LCA120
Single Pole OptoMOS® Relay

	LCA120	Units
Blocking Voltage	250	V
Load Current	170	mA
Max On Resistance	20	Ω

Features
- Small 6 Pin Surface Mount and DIP Package
- Low Drive Power Requirements (TTL/CMOS Compatible)
- No Moving Parts
- High Reliability
- Arc-Free With No Snubbing Circuits
- 3750V_{rms} Input/Output Isolation
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Surface Mount and Tape & Reel Versions Available
- Flammability classification rating of V-0

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
The LCA120 is a 1-Form-A solid state relay which uses optically coupled MOSFET technology to provide 3750V_{rms} of input to output isolation. The efficient MOSFET switches and photovoltaic die use Clare's patented OptoMOS architecture. The optically-coupled input is controlled by a highly efficient GaAlAs infrared LED. the LCA120 can be used to replace mechanical relays and offers the superior reliability associated with semiconductor devices. Because they have no moving parts, they can offer faster, bounce-free switching in a more compact surface mount or through hole package.

Approvals
- UL Recognized: File Number E76270
- CSA Certified: File Number LR 43639-10
- Certified to: EN 60950, EN 41003, AS/NZS 3260, IEC 950

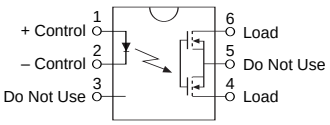
Ordering Information

Part #	Description
LCA120	6 Pin DIP (50/Tube)
LCA120S	6 Pin Surface Mount (50/Tube)
LCA120STR	6 Pin Surface Mount (1000/Reel)

Pin Configuration

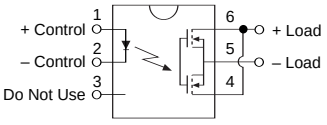
LCA120 Pinout

AC/DC Configuration

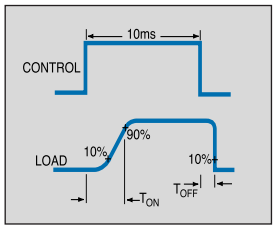


LCA120 Pinout

DC Only Configuration



Switching Characteristics of Normally Open (Form A) Devices



Absolute Maximum Ratings (@ 25° C)

Parameter	Ratings	Units
Blocking Voltage	250	V_P
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation	150[1]	mW
Total Power Dissipation	800[2]	mW
Isolation Voltage Input to Output	3750	V_{rms}
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C
Soldering Temperature DIP Package	+260	°C
Surface Mount Package (10 Seconds Max.)	+220	°C

[1] Derate Linearly 1.33 mw/°C

[2] Derate Linearly 6.67 mw/°C

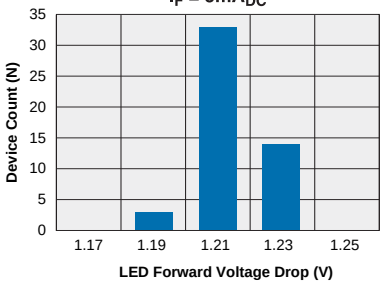
Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Electrical Characteristics

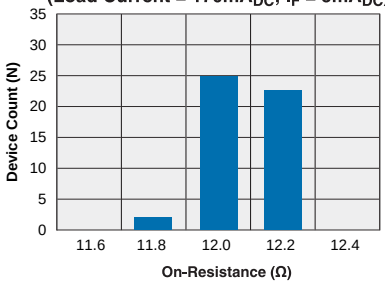
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics @ 25°C						
Load Current (Continuous) AC/DC Configuration	-	I_L	-	-	170	mA
DC Configuration	-	I_L	-	-	200	mA
Peak Load Current	10ms	I_{LPK}	-	-	350	mA
On-Resistance AC/DC Configuration	I_L=170 mA	R_{ON}	-	15	20	Ω
DC Configuration	I_L=200 mA	-	-	5	6	Ω
Off-State Leakage Current	V_L=250V	I_{LEAK}	-	-	1	µA
Switching Speeds Turn-On	I_F=5mA, V_L=10V	T_{ON}	-	-	3	ms
Turn-Off	I_F =5mA, V_L=10V	T_{OFF}	-	-	3	ms
Output Capacitance	50V; f=1MHz	C_{OUT}	-	50	-	pF
Input Characteristics @ 25°C						
Input Control Current	I_L=Load Current	I_F	5	-	-	mA
Input Dropout Current	-	I_F	0.4	0.7	-	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

PERFORMANCE DATA*

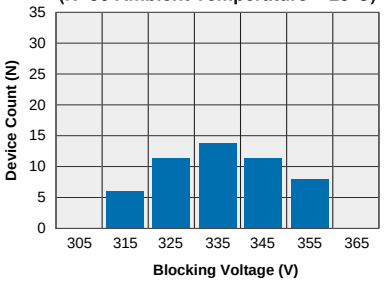
LCA120
Typical LED Forward Voltage Drop
(N=50 Ambient Temperature = 25°C)
I_F = 5mA$_{DC}$



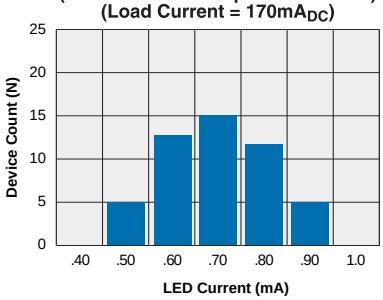
LCA120
Typical On-Resistance Distribution
(N=50 Ambient Temperature = 25°C)
(Load Current = 170mA$_{DC}$; I_F = 5mA$_{DC}$)



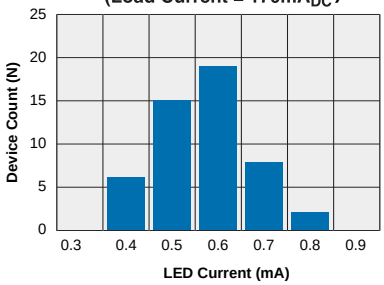
LCA120
Typical Blocking Voltage Distribution
(N=50 Ambient Temperature = 25°C)



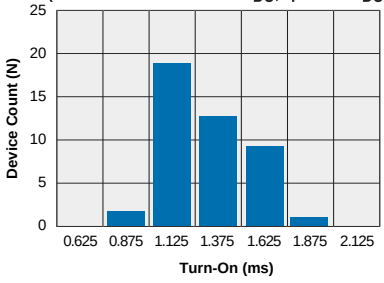
LCA120
Typical I_F for Switch Operation
(N=50 Ambient Temperature = 25°C)
(Load Current = 170mA$_{DC}$)



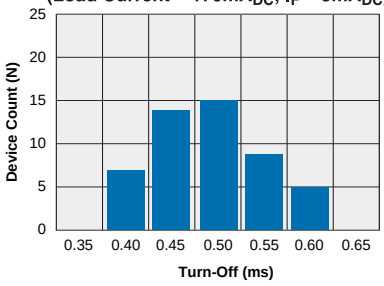
LCA120
Typical I_F for Switch Dropout
(N=50 Ambient Temperature = 25°C)
(Load Current = 170mA$_{DC}$)



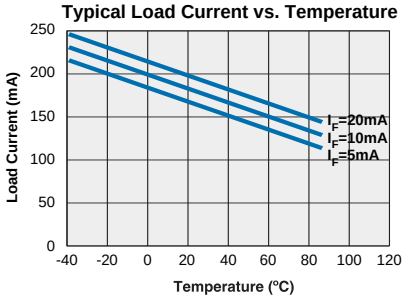
LCA120
Typical Turn-On Time
(N=50 Ambient Temperature = 25°C)
(Load Current = 170mA$_{DC}$; I_F = 5mA$_{DC}$)



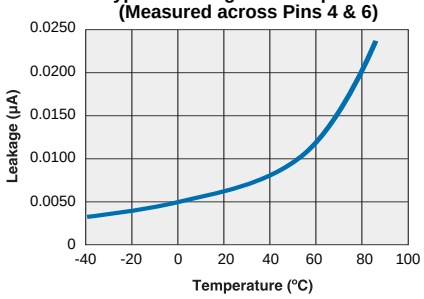
LCA120
Typical Turn-Off Time
(N=50 Ambient Temperature = 25°C)
(Load Current = 170mA$_{DC}$; I_F = 5mA$_{DC}$)



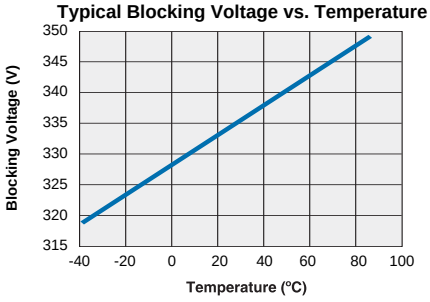
LCA120
Typical Load Current vs. Temperature



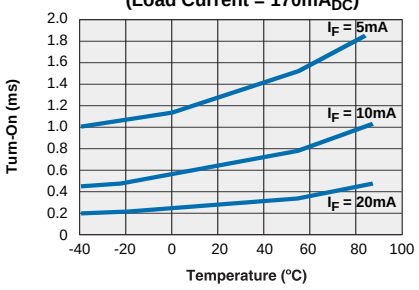
LCA120
Typical Leakage vs. Temperature
(Measured across Pins 4 & 6)



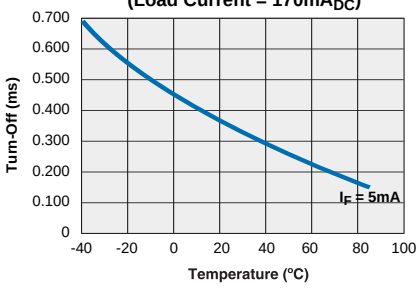
LCA120
Typical Blocking Voltage vs. Temperature



LCA120
Typical Turn-On vs. Temperature
(Load Current = 170mA$_{DC}$)



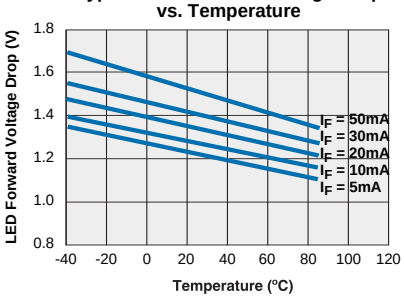
LCA120
Typical Turn-Off vs. Temperature
(Load Current = 170mA$_{DC}$)



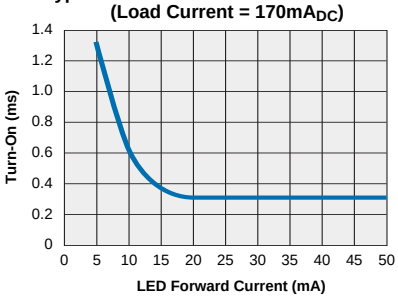
*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

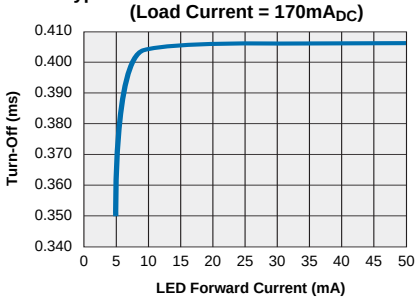
LCA120
Typical LED Forward Voltage Drop vs. Temperature



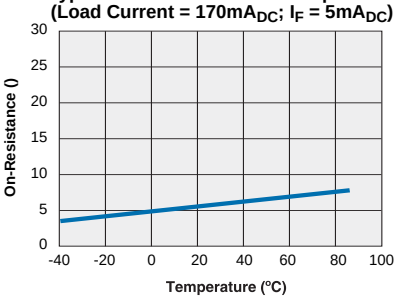
LCA120
Typical Turn-On vs.LED Forward Current (Load Current = 170mA$_{DC}$)



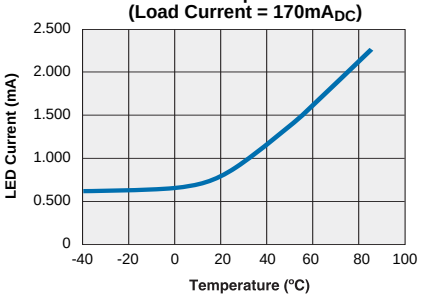
LCA120
Typical Turn-Off vs.LED Forward Current (Load Current = 170mA$_{DC}$)



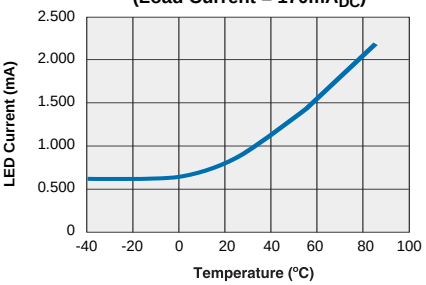
LCA120
Typical On-Resistance vs. Temperature (Load Current = 170mA$_{DC}$; I$_F$ = 5mA$_{DC}$)



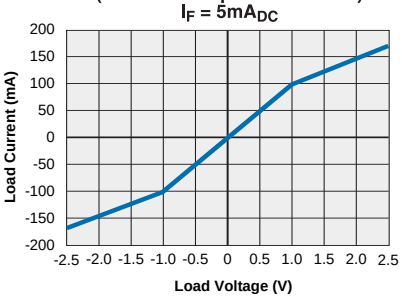
LCA120
Typical I$_F$ for Switch Operation vs. Temperature (Load Current = 170mA$_{DC}$)



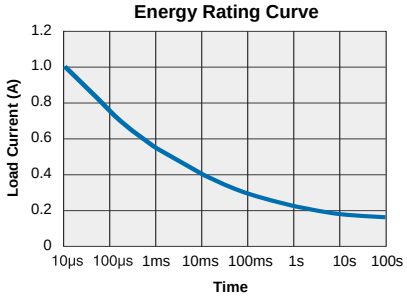
LCA120
Typical I$_F$ for Switch Dropout vs. Temperature (Load Current = 170mA$_{DC}$)



LCA120
Typical Load Current vs. Load Voltage (Ambient Temperature = 25°C) I$_F$ = 5mA$_{DC}$



LCA120
Energy Rating Curve



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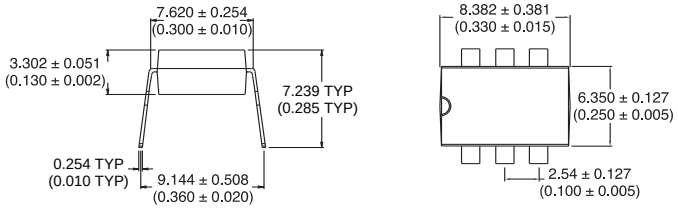
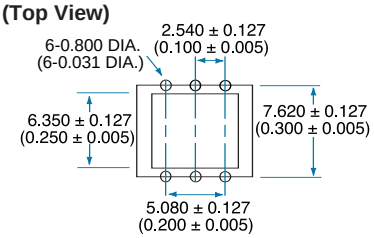
MECHANICAL DIMENSIONS

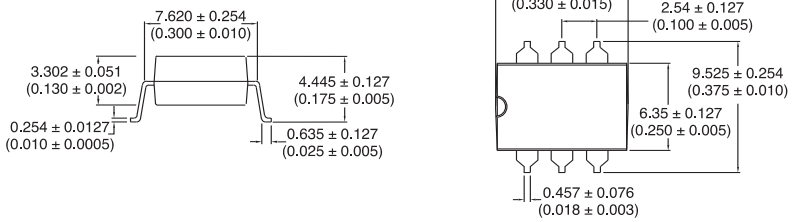
6Pin DIP Through Hole (Standard)



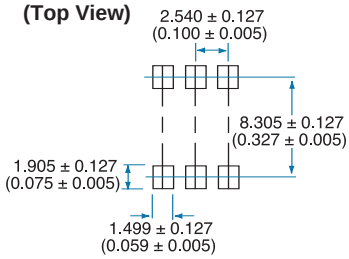
PC Board Pattern (Top View)



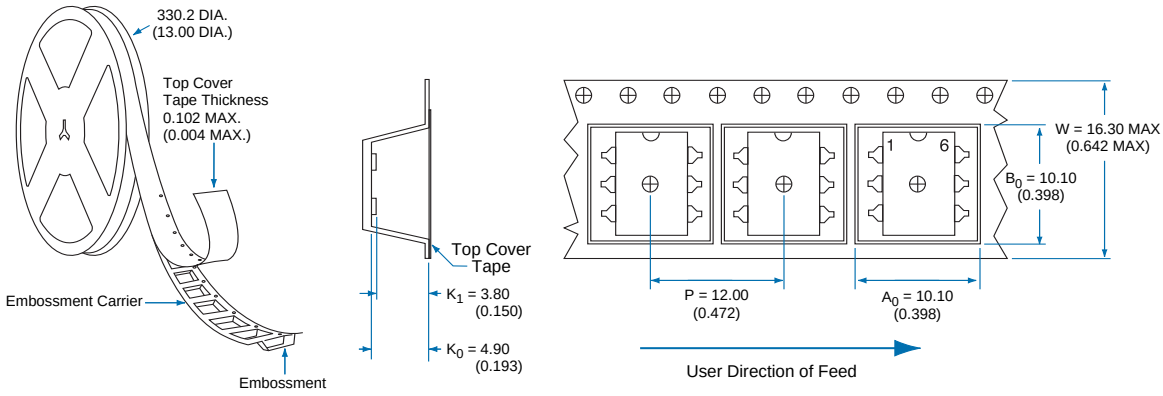
6Pin Surface Mount ("S" Suffix)



PC Board Pattern (Top View)



Tape and Reel Packaging for 6 Pin Surface Mount Package



Dimensions:
mm
(inches)

For additional information please visit our website at: www.clare.com

Specification: DS-LCA120-R09.2

9/29/04