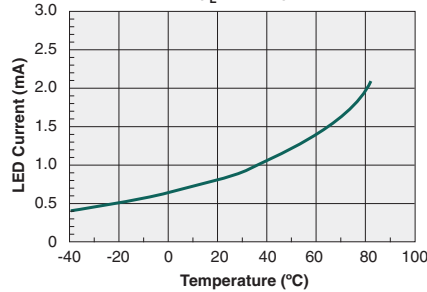
**Typical Blocking Voltage Distribution**  
(N=50)



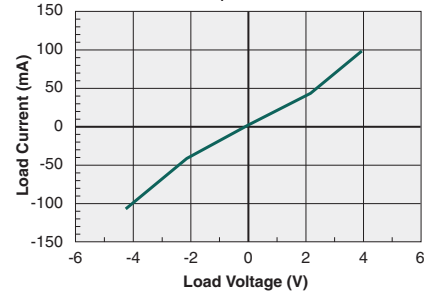
**Typical LED Forward Voltage Drop vs. Temperature**



**Typical  $I_F$  for Switch Operation vs. Temperature**  
( $I_L=50\text{mA}$ )



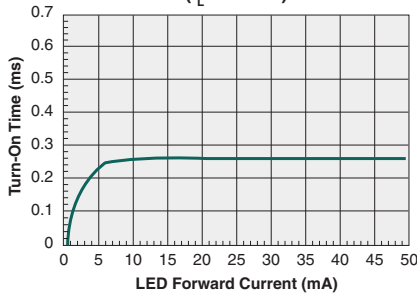
**Typical Load Current vs. Load Voltage**  
( $I_F=0\text{mA}$ )



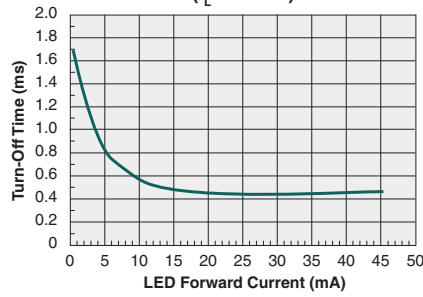
\*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.

**PERFORMANCE DATA\***

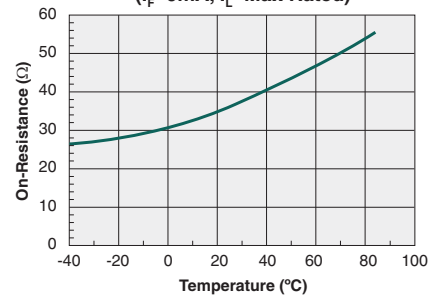
**Typical Turn-On Time vs. LED Forward Current ( $I_L=100\text{mA}$ )**



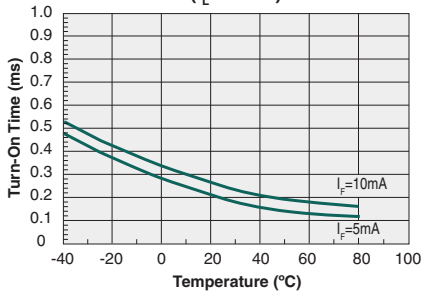
**Typical Turn-Off Time vs. LED Forward Current ( $I_L=100\text{mA}$ )**



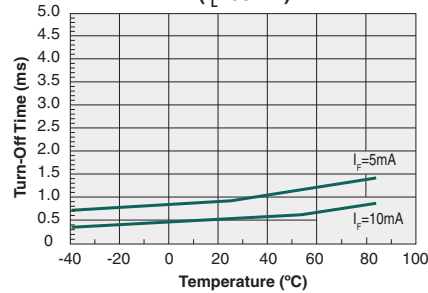
**Typical On-Resistance vs. Temperature ( $I_F=0\text{mA}$ ,  $I_L=\text{Max Rated}$ )**



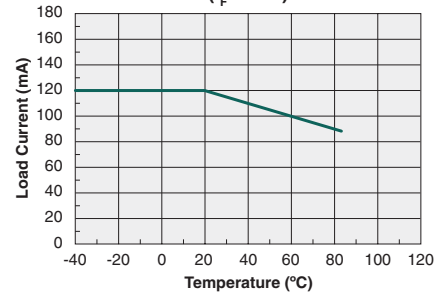
**Typical Turn-On Time vs. Temperature ( $I_L=50\text{mA}$ )**



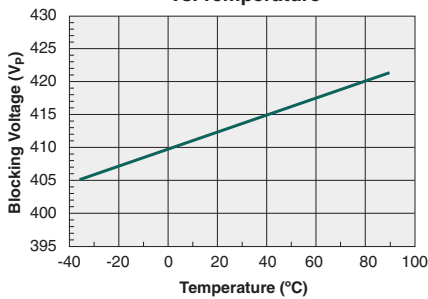
**Typical Turn-Off Time vs. Temperature ( $I_L=50\text{mA}$ )**



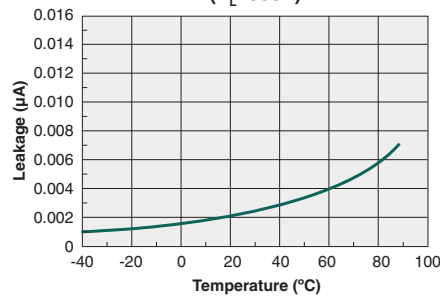
**Maximum Load Current vs. Temperature ( $I_F=0\text{mA}$ )**



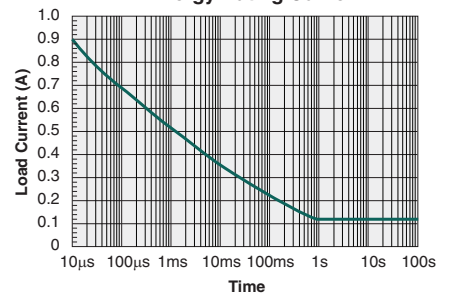
**Typical Blocking Voltage vs. Temperature**



**Typical Leakage vs. Temperature Measured Across Pins 3&4 ( $V_L=350\text{V}$ )**



**Energy Rating Curve**



\*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.

## 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**.

Device	Moisture Sensitivity Level (MSL) Classification
CPC1150N	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 **IPC/JEDEC J-STD-020** Classification Temperature ( $T_C$ ) and the maximum dwell time the body temperature of these surface mount devices may be ( $T_C - 5$ )°C or greater. The Classification Temperature sets the Maximum Body Temperature allowed for these devices during reflow soldering processes.

Device	Classification Temperature ( $T_C$ )	Dwell Time ( $t_p$ )	Max Reflow Cycles
CPC1150N	260°C	30 seconds	3

### 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 halide flux or solvents.



