# LDA102
## Unidirectional-Input, Single-Transistor Output Optocoupler

| Parameter | Rating | Units |
|---|---|---|
| Breakdown Voltage | 30 | $V_P$ |
| Current Transfer Ratio (Minimum) | 50 | % |
| Saturation Voltage | 0.5 | V |
| Input Control Current | 1 | mA |

## Features

- Small 6-Pin Package, Thru-Hole or Surface Mount
- 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 Tape & Reel Version Available

## Applications

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

## Description

The LDA102 is a unidirectional-input optocoupler with a single transistor output. Optically coupled technology provides a $3750V_{rms}$ isolation barrier between the input and the output.

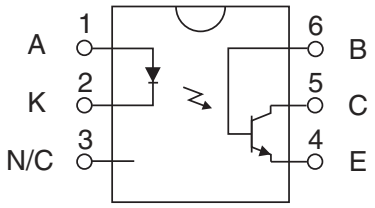
## Approvals

- UL Recognized Component: File # E76270
- EN/IEC 60950-1 Compliant

## Ordering Information

| Part Number | Description |
|---|---|
| LDA102 | 6-Pin DIP (50/Tube) |
| LDA102S | 6-Pin Surface Mount (50/Tube) |
| LDA102STR | 6-Pin Surface Mount (1000/Reel) |

## Pin Configuration



## Absolute Maximum Ratings

| Parameter | Ratings | Units |
|---|---|---|
| Breakdown Voltage | 30 | $V_P$ |
| Reverse Input Voltage | 5 | V |
| Input Control Current | 50 | mA |
| Peak (10ms) | 1 | A |
| Power Dissipation | | |
| Input [1] | 150 | mW |
| Phototransistors [2] | 150 | |
| Isolation Voltage Input to Output | 3750 | $V_{rms}$ |
| Operational Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +125 | °C |

[1] Derate Linearly 1.33 mW/°C
[2] Derate Linearly 2.0 mW/°C

Electrical absolute maximum ratings are at 25°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.*

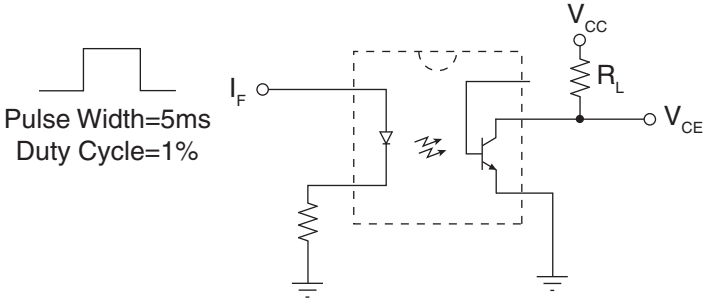
## Electrical Characteristics

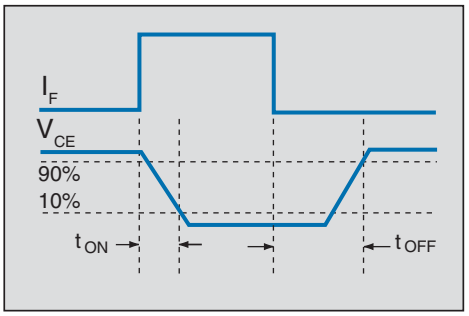
| Parameters | Conditions | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Output Characteristics @ 25°C (unless otherwise noted)** | | | | | | |
| Phototransistor Breakdown Voltage | $I_C$=10µA | $BV_{CEO}$ | 30 | - | - | V |
| Phototransistor Dark Current | $V_{CE}$=5V, $I_F$=0mA | $I_{CEO}$ | - | - | 500 | nA |
| Saturation Voltage | $I_C$=2mA, $I_F$=1mA | $V_{CEsat}$ | - | - | 0.5 | V |
| Current Transfer Ratio | $I_F$=1mA, $V_{CE}$=0.5V | CTR | 50 | 350 | - | % |
| Output Capacitance | 25V, f=1MHz | $C_{OUT}$ | - | 6 | - | pF |
| **Input Characteristics @ 25°C** | | | | | | |
| Input Control Current | $I_C$=2mA, $V_{CE}$=0.5V | $I_F$ | - | - | 1 | mA |
| Input Voltage Drop | $I_F$=5mA | $V_F$ | 0.9 | 1.2 | 1.4 | V |
| **Common Characteristics @ 25°C** | | | | | | |
| Input to Output Capacitance | - | $C_{I/O}$ | - | 3 | - | pF |

## Switching Characteristics @ 25°C

| Characteristic | Symbol | Test Condition | Typ | Units |
|---|---|---|---|---|
| Turn-On Time | $t_{ON}$ | $V_{CC}$=5V, $I_F$=2mA, $R_L$=1KΩ | 7 | µs |
| Turn-Off Time | $t_{OFF}$ | | 20 | |

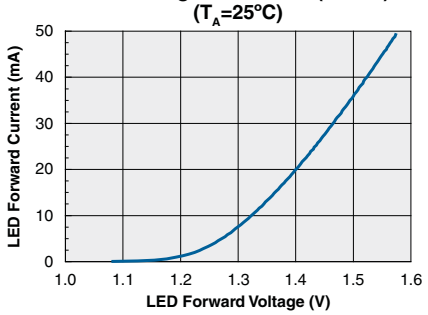
Switching Time Test Circuit



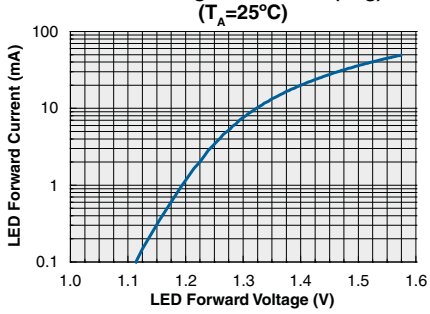



## PERFORMANCE DATA*

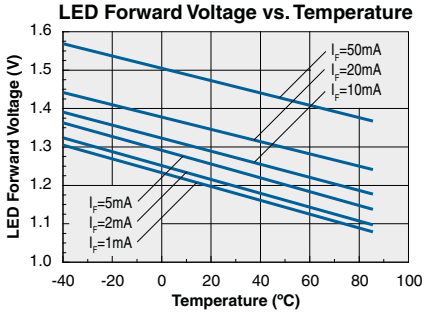
**LDA102**
**LED Voltage vs. Current (Linear)**
**($T_A$=25°C)**



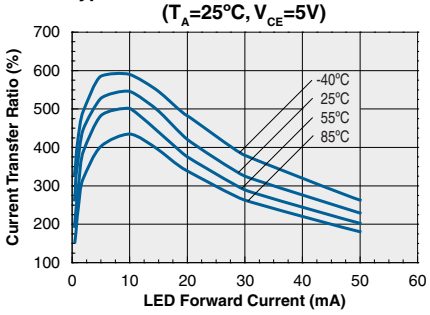

**LDA102**
**LED Voltage vs. Current (Log)**
**($T_A$=25°C)**



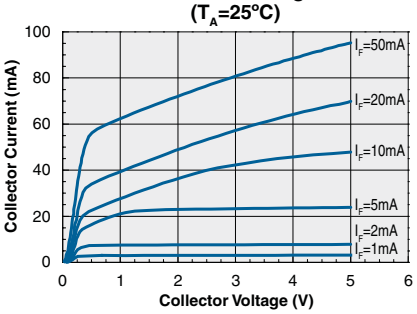

**LDA102**
**LED Forward Voltage vs. Temperature**



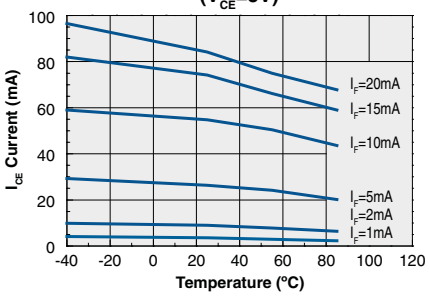

**LDA102**
**Typical CTR vs. LED Forward Current**
**($T_A$=25°C, $V_{CE}$=5V)**



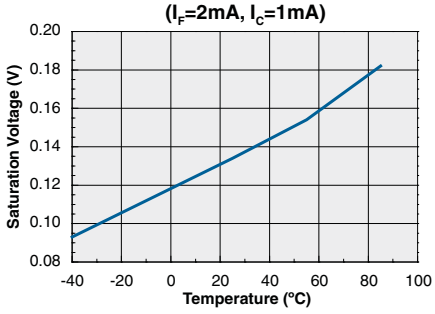

**LDA102**
**Typical Collector Current vs.**
**Collector Voltage**
**($T_A$=25°C)**



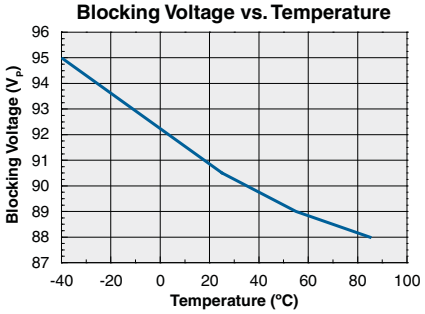

**LDA102**
**$I_{CE}$ Current vs. Temperature**
**($V_{CE}$=5V)**



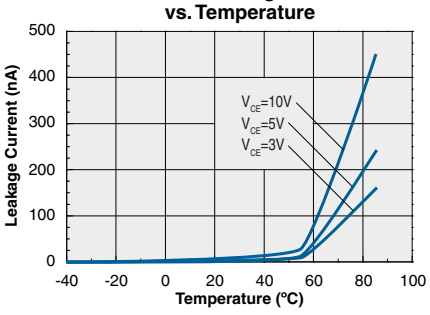

**LDA102**
**Saturation Voltage vs. Temperature**
**($I_F$=2mA, $I_C$=1mA)**



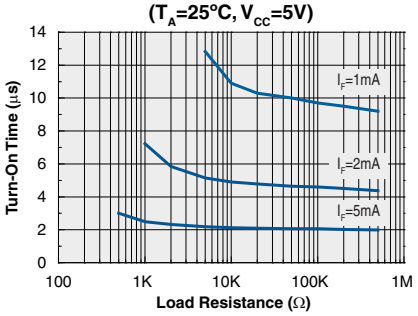

**LDA102**
**Blocking Voltage vs. Temperature**



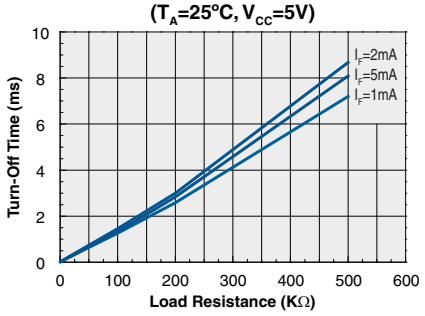

**LDA102**
**Collector Leakage Current**
**vs. Temperature**




**LDA102**
**Turn-On Time vs. Load Resistance**
**($T_A$=25°C, $V_{CC}$=5V)**




**LDA102**
**Turn-Off Time vs. Load Resistance**
**($T_A$=25°C, $V_{CC}$=5V)**




*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.

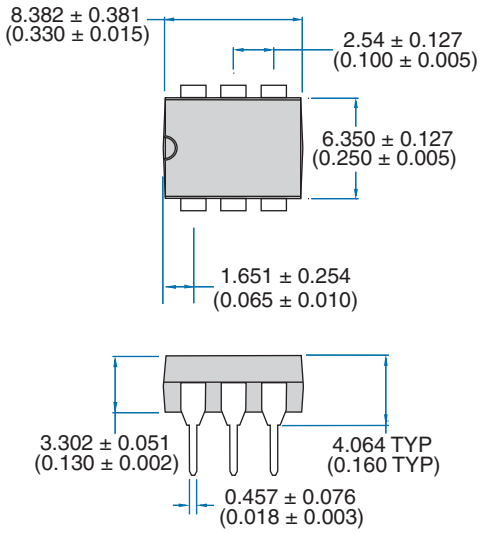
## Manufacturing Information

**Soldering**
For proper assembly, the component must be processed in accordance with the current revision of IPC/JEDEC standard J-STD-020. Failure to follow the recommended guidelines may cause permanent damage to the device resulting in impaired performance and/or a reduced lifetime expectancy.

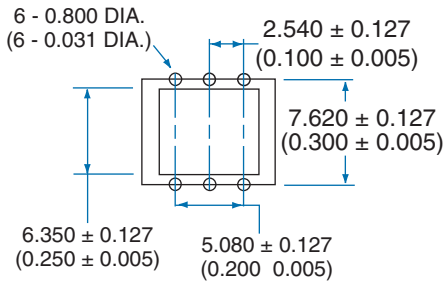
**Washing**
Clare does not recommend ultrasonic cleaning or the use of chlorinated solvents.

## MECHANICAL DIMENSIONS

### 6-Pin DIP Thru-Hole Package

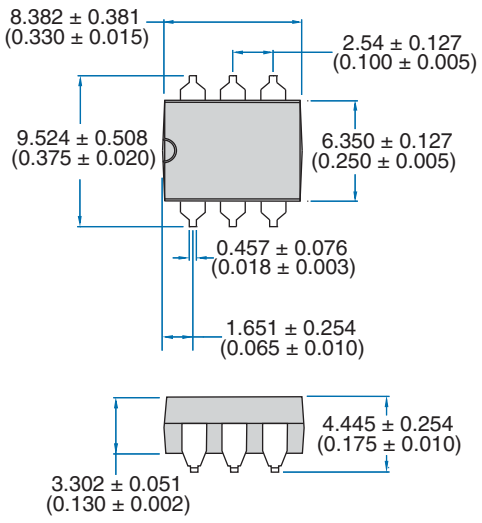



### PC Board Pattern

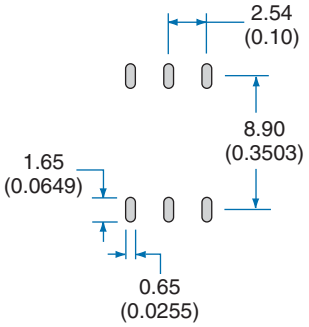



Dimensions
mm
(inches)

### 6-Pin Surface Mount Package ("S" Suffix)

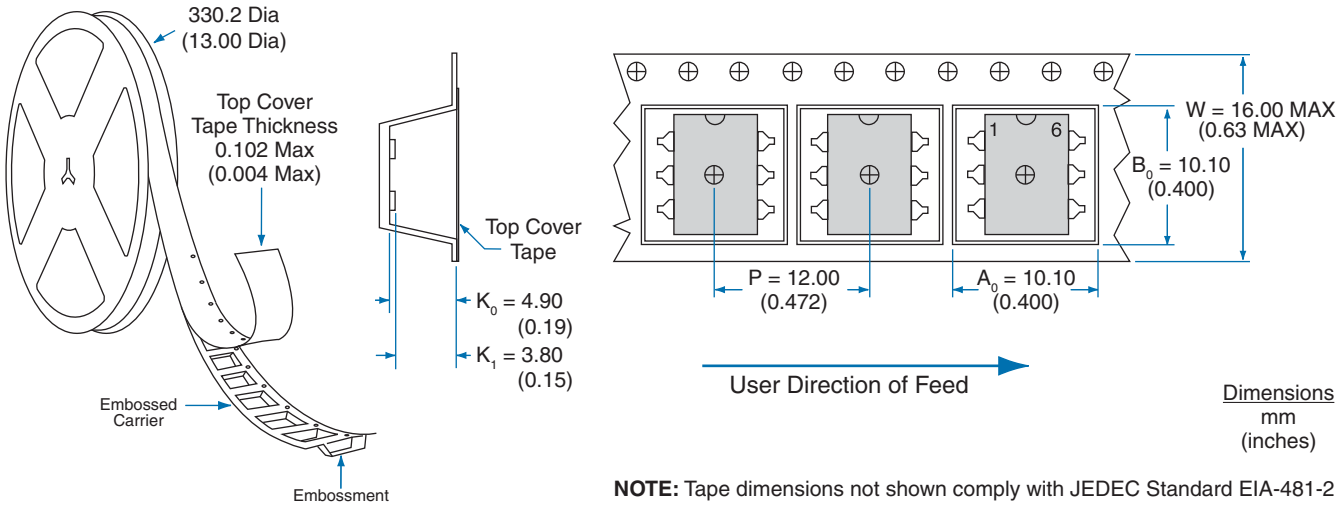



### Recommended PCB Land Pattern




Dimensions
mm
(inches)

## Tape and Reel Packaging for 6-Pin “R” and “S” Suffix Parts




Dimensions
mm
(inches)

**NOTE:** Tape dimensions not shown comply with JEDEC Standard EIA-481-2

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Specification: DS-LDA102-R01
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2/26/08