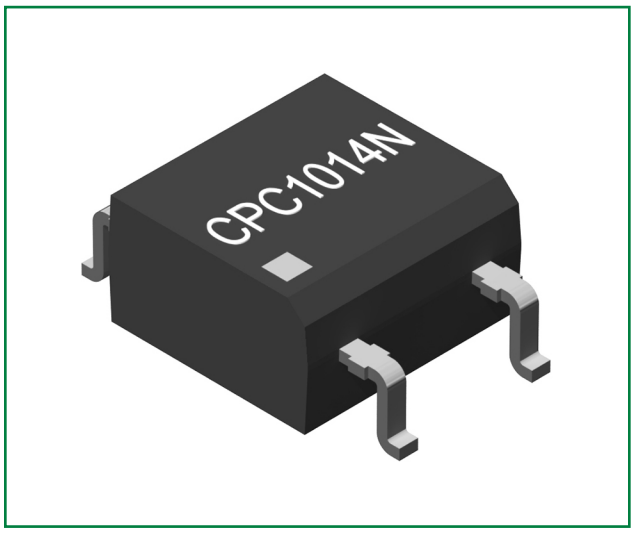
CPC1014N

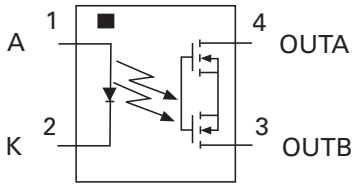
60V, 400 mA_{RMS} / mA_{DC} 1-Form-A SSR

Key Attributes

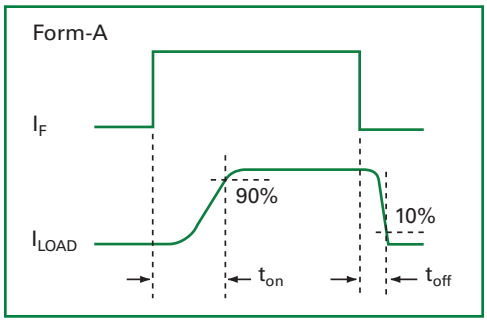
Characteristic	Rating	Unit
Blocking Voltage	60	V_P
Load Current	400	mA_{RMS} / mA_{DC}
On-resistance (max)	2	Ω
LED Current to Operate	2	mA



Pin Configuration



Switching Characteristics of Normally Open Devices



Description

The CPC1014N is a miniature single-pole, normally-open (1-Form-A) 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 super efficient MOSFET switches and photovoltaic die use Littelfuse's patented OptoMOS architecture. The optically coupled output is controlled by a highly efficient infrared LED.

Littelfuse's state of the art, double-molded vertical construction packaging makes the CPC1014N one of the world's smallest relays. It offers board space savings over the competitor's larger 4-pin SOP relay.

Features

- Designed for use in security systems complying with EN 50130-4
- 1500V_{RMS} Input/Output Isolation
- Small 4-Pin SOP Package
- No EMI/RFI Generation
- Immune to radiated EM fields
- Tape & Reel Version

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

Approvals

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

Ordering Information

Part Number	Description
CPC1014N	4-Pin SOP (100/tube)
CPC1014NTR	4-Pin SOP (2000/Reel)

Specifications

Absolute Maximum Ratings

Parameter	Ratings	Units
Blocking Voltage	60	V_P
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10 ms)	1	A
Input Power Dissipation	70	mW
Total Power Dissipation [1]	400	
Isolation Voltage, Input to Output (60 s)	1500	V_{RMS}
Operating Temperature, Ambient	–40 to +85	°C
Storage Temperature	–40 to +125	

[1] Derate output power 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.

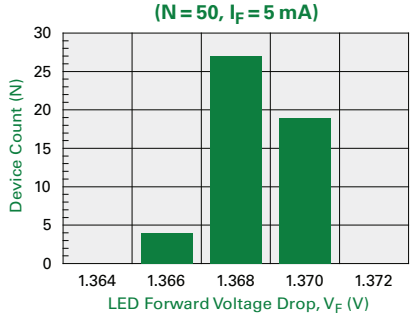
Electrical Characteristics @ 25°C

Parameter	Conditions	Symbol	Value			Units
			Minimum	Typical	Maximum	
Output Characteristics						
Blocking voltage	$I_L = 1\,\mu A$	V_{DRM}	60	-	-	V
Load current:						
Continuous [1]	$I_F = 2$ mA	I_L	-	-	400	mA_{RMS}/mA_{DC}
Peak	$t \leq 10$ ms	I_{LPK}	-	-	±1	A_P
On-resistance [2]	$I_F = 2$ mA, $I_L = 400$ mA	R_{ON}	-	-	2	Ω
Off-state leakage current	$V_L = 60$V	I_{LEAK}	-	-	1	µA
Switching speeds:						
Turn-on	$I_F = 5$ mA, $V_L = 10$V	t_{on}	-	0.47	2	ms
Turn-off		t_{off}	-	0.22	1	
Output capacitance	$I_F = 0$ mA, $V_L = 50$V, f = 1 MHz	C_{OUT}	-	25	-	pF
Input Characteristics						
Input control current to activate [3]	$I_L = 400$ mA	I_F	-	0.25	2	mA
Input control current to deactivate	-	I_F	0.1	0.2	-	
Input voltage drop	$I_F = 5$ mA	V_F	0.9	1.36	1.5	V
Reverse input current	$V_R = 5$V	I_R	-	-	10	µA
Input/Output Characteristics						
Capacitance, input to output	$V_{IO} = 0$V, f = 1 MHz	C_{IO}	-	1	-	pF

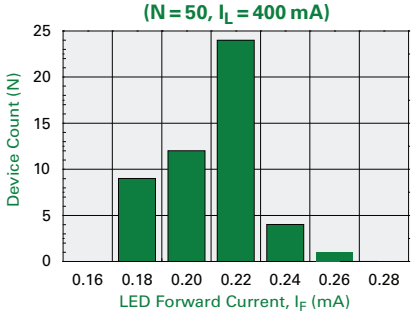
[1] Load current derates linearly from 400 mA @ 25 °C to 200 mA @ 85 °C.
[2] Measurement taken within 1 second of on-time.
[3] For applications requiring operation greater than 60 °C, a minimum LED drive current of 4 mA is recommended.

Characteristic Curves

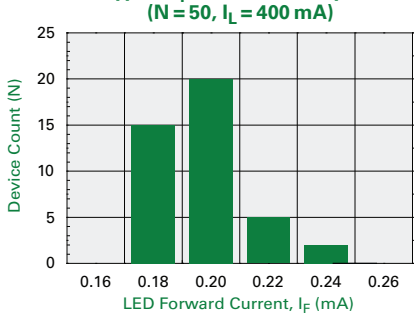
Typical LED Forward Voltage Drop (N = 50, I_F = 5 mA)



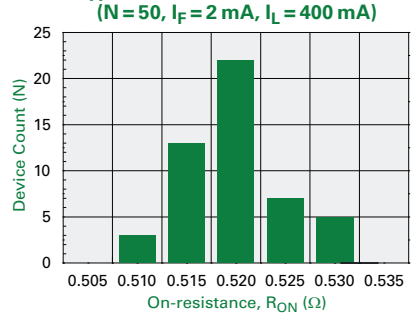
Typical I_F for Switch Operation (N = 50, I_L = 400 mA)



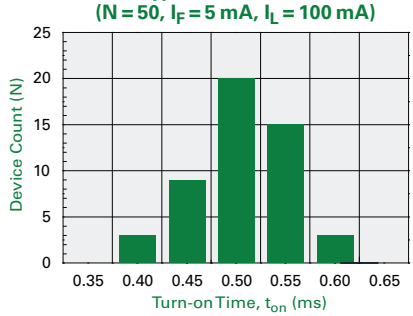
Typical I_F for Switch Dropout (N = 50, I_L = 400 mA)



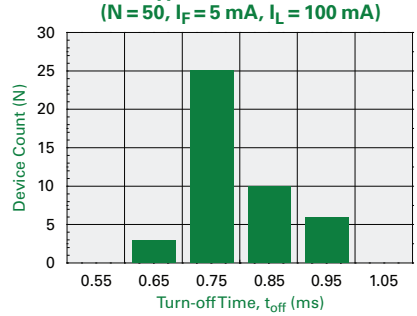
Typical On-resistance Distribution (N = 50, I_F = 2 mA, I_L = 400 mA)



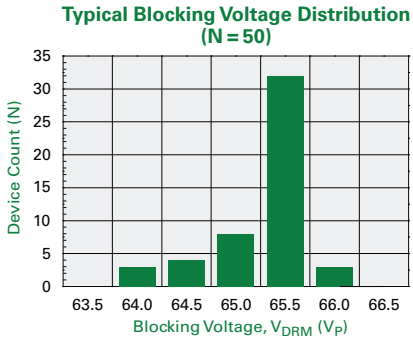
Typical Turn-on Time (N = 50, I_F = 5 mA, I_L = 100 mA)



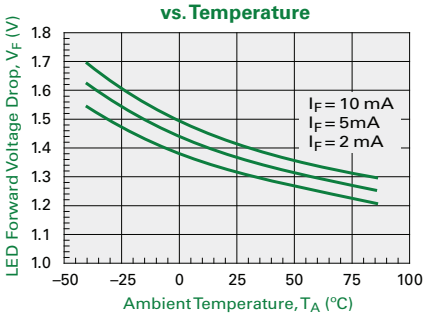
Typical Turn-off Time (N = 50, I_F = 5 mA, I_L = 100 mA)



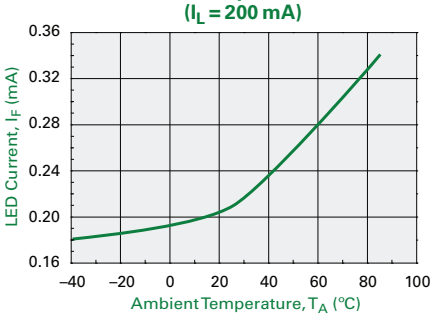
Typical Blocking Voltage Distribution (N = 50)



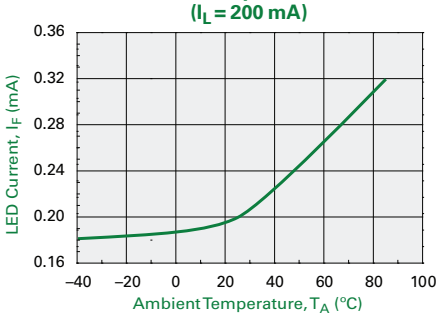
Typical LED Forward Voltage Drop vs. Temperature



Typical I_F for Switch Operation vs. Temperature (I_L = 200 mA)



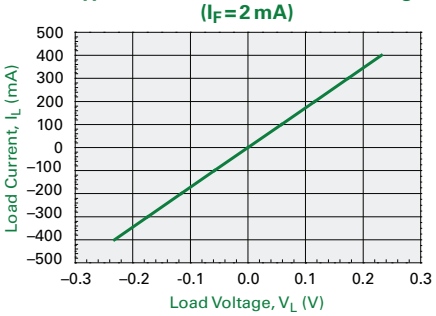
Typical I_F for Switch Dropout vs. Temperature (I_L = 200 mA)



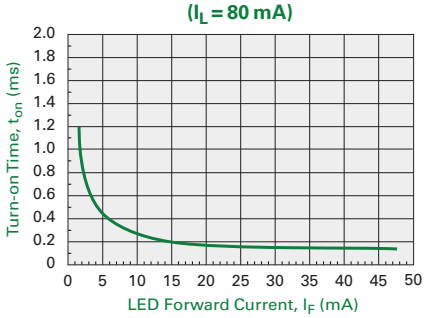
*Unless otherwise noted, data presented in these graphs is typical of device operation at T_A = 25°C.

Characteristic Curves

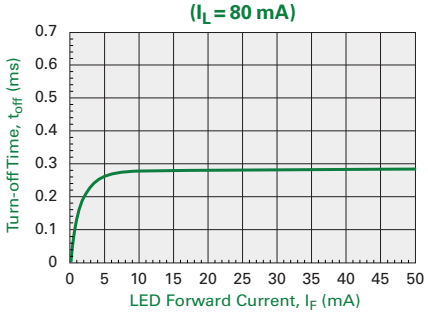
Typical Load Current vs. Load Voltage (I_F = 2 mA)



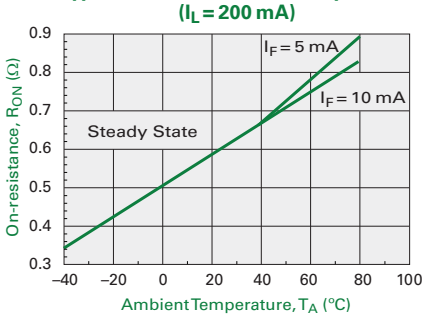
Turn-on Time vs. LED Forward Current (I_L = 80 mA)



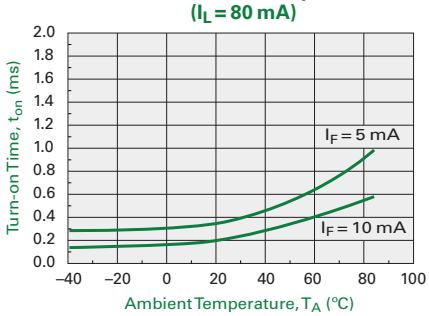
Turn-off Time vs. LED Forward Current (I_L = 80 mA)



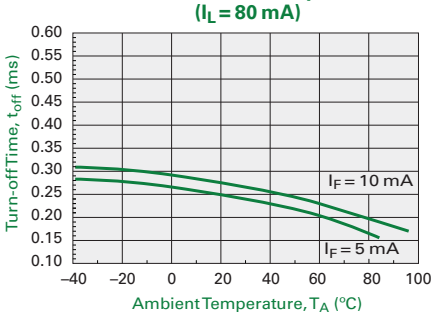
Typical On-resistance vs. Temperature (I_L = 200 mA)



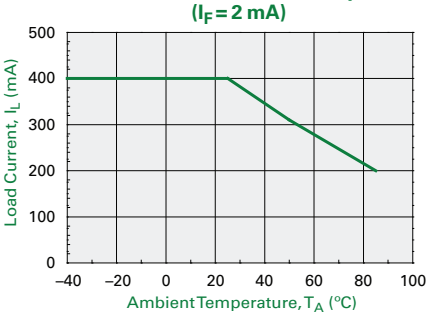
Turn-on Time vs. Temperature (I_L = 80 mA)



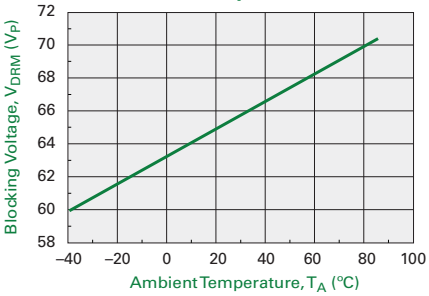
Turn-off Time vs. Temperature (I_L = 80 mA)



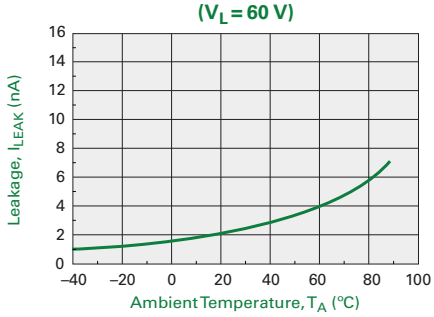
Maximum Load Current vs. Temperature (I_F = 2 mA)



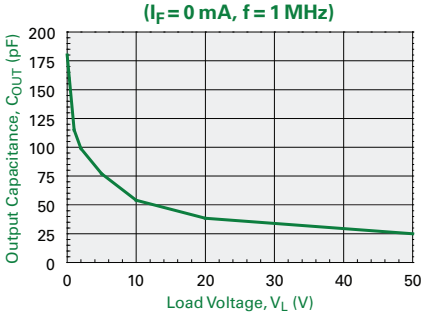
Typical Blocking Voltage vs. Temperature



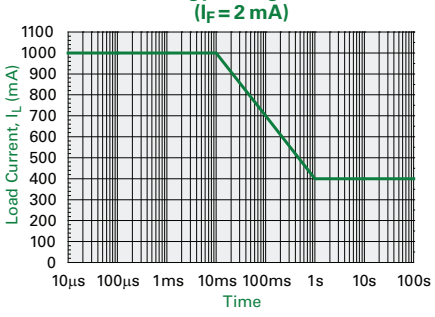
Typical Leakage vs. Temperature Measured Across Pins 3 & 4 (V_L = 60 V)



Output Capacitance vs. Load Voltage (I_F = 0 mA, f = 1 MHz)



Energy Rating Curve (I_F = 2 mA)



*Unless otherwise noted, data presented in these graphs is typical of device operation at T_A = 25°C.

Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. Littelfuse classifies its plastic encapsulated devices for moisture sensitivity according to the latest revision 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 revision of the joint industry standard **IPC/JEDEC J-STD-033**.

Device	Moisture Sensitivity Level (MSL) Classification
CPC1014N	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.

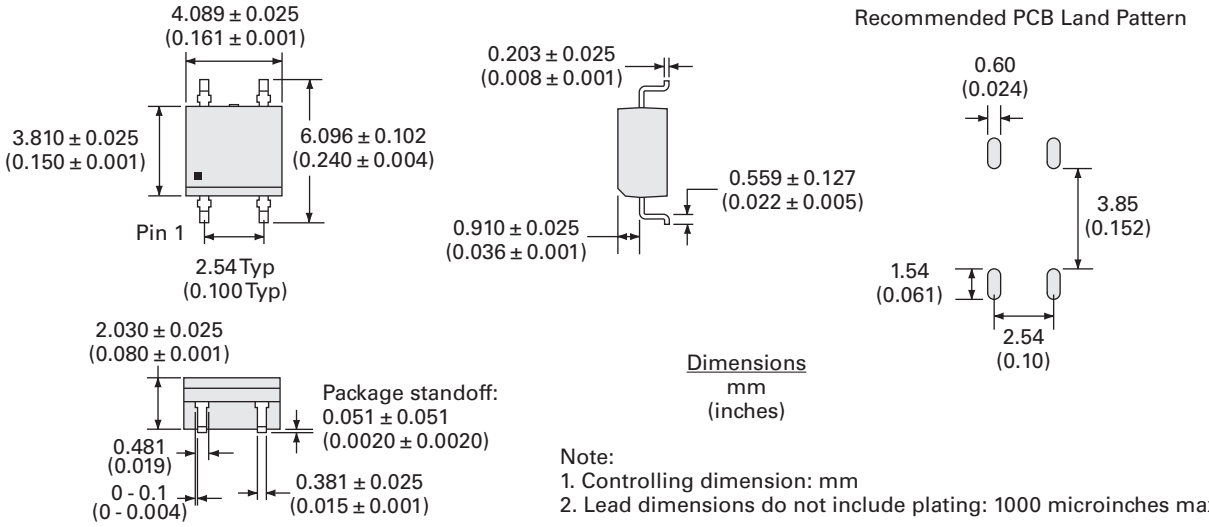
Device	Classification Temperature (T_c)	Dwell Time (T_p)	Max Reflow Cycles
CPC1014N	260 °C	30 seconds	3

Board Wash

Littelfuse 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

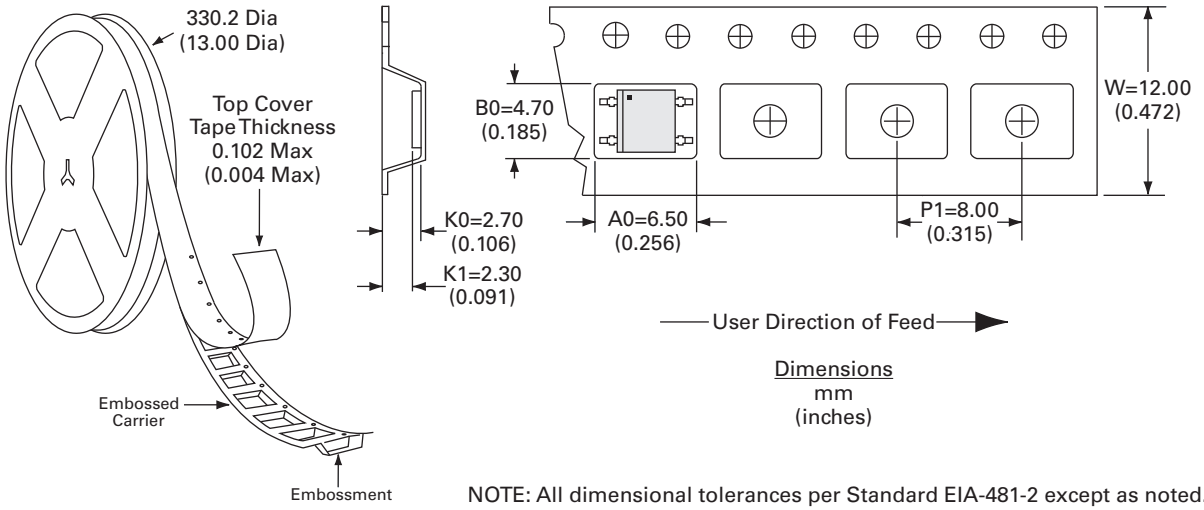
CPC1010N



Dimensions
mm
(inches)

Note:
1. Controlling dimension: mm
2. Lead dimensions do not include plating: 1000 microinches max.

CPC1010NTR Tape & Reel Packaging



Dimensions
mm
(inches)

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