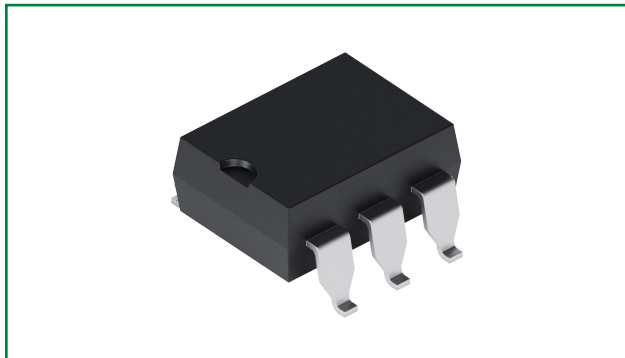


# LCA110

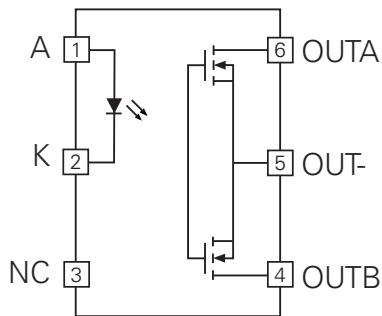
350V, 120mA 1-Form-A SSR

## Key Attributes

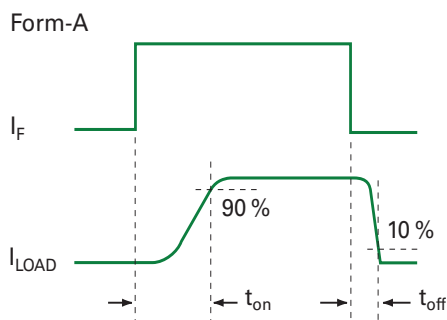
Characteristic	Rating	Unit
Blocking Voltage	350	V <sub>P</sub>
Load Current	120	mA <sub>RMS</sub> /mA <sub>DC</sub>
On-resistance (max.)	35	Ω
LED Current to Operate	2	mA



## Pin Configuration



## Switching Characteristics of Normally Open Device



## Description



The LCA110 is a normally open (1-Form-A) Solid State Relay which uses optically coupled MOSFET technology to provide 3750V<sub>RMS</sub> of input to output isolation.

Its optically coupled outputs, which use OptoMOS architecture, are controlled by a highly efficient infrared LED.

The LCA110 can be used to replace mechanical relays, and offers the superior reliability associated with semiconductor devices.

## Features

- 3750V<sub>RMS</sub> Input/Output Isolation
- Small 6-Pin Package
- Low Drive Power Requirements
- High Reliability
- No EMI/RFI Generation
- Immune to Radiated EM Fields
- V-0 Flammability Classification Rating

## Applications

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

## Approvals

- UL 1577 Recognized Component: File E76270
- CSA Certified Component: Certificate # 1175739
- TUV EN 62368-1: Certificate # B 082667 0008

## Ordering Information

Part Number	Description
LCA110	6-PIN DIP (50/Tube)
LCA110S	6-Pin Surface Mount (50/Tube)
LCA110STR	6-Pin Surface Mount (1,000/Reel)

## Specifications

### Absolute Maximum Ratings

Parameter	Ratings	Units
Blocking Voltage	350	V <sub>P</sub>
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10 ms)	1	A
Input Power Dissipation <sup>1</sup>	150	mW
Total Power Dissipation <sup>2</sup>	800	
Isolation Voltage, Input to Output	3750	V <sub>RMS</sub>
Operational Temperature, Ambient	−40 to +85	°C
Storage Temperature	−40 to +125	

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

<sup>2</sup> Derate output power 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.

Typical values are characteristic of the device at +25 °C, and are the result of engineering evaluations. They are provided for information purposes only, and are not part of the manufacturing testing requirements.

### Electrical Characteristics @ 25 °C

Parameter	Conditions	Symbol	Value			Units
			Minimum	Typical	Maximum	

#### Output Characteristics

Blocking voltage	I <sub>L</sub> = 1 μA	V <sub>DRM</sub>	350	—	—	V <sub>P</sub>
Load current:						
Continuous, AC/DC Configuration	—	I <sub>L</sub>	—	—	120	mA <sub>RMS</sub> /mA <sub>DC</sub>
Continuous, DC Configuration	—		—	—	200	
Peak	t = 10 ms	I <sub>LPK</sub>	—	—	±350	mA <sub>P</sub>
On-resistance <sup>1</sup>						
AC/DC Configuration	I <sub>L</sub> = 120 mA	R <sub>ON</sub>	—	23	35	Ω
DC Configuration	I <sub>L</sub> = 200 mA		—	7	10	
Off-state leakage current	V <sub>L</sub> = 350 V <sub>P</sub>	I <sub>LEAK</sub>	—	—	1	μA
Switching speeds:						
Turn-on	I <sub>F</sub> = 5 mA, V <sub>L</sub> = 10 V	t <sub>on</sub>	—	—	3	ms
Turn-off		t <sub>off</sub>	—	—	3	
Output capacitance	I <sub>F</sub> = 0 mA, V <sub>L</sub> = 50 V, f = 1 MHz	C <sub>OUT</sub>	—	25	—	pF

#### Input Characteristics

Input control current to activate	I <sub>L</sub> = 120 mA	I <sub>F</sub>	—	—	2	mA
Input control current to deactivate	—	I <sub>F</sub>	0.1	—	—	
Input voltage drop to deactivate	—	V <sub>F</sub>	0.8	—	—	V
Input voltage drop	I <sub>F</sub> = 5 mA	V <sub>F</sub>	0.9	1.36	1.5	
Reverse input current	V <sub>R</sub> = 5 V	I <sub>R</sub>	—	—	10	μA

#### Common Characteristics

Capacitance, input to output	V <sub>IO</sub> = 0 V, f = 1 MHz	C <sub>IO</sub>	—	3	—	pF
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<sup>1</sup> Measurement taken within 1 second of on-time.

## Load Configuration Methods

The diagrams below show load connection methods based on selected application circuit option.

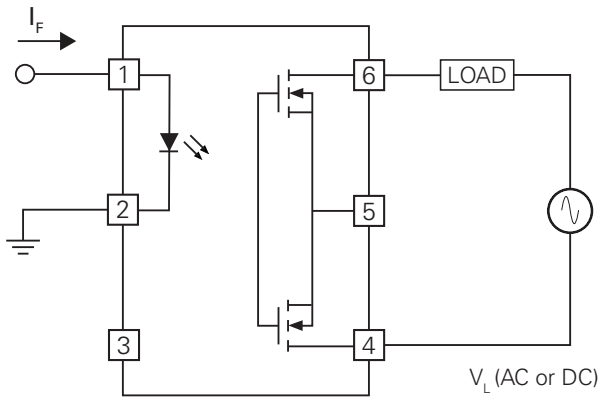


Figure 1. AC/DC, Bidirectional Load Configuration

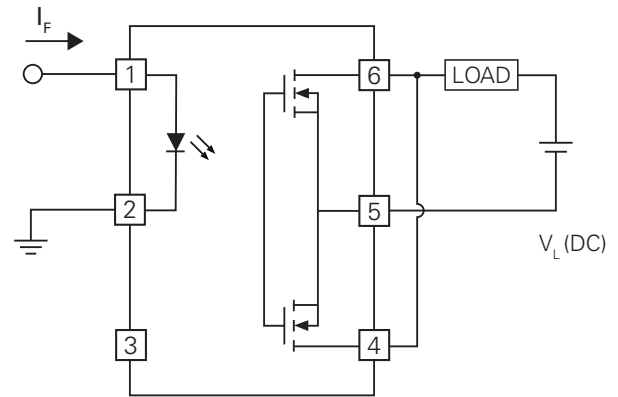
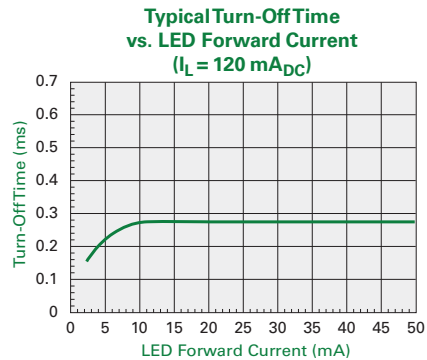
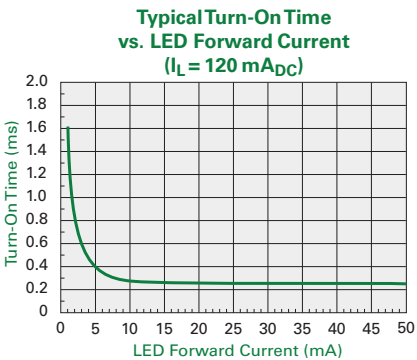
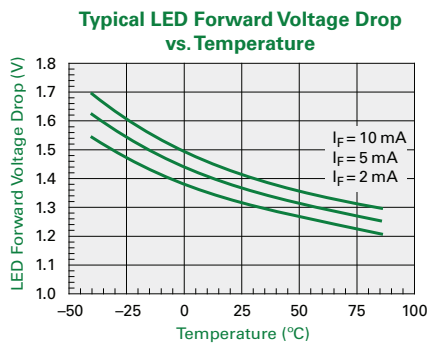
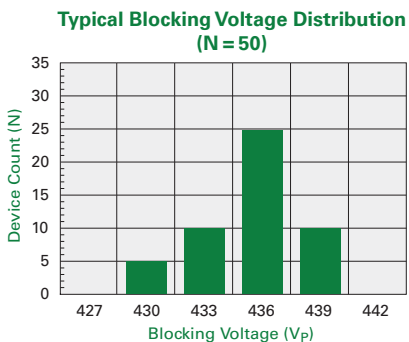
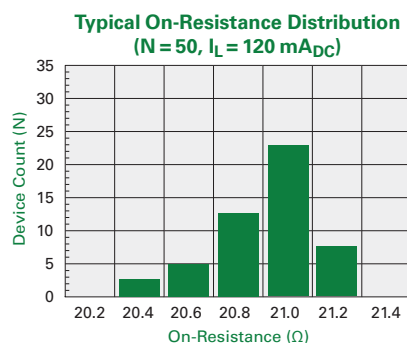
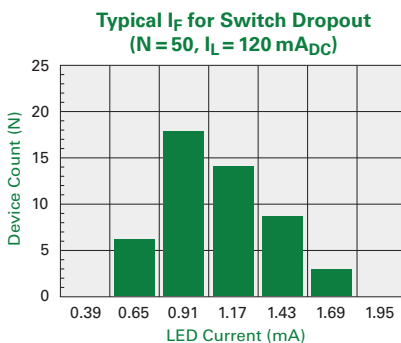
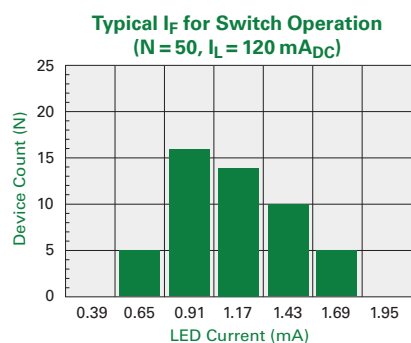
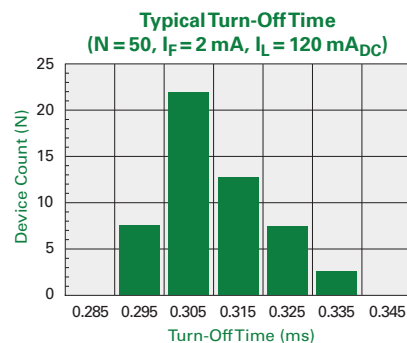
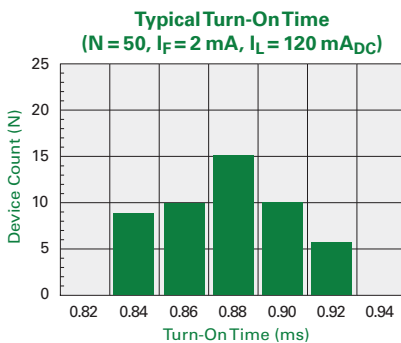
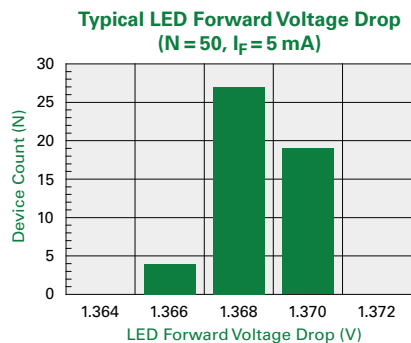


Figure 2. DC, Unidirectional Load Configuration

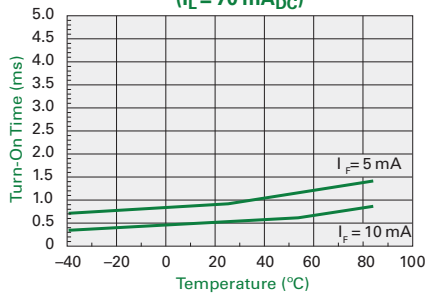
## Characteristic Curves



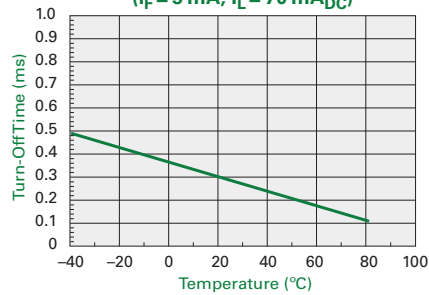
\*Unless otherwise noted, data presented in these graphs is typical of device operation at  $T_A = 25^\circ\text{C}$ .

## Characteristic Curves

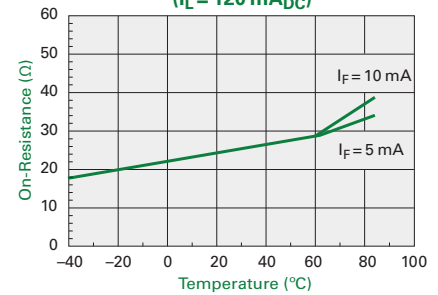
Typical Turn-On Time  
vs. Temperature  
( $I_L = 70 \text{ mA}_{DC}$ )



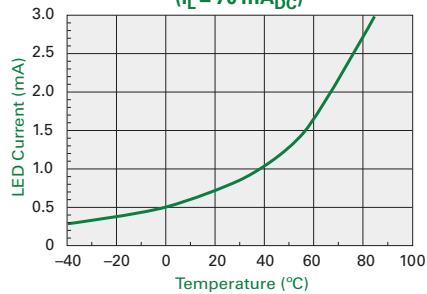
Typical Turn-Off Time  
vs. Temperature  
( $I_F = 5 \text{ mA}$ ,  $I_L = 70 \text{ mA}_{DC}$ )



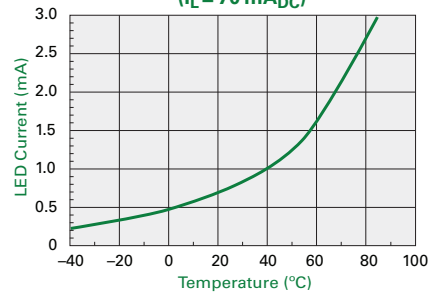
Typical Steady State  
On-Resistance vs. Temperature  
( $I_L = 120 \text{ mA}_{DC}$ )



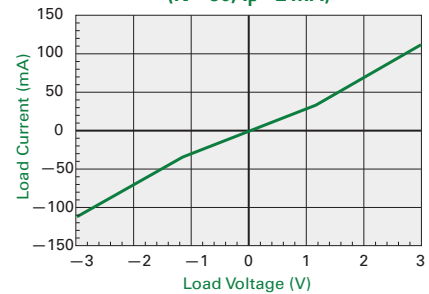
Typical  $I_F$  for Switch Operation  
vs. Temperature  
( $I_L = 70 \text{ mA}_{DC}$ )



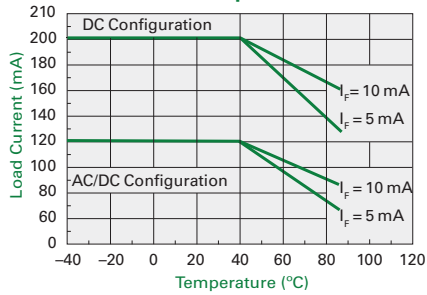
Typical  $I_F$  for Switch Dropout  
vs. Temperature  
( $I_L = 70 \text{ mA}_{DC}$ )



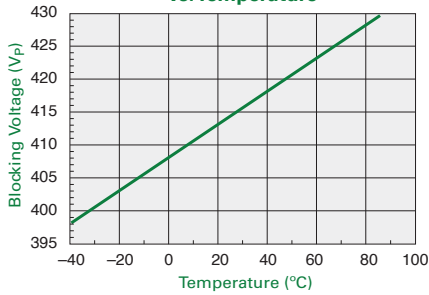
Typical Load Current vs. Load Voltage  
( $N = 50$ ,  $I_F = 2 \text{ mA}$ )



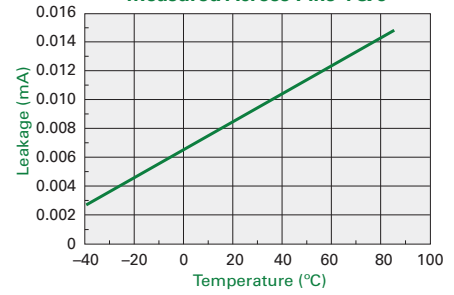
Maximum Load Current  
vs. Temperature



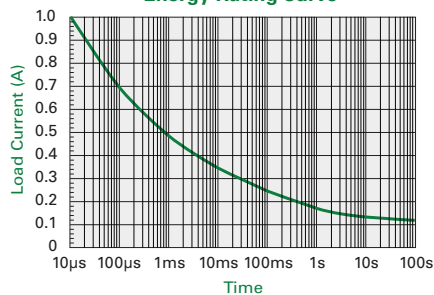
Typical Blocking Voltage  
vs. Temperature



Typical Leakage vs. Temperature  
Measured Across Pins 4 & 6



Energy Rating Curve



\*Unless otherwise noted, data presented in these graphs is typical of device operation at  $T_A = 25^\circ\text{C}$ .

## Manufacturing Information

### Moisture Sensitivity



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. Littelfuse classifies 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)** classification 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) Classification
LCA110S	MSL 1

### ESD Sensitivity



This product is ESD Sensitive, and should be handled according to the industry standard **JESD-625**.

### Soldering Profile

Provided in the table below is the **IPC/JEDEC J-STD-020** Classification Temperature ( $T_C$ ) and the maximum dwell time ( $T_C - 5^\circ\text{C}$ ). The Classification Temperature sets the Maximum Body Temperature allowed for these devices during reflow soldering processes.

Device	Classification Temperature ( $T_C$ )	Dwell Time ( $T_P$ )	Max Reflow Cycles
LCA110S	250°C	30 seconds	3

For through-hole devices, the maximum pin temperature and maximum dwell time through all solder waves is provided in the table below. Dwell time is the interval beginning when the pins are initially immersed into the solder wave until they exit the solder wave. For multiple waves, the dwell time is from entering the first wave until exiting the last wave. During this time, pin temperatures must not exceed the maximum temperature given in the table below. Body temperature of the device must not exceed the limit shown in the table below at any time during the soldering process.

Device	Maximum Pin Temperature	Maximum Body Temperature	Maximum Dwell Time	Wave Cycles
LCA110S	260°C	250°C	10 seconds*	1

\*Total cumulative duration of all waves.

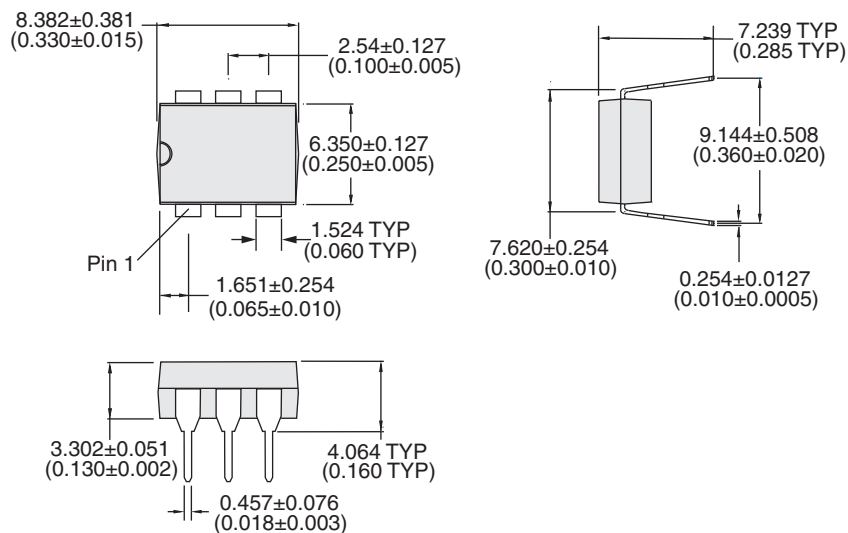
### Board Wash

Littelfuse recommends the use of no-clean flux formulations. Board washing to reduce, or remove flux residue following the solder reflow process is acceptable, provided proper precautions are taken to prevent damage to the device. These precautions include, but are not limited to: Using a low pressure wash and providing a follow-up bake cycle sufficient to remove any moisture trapped within the device, due to the washing process. Due to the variability of the wash parameters used to clean the board, determination of the bake temperature and duration necessary to remove the moisture trapped within the package is the responsibility of the user (assembler). Cleaning, or drying methods that employ ultrasonic energy may damage the device and should not be used. Additionally, the device must not be exposed to halide flux or solvents.

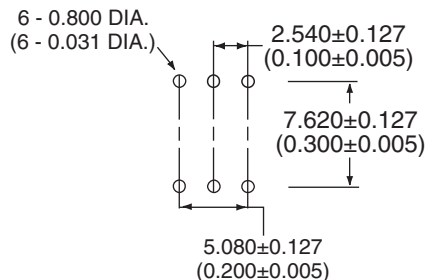


## Mechanical Dimensions

LCA110



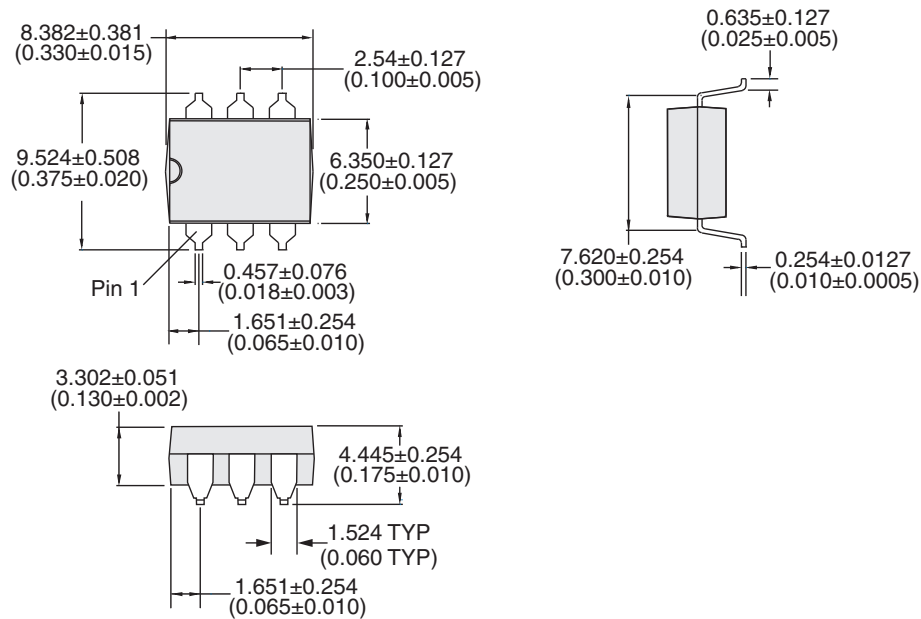
PCB Hole Pattern



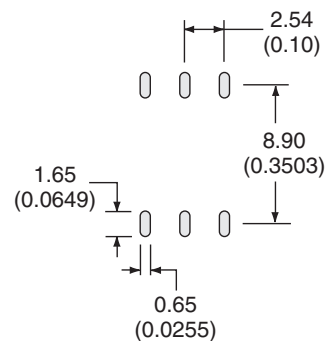
Controlling dimension: inches

Dimensions  
mm  
(inches)

LCA110S



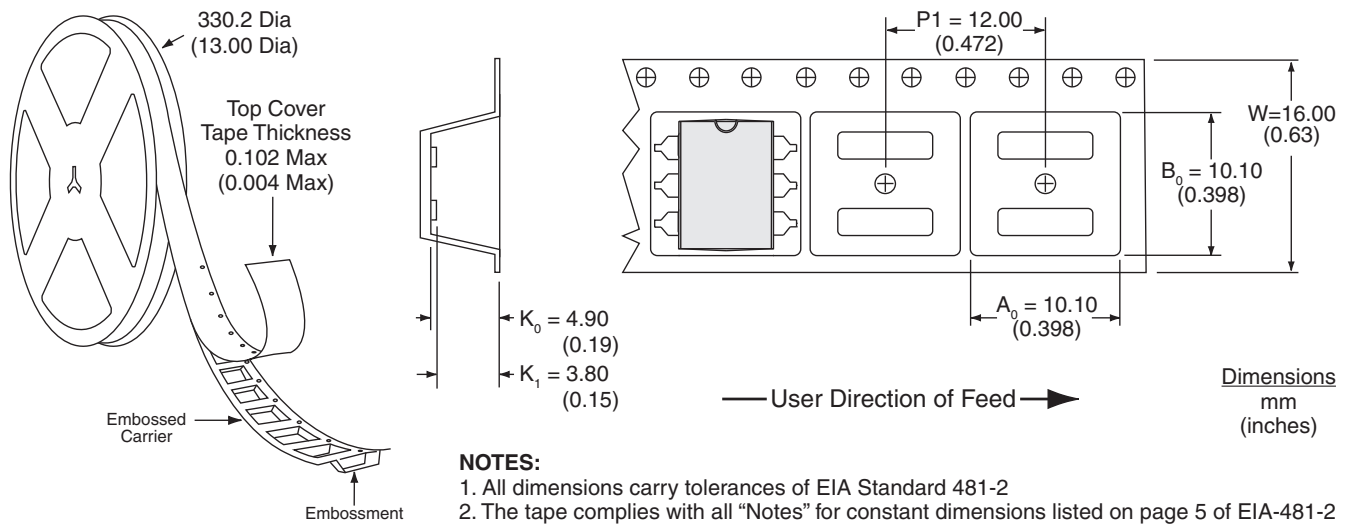
PCB Land Pattern



Controlling dimension: inches

Dimensions  
mm  
(inches)

## LCA110STR Tape and Reel Packaging



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