



# CPC1106N 60V, 75mA<sub>rms</sub>/mA<sub>DC</sub> Single-Pole Normally Closed Relay

Parameter	Rating	Units
Blocking Voltage	60	V <sub>P</sub>
Load Current	75	mA <sub>rms</sub> / mA <sub>DC</sub>
On-Resistance (max)	10	Ω
LED Current to Operate	0.5	mA

### **Features**

- Designed for EN50130-4 Compliant Security Systems
- Only 0.5mA of LED Current Required to Operate
- 1500V<sub>rms</sub> Input/Output Isolation
- Small 4-Pin SOP Package
- · High Reliability
- 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 CPC1106N is a 60V, normally-closed, single-pole (1-Form-B) 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 relay outputs are constructed with efficient MOSFET switches and photovoltaic die that use IXYS Integrated Circuits' patented OptoMOS architecture while the input, a highly efficient infrared LED, provides the optically coupled control.

The CPC1106N, using IXYS Integrated Circuits' state of the art double-molded vertical construction packaging to produce one of the world's smallest relays, offers board space savings of at least 20% over the competitor's larger 4-pin SOP relay.

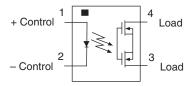
## **Approvals**

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

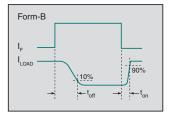
# **Ordering Information**

	Part #	Description
1	CPC1106N	4-Pin SOP (100/tube)
	CPC1106NTR	4-Pin SOP (2000/reel)

# **Pin Configuration**



#### Switching Characteristics of Normally-Closed Devices







## Absolute Maximum Ratings @ 25°C

Parameter	Ratings	Units		
Blocking Voltage	60	V <sub>P</sub>		
Reverse Input Voltage	5	V		
Input Control Current	50	mA		
Peak (10ms)	1	A		
Input Power Disipation <sup>1</sup>	70	mW		
Total Power Dissipation <sup>2</sup>	400	mW		
Isolation Voltage, Input to Output	1500	V <sub>rms</sub>		
ESD Rating, Human Body Model	8	kV		
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 ouptput power linearly 3.33 mW / °C.

# Electrical Characteristics @ 25°C

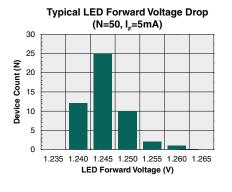
Parameter	Conditions	Symbol	Min	Тур	Max	Units
Output Characteristics					1	
Blocking Voltage	I <sub>L</sub> =1μA	V <sub>DRM</sub>	60	-	-	V
Load Current						
Continuous	I <sub>F</sub> =0mA	ΙL	-	-	75	mA <sub>rms</sub> / mA <sub>DC</sub>
Peak	t=10ms	I <sub>LPK</sub>	-	-	±350	mA <sub>P</sub>
On-Resistance <sup>1</sup>	I <sub>F</sub> =0mA, I <sub>L</sub> =75mA	R <sub>ON</sub>	-	3.85	10	Ω
Off-State Leakage Current	I <sub>F</sub> =0.5mA, V <sub>L</sub> =60V <sub>P</sub>	I <sub>LEAK</sub>	-	-	1	μΑ
Switching Speeds						
Turn-On	I <sub>F</sub> =2mA, V <sub>L</sub> =10V	t <sub>on</sub>	-	-	10	
Turn-Off		t <sub>off</sub>	-	-	10	ms
Output Capacitance	I <sub>F</sub> =0.5mA, V <sub>L</sub> =50V, f=1MHz	C <sub>OUT</sub>	-	10	-	pF
Input Characteristics	l l			4		
Input Control Current to Activate <sup>2</sup>	-	۱ <sub>F</sub>	-	0.16	0.5	mA
Input Control Current to Deactivate	I <sub>L</sub> =75mA	۱ <sub>F</sub>	0.05	-	-	mA
Input Voltage Drop	I <sub>F</sub> =5mA	V <sub>F</sub>	0.9	1.2	1.5	V
Reverse Input Current	V <sub>R</sub> =5V	I <sub>R</sub>	-	-	10	μΑ
Common Characteristics			L	1	1	
Capacitance, Input to Output	V <sub>IO</sub> =0V, f=1MHz	C <sub>IO</sub>	-	1	-	pF

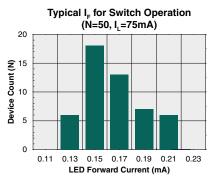
<sup>1</sup> Measurement taken within 1 second of on-time.
<sup>2</sup> For applications requiring high temperature operation (greater than 60°C) a minimum LED drive current of 2mA is recommended.

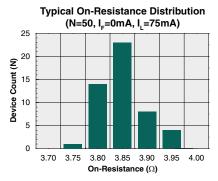


# **CPC1106N**

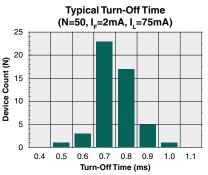
# **PERFORMANCE DATA\***



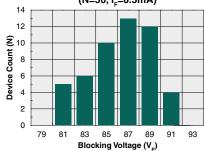




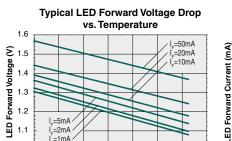
**Typical Turn-On Time** (N=50, I<sub>F</sub>=2mA, I<sub>I</sub>=75mA) 25 20 Device Count (N) 15 10 5 0 0.50 0.53 0.56 0.59 0.62 0.65 0.68 Turn-On Time (ms)



**Typical Blocking Voltage Distribution** (N=50, I\_=0.5mA)



Typical Load Current



Temperature (°C)

**Typical Turn-On Time** 

vs. LED Forward Current

(I,=50mA)

20

LED Forward Current (mA)

10

30

40

lˈ=1mA

1.0

548

546

544

542

540

538

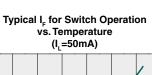
536

534 532

0

Turn-On Time (µs)

-40 -20 0 20 40 60 80 100



0.30

1400

1200

1000

800

600

400

200

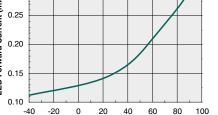
0

0

10

Turn-Off Time (µs)

50

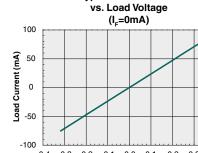


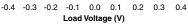
Temperature (°C)

**Typical Turn-Off Time** 

vs. LED Forward Current

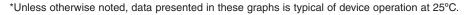
(I,=50mA)





**Typical On-Resistance** vs. Temperature (I\_=0mA, I\_=50mA) 5.0 (ු 4.5 4.0 3.5 3.0 -40 -20 0 20 40 60 80 100

Temperature (°C)



20

LED Forward Current (mA)

30

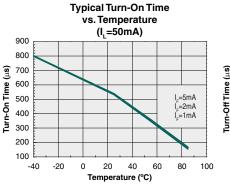
50

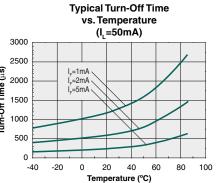
40

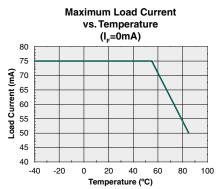


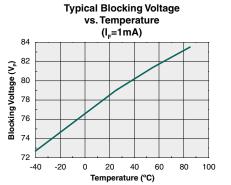
# **CPC1106N**

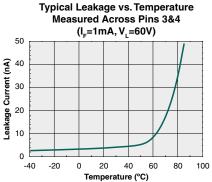
**PERFORMANCE DATA\*** 



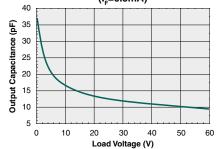




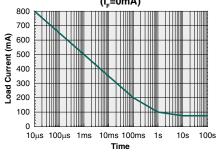




Output Capacitance vs. Load Voltage (I<sub>F</sub>=0.5mA)



#### Energy Rating Curve (I<sub>F</sub>=0mA)



\*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 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
CPC1106N	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 <sub>c</sub> )	Dwell Time (t <sub>p</sub> )	Max Reflow Cycles
CPC1106N	260°C	30 seconds	3

#### **Board Wash**

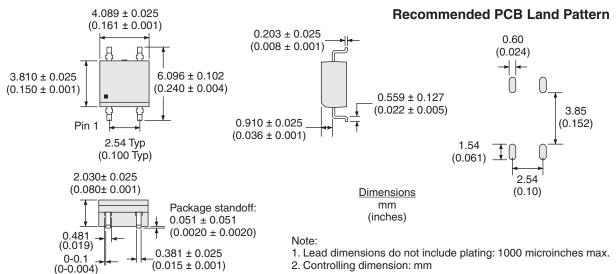
IXYS Integrated Circuits recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include but are not limited to: using a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



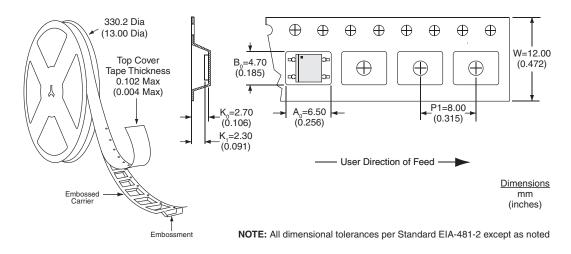


# **Mechanical Dimensions**

### **CPC1106N**



## CPC1106NTR Tape & Reel



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



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