



Parameter	Rating	Units
Blocking Voltage	60	V <sub>P</sub>
Load Current	4	A <sub>DC</sub>
On-Resistance	0.09	Ω

## Features

- Handle Load Currents Up to 4A<sub>DC</sub>
- 2500V<sub>rms</sub> Input/Output Isolation
- Power SIP Package
- High Reliability
- No Moving Parts
- Low Drive Power Requirements (TTL/CMOS Compatible)
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable

## Applications

- Industrial Controls
- Motor Control
- Robotics
- Medical Equipment—Patient/Equipment Isolation
- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
  - Meters (Watt-Hour, Water, Gas)
- IC Equipment
- Home Appliances

## Description

Clare and IXYS have combined to bring OptoMOS® technology, reliability, and compact size to a new family of high power solid state relays. The CPC1706, a DC-switching, normally open (1-Form-A) Solid State Relay, is part of that family.

Employing optically coupled MOSFET technology, the CPC1706 provides 2500V<sub>rms</sub> of input to output isolation. The efficient MOSFET switches and photovoltaic die use Clare's patented OptoMOS architecture, while the highly efficient GaAlAs infrared LED provides the optically coupled control.

The combination of low on-resistance and high load current handling capability makes the relay suitable for a variety of high performance switching applications.

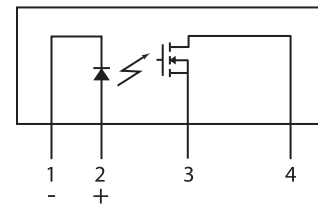
## Approvals

- UL recognized component: File # E69938

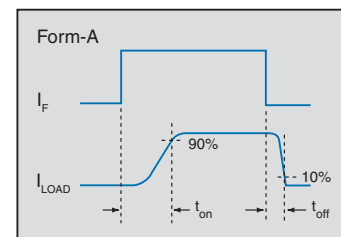
## Ordering Information

Part #	Description
CPC1706Y	Power SIP Package (25 per tube)

## Pin Configuration



## Switching Characteristics of Normally Open Devices



## Absolute Maximum Ratings (@ 25° C)

Parameter	Min	Max	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 <sup>1</sup>	-	150	mW
Total Power Dissipation <sup>2</sup>	-	1600	mW
Isolation voltage Input to Output	-	2500	V <sub>rms</sub>
Operational Temperature	-40	+85	°C
Storage Temperature	-40	+125	°C

<sup>1</sup> Derate Linearly 3.33 mW / °C

<sup>2</sup> Derate linearly 16.667 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	I <sub>F</sub> =5mA, Free air	I <sub>L</sub>	-	-	4	A <sub>DC</sub>
Peak Load Current	I <sub>F</sub> =5mA, t=10ms	I <sub>LPK</sub>	-	-	9	A
On-Resistance <sup>1</sup>	I <sub>F</sub> =5mA, I <sub>L</sub> =1A	R <sub>ON</sub>	-	0.07	0.09	Ω
Off-State Leakage Current	I <sub>F</sub> =0mA, V <sub>L</sub> =60V <sub>P</sub>	I <sub>LEAK</sub>	-	-	1	μA
Switching Speeds						
Turn-On	I <sub>F</sub> =5mA, V <sub>L</sub> =10V	t <sub>ON</sub>	-	0.5	5	ms
Turn-Off		t <sub>OFF</sub>	-	0.085	2	
Output Capacitance	I <sub>F</sub> =0mA, V <sub>L</sub> =50V, f=1MHz	C <sub>OUT</sub>	-	75	-	pF
<b>Input Characteristics</b>						
Input Control Current	I <sub>L</sub> =1A	I <sub>F</sub>	-	1.4	5	mA
Input Dropout Current	-	I <sub>F</sub>	0.4	-	-	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>Input/Output Characteristics</b>						
Capacitance Input/Output	f=1MHz	C <sub>IO</sub>	-	2	-	pF

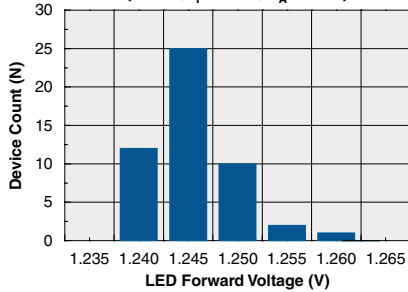
<sup>1</sup> Measurement taken within 1 second of on-time.

## Thermal Characteristics

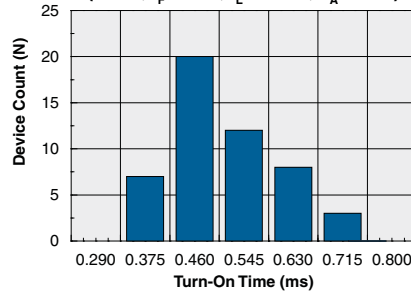
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Thermal Resistance (junction to case)	-	R <sub>θJC</sub>	-	1.5	-	°C/W

**PERFORMANCE DATA\***

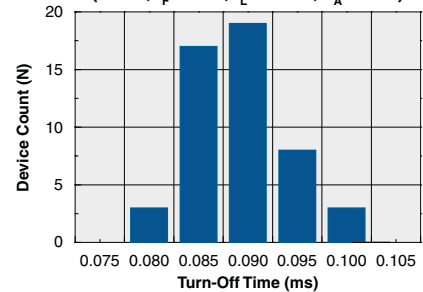
**Typical LED Forward Voltage Drop**  
(N=50,  $I_F=5\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



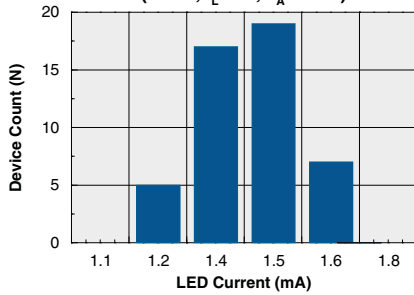
**Typical Turn-On Time**  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=75\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



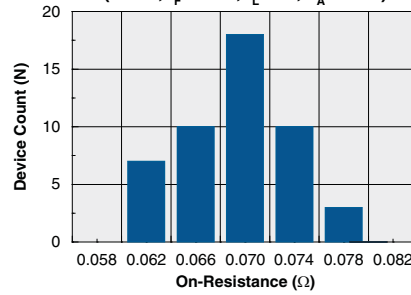
**Typical Turn-Off Time**  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=75\text{mA}$ ,  $T_A=25^\circ\text{C}$ )



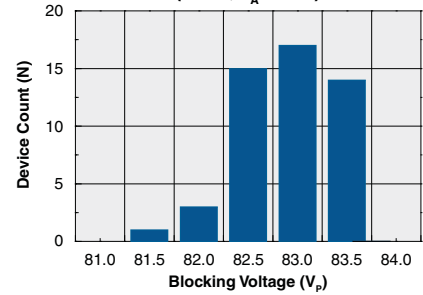
**Typical  $I_F$  for Switch Operation**  
(N=50,  $I_L=1\text{A}$ ,  $T_A=25^\circ\text{C}$ )



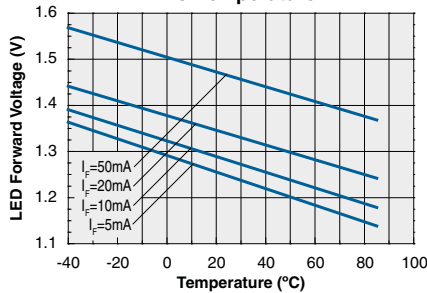
**Typical On-Resistance Distribution**  
(N=50,  $I_F=5\text{mA}$ ,  $I_L=1\text{A}$ ,  $T_A=25^\circ\text{C}$ )



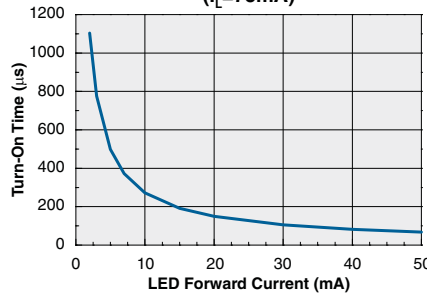
**Typical Blocking Voltage Distribution**  
(N=50,  $T_A=25^\circ\text{C}$ )



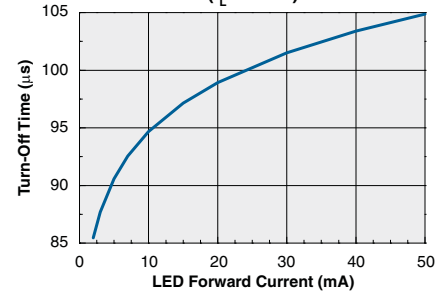
**Typical LED Forward Voltage Drop vs. Temperature**



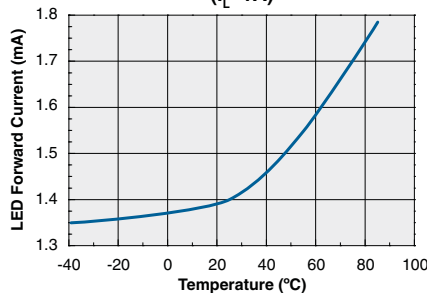
**Typical Turn-On vs. LED Forward Current**  
( $I_L=75\text{mA}$ )



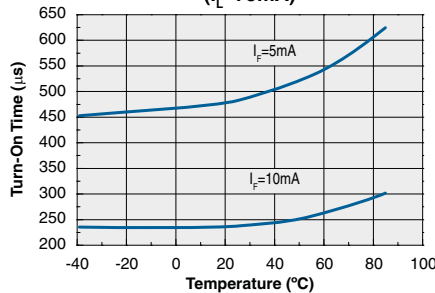
**Typical Turn-Off vs. LED Forward Current**  
( $I_L=75\text{mA}$ )



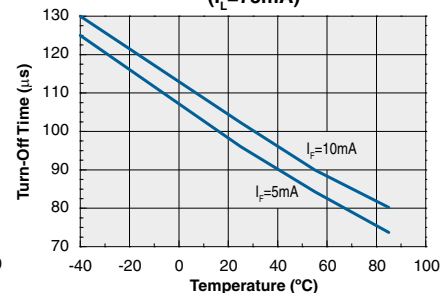
**Typical  $I_F$  for Switch Operation vs. Temperature**  
( $I_L=1\text{A}$ )



**Typical Turn-On vs. Temperature**  
( $I_L=75\text{mA}$ )

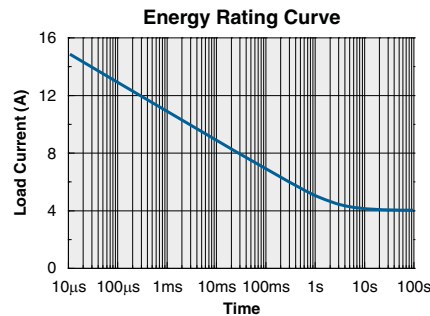
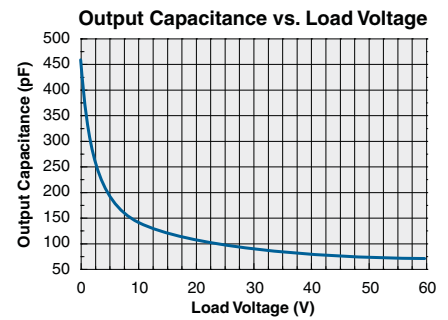
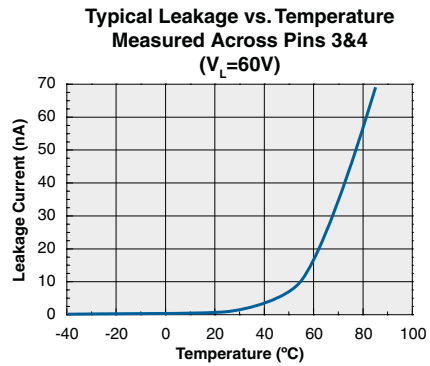
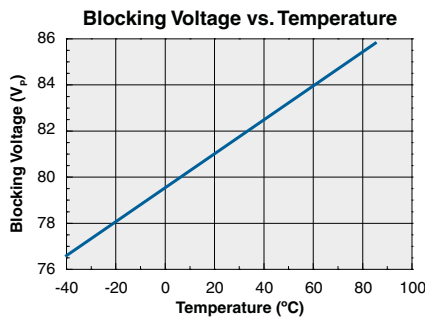
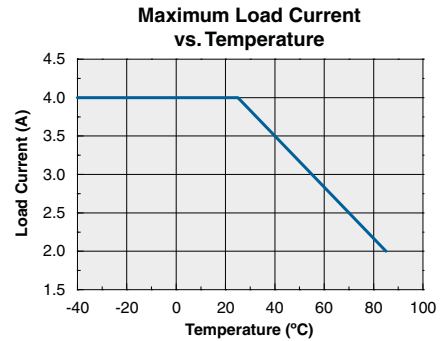
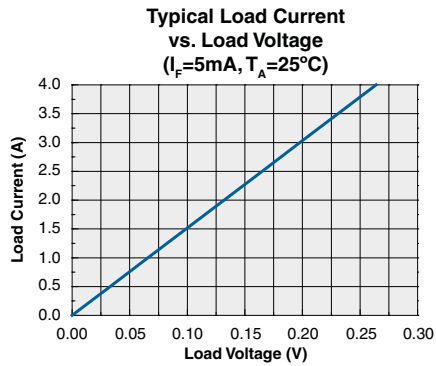
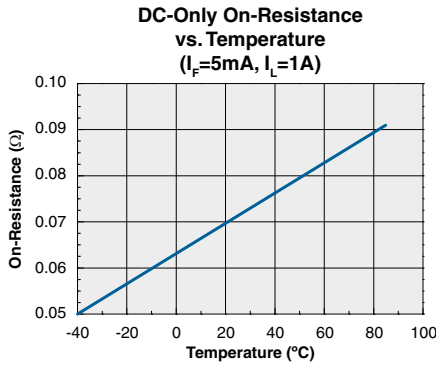


**Typical Turn-Off vs. Temperature**  
( $I_L=75\text{mA}$ )



\* 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\*



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## Manufacturing Information

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.

### Moisture Sensitivity

This product is rated **Moisture Sensitivity Level 1 (MSL 1)**, and should be handled according to the requirements of the latest version of the joint industry standard **IPC/JEDEC J-STD-033**.

### ESD Sensitivity

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

### Reflow Profile

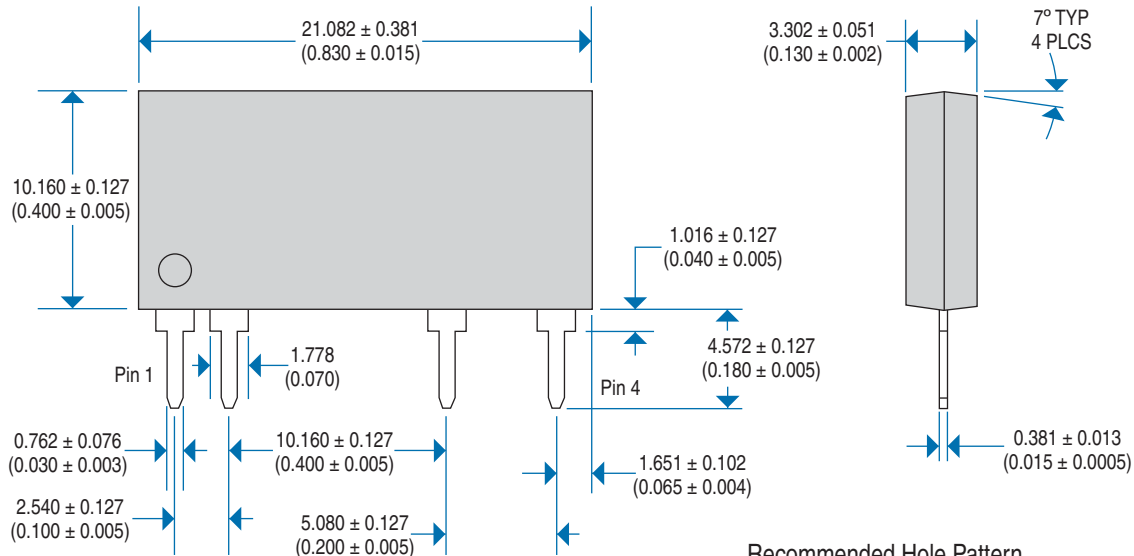
This product has a maximum body temperature rating of **245°C for a maximum of 30 seconds**. All other guidelines of **J-STD-020** must be observed.

### Board Wash

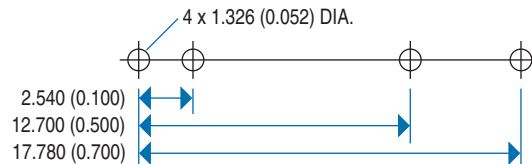
Clare recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since Clare employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a short drying bake could be necessary if a wash is used 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**



**Recommended Hole Pattern**



Dimensions  
mm  
(inches)

**Note:** Recommended hole size is based on the maximum cross-section diagonal measure of the pin plus 0.4mm (0.016).

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

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