PLA171PH
Single-Pole Normally Open OptoMOS® Relay

A Clare Hi-Rel Product

Parameter	Rating	Units
Load Voltage	800	V_P
Load Current	100	mA
Maximum On-Resistance	50	Ω
Input Control Current	2	mA

Features

- Operational Temperature Range: -40ºC to +105ºC
- 800V_P Blocking Voltage
- 5000V_{rms} Input/Output Isolation
- Electrical Tests at Room Temperature and at 85ºC
- 100% Burn-In
  JESD22-A108 / MIL-STD-883 Method 1015
- 100% Post Burn-In Electrical Test
- Small 6-Pin Surface Mount Package
- Low Drive Power Requirements (TTL/CMOS Compatible)
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Flammability Rating UL 94 V-0

Applications

- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
  - Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Automotive High-Voltage Circuitry
- Aerospace
- Industrial Controls

Description

Clare's Hi-Rel PLA171PH is a single-pole, normally open (1-Form-A) Solid State Relay that uses optically coupled MOSFET technology to provide enhanced input-to-output isolation of 5000V_{rms}. The efficient MOSFET switches and photovoltaic die use Clare's patented OptoMOS® architecture.

Control of the optically-coupled output is by the input GaAlAs infrared LED. The PLA171PH is designed to replace electromechanical relays and offers the superior reliability associated with Clare's Hi-Rel Solid State devices. This device provides bounce-free switching in a compact surface mount package.

Approvals

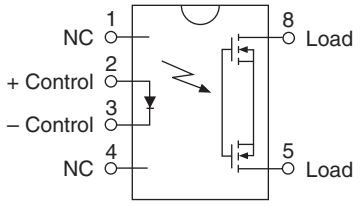
- UL Certified Component: File # E76270
- EN/IEC 60950 Certified Component:
  TUV Certificate B 09 07 49410 004
- Meets Requirements of:
  AEC-Q101 "Temperature Grade 2" - Pending

Ordering Information

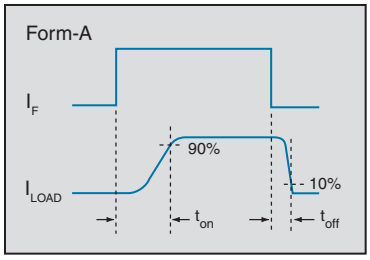
Part #	Description
PLA171PH	6-Lead Surface Mount (50/Tube)
PLA171PHTR	6-Lead Surface Mount, Tape & Reel (1000/Reel)

Pin Configuration

AC/DC Configuration



Switching Characteristics of Normally Open Devices



Absolute Maximum Ratings
(@ 25ºC Unless otherwise noted)

Parameter	Ratings	Units
Blocking Voltage (-40ºC to +105ºC)	800	V_P
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation [1]	150	mW
Total Power Dissipation [2]	800	mW
Isolation Voltage, Input to Output (60 Seconds)	5000	V_{rms}
Operational Temperature	-40 to +105	ºC
Storage Temperature	-40 to +125	ºC

[1] Derate linearly 3.33 mW / ºC
[2] Derate linearly 6.67 mW / ºC

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.

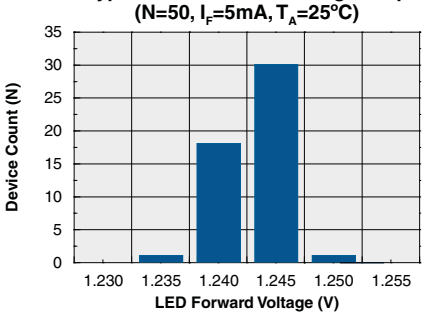
Electrical Characteristcs

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics @ 25°C						
Load Current						
Continuous [1]	I_F=2mA	I_L	-	-	100	mA
Peak	I_F=2mA , t=10ms	I_{LPK}	-	-	350	
On-Resistance [2]	I_F=2mA, I_L= 100mA	R_{ON}	-	40	50	Ω
	I_F=5mA, I_L=1mA		-	70	85	
Off-State Leakage Current	V_L=800V_P	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=5mA, V_L=10V	t_{on}	-	0.42	5	ms
Turn-Off		t_{off}	-	0.15	5	
Output Capacitance	I_F=0mA, V_L=50V, f=1MHz	C_{OUT}	-	11	-	pF
Output Characteristics @ 105°C						
On-Resistance [2]	I_F=5mA, I_L=30mA	R_{ON}	-	75	110	Ω
	I_F=5mA, I_L=1mA		-	115	140	
Off-State Leakage Current	V_L=800V_P	I_{LEAK}	-	-	5	µA
Input Characteristics @ 25°C						
Input Control Current [3]	I_L=100mA	I_F	-	0.39	2	mA
Input Dropout Current	-	I_F	0.1	-	-	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						
Input to Output Capacitance	-	$C_{I/O}$	-	3	-	pF

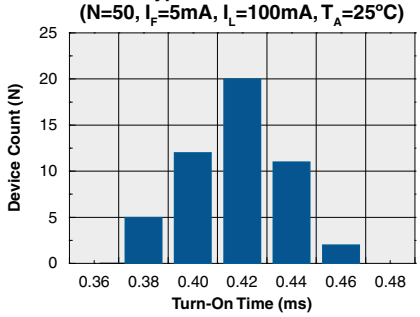
[1] Load derates linearly from 100mA @ 25ºC to 40mA @105ºC.
[2] Measurement taken within 1 second of on-time.
[3] For applications requiring high temperature operation (greater than 60ºC) an LED drive current of 5mA is recommended.

PERFORMANCE DATA*

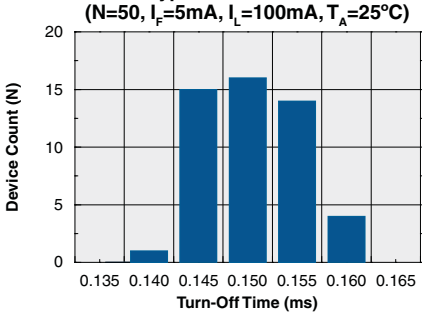
Typical LED Forward Voltage Drop
(N=50, I_F=5mA, T_A=25°C)



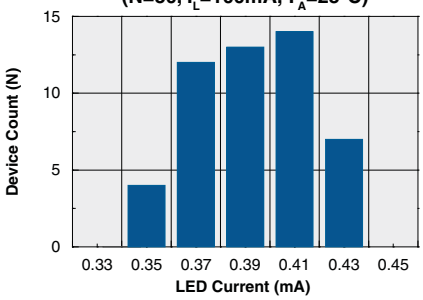
Typical Turn-On Time
(N=50, I_F=5mA, I_L=100mA, T_A=25°C)



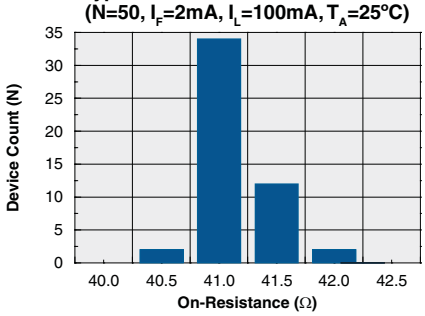
Typical Turn-Off Time
(N=50, I_F=5mA, I_L=100mA, T_A=25°C)



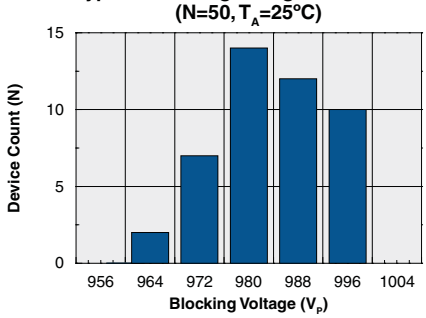
Typical I_F for Switch Operation
(N=50, I_L=100mA, T_A=25°C)



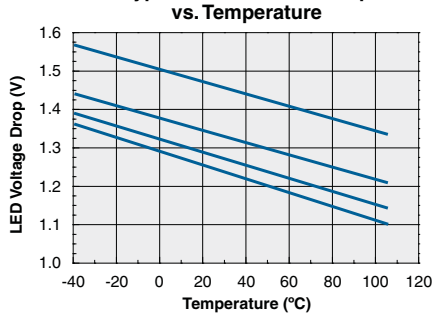
Typical On-Resistance Distribution
(N=50, I_F=2mA, I_L=100mA, T_A=25°C)



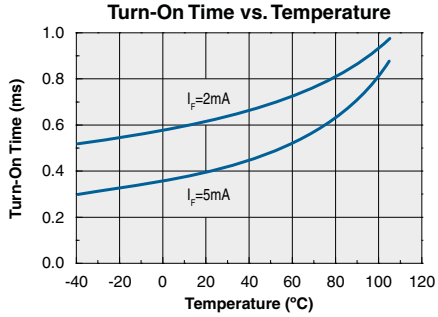
Typical Blocking Voltage Distribution
(N=50, T_A=25°C)



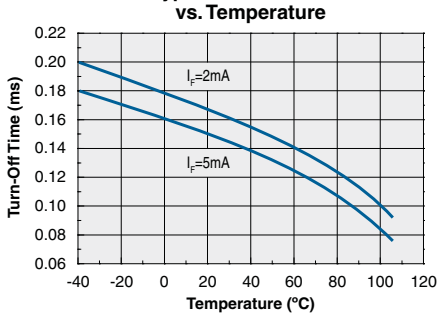
Typical LED Forward Drop
vs. Temperature



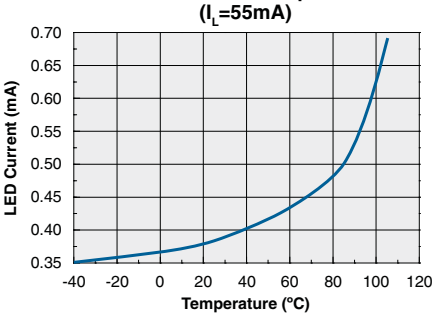
Turn-On Time vs. Temperature



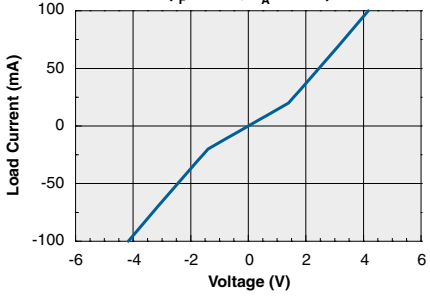
Typical Turn-Off Time
vs. Temperature



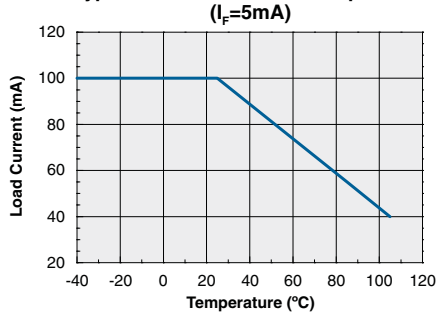
LED Current to Operate
(I_L=55mA)



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



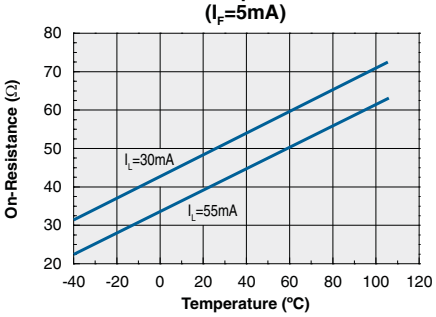
Typical Load Current vs. Temperature
(I_F=5mA)



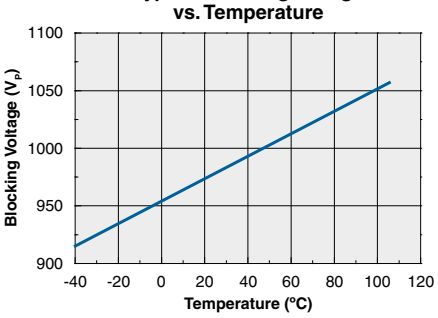
*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

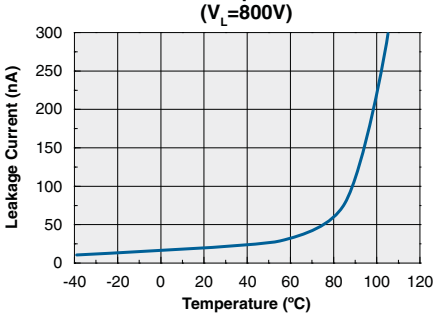
Typical On-Resistance vs. Temperature (I_F=5mA)



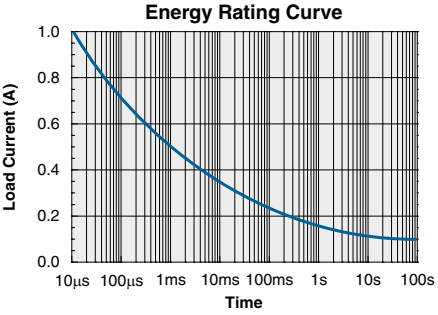
Typical Blocking Voltage vs. Temperature



Typical Leakage Current vs. Temperature (V_L=800V)



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 ingression. 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
PLA171PH	MSL 1

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
PLA171PH	260°C for 30 seconds

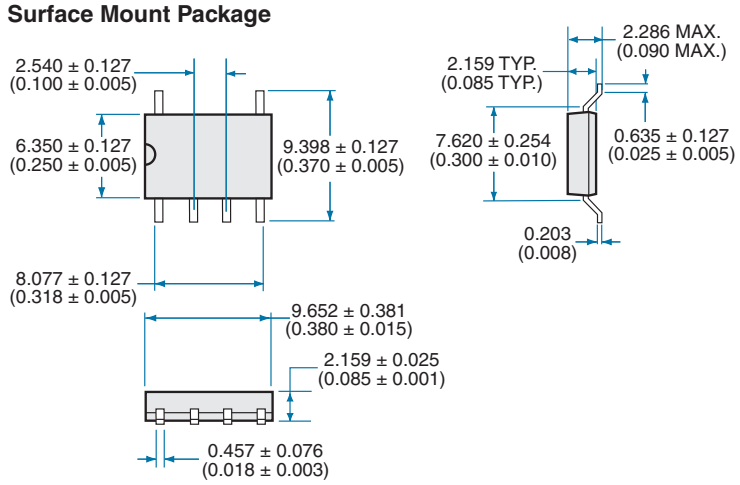
Board Wash

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.

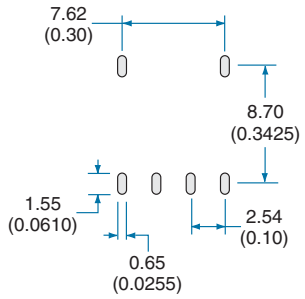
MECHANICAL DIMENSIONS

PLA171PH

Surface Mount Package



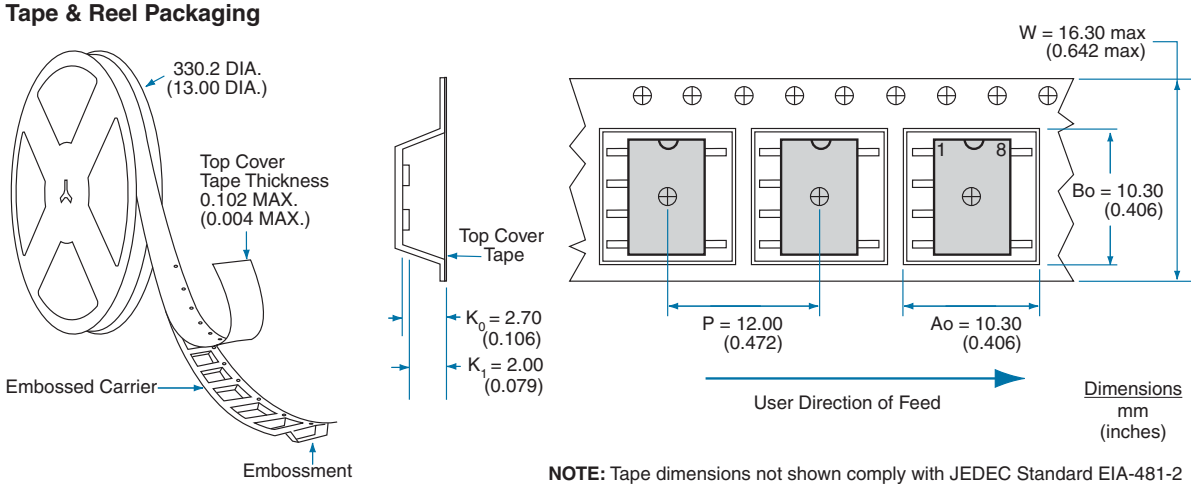
Recommended PCB Land Pattern



Dimensions
mm
(inches)

PLA171PH Tape & Reel

Tape & Reel Packaging



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-PLA171PH-R02

8/10/2010