

Parameter	Ratings	Units
Load Voltage	100	V _P
Load Current	150	mA _{rms} / mA _{DC}
On-Resistance (max)	8	Ω
Output Leakage, Off-State	20	nA

Features

- Extremely Low Output Leakage: 20nA
- 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

- Instrumentation
- Multiplexers
- Data Acquisition
- Electronic Switching
- I/O Subsystems
- Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Security Systems
- Aerospace
- Industrial Controls

Description

CPC1009N is a miniature low voltage, low on-resistance, low off-state leakage, normally-open (1-Form-A) solid state relay in a 4-pin SOP package.

The MOSFET switches and photovoltaic die use IXYS Integrated Circuits' patented OptoMOS[®] architecture to provide 1500 V_{rms} of input to output isolation. The optically coupled output is controlled by a highly efficient infrared LED.

The CPC1009N uses IXYS Integrated Circuits' state of the art double-molded vertical construction to produce one of the world's smallest 4-pin relays, which offers board space savings of 20% over the competitor's larger 4-pin SOP relay.

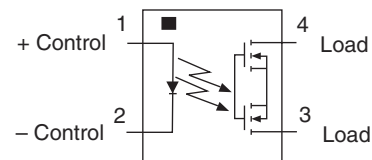
Approvals

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

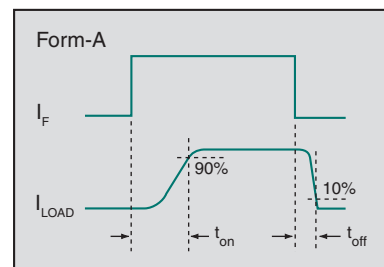
Ordering Information

Part #	Description
CPC1009N	4-Pin SOP (100/tube)
CPC1009NTR	4-Pin SOP (2000/reel)

Pin Configuration



Switching Characteristics of Normally-Open Devices



Absolute Maximum Ratings @ 25°C

Parameter	Ratings	Units
Blocking Voltage	100	V _p
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation ¹	70	mW
Total PowerDissipation 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 (Unless Otherwise Noted)

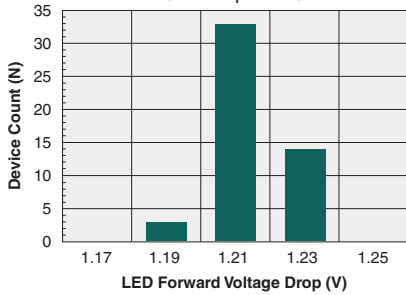
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics						
Load Current						
Continuous ¹	-	I _L	-	-	150	mA _{rms} / mA _{DC}
Peak	t=10ms	I _{LPK}	-	-	±350	mA _p
On-Resistance ²	I _L =150mA	R _{ON}	-	5	8	Ω
Off-State Leakage Current	V _L =100V _p , T=115°C	I _{LEAK}	-	-	20	nA
Switching Speeds						
Turn-On	I _F =5mA, V _L =10V	t _{on}	-	-	2	ms
Turn-Off		t _{off}	-	-	0.5	
Output Capacitance	I _F =0mA, V _L =50V, f=1MHz	C _{OUT}	-	6	-	pF
Input Characteristics						
Input Control Current to Activate	I _L =150mA	I _F	-	0.87	2	mA
Input Control Current to Deactivate	-	I _F	0.3	0.86	-	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} =0V, f=1MHz	C _{IO}	-	1	-	pF

¹ Load current derates linearly from 150mA @ 25°C to 120mA @ 85°C.

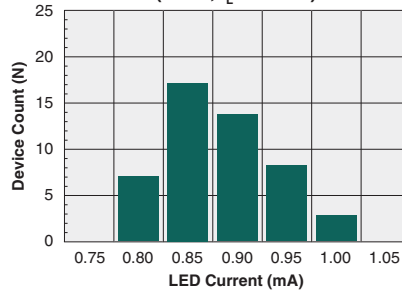
² Measurement taken within 1 second of on-time.

PERFORMANCE DATA*

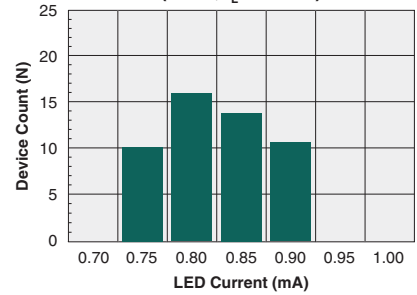
Typical LED Forward Voltage Drop
(N=50, $I_F=5\text{mA}$)



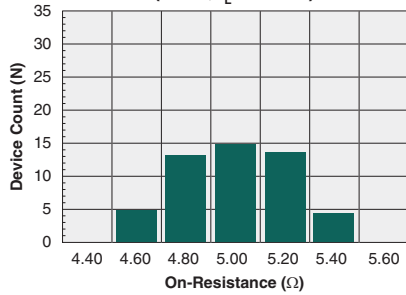
Typical I_F for Switch Operation
(N=50, $I_L=100\text{mA}$)



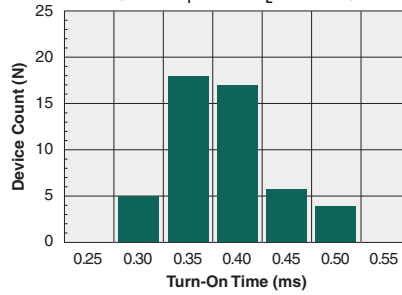
Typical I_F for Switch Dropout
(N=50, $I_L=100\text{mA}$)



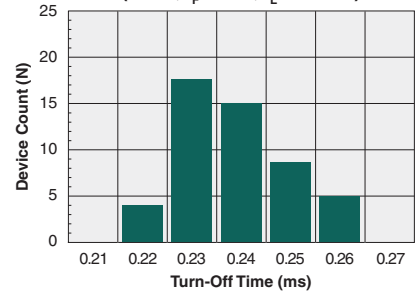
Typical On-Resistance Distribution
(N=50, $I_L=150\text{mA}$)



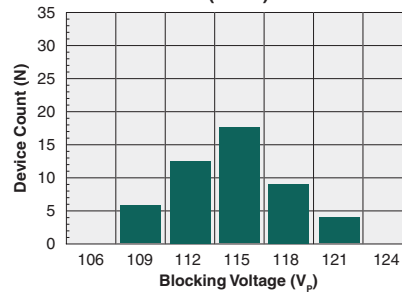
Typical Turn-On Time
(N=50, $I_F=5\text{mA}$, $I_L=150\text{mA}$)



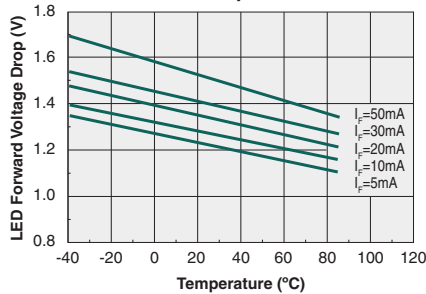
Typical Turn-Off Time
(N=50, $I_F=5\text{mA}$, $I_L=150\text{mA}$)



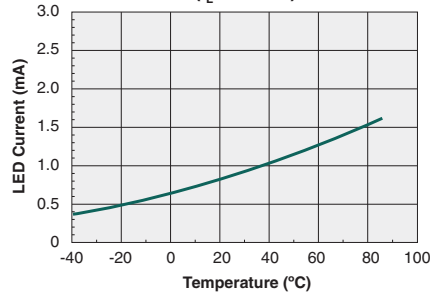
Typical Blocking Voltage Distribution
(N=50)



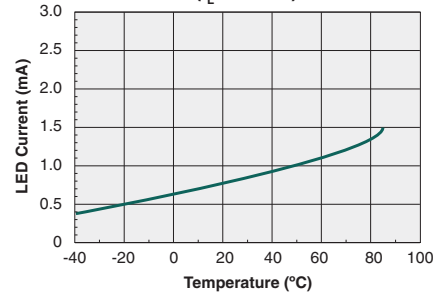
Typical LED Forward Voltage Drop vs. Temperature



Typical I_F for Switch Operation vs. Temperature
($I_L=100\text{mA}$)



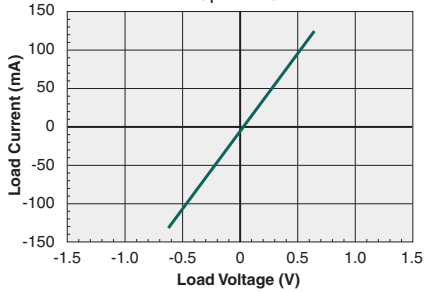
Typical I_F for Switch Dropout vs. Temperature
($I_L=100\text{mA}$)



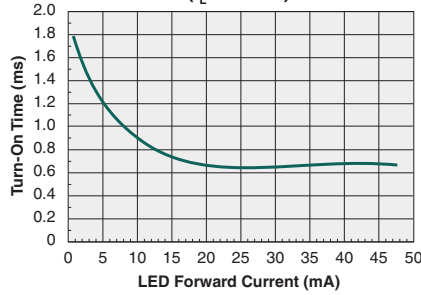
*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

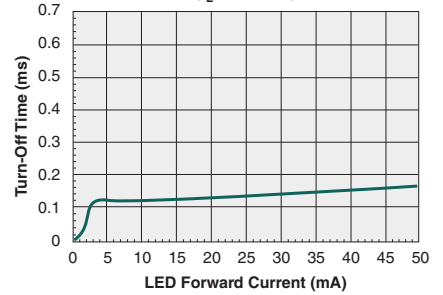
Typical Load Current vs. Load Voltage
($I_F=5mA$)



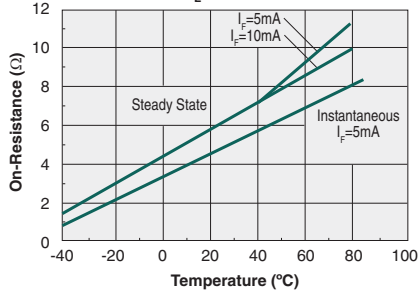
Typical Turn-On Time vs. LED Forward Current
($I_L=120mA$)



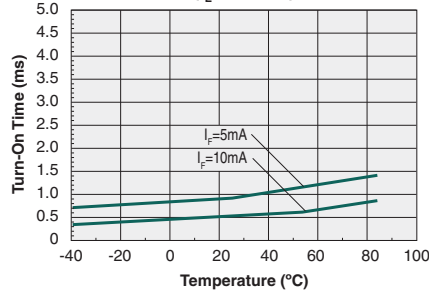
Typical Turn-Off Time vs. LED Forward Current
($I_L=120mA$)



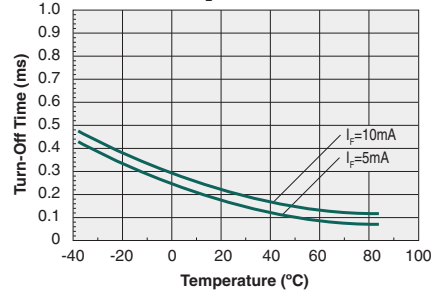
Typical On-Resistance vs. Temperature
($I_L=150mA$)



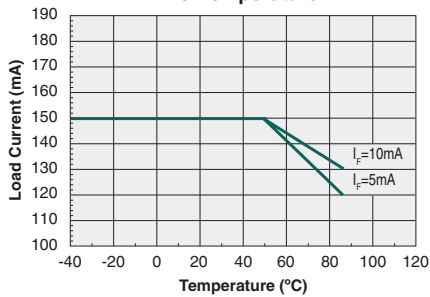
Typical Turn-On Time vs. Temperature
($I_L=100mA$)



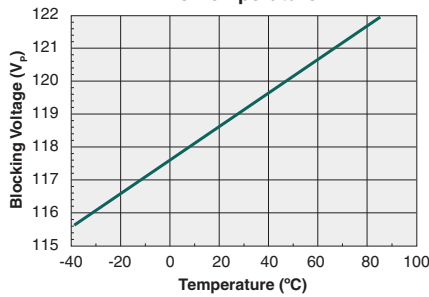
Typical Turn-Off Time vs. Temperature
($I_L=100mA$)



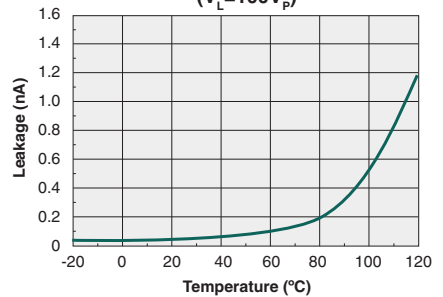
Typical Maximum Load Current vs. Temperature



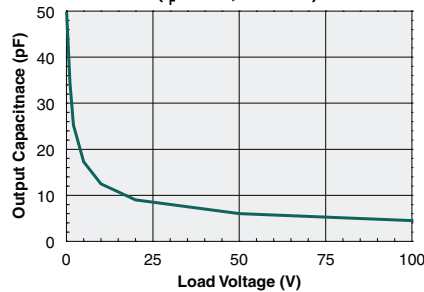
Typical Blocking Voltage vs. Temperature



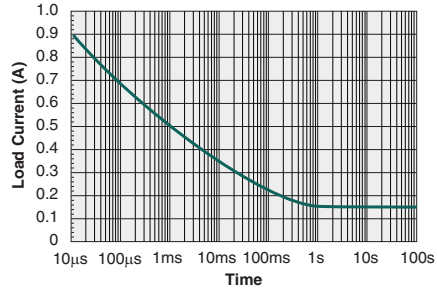
Typical Leakage vs. Temperature
Measured Across Pins 3&4
($V_L=100V_p$)



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 25°C.
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**.

Device	Moisture Sensitivity Level (MSL) Classification
CPC1009N	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 ($T_C - 5$)°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.

Device	Classification Temperature (T_C)	Dwell Time (t_p)	Max Reflow Cycles
CPC1009N	260°C	30 seconds	3

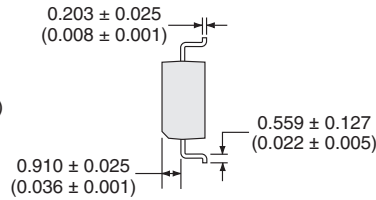
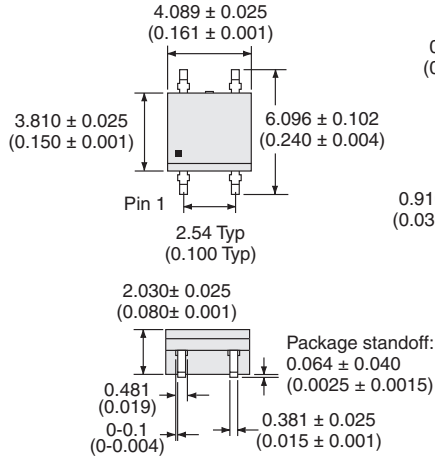
Board Wash

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 flux or solvents that are Chlorine- or Fluorine-based.

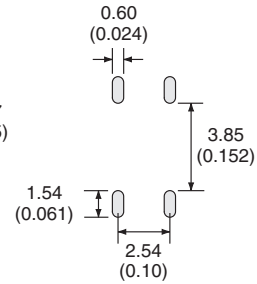


MECHANICAL DIMENSIONS

CPC1009N



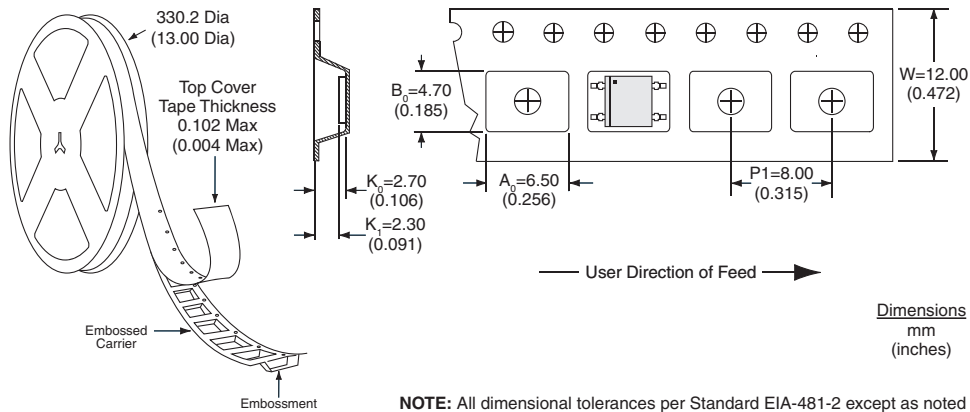
Recommended PCB Land Pattern



Dimensions
mm
(inches)

Note:
1. Lead dimensions do not include plating: 1000 microinches max.

CPC1009NTR Tape & Reel



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

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