



Parameter	Ratings	Units
Blocking Voltage	250	V <sub>p</sub>
Load Current	150	mA
Max R <sub>ON</sub>	20	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
- FCC Compatible
- VDE Compatible
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Surface Mount Tape & Reel Version Available

## Applications

- Telecommunications
  - Telecom Switching
  - Tip/Ring Circuits
  - Modem Switching (Laptop, Notebook, Pocket Size)
  - Hook Switch
  - Dial Pulsing
  - Ground Start
  - Ringing Injection
- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
  - Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Security
- Aerospace
- Industrial Controls

## Description

LCA120L is a current-limiting, 250V, 150mA, 20Ω, 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 GaAlAs infrared LED.

Use the LCA120L to replace mechanical relays because it offers the superior reliability associated with semiconductor devices. Since it has no moving parts, it can offer faster, bounce-free switching in a more compact surface mount or thru-hole package.

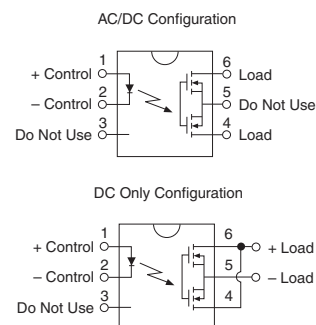
## Approvals

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

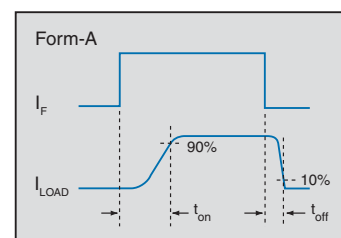
## Ordering Information

Part #	Description
LCA120L	6-Pin DIP (50/Tube)
LCA120LS	6-Pin Surface Mount (50/Tube)
LCA120LSTR	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	250	V <sub>P</sub>
Reverse Input Voltage	5	V
Input Control Current Peak (10ms)	50	mA
	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

<sup>1</sup> Derate Linearly 1.33 mW / °C

<sup>2</sup> Derate Linearly 6.67 mW / °C

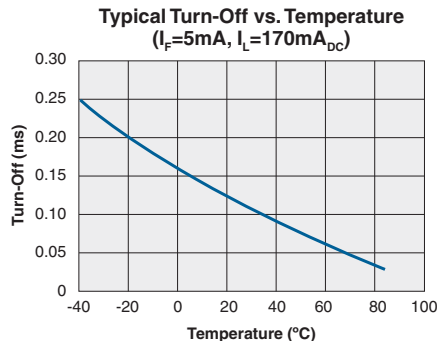
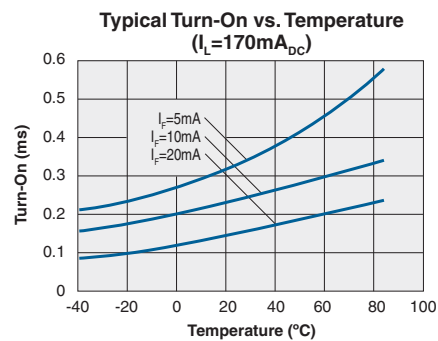
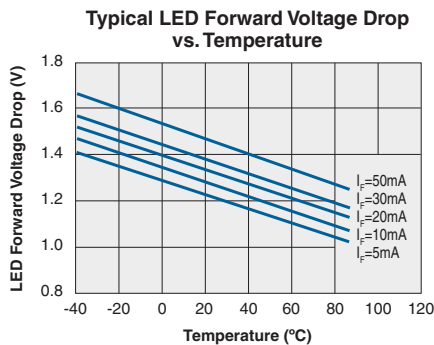
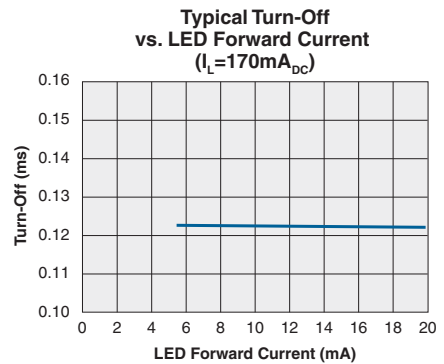
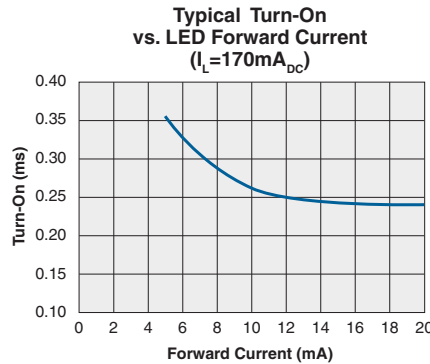
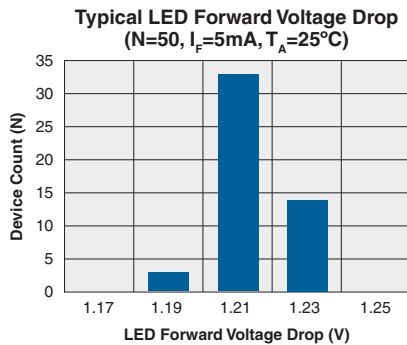
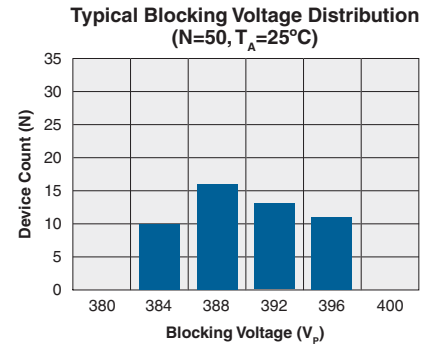
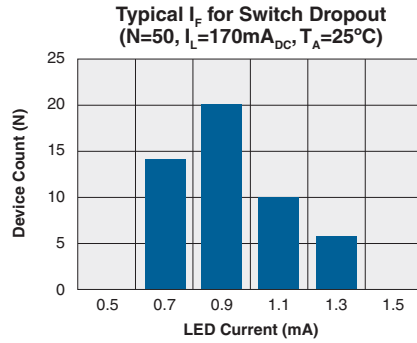
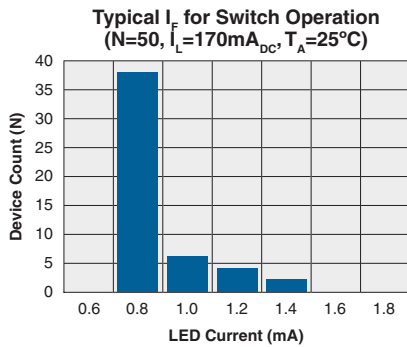
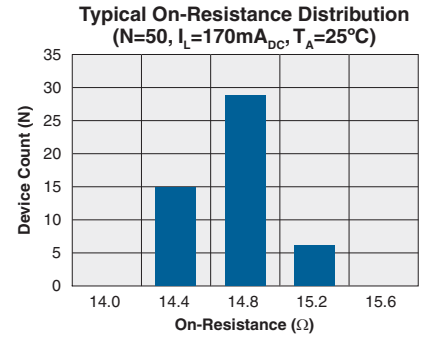
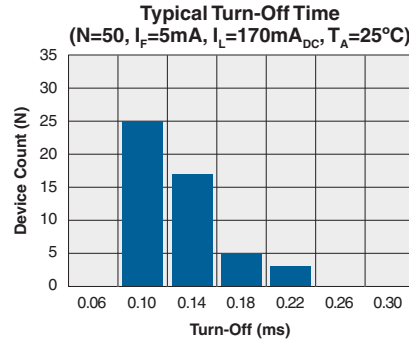
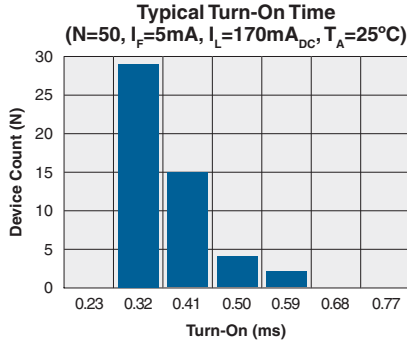
*Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.*

### Electrical Characteristics @ 25°C

Parameter	Conditions	Symbol	Min	Typ	Max	Units
<b>Output Characteristics</b>						
Load Current AC/DC Configuration, Continuous DC Configuration, Continuous	-	I <sub>L</sub>	-	-	150	mA
	-		-	-	200	
Load Current Limiting	-	I <sub>CL</sub>	190	235	280	mA
On-Resistance <sup>1</sup> AC/DC Configuration DC Configuration	I <sub>L</sub> =Load Current	R <sub>ON</sub>	-	15	20	Ω
	I <sub>L</sub> =Load Current		-	5	6	
Off-State Leakage Current	V <sub>L</sub> =250V <sub>P</sub>	I <sub>LEAK</sub>	-	-	1	μA
<b>Switching Speeds</b>						
Turn-On	I <sub>F</sub> = 5mA, V <sub>L</sub> = 10V	t <sub>on</sub>	-	-	3	ms
Turn-Off		t <sub>off</sub>	-	-	3	ms
Output Capacitance	V <sub>L</sub> =50V, f=1MHz	C <sub>OUT</sub>	-	50	-	pF
<b>Input Characteristics</b>						
Input Control Current	I <sub>L</sub> = Load Current	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	μA
<b>Common Characteristics</b>						
Capacitance, Input to Output	-	C <sub>I/O</sub>	-	3	-	pF

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

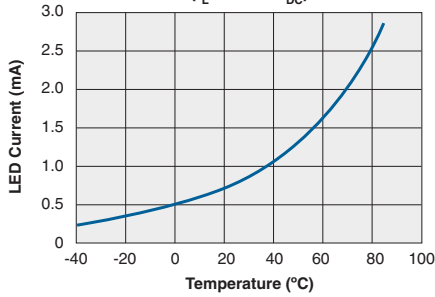
**PERFORMANCE DATA\***



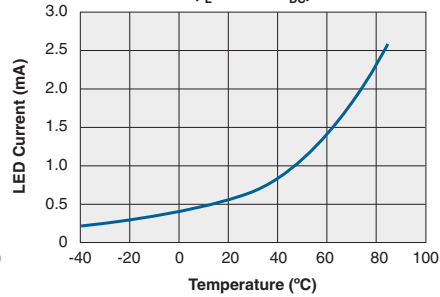
\*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

**PERFORMANCE DATA\***

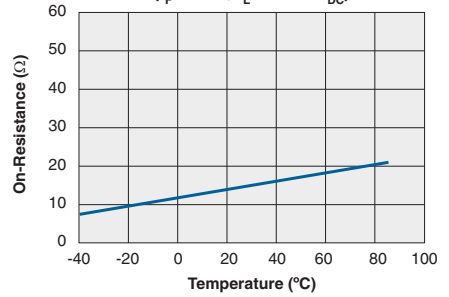
**Typical  $I_F$  for Switch Operation vs. Temperature**  
( $I_L=170mA_{DC}$ )



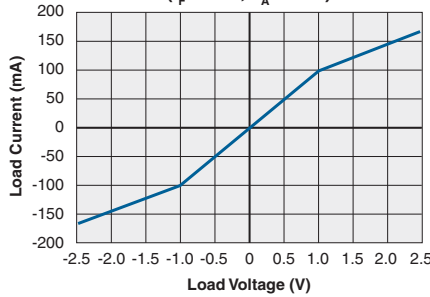
**Typical  $I_F$  for Switch Dropout vs. Temperature**  
( $I_L=170mA_{DC}$ )



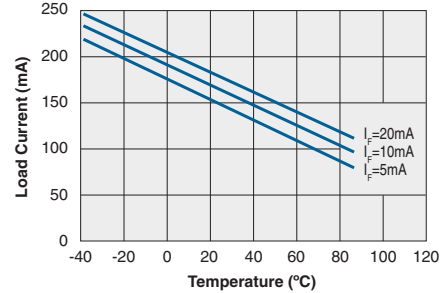
**Typical On-Resistance vs. Temperature**  
( $I_F=5mA, I_L=170mA_{DC}$ )



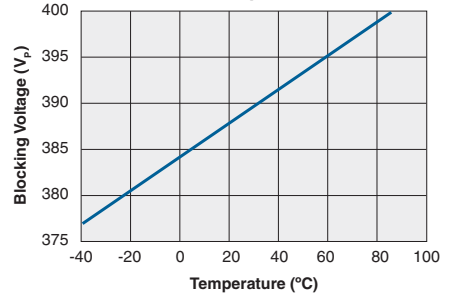
**Typical Load Current vs. Load Voltage**  
( $I_F=5mA, T_A=25°C$ )



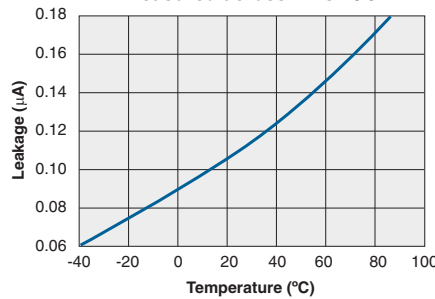
**Typical Load Current vs. Temperature**



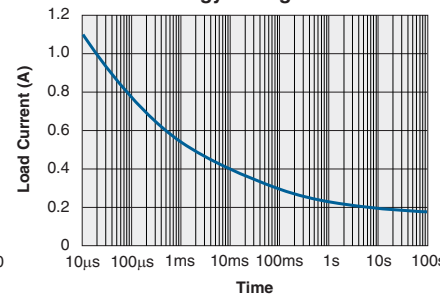
**Typical Blocking Voltage vs. Temperature**



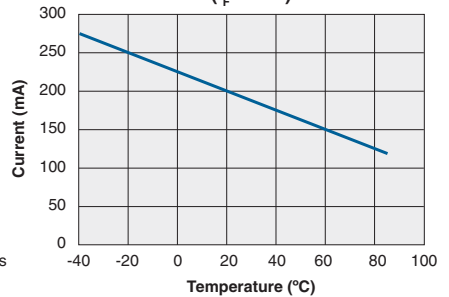
**Typical Leakage vs. Temperature Measured across Pins 4&6**



**Energy Rating Curve**



**Typical Current Limiting vs. Temperature**  
( $I_F=2mA$ )



\*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 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.

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
LCA120L / LCA120LS	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
LCA120L / LCA120LS	250°C for 30 seconds

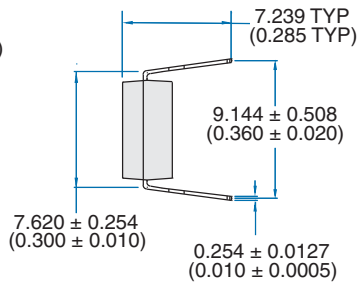
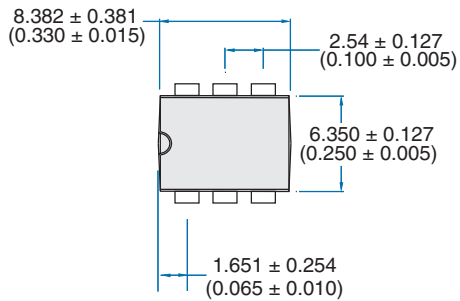
### Board Wash

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.

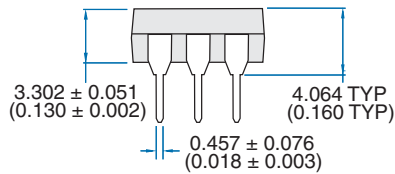
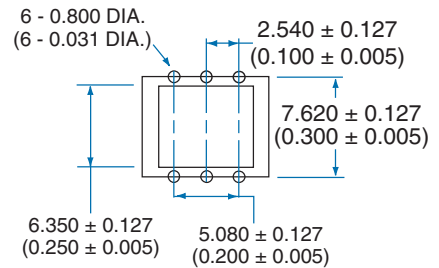


**MECHANICAL DIMENSIONS**

**LCA120L**

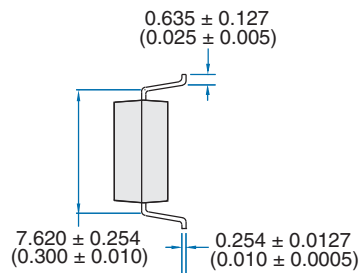
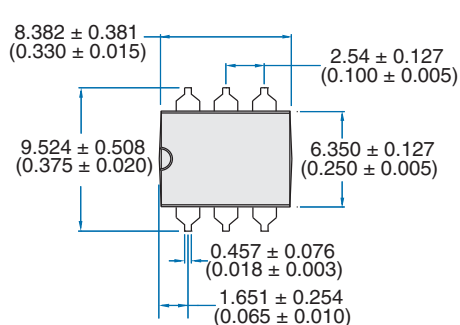


**PCB Hole Pattern**

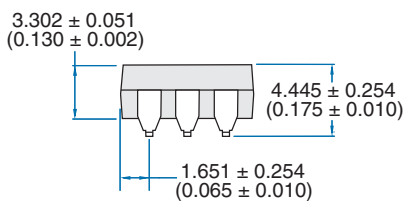
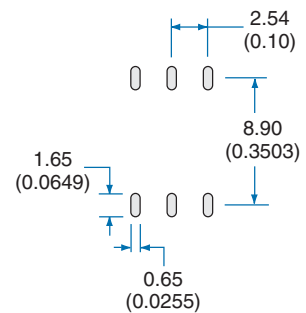


Dimensions  
mm  
(inches)

**LCA120LS**

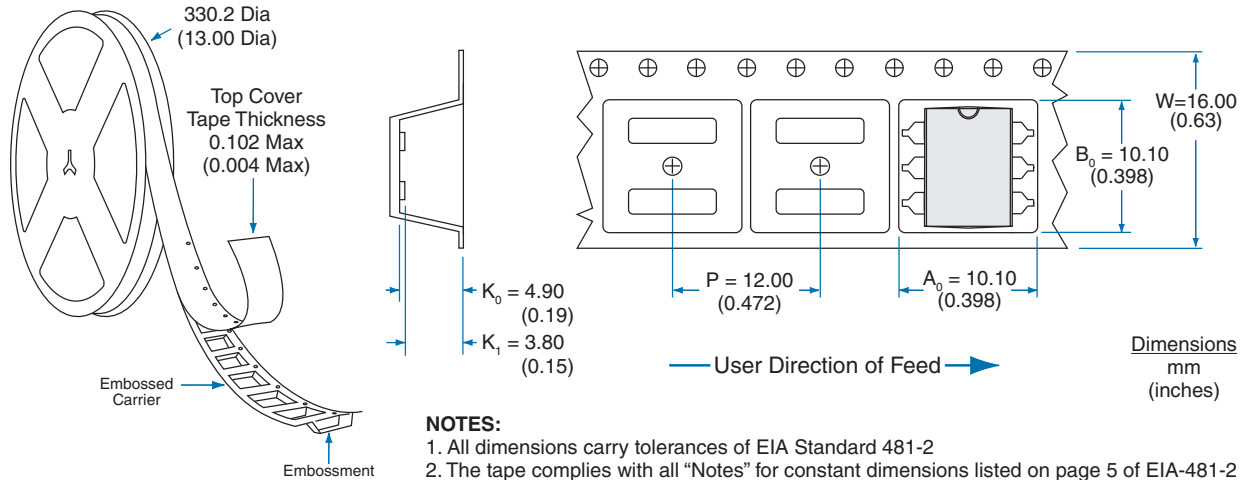


**PCB Land Pattern**



Dimensions  
mm  
(inches)

**LCA120LS Tape & Reel**



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