IXYS
INTEGRATED CIRCUITS DIVISION

CPC1002N
60V, 700mA$_{DC}$ Single-Pole Normally Open Relay

Parameter	Rating	Units
Blocking Voltage	60	V_P
Load Current	700	mA_{DC}
On-Resistance (max)	0.55	Ω
LED Current to operate	2	mA

Features

- Designed for use in Security Systems Complying with EN50130-4
- Only 2mA of LED Current Required to Operate
- Small 4-Pin SOP Package
- 100% Solid State
- High Reliability
- 1500V$_{rms}$ Input/Output Isolation
- 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
- Industrial Controls

Description

The CPC1002N is a miniature, normally-open (1-Form-A) DC 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 super-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.

The CPC1002N uses IXYS Integrated Circuits' state of the art double-molded vertical construction packaging to produce one of the world's smallest relays. The CPC1002N offers board space savings of at least 20% over the competitor's larger 4-pin SOP relay.

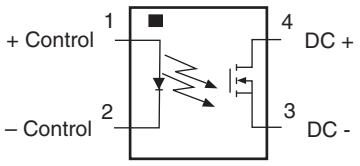
Approvals

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

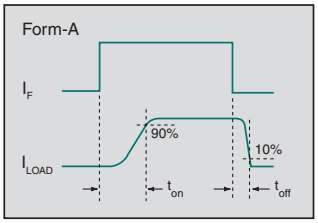
Ordering Information

Part #	Description
CPC1002N	4-Pin SOP (100/tube)
CPC1002NTR	4-Pin SOP (2000/reel)

Pin Configuration



Switching Characteristics of Normally-Open Devices



Absolute Maximum Ratings @ 25ºC

Parameter	Ratings	Units
Blocking Voltage	60	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, Ambient	-40 to +85	°C
Storage Temperature	-40 to +125	°C

[1] Derate linearly 1.33 mW/°C

[2] Derate output power linearly 3.33mW/°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 @ 25ºC

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics						
Blocking Voltage	I_L=1µA	V_{DRM}	60	-	-	V
Load Current	I_F=2mA, Free Air					
Continuous [1]	-	I_L	-	-	700	mA_{DC}
Peak	t=10ms	I_{LPK}	-	-	1	A_P
On-Resistance [2]	I_L=100mA	R_{ON}	-	0.35	0.55	Ω
Off-State Leakage Current	V_L=60V_P	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=3mA, V_L=10V	t_{on}	-	1.3	5	ms
Turn-Off		t_{off}	-	0.41	2	
Output Capacitance	I_F=0mA, V=50V, f=1MHz	C_{OUT}	-	25	-	pF
Input Characteristics						
Input Control Current to Activate [3]	I_L=100mA	I_F	-	0.55	2	mA
Input Control Current to Deactivate	-	I_F	0.3	-	-	mA
Input Voltage Drop	I_F=5mA	V_F	0.9	1.36	1.5	V
Reverse Input Current	V_R=5V	I_R	-	-	10	µA
Common Characteristics						
Capacitance, Input to Output	V_{IO}=0V, f=1MHz	C_{IO}	-	1	-	pF

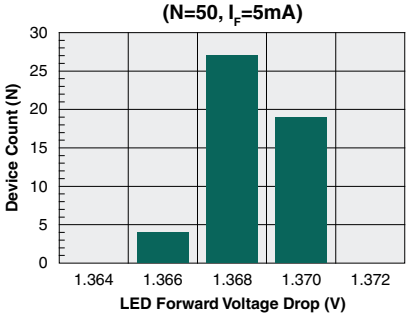
[1] Load current derates linearly from 700mA @ 25ºC to 420mA @80ºC.

[2] Measurement taken within 1 second of on-time.

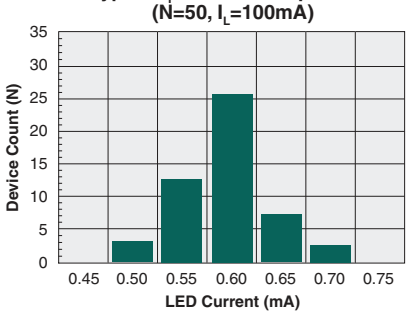
[3] For applications requiring high temperature operation (greater than 60ºC) a minimum LED drive current of 3mA is recommended.

PERFORMANCE DATA*

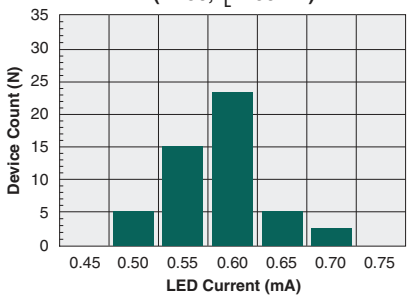
Typical LED Forward Voltage Drop (N=50, I_F=5mA)



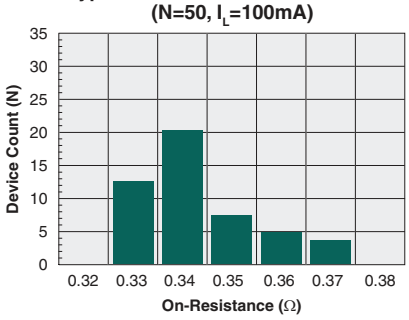
Typical I_F for Switch Operation (N=50, I_L=100mA)



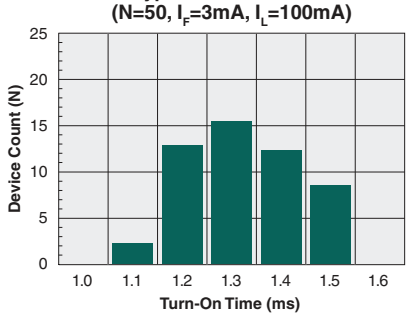
Typical I_F for Switch Dropout (N=50, I_L=100mA)



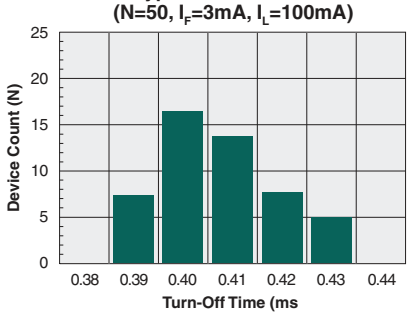
Typical On-Resistance Distribution (N=50, I_L=100mA)



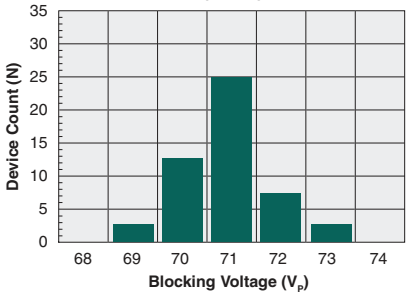
Typical Turn-On Time (N=50, I_F=3mA, I_L=100mA)



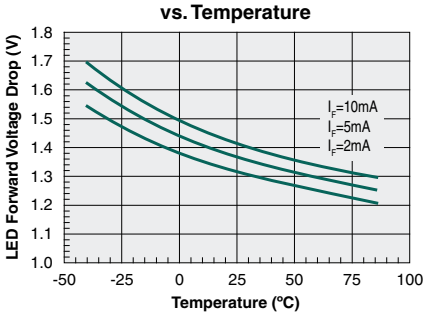
Typical Turn-Off Time (N=50, I_F=3mA, I_L=100mA)



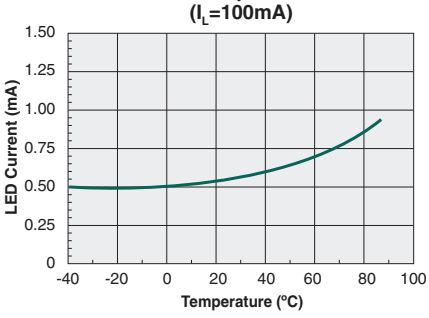
Typical Blocking Voltage Distribution (N=50)



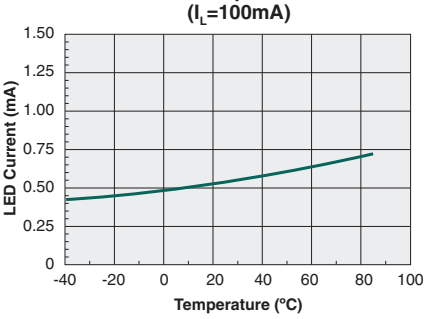
Typical LED Forward Voltage Drop vs. Temperature



Typical I_F for Switch Operation vs. Temperature (I_L=100mA)



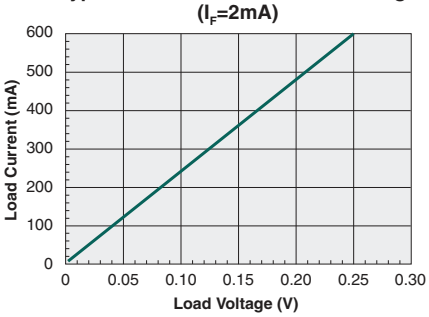
Typical I_F for Switch Dropout vs. Temperature (I_L=100mA)



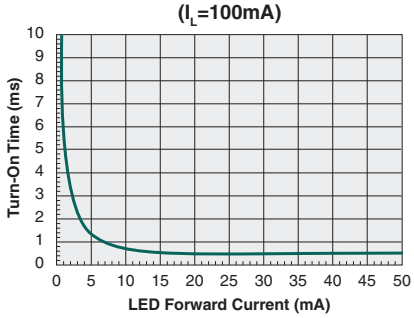
*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.

PERFORMANCE DATA*

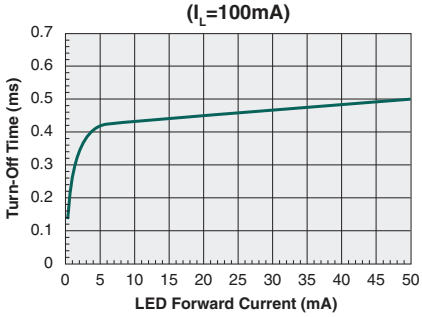
Typical Load Current vs. Load Voltage (I_F=2mA)



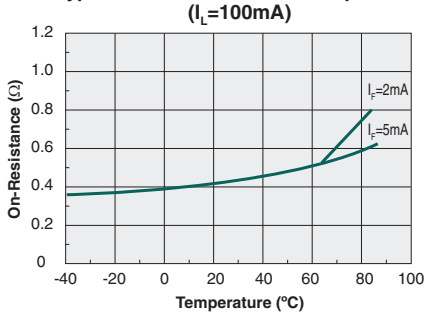
Typical Turn-On Time vs. LED Forward Current (I_L=100mA)



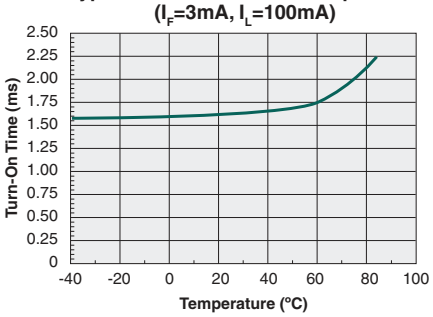
Typical Turn-Off Time vs. LED Forward Current (I_L=100mA)



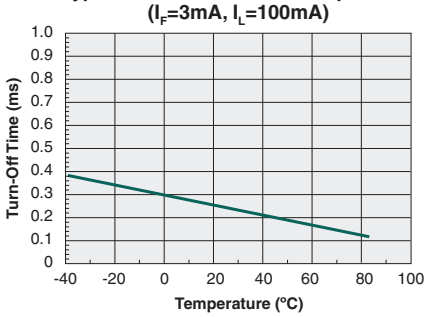
Typical On-Resistance vs. Temperature (I_L=100mA)



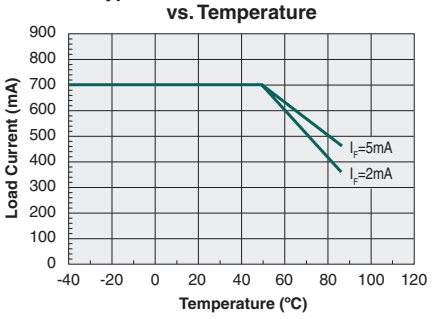
Typical Turn-On Time vs. Temperature (I_F=3mA, I_L=100mA)



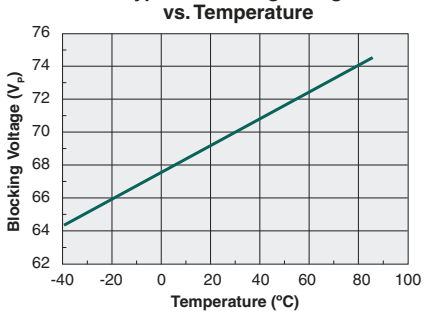
Typical Turn-Off Time vs. Temperature (I_F=3mA, I_L=100mA)



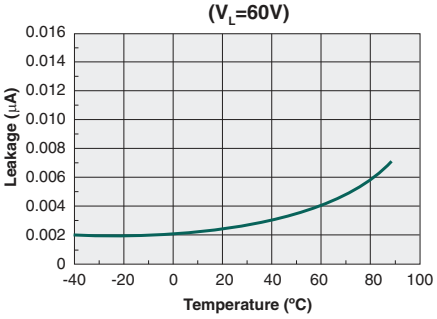
Typical Maximum Load Current vs. Temperature



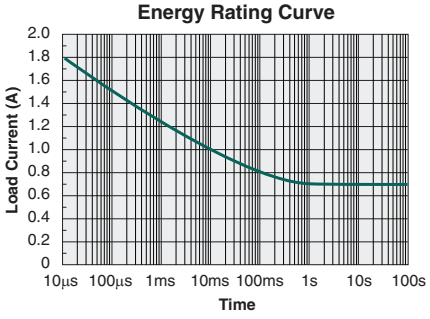
Typical Blocking Voltage vs. Temperature



Typical Leakage vs. Temperature Measured Across Pins 3&4 (V_L=60V)



Energy Rating Curve



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

Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. 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
CPC1002N	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.

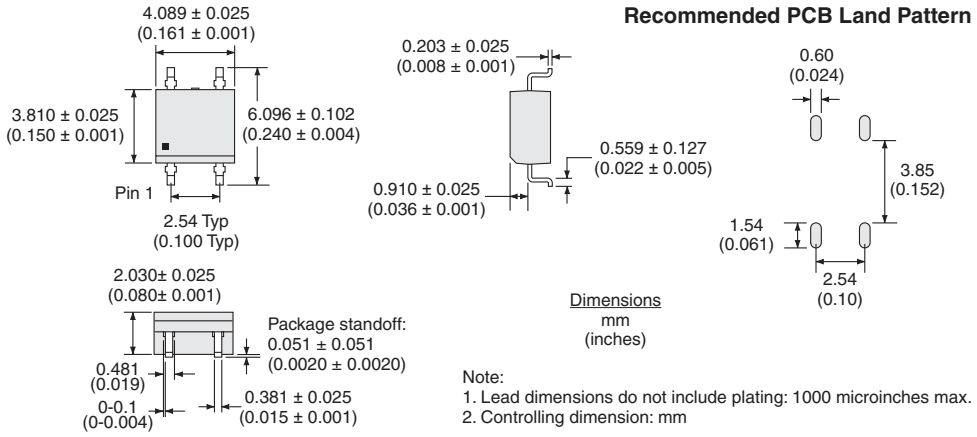
Device	Classification Temperature (T_c)	Dwell Time (t_p)	Max Reflow Cycles
CPC1002N	260°C	30 seconds	3

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.

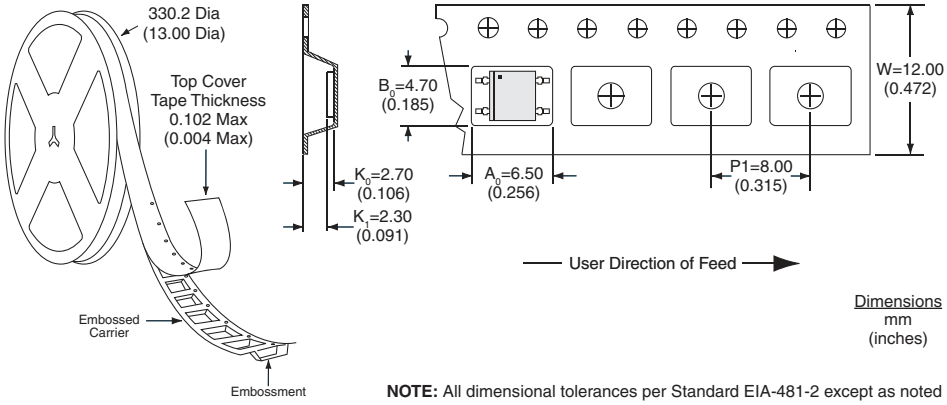
MECHANICAL DIMENSIONS

CPC1002N



Note:
1. Lead dimensions do not include plating: 1000 microinches max.
2. Controlling dimension: mm

CPC1002NTR Tape & Reel



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

For additional information please visit our website at: https://www.ixysic.com

IXYS
A Littelfuse Technology

Specification: DS-CPC1002N-R08

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