



| Parameter | Rating | Units |
|------------------------|--------|--------------------------------------|
| Blocking Voltage | 60 | V _P |
| Load Current | 400 | mA _{rms} / mA _{DC} |
| Max On-Resistance | 2 | Ω |
| LED Current to Operate | 2 | mA |

Features

- 1500V_{rms} Input/Output Isolation
- Small 4-Pin SOP Package
- High Reliability
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Immune to radiated EM fields
- Wave Solderable
- Tape & Reel Version Available

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
- Aerospace
- Industrial Controls

Description

The CPC1114N is a 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_{rms} of input/output isolation.

Its optically coupled outputs, which use the patented OptoMOS architecture, are controlled by a highly efficient infrared LED.

IXYS Integrated Circuits Division's state of the art double-molded vertical construction packaging makes the CPC1114N one of the world's smallest relays. It offers board space savings of at least 20% over the competitor's larger 4-pin SOP relay.

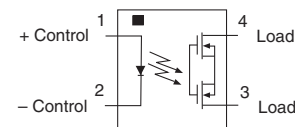
Approvals

- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN/IEC 60950-1 Certified Component: Certificate B 13 12 82667 003

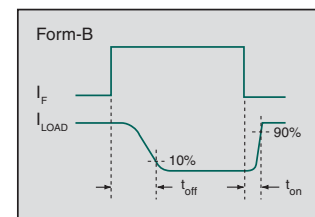
Ordering Information

| Part # | Description |
|------------|-----------------------|
| CPC1114N | 4-Pin SOP (100/tube) |
| CPC1114NTR | 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 _P |
| Reverse Input Voltage | 5 | V |
| Input Control Current | 50 | mA |
| Peak (10ms) | 1 | A |
| Input Power Dissipation | 70 | mW |
| Total Power Dissipation ¹ | 400 | mW |
| Isolation Voltage, Input to Output | 1500 | V _{rms} |
| ESD Rating, Human Body Model | 8 | kV |
| Operational Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +125 | °C |

¹ 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

| Parameter | Conditions | Symbol | Min | Typ | Max | Units |
|--------------------------------------------------------------|-------------------------------------------------------|-------------------|-----|------|------|--------------------------------------|
| Output Characteristics | | | | | | |
| Load Current | | | | | | |
| Continuous ¹ | I _F =0mA | I _L | - | - | 400 | mA _{rms} / mA _{DC} |
| Peak | I _F =0mA, t _≤ 10ms | I _{LPK} | - | - | 1000 | mA |
| On-Resistance ² | I _F =0mA, I _L =400mA | R _{ON} | - | 1.2 | 2 | Ω |
| Off-State Leakage Current | I _F =2mA, V _L =60V _P | I _{LEAK} | - | - | 1 | μA |
| Switching Speeds | | | | | | |
| Turn-On | I _F =5mA, V _L =10V | t _{on} | - | 0.46 | 2 | ms |
| Turn-Off | | t _{off} | - | 2.1 | 5 | |
| Output Capacitance | I _F =2mA, V _L =50V, f=1MHz | C _{OUT} | - | 24 | - | pF |
| | I _F =2mA, V _L =1V, f=1MHz | | - | 114 | - | |
| Input Characteristics | | | | | | |
| Input Control Current to Activate (Output Open) ³ | - | I _F | - | 0.58 | 2 | mA |
| Input Control Current to Deactivate (Output Closed) | I _L =120mA | I _F | 0.1 | 0.56 | - | mA |
| Input Voltage Drop | I _F =5mA | V _F | 0.9 | 1.2 | 1.4 | 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 |

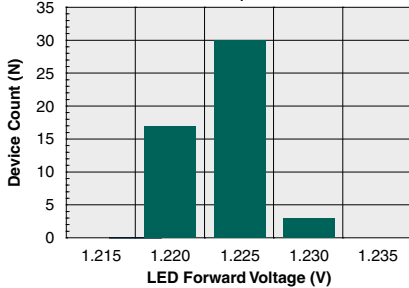
¹ Load current derates linearly from 400mA @ 25°C to 200mA @ 85°C.

² Measurement taken within 1 second of on-time.

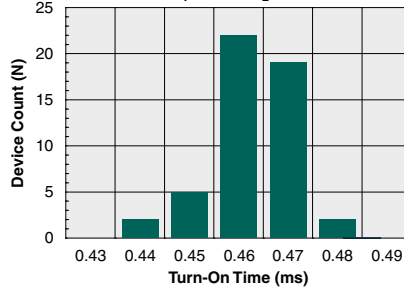
³ For applications requiring high temperature operation (greater than 60°C) a minimum LED drive current of 4mA is recommended.

PERFORMANCE DATA @25°C (Unless Otherwise Noted)*

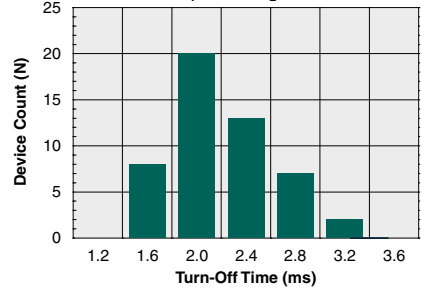
Typical LED Forward Voltage Drop
(N=50, I_F=5mA)



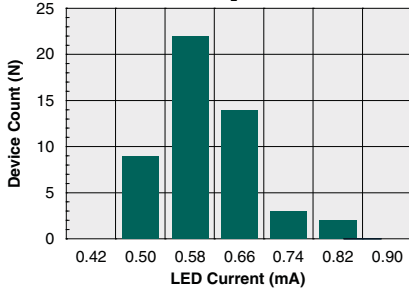
Typical Turn-On Time
(N=50, I_F=5mA, I_L=1000mA)



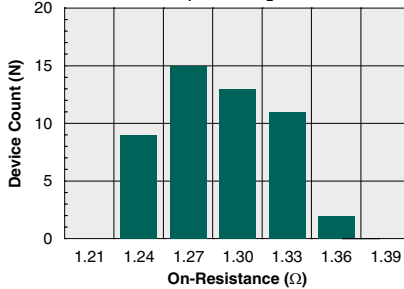
Typical Turn-Off Time
(N=50, I_F=5mA, I_L=1000mA)



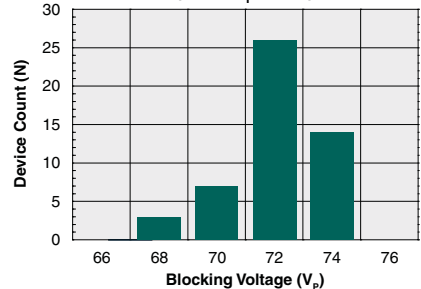
Typical I_F for Switch Operation
(N=50, I_L=400mA)



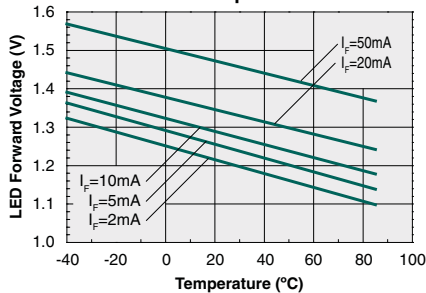
Typical On-Resistance Distribution
(N=50, I_F=0mA, I_L=400mA)



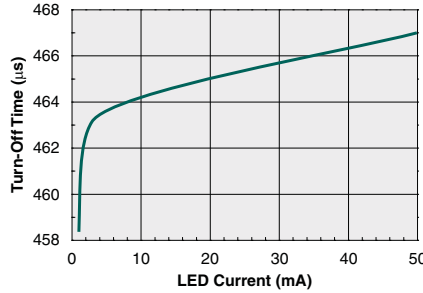
Typical Blocking Voltage Distribution
(N=50, I_F=2mA)



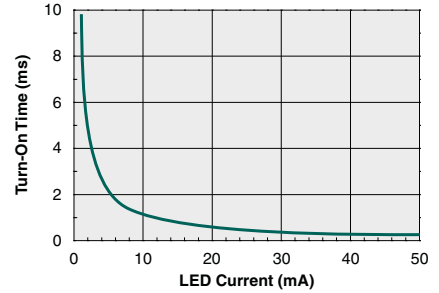
Typical LED Forward Voltage Drop vs. Temperature



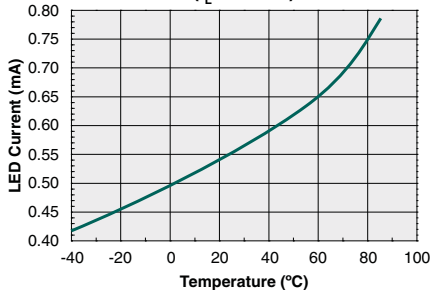
Typical Turn-On Time vs. LED Forward Current



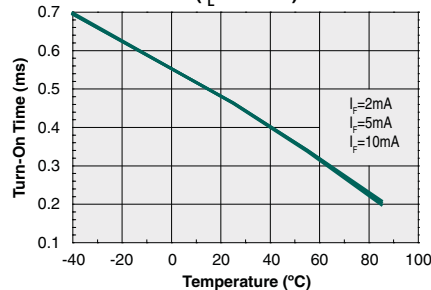
Typical Turn-Off Time vs. LED Forward Current



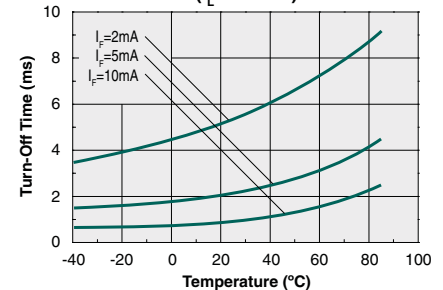
Typical I_F for Switch Operation
(I_L=200mA)



Typical Turn-On Time vs. Temperature
(I_L=200mA)

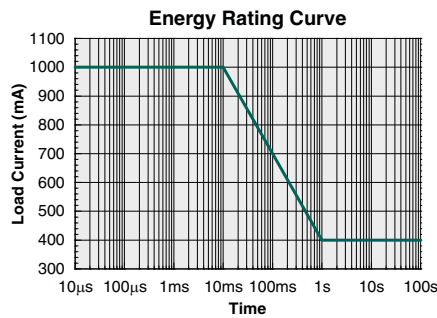
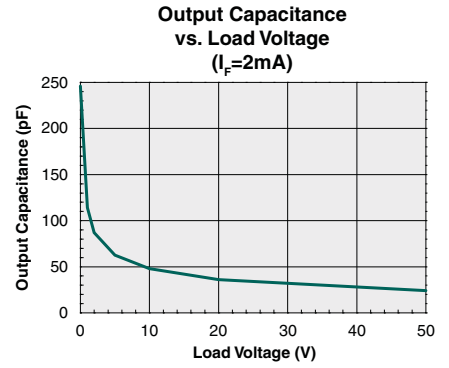
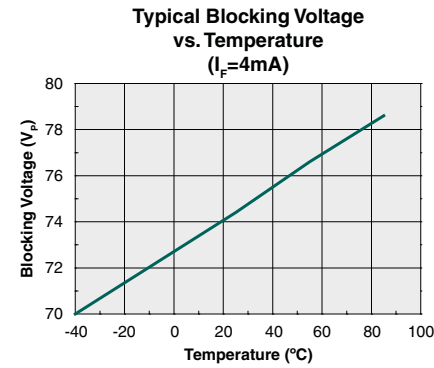
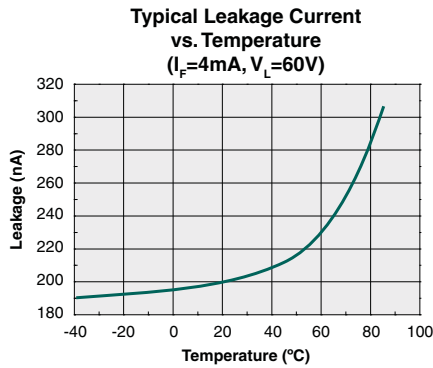
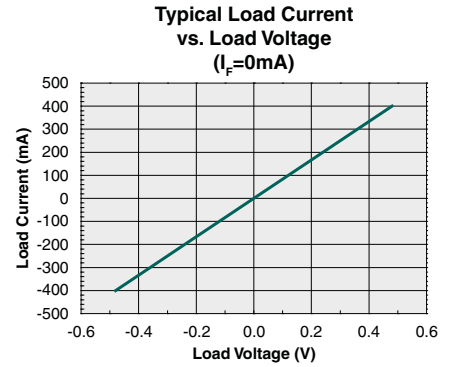
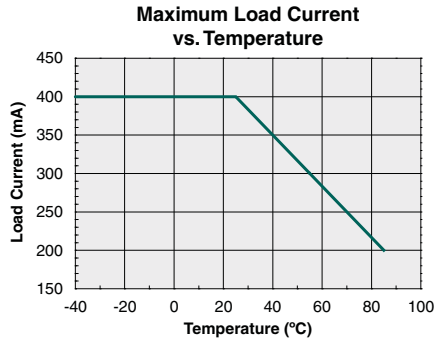
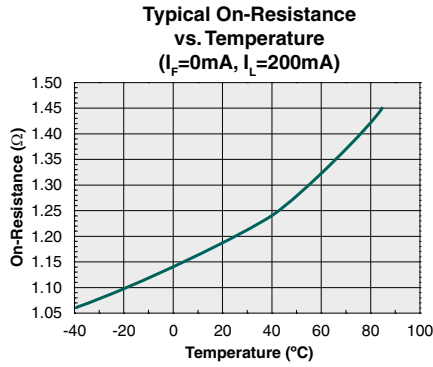


Typical Turn-Off Time vs. Temperature
(I_L=200mA)



*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 @25°C (Unless Otherwise Noted)*



*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.

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 |
|----------|-----------------------------------------|
| CPC1114N | MSL 3 |

ESD Sensitivity



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

Soldering 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 | Maximum Reflow Cycles |
|----------|----------------------------|-----------------------|
| CPC1114N | 260°C for 30 seconds | 3 |

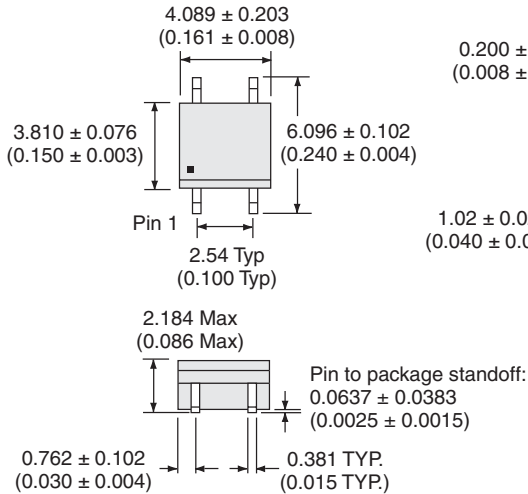
Board Wash

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.

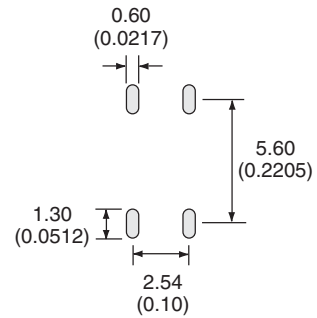


Mechanical Dimensions

CPC1114N

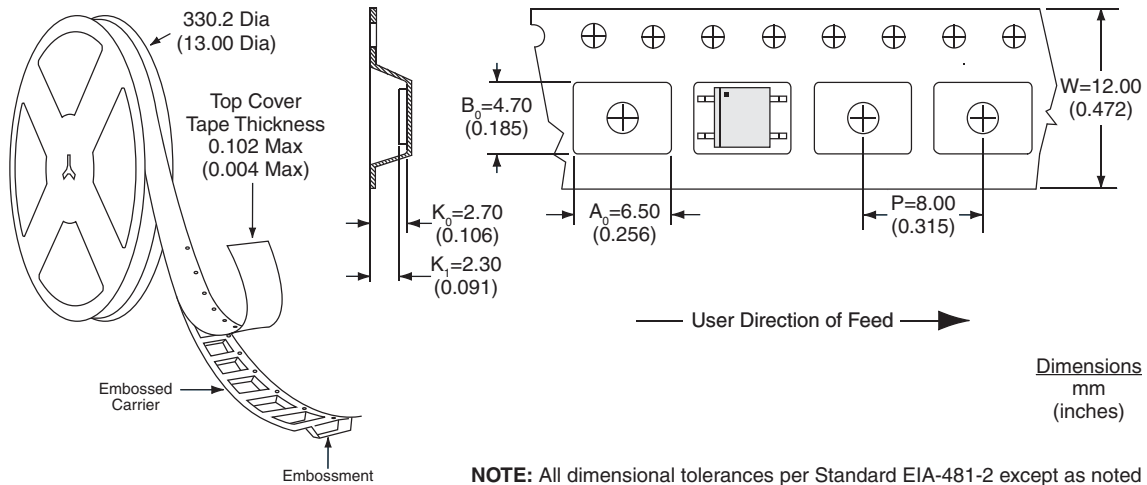


Recommended PCB Land Pattern



Dimensions
mm
(inches)

CPC1114NTR Tape & Reel



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

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