



| Parameter              | Rating | Units          |
|------------------------|--------|----------------|
| Blocking Voltage       | 60     | V <sub>P</sub> |
| Load Current           | 700    | mA             |
| Max On-resistance      | 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
- TTL/CMOS Compatible input
- 100% Solid State
- High Reliability
- Arc-Free With No Snubbing Circuits
- 1500V<sub>rms</sub> Input/Output Isolation
- No EMI/RFI Generation
- Immune to radiated EM fields
- SMD Pick & Place, 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 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<sub>rms</sub> of input to output isolation. The super-efficient MOSFET switches and photovoltaic die use Clare's patented OptoMOS architecture. The optically coupled output is controlled by the input's highly efficient GaAlAs infrared LED.

The CPC1002N uses Clare's 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.

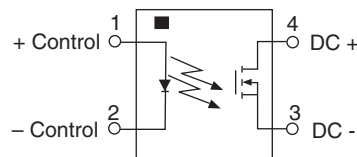
### Approvals

- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1175739
- EN/IEC 60950-1 Certified Component:  
TUV Certificate B 09 07 49410 004

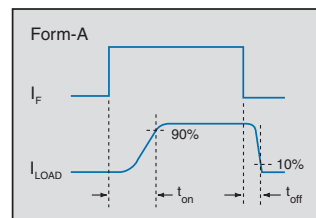
### Ordering Information

| 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 @ 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 Dissipation              | 70          | mW               |
| Total Power Dissipation <sup>1</sup> | 400         | mW               |
| Isolation Voltage Input to Output    | 1500        | V <sub>rms</sub> |
| Operational Temperature              | -40 to +85  | °C               |
| Storage Temperature                  | -40 to +125 | °C               |

<sup>1</sup> 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.*

## Electrical Characteristics @ 25°C

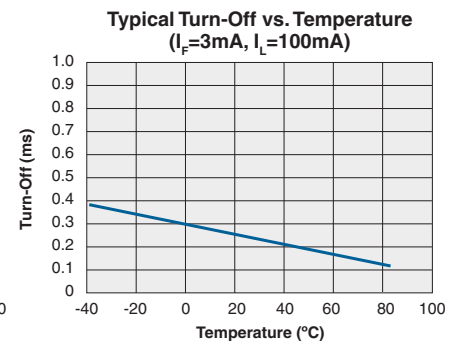
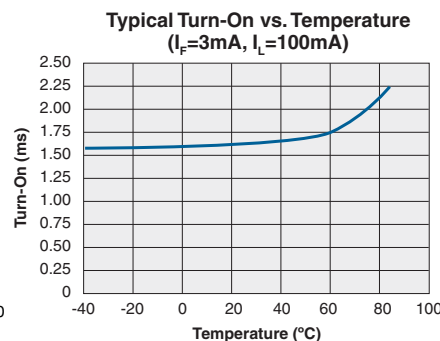
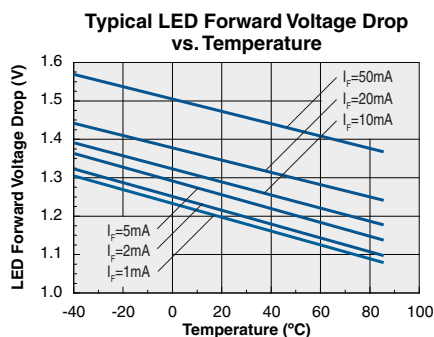
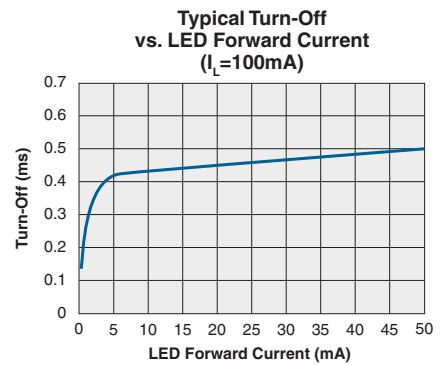
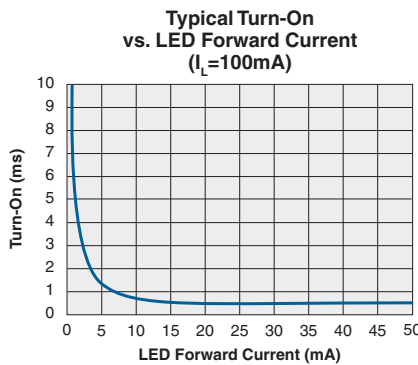
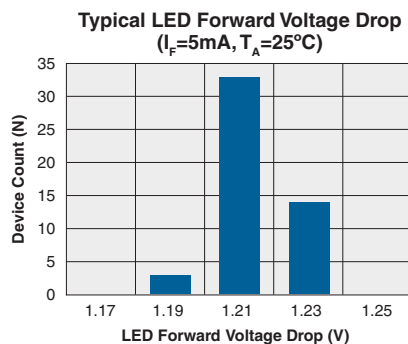
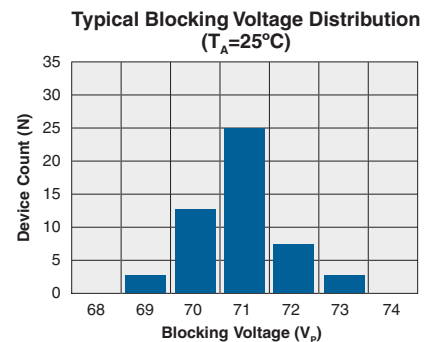
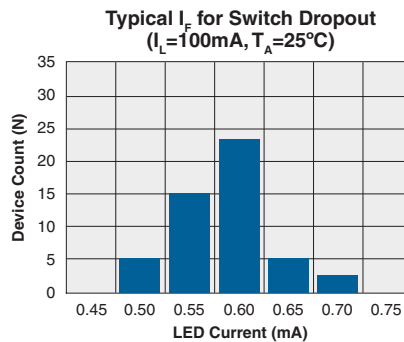
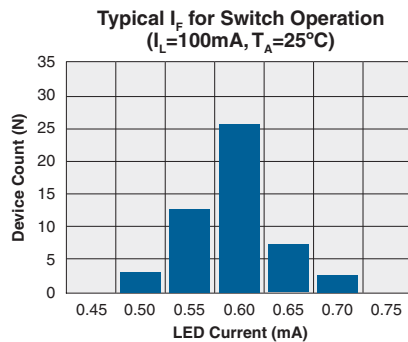
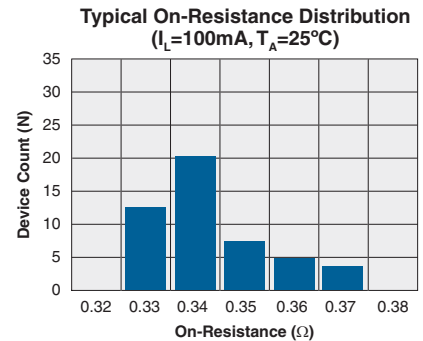
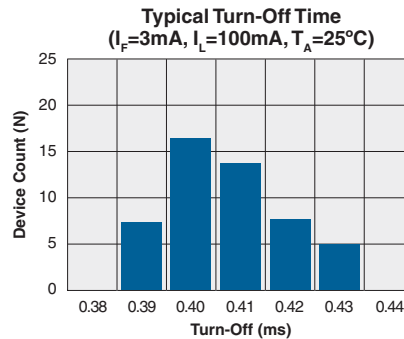
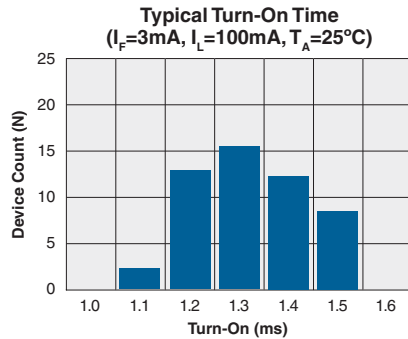
| Parameter                             | Conditions                               | Symbol            | Min | Typ  | Max  | Units |
|---------------------------------------|------------------------------------------|-------------------|-----|------|------|-------|
| <b>Output Characteristics</b>         |                                          |                   |     |      |      |       |
| Load Current, Continuous <sup>1</sup> | I <sub>F</sub> =2mA                      | I <sub>L</sub>    | -   | -    | 700  | mA    |
| Peak Load Current                     | t=10ms                                   | I <sub>LPK</sub>  | -   | -    | 1    | A     |
| On-Resistance <sup>2</sup>            | I <sub>L</sub> =100mA                    | R <sub>ON</sub>   | -   | 0.35 | 0.55 | Ω     |
| Off-State Leakage Current             | V <sub>L</sub> =60V <sub>P</sub>         | I <sub>LEAK</sub> | -   | -    | 1    | μA    |
| Switching Speeds                      | I <sub>F</sub> =3mA, V <sub>L</sub> =10V | t <sub>on</sub>   | -   | 1.3  | 5    | ms    |
| Turn-On                               |                                          |                   |     |      |      |       |
| Turn-Off                              |                                          | t <sub>off</sub>  | -   | 0.41 | 2    |       |
| Output Capacitance                    | V <sub>L</sub> =50V; f=1MHz              | C <sub>OUT</sub>  | -   | 25   | -    | pF    |
| <b>Input Characteristics</b>          |                                          |                   |     |      |      |       |
| Input Control Current <sup>3</sup>    | I <sub>L</sub> =100mA                    | I <sub>F</sub>    | -   | 0.55 | 2    | mA    |
| Input Dropout Current                 | -                                        | I <sub>F</sub>    | 0.3 | -    | -    | mA    |
| Input Voltage Drop                    | I <sub>F</sub> =5mA                      | V <sub>F</sub>    | 0.9 | 1.2  | 1.4  | V     |
| Reverse Input Current                 | V <sub>R</sub> =5V                       | I <sub>R</sub>    | -   | -    | 10   | μA    |
| <b>Common Characteristics</b>         |                                          |                   |     |      |      |       |
| Capacitance Input to Output           | -                                        | C <sub>I/O</sub>  | -   | 1    | -    | pF    |

<sup>1</sup> Load current derates linearly from 700mA @ 25°C to 420mA @ 80°C.

<sup>2</sup> Measurement taken within 1 second of on-time.

<sup>3</sup> For applications requiring high temperature operation (greater than 60°C) a LED drive current of 3mA is recommended.

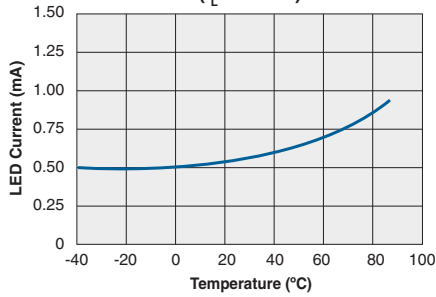
**PERFORMANCE DATA\***



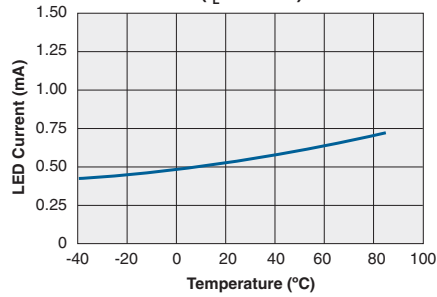
\*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

**PERFORMANCE DATA\***

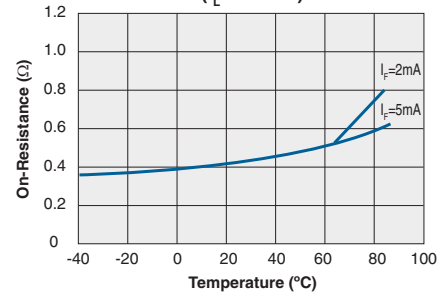
**Typical  $I_F$  for Switch Operation  
vs. Temperature  
( $I_L=100\text{mA}$ )**



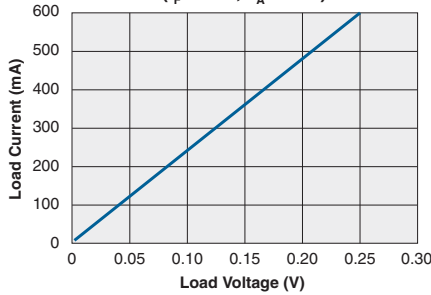
**Typical  $I_F$  for Switch Dropout  
vs. Temperature  
( $I_L=100\text{mA}$ )**



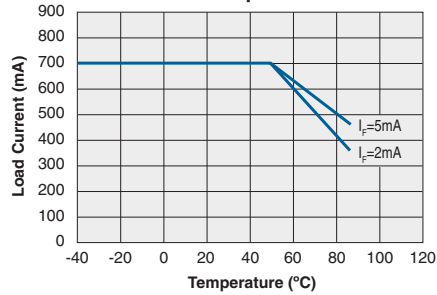
**Typical On-Resistance vs. Temperature  
( $I_L=100\text{mA}$ )**



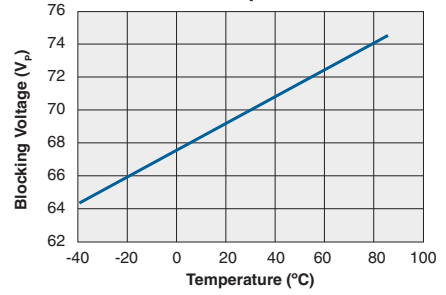
**Typical Load Current vs. Load Voltage  
( $I_F=2\text{mA}$ ,  $T_A=25^\circ\text{C}$ )**



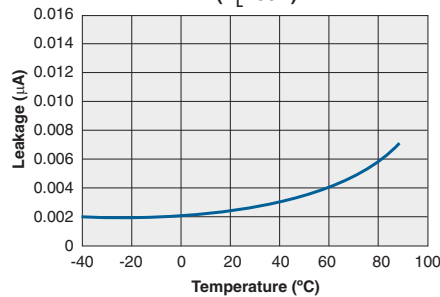
**Typical Maximum Load Current  
vs. Temperature**



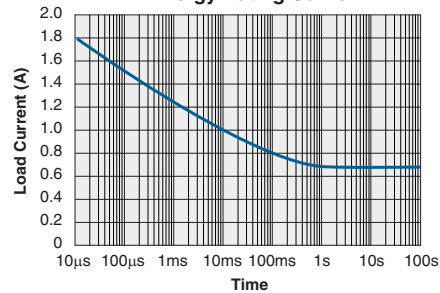
**Typical Blocking Voltage  
vs. Temperature**



**Typical Leakage vs. Temperature  
Measured Across Pins 3&4  
( $V_L=60\text{V}$ )**



**Energy Rating Curve**



\*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. Clare 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 |
|----------|-----------------------------------------|
| CPC1002N | MSL 3                                   |

### ESD Sensitivity



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

### Reflow 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 |
|----------|----------------------------|
| CPC1002N | 260°C for 30 seconds       |

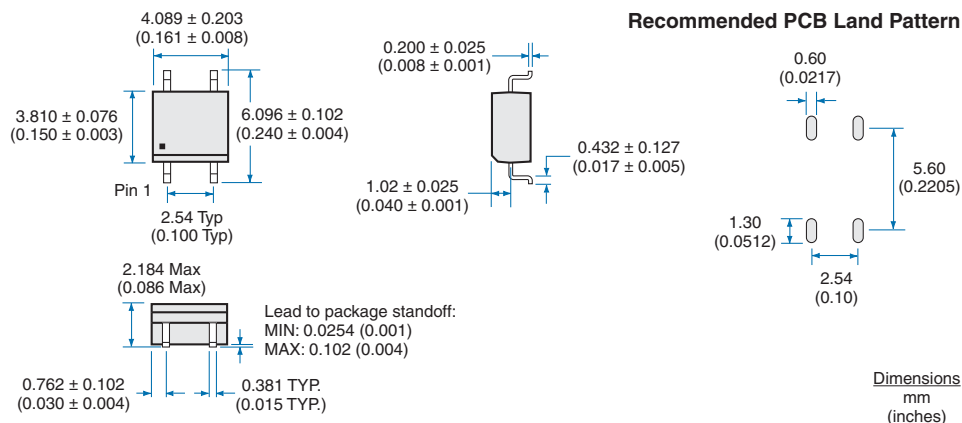
### Board Wash

Clare recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since Clare 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.

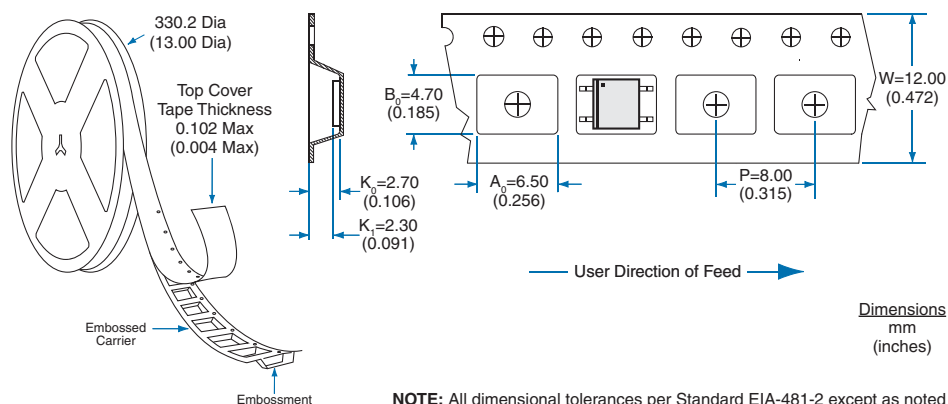


## MECHANICAL DIMENSIONS

## CPC1002N



## CPC1002N Tape & Reel



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

**For additional information please visit our website at: [www.clare.com](http://www.clare.com)**

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