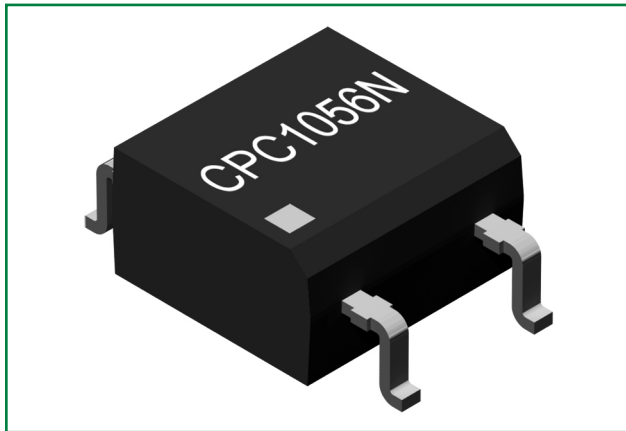


CPC1056N

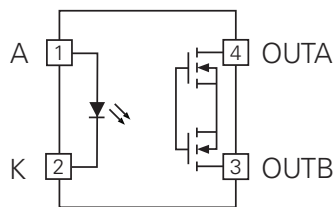
60 V, 75 mA_{RMS}/mA_{DC} Normally Open Relay

Key Attributes

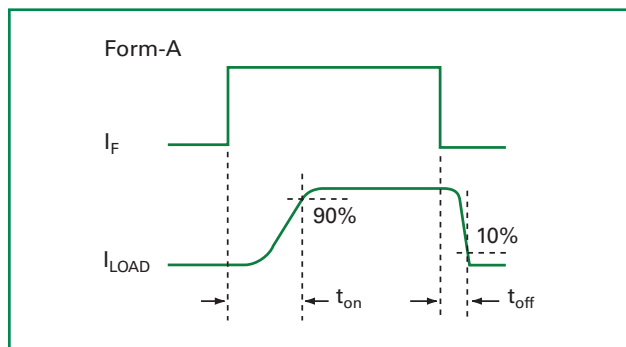
Characteristic	Rating	Unit
Blocking Voltage	60	V _P
Load Current	75	mA _{RMS} /mA _{DC}
On-Resistance (max.)	10	Ω
LED Current to Operate	0.5	mA



Pin Configuration



Switching Characteristics



Description



The CPC1056N is a bidirectional 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 relay outputs are constructed with efficient MOSFET switches and a photovoltaic generator/driver that uses Littelfuse's patented OptoMOS® architecture while the input, a highly efficient infrared LED, provides the optically coupled control.

Using Littelfuse's state of the art double-molded vertical construction packaging, the CPC1056N offers board space savings of at least 20 % over the competitor's larger 4-pin SOP relay.

Features

- Designed for EN50130-4 Compliant Security Systems
- 1500V_{RMS} Input/Output Isolation
- Only 0.5mA of LED Current Required to Operate
- Small 4-Pin SOP Package
- High Reliability
- No EMI/RFI Generation
- Immune to Radiated EM Fields

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 1577 Recognized Component: File E76270
- EN 62368-1: TUV Certificate # B 082667 0008

Ordering Information

Part Number	Description
CPC1056N	4-Pin SOP (100/Tube)
CPC1056NTR	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		
Continuous	50	mA
Peak (10 ms)	1	A
Power Dissipation		
Input	70	mW
Package Total ¹	400	
Isolation Voltage, Input to Output (60 s)	1500	V _{RMS}
ESD Rating, Human Body Model (HBM)	4	kV
Operating Temperature, Ambient (T _A)	−40 to +85	°C
Storage Temperature (T _{STG})	−40 to +125	

¹ Derate output power linearly 3.3mW/°C

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 μA	V _{DRM}	60	—	—	V
Load current	I _F = 0.5 mA	I _L	—	—	75	mA _{RMS} /mA _{DC}
Continuous ¹		t = 10 ms	I _{LPK}	—	—	
Peak		I _F = 0.5 mA, I _L = 75 mA	R _{ON}	—	7	10
On-resistance ²	I _F = 0 mA, V _L = 60V	I _{LK}	—	—	1	μA
Off-state leakage current	I _F = 2 mA, V _L = 10V	t _{on}	—	—	3	ms
Switching speeds		t _{off}	—	—	3	
Turn-on		I _F = 0 mA, V _L = 50V, f = 1MHz	C _{OUT}	—	5	—
Turn-off						
Output capacitance						
Input Characteristics						
Input control current to activate ³	I _L = 75 mA	I _F	—	0.1	0.5	mA
Input control to deactivate ⁴	—					
Current		—	0.05	—	—	mA
Voltage		—	0.8	—	—	V
Input voltage drop	I _F = 5 mA	V _F	0.9	1.36	1.5	V
Reverse input current	V _R = 5V	I _R	—	—	10	μA
Input/Output Characteristics						
Capacitance, input to output	V _{IO} = 0V, f = 1 MHz	C _{IO}	—	1	—	pF

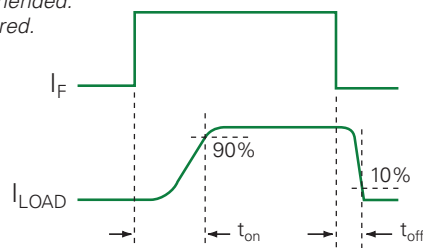
¹ Load current derates linearly from 75mA @ 55 °C to 50mA @ 85 °C.

² Measurement taken within 1 second of on-time.

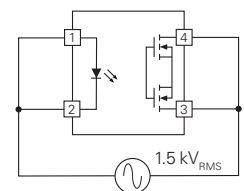
³ For operation above 60 °C a minimum input current of 2 mA is recommended.

⁴ Either condition is sufficient to deactivate the relay, both are not required.

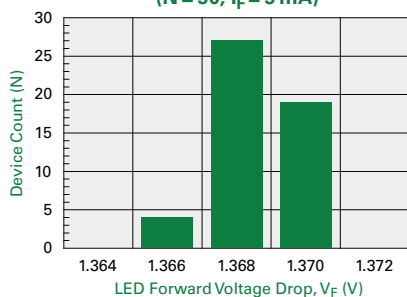
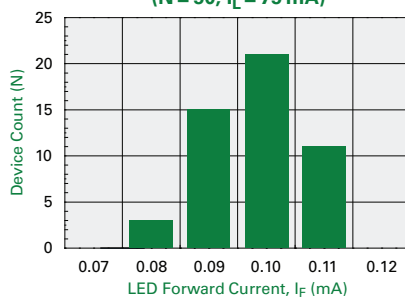
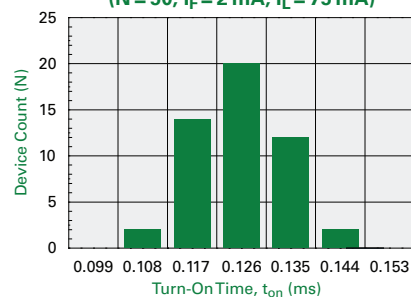
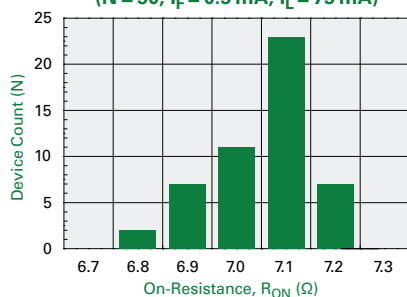
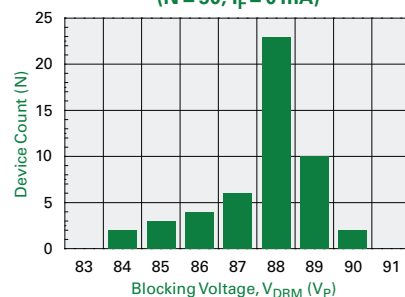
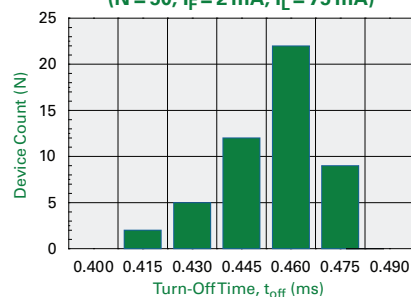
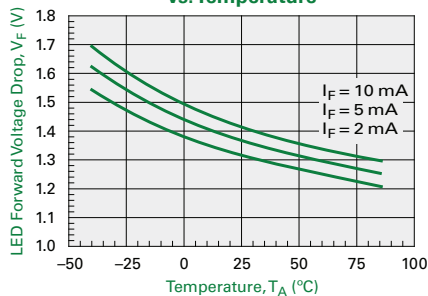
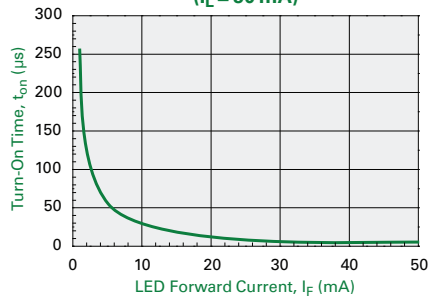
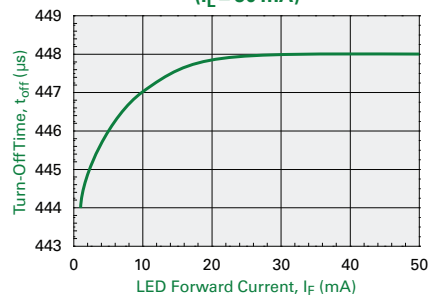
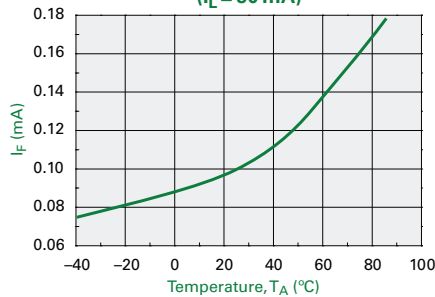
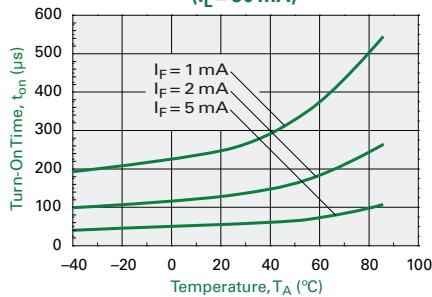
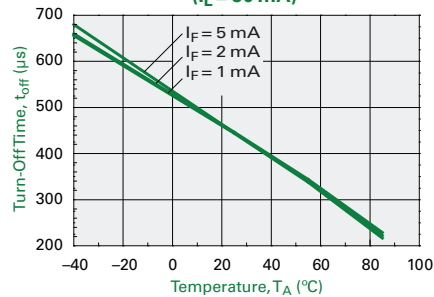
Timing Diagram



Isolation Test Circuit

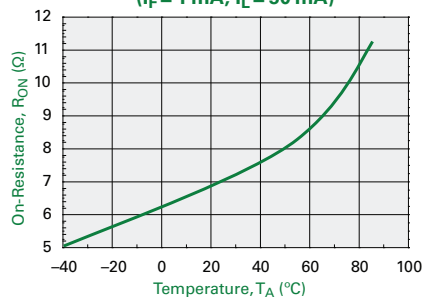


Characteristic Curves

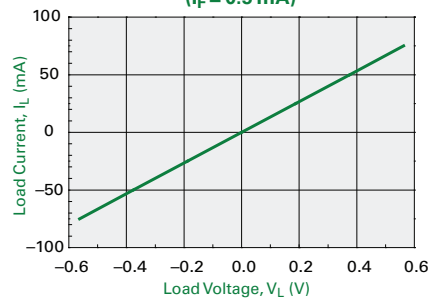
Typical LED Forward Voltage Drop
(N = 50, $I_F = 5$ mA)Typical I_F for Switch Operation
(N = 50, $I_L = 75$ mA)Typical Turn-On Time
(N = 50, $I_F = 2$ mA, $I_L = 75$ mA)Typical On-Resistance Distribution
(N = 50, $I_F = 0.5$ mA, $I_L = 75$ mA)Typical Blocking Voltage Distribution
(N = 50, $I_F = 0$ mA)Typical Turn-Off Time
(N = 50, $I_F = 2$ mA, $I_L = 75$ mA)Typical LED Forward Voltage Drop
vs. TemperatureTypical Turn-On Time
vs. LED Forward Current
($I_L = 50$ mA)Typical Turn-Off Time
vs. LED Forward Current
($I_L = 50$ mA)Typical I_F for Switch Operation
vs. Temperature
($I_L = 50$ mA)Typical Turn-On Time
vs. Temperature
($I_L = 50$ mA)Typical Turn-Off Time
vs. Temperature
($I_L = 50$ mA)

Unless otherwise noted, data presented in these graphs is typical of device operation at $T_A = 25^\circ\text{C}$.

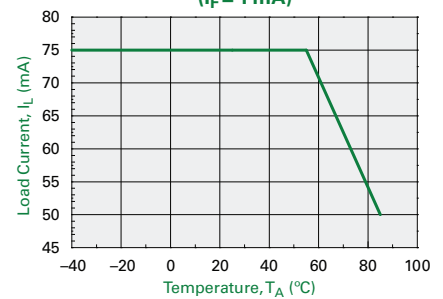
**Typical On-Resistance
vs. Temperature**
($I_F = 1\text{ mA}$, $I_L = 50\text{ mA}$)



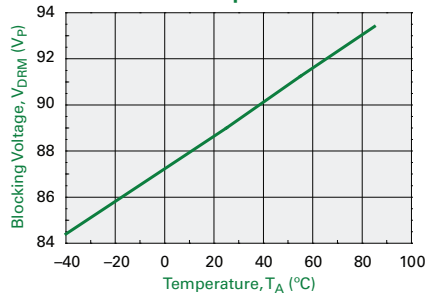
**Typical Load Current
vs. Load Voltage**
($I_F = 0.5\text{ mA}$)



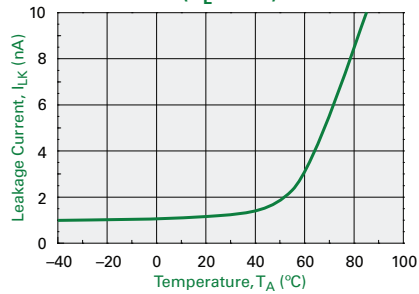
**Maximum Load Current
vs. Temperature**
($I_F = 1\text{ mA}$)



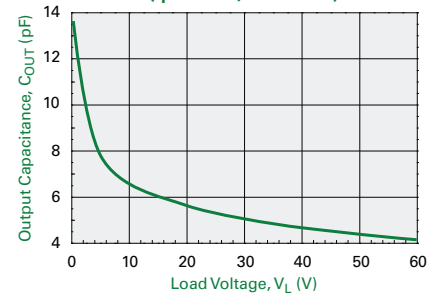
**Typical Blocking Voltage
vs. Temperature**



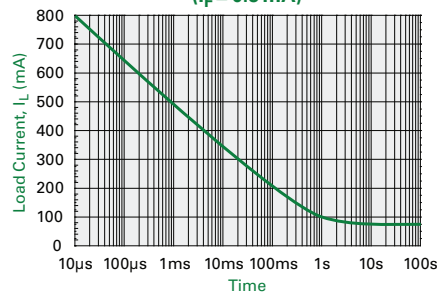
**Typical Leakage vs. Temperature
Measured Across Pins 3 and 4**
($V_L = 60\text{ V}$)



Output Capacitance vs. Load Voltage
($I_F = 0\text{ mA}$, $f = 1\text{ MHz}$)



Energy Rating Curve
($I_F = 0.5\text{ mA}$)



Unless otherwise noted, data presented in these graphs is typical of device operation at $T_A = 25^{\circ}\text{C}$.

Manufacturing Information

Moisture Sensitivity



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. Littelfuse 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
CPC1056N	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 ($T_C - 5^\circ\text{C}$). 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
CPC1056N	260°C	30 seconds	3

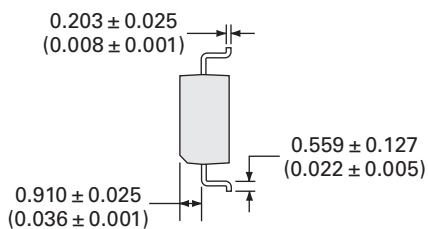
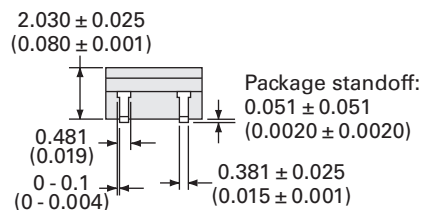
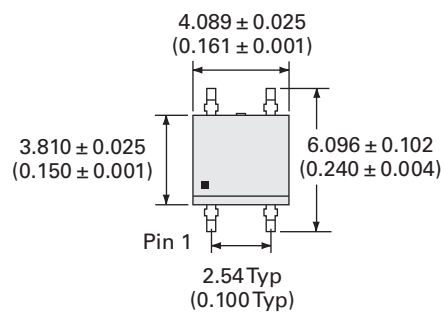
Board Wash

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.

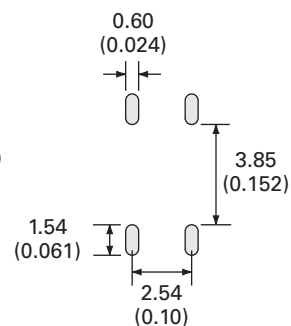


Mechanical Dimensions

CPC1056N



Recommended PCB Land Pattern

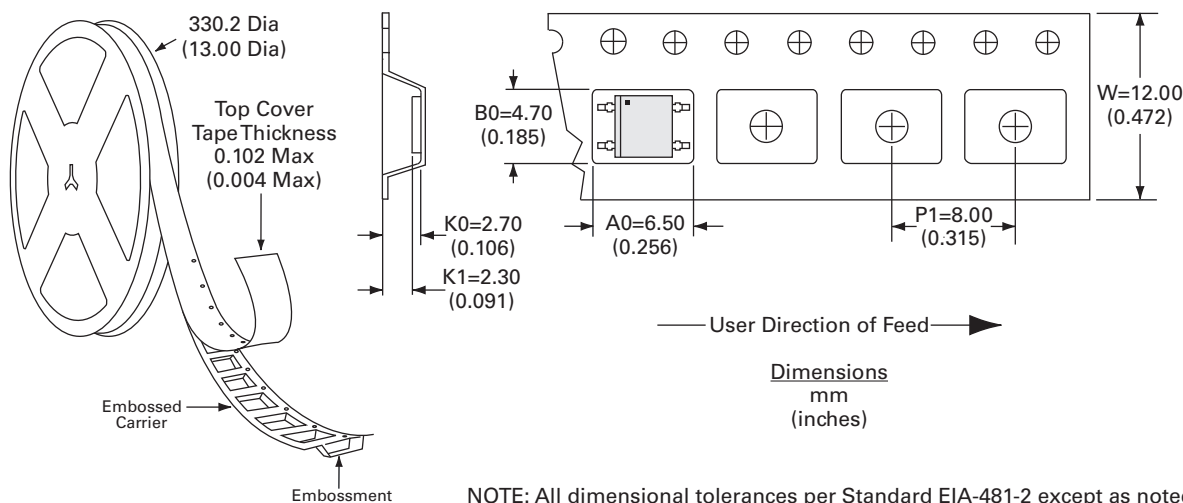


Dimensions
mm
(inches)

Note:

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

CPC1056NTR Tape and Reel Packaging



Dimensions
mm
(inches)

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

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <https://www.littelfuse.com/disclaimer-electronics>