



PLA140L Single-Pole, Normally Open, Current-Limiting OptoMOS<sup>®</sup> Relay

Parameter	Rating	Units
Blocking Voltage	400	V <sub>P</sub>
Load Current	200	mA
Max On-resistance	13	Ω

# **Features**

- Current Limiting
- 3750V<sub>rms</sub> Input/Output Isolation
- Small 6-Pin Package
- Low Drive Power Requirements (TTL/CMOS Compatible)
- · High Reliability
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Surface Mount Tape & Reel Version Available
- Flammability Classification Rating of V-0

# **Applications**

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

### Description

PLA140L is a single-pole, normally open (1-Form-A) solid state relay that uses optically coupled MOSFET technology to provide 3750V<sub>rms</sub> of input to output isolation. The efficient MOSFET switches and photovoltaic die use Clare's patented OptoMOS architecture. The optically coupled output is controlled by a highly efficient GaAIAs infrared LED.

The PLA140L also contains a built-in load current limiting feature. This combined with low on-resistance and very high load current handling capabilities makes it suitable for a variety of high performance switching applications.

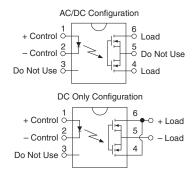
## **Approvals**

- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1175739
- EN/IEC 60950-1 Certified Component: TUV Certificate B 09 07 49410 004

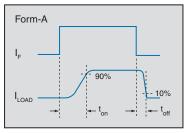
# **Ordering Information**

Part Number	Description
PLA140L	6-Pin DIP (50/Tube)
PLA140LS	6-Pin Surface Mount (50/Tube)
PLA140LSTR	6-Pin Surface Mount (1,000/Reel)

# **Pin Configuration**



#### Switching Characteristics of Normally Open Devices







# Absolute Maximum Ratings @ 25°C

Parameter	Ratings	Units
Blocking Voltage	400	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>	800	mW
Isolation Voltage, Input to Output	3750	V <sub>rms</sub>
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°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.

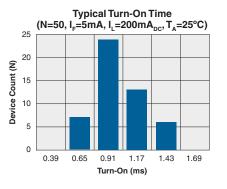
Derate linearly 1.33 mW / °C
Derate linearly 6.67 mW / °C

**Electrical Characteristics @ 25°C** 

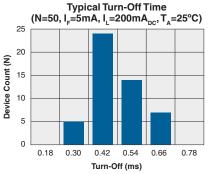
Parameter	Conditions	Symbol	Min	Тур	Max	Units
Output Characteristics						
Load Current (Continuous)						
AC/DC Configuration			-	-	200	
DC Configuration	-		-	-	350	– mA
Peak Load Current	t=10ms	I <sub>LPK</sub>	-	-	500	mA
On-Resistance						
AC/DC Configuration	I <sub>F</sub> =200mA		-	10	13	
DC Configuration	I <sub>F</sub> =350mA		3	4	Ω	
Off-State Leakage Current	V <sub>L</sub> =400V <sub>P</sub>	ILEAK	-	-	1	μΑ
Switching Speeds						
Turn-On	1 - 5mA = 1 - 10V	t <sub>on</sub>	-	-	5	mo
Turn-Off	I <sub>F</sub> =5mA, V <sub>L</sub> =10V	t <sub>off</sub>	-	-	3	– ms
Load Current Limit	I <sub>F</sub> =5mA, T <sub>A</sub> =25°C	I <sub>CL</sub>	240	-	380	mA
Output Capacitance	V <sub>L</sub> =50V, f=1MHz	C <sub>OUT</sub>	-	65	-	pF
Input Characteristics				I		
Input Control Current	I <sub>L</sub> =200mA	I <sub>F</sub>	-	-	5	mA
Input Dropout Current	-	I <sub>F</sub>	0.4	0.7	-	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	μΑ
Common Characteristics				1		
Capacitance, Input to Output	-	C <sub>I/O</sub>	-	3	-	pF

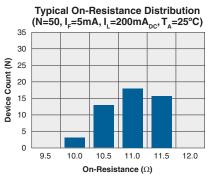


# PLA140L

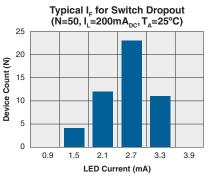


# **PERFORMANCE DATA\***



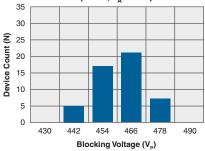


Typical I<sub>F</sub> for Switch Operation  $(N=50, I_{L}=200 \text{mA}_{DC}, T_{A}=25^{\circ}\text{C})$ 25 20 Device Count (N) 15 10 5 0 1.5 4.5 2.7 3.3 3.9 2.1 LED Current (mA)



**Typical Turn-On** 

35 40 45 50 **Typical Blocking Voltage Distribution** (N=50, T<sub>1</sub>=25°C)

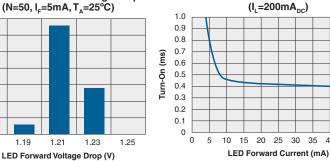


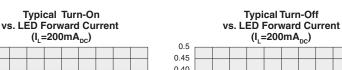
Typical LED Forward Voltage Drop  $(N=50, I_{F}=5mA, T_{A}=25°C)$ 35 30 Device Count (N) 25 20 15 10 5 0

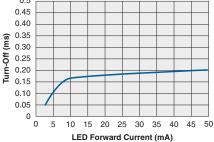
1.21

1.17

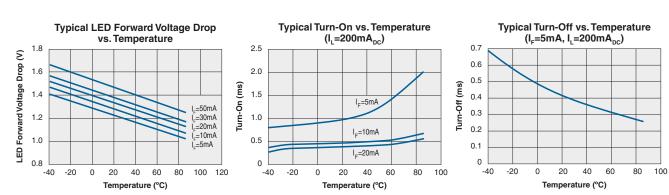
1.19







(I\_=200mA\_DC)

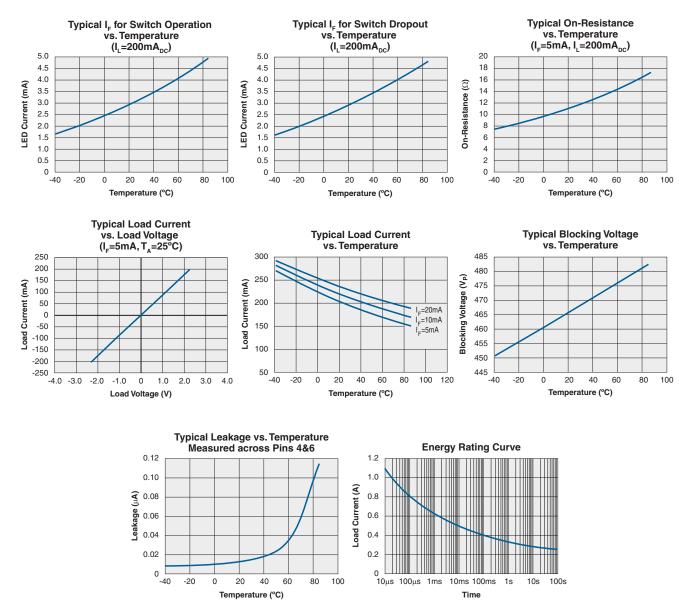


\*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.



PLA140L

### **PERFORMANCE DATA\***



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# **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
PLA140L / PLA140LS	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
PLA140L / PLA140LS	250°C for 30 seconds

#### **Board Wash**

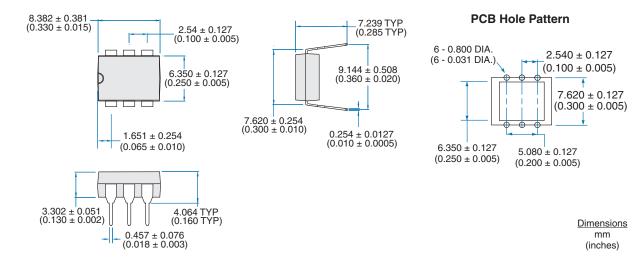
Clare recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since Clare employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a short drying bake could be necessary if a wash is used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



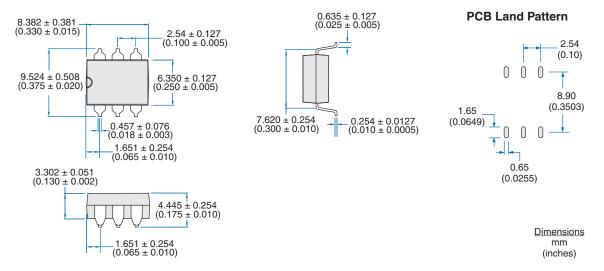


# **MECHANICAL DIMENSIONS**

**PLA140L** 



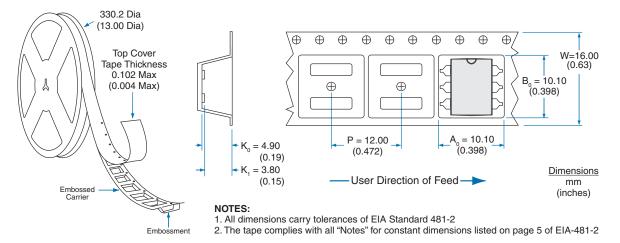
# PLA140LS





PLA140L

### PLA140LS Tape & Reel



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