CPC1002N
4-Pin SOP OptoMOS® Relay

Parameter	Rating	Units
Blocking Voltage	60	V_P
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
- $1500V_{rms}$ 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 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/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.

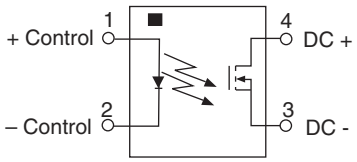
Approvals

- UL Recognized Component: File # E76270
- EN/IEC 60950-1 Compliant
- CSA Certified Component: Certificate # 1172007

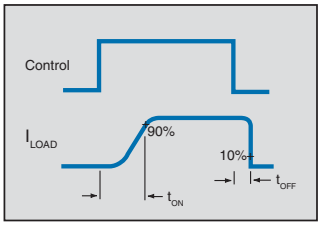
Ordering Information

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

Pin Configuration



Switching Characteristics of Normally Open (Form A) Devices



Absolute Maximum Ratings

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}
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C

[1] Derate Linearly 3.33 mw / °C

Electrical absolute maximum ratings are at 25°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.

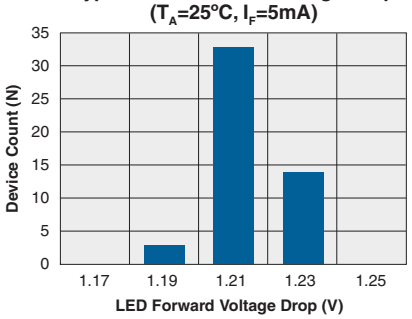
Electrical Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics @ 25°C						
Load Current, Continuous [1]	I_F=2mA	I_L	-	-	700	mA
Peak Load Current	t=10ms	I_{LPK}	-	-	1	A
On-Resistance [2]	I_L=100mA	R_{ON}	-	0.35	0.55	Ω
Off-State Leakage Current	V_L=60V	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	V_L=50V; f=1MHz	C_{OUT}	-	25	-	pF
Input Characteristics @ 25°C						
Input Control Current [3]	I_L=100mA	I_F	-	0.55	2	mA
Input Dropout Current	-	I_F	0.3	-	-	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 @ 25°C						
Capacitance Input to Output	-	$C_{I/O}$	-	1	-	pF

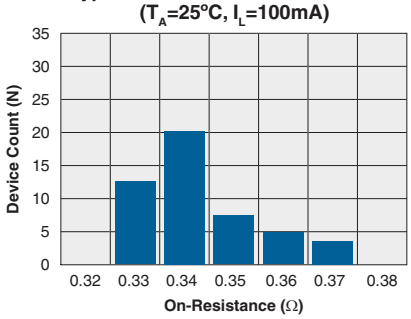
[1] Load current derates linearly from 700mA @ 25ºC to 420mA @80ºC.
[2] Measurement taken within 1 second of on time.
[3] For applications requiring high temperature operation (greater than 60ºC) an LED drive current of 3mA is recommended.

PERFORMANCE DATA*

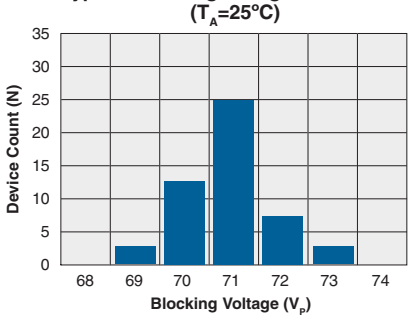
CPC1002N
Typical LED Forward Voltage Drop
(T_A=25°C, I_F=5mA)



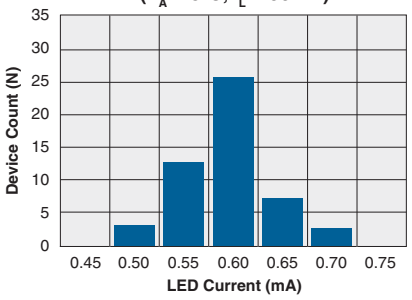
CPC1002N
Typical On-Resistance Distribution
(T_A=25°C, I_L=100mA)



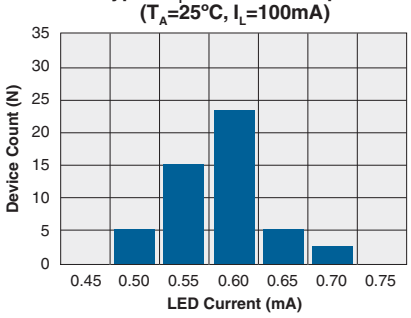
CPC1002N
Typical Blocking Voltage Distribution
(T_A=25°C)



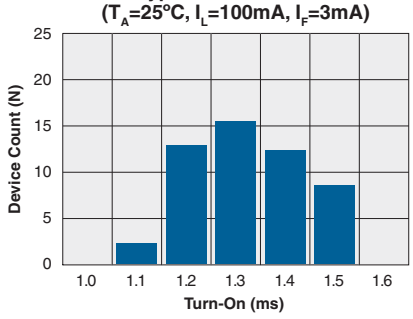
CPC1002N
Typical I_F for Switch Operation
(T_A=25°C, I_L=100mA)



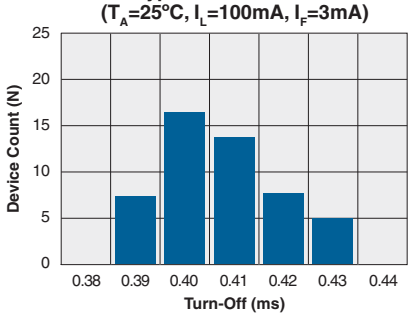
CPC1002N
Typical I_F for Switch Dropout
(T_A=25°C, I_L=100mA)



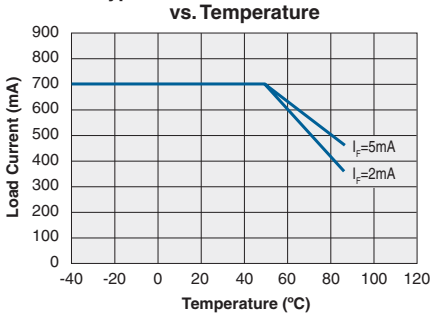
CPC1002N
Typical Turn-On Time
(T_A=25°C, I_L=100mA, I_F=3mA)



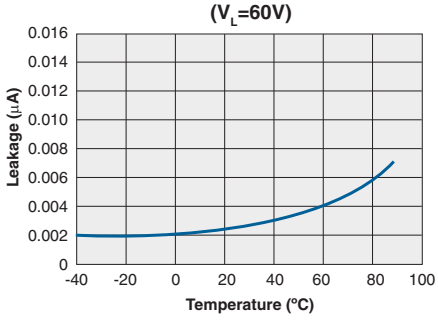
CPC1002N
Typical Turn-Off Time
(T_A=25°C, I_L=100mA, I_F=3mA)



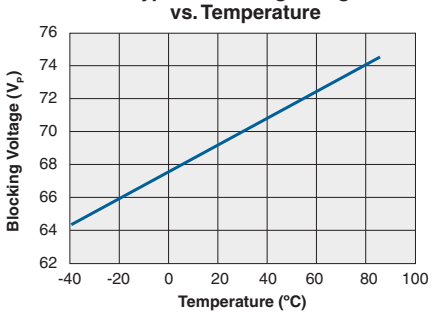
CPC1002N
Typical Maximum Load Current
vs. Temperature



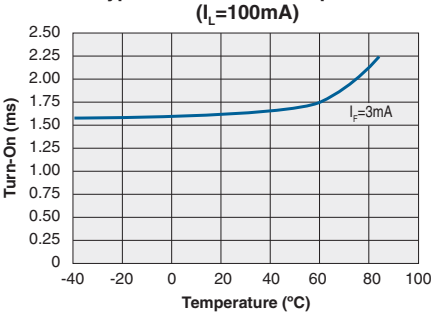
CPC1002N
Typical Leakage vs. Temperature
Measured Across Pins 3 & 4
(V_L=60V)



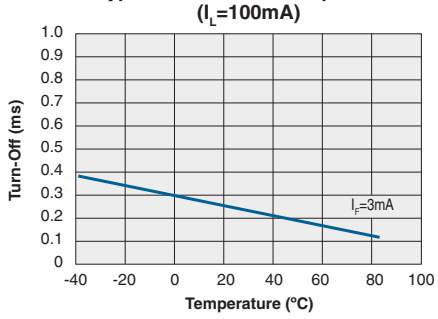
CPC1002N
Typical Blocking Voltage
vs. Temperature



CPC1002N
Typical Turn-On vs. Temperature
(I_L=100mA)



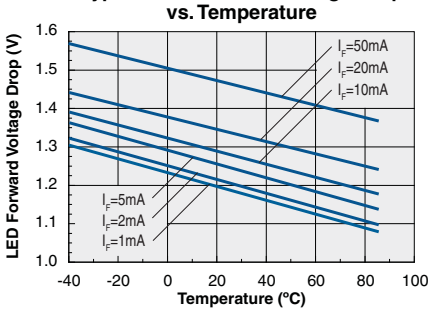
CPC1002N
Typical Turn-Off vs. Temperature
(I_L=100mA)



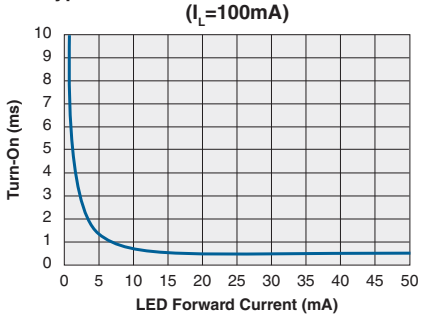
*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

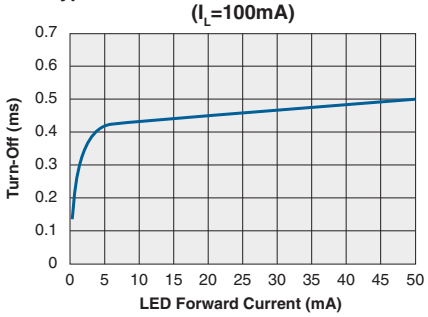
CPC1002N
Typical LED Forward Voltage Drop vs. Temperature



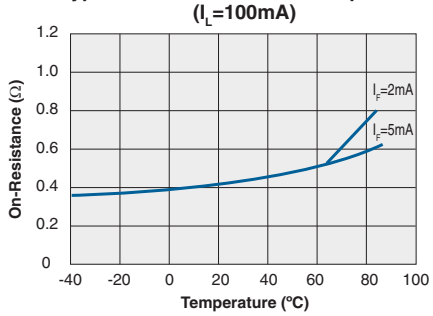
CPC1002N
Typical Turn-On vs. LED Forward Current (I_L=100mA)



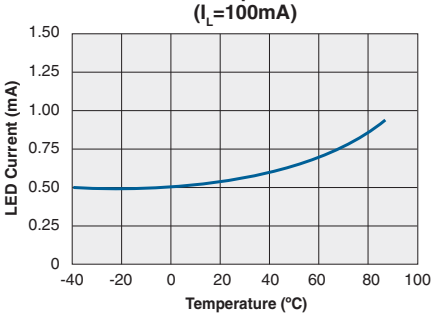
CPC1002N
Typical Turn-Off vs. LED Forward Current (I_L=100mA)



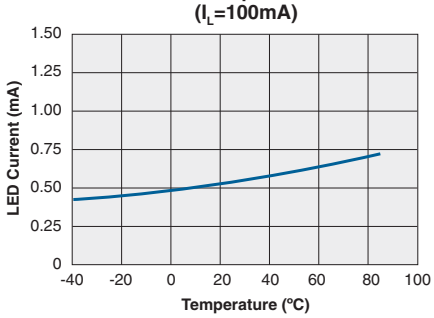
CPC1002N
Typical On-Resistance vs. Temperature (I_L=100mA)



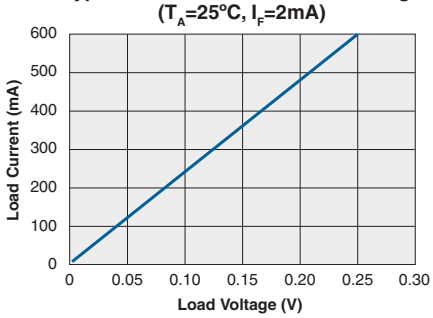
CPC1002N
Typical I_F for Switch Operation vs. Temperature (I_L=100mA)



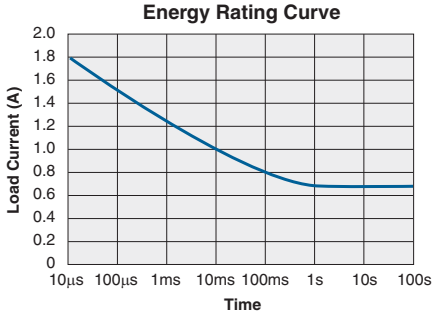
CPC1002N
Typical I_F for Switch Dropout vs. Temperature (I_L=100mA)



CPC1002N
Typical Load Current vs. Load Voltage (T_A=25°C, I_F=2mA)



CPC1002N
Energy Rating Curve



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MANUFACTURING INFORMATION

Moisture Sensitivity

Clare has characterized the moisture reflow sensitivity of this package, and has determined that this component must be handled in accordance with IPC/JEDEC standard J-STD-033 moisture sensitivity level (MSL), level 3 classification.

Soldering Reflow Profile

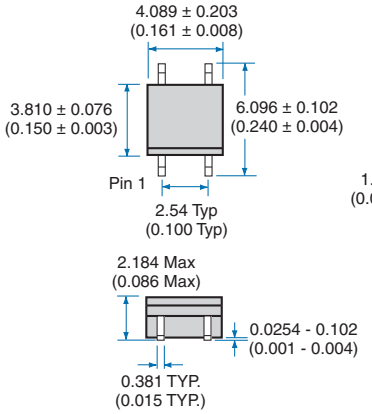
For proper assembly, the component must be processed in accordance with the current revision of IPC/JEDEC standard J-STD-020. Failure to follow the recommended guidelines may cause permanent damage to the device resulting in impaired performance and/or a reduced lifetime expectancy.

Washing

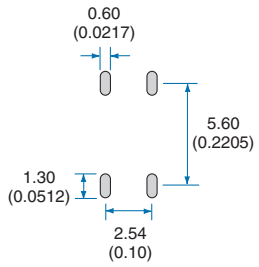
Clare does not recommend ultrasonic cleaning or the use of chlorinated solvents.

MECHANICAL DIMENSIONS

4-Pin SOP Package

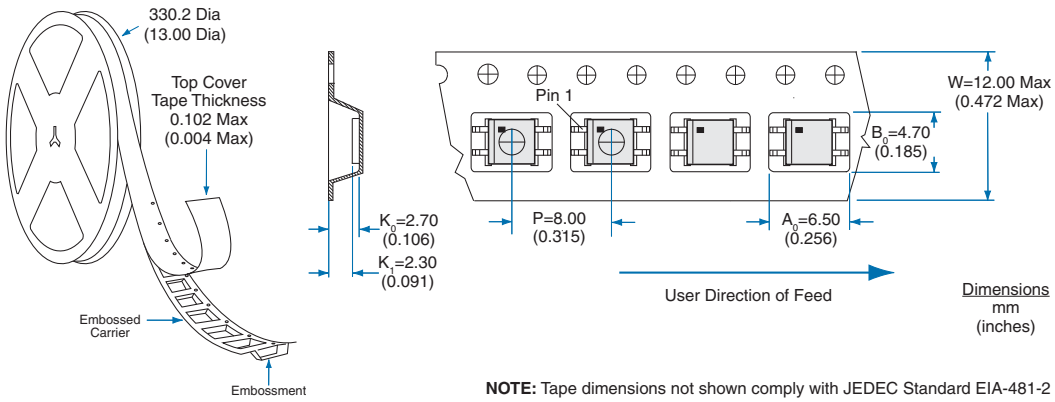


Recommended PCB Land Pattern



Dimensions
mm
(inches)

Tape and Reel Packaging for 4-Pin SOP Package



Dimensions
mm
(inches)

NOTE: Tape dimensions not shown comply with JEDEC Standard EIA-481-2

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

Specification: DS-CPC1002N-R03

9/2/08