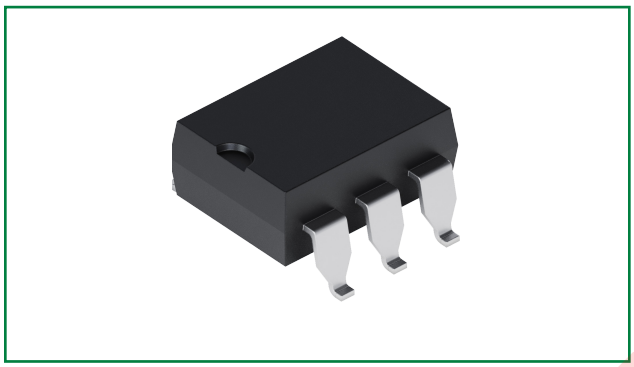
# LCA710

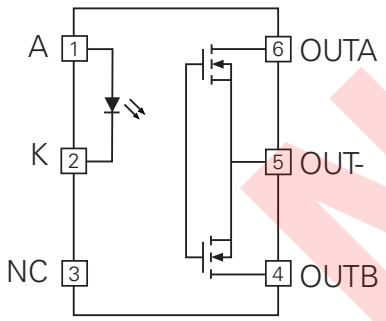
60V, 1 A 1-Form-A SSR

## Key Attributes

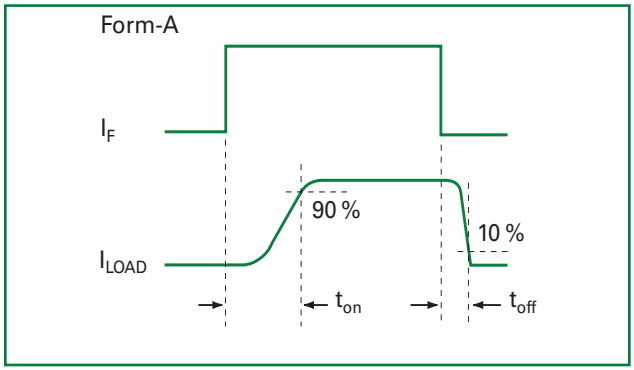
| Characteristic | Rating | Unit |
|---|---|---|
| Blocking Voltage | 60 | $V_P$ |
| Load Current | 1 | $A_{RMS}/A_{DC}$ |
| On-resistance (max.) | 0.5 | Ω |
| LED Current to Operate | 10 | mA |



## Pin Configuration




## Switching Characteristics of Normally Open Device




## Description

The LCA710 is a 60V, 1 A, 0.5 Ω, normally open (1-Form-A) solid state relay featuring low on-resistance and high current handling capability. It uses optically coupled MOSFET technology to provide 3750$V_{RMS}$ of input to output isolation.

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

The LCA710 can be used to replace mechanical relays, and offers the superior reliability associated with semiconductor devices. Because it has no moving parts, it can offer faster, bounce-free switching in a more compact surface mount or thru-hole package.

## Features

- Low On-Resistance 0.5 Ω
- High Current Handling Capability: 1 A
- 3750$V_{RMS}$ Input/Output Isolation
- Small 6-Pin Package
- Low Drive Power Requirements
- High Reliability
- No EMI/RFI Generation
- Immune to Radiated EM Fields

## 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 |
|---|---|
| LCA710 | 6-Pin DIP (50/Tube) |
| LCA710R | 6-Pin Lo-Profile Surface Mount (50/Tube) |
| LCA710RTR | 6-Pin Lo-Profile Surface Mount (1000/Reel) |
| LCA710S | 6-Pin Surface Mount (50/Tube) |
| LCA710STR | 6-Pin Surface Mount (1000/Reel) |

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# Specifications

## Absolute Maximum Ratings

| Parameter | Ratings | Units |
|---|---|---|
| Blocking Voltage | 60 | $V_P$ |
| Reverse Input Voltage | 5 | V |
| Input Control Current | 50 | mA |
| Peak (10 ms) | 1 | A |
| Input Power Dissipation [1] | 150 | mW |
| Total Power Dissipation [2] | 800 | |
| Isolation Voltage, Input to Output | 3750 | $V_{RMS}$ |
| Operational Temperature, Ambient | –40 to +85 | °C |
| Storage Temperature | –40 to +125 | |

[1] *Derate linearly 1.33 mW/°C*
[2] *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 | $I_L$ = 1 µA | $V_{DRM}$ | 60 | — | — | $V_P$ |
| Load current: | | | | | | |
| Continuous, AC/DC Configuration | — | $I_L$ | — | — | 1 | $A_{RMS}/A_{DC}$ |
| Continuous, DC Configuration | — | | — | — | 1.8 | $A_{DC}$ |
| Peak | t = 10 ms | $I_{LPK}$ | — | — | ±5 | $A_P$ |
| On-resistance [1] | | | | | | |
| AC/DC Configuration | $I_L$ = 1 A | $R_{ON}$ | — | 0.3 | 0.5 | Ω |
| DC Configuration | $I_L$ = 1.8 A | | — | 0.1 | 0.15 | |
| Off-state leakage current | $V_L$ = 60 $V_P$ | $I_{LEAK}$ | — | — | 1 | µA |
| Switching speeds: | | | | | | |
| Turn-on | $I_F$ = 10 mA, $V_L$ = 10 V | $t_{on}$ | — | — | 2.5 | ms |
| Turn-off | | $t_{off}$ | — | — | 0.25 | |
| Output capacitance | $I_F$ = 0 mA, $V_L$ = 0 V, f = 1 MHz | $C_{OUT}$ | — | 105 | — | pF |
| **Input Characteristics** | | | | | | |
| Input control current to activate | $I_L$ = 1 A | $I_F$ | — | — | 10 | mA |
| Input control current to deactivate | — | $I_F$ | 0.1 | — | — | |
| Input voltage drop to deactivate | — | $V_F$ | 0.8 | — | — | V |
| Input voltage drop | $I_F$ = 10 mA | $V_F$ | 0.9 | 1.42 | 1.56 | |
| Reverse input current | $V_R$ = 5 V | $I_R$ | — | — | 10 | µA |
| **Common Characteristics** | | | | | | |
| Capacitance, input to output | $V_{IO}$ = 0 V, f = 1 MHz | $C_{IO}$ | — | 3 | — | pF |

[1] *Measurement taken within 1 second of on-time.*

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## Load Configuration Methods

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

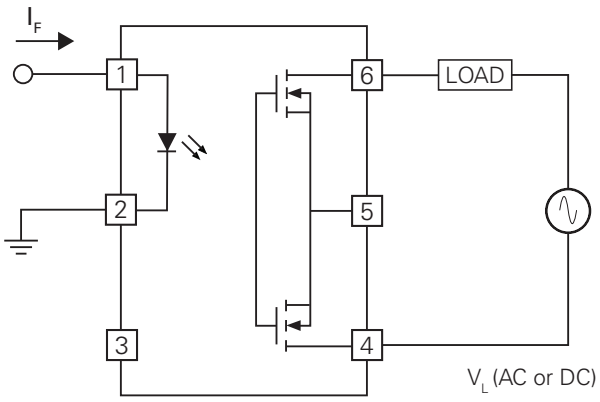



**Figure 1. AC/DC, Bidirectional Load Configuration**

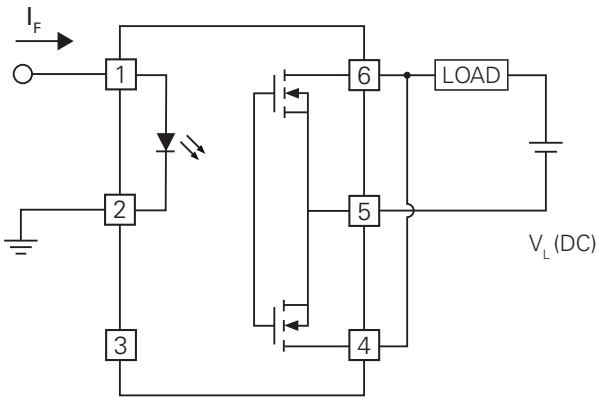



**Figure 2. DC, Unidirectional Load Configuration**

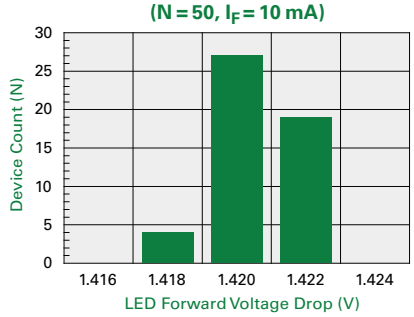
NFND



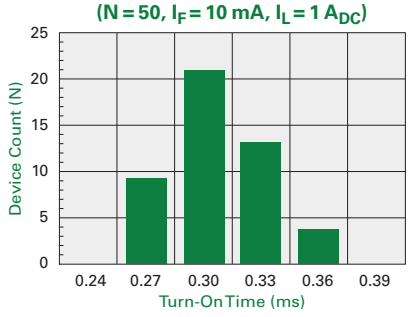
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SC 11/18/2025
LCA710_R13

## Characteristic Curves

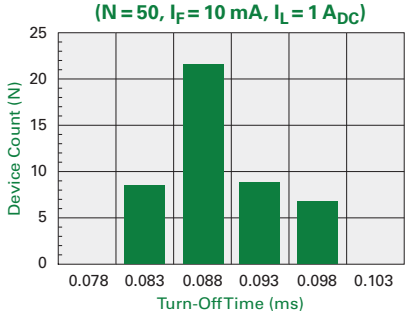
**Typical LED Forward Voltage Drop (N = 50, $I_F$ = 10 mA)**



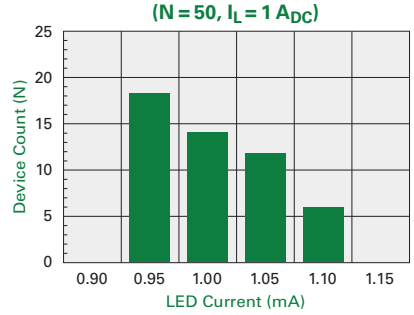

**Typical Turn-On Time (N = 50, $I_F$ = 10 mA, $I_L$ = 1 $A_{DC}$)**



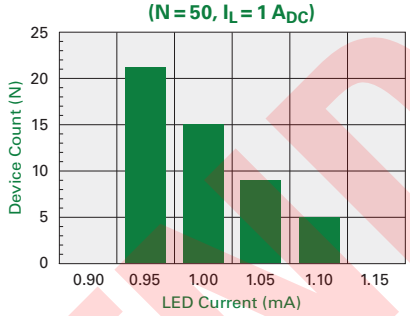

**Typical Turn-Off Time (N = 50, $I_F$ = 10 mA, $I_L$ = 1 $A_{DC}$)**



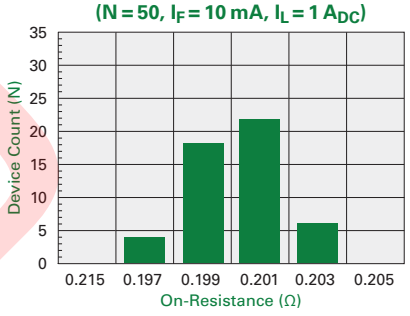

**Typical $I_F$ for Switch Operation (N = 50, $I_L$ = 1 $A_{DC}$)**



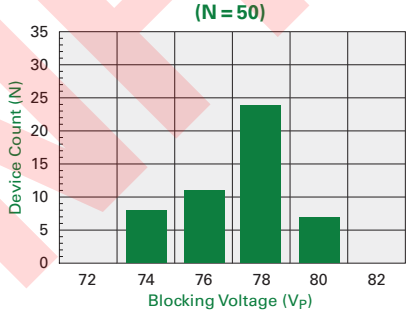

**Typical $I_F$ for Switch Dropout (N = 50, $I_L$ = 1 $A_{DC}$)**



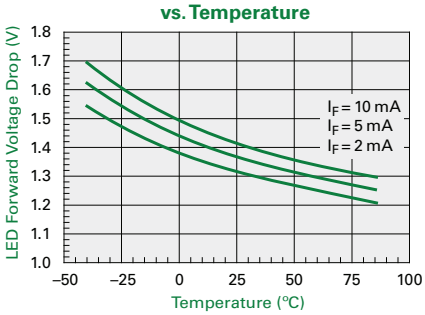

**Typical On-Resistance Distribution (N = 50, $I_F$ = 10 mA, $I_L$ = 1 $A_{DC}$)**



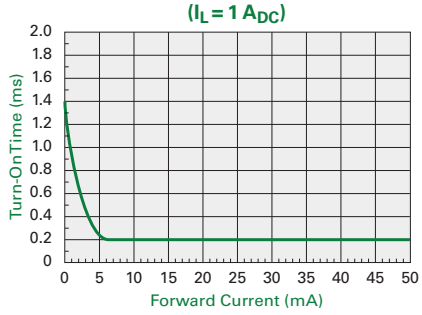

**Typical Blocking Voltage Distribution (N = 50)**



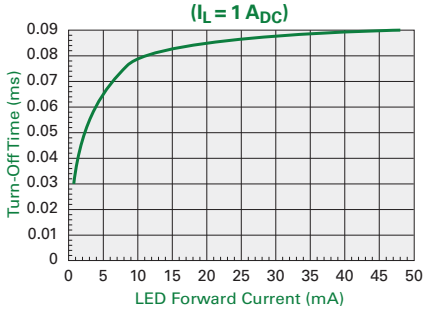

**Typical LED Forward Voltage Drop vs. Temperature**




**Typical Turn-On Time vs. LED Forward Current ($I_L$ = 1 $A_{DC}$)**




**Typical Turn-Off Time vs. LED Forward Current ($I_L$ = 1 $A_{DC}$)**



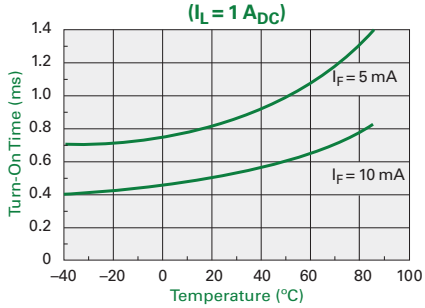

*Unless otherwise noted, data presented in these graphs is typical of device operation at $T_A$ = 25°C.



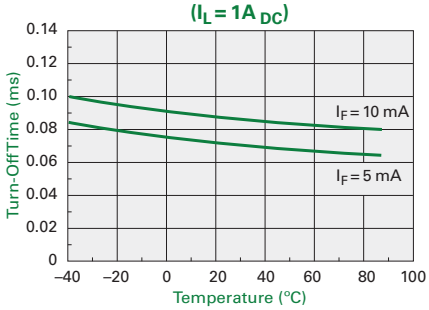
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## Characteristic Curves

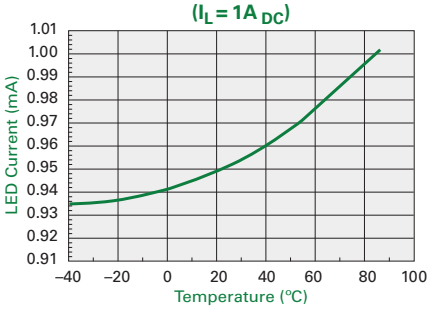
**Typical Turn-On Time vs. Temperature ($I_L$ = 1 $A_{DC}$)**



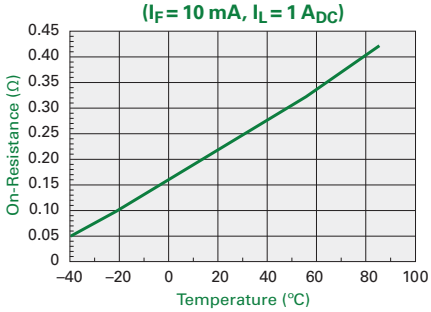

**Typical Turn-Off Time vs. Temperature ($I_L$ = 1A $_{DC}$)**



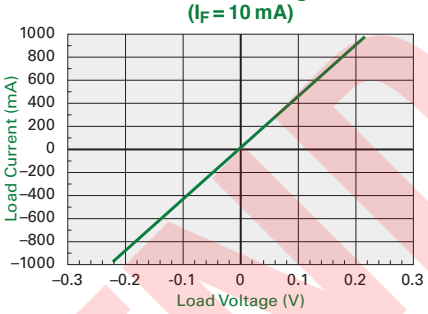

**Typical $I_F$ for Switch Operation vs. Temperature ($I_L$ = 1A $_{DC}$)**



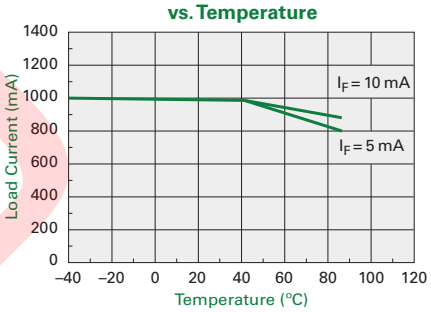

**Typical On-Resistance vs. Temperature ($I_F$ = 10 mA, $I_L$ = 1 $A_{DC}$)**



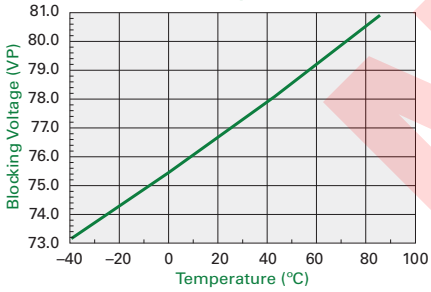

**Typical Load Current vs. Load Voltage ($I_F$ = 10 mA)**



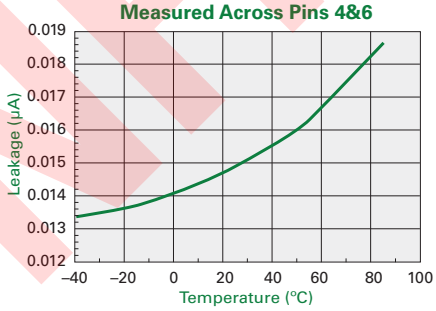

**Maximum Load Current vs. Temperature**



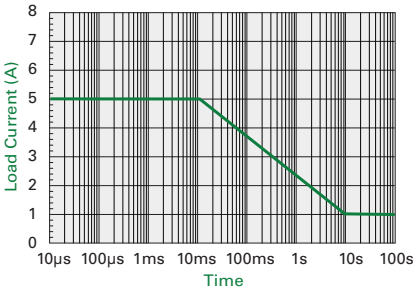

**Typical Blocking Voltage vs. Temperature**




**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°C.


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## Manufacturing Information

### Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. 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 |
|---|---|
| LCA710R / LCA710S | 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 °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 |
|---|---|---|---|
| LCA710R / LCA710S | 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 |
|---|---|---|---|---|
| LCA710 | 260 °C | 250 °C | 10 seconds* | 1 |

**Total cumulative duration of all waves.*

### Board Wash

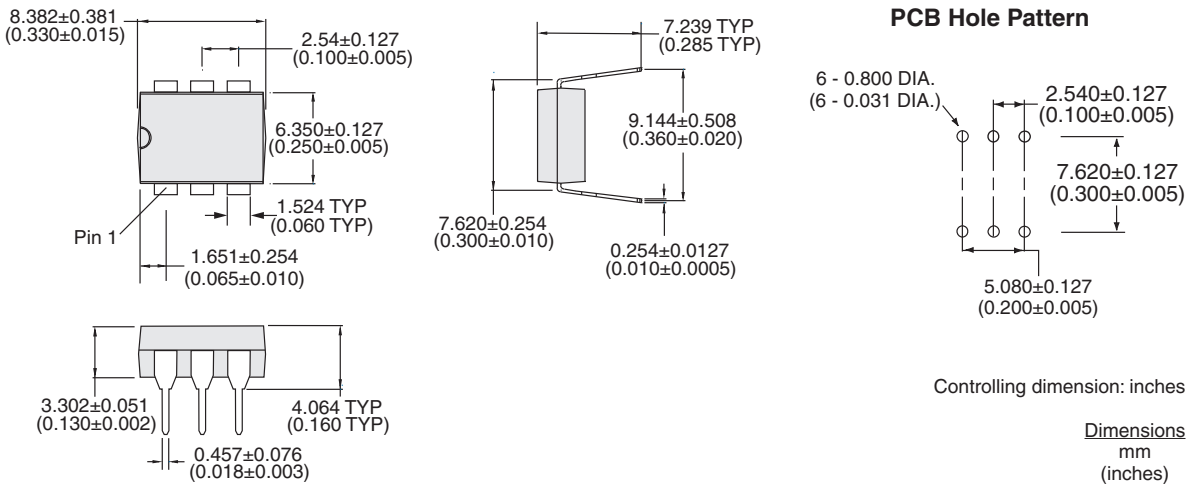
Littelfuse recommends the use of no-clean flux formulations. Board washing to reduce, or remove flux residue following the solder reflow process is acceptable, provided proper precautions are taken to prevent damage to the device. These precautions include, but are not limited to: Using a low pressure 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.

NEND


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## Mechanical Dimensions

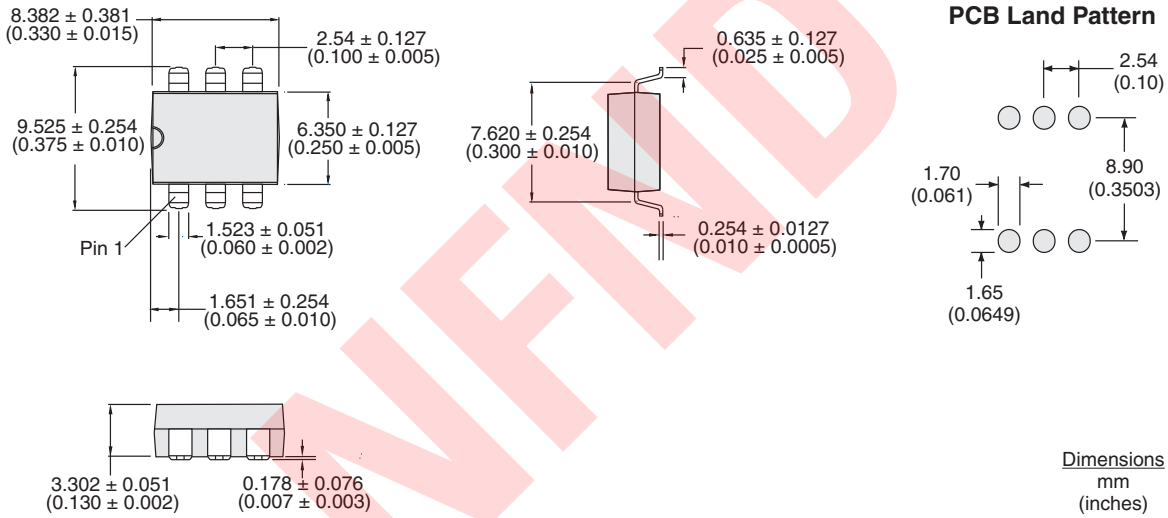
LCA710




Controlling dimension: inches

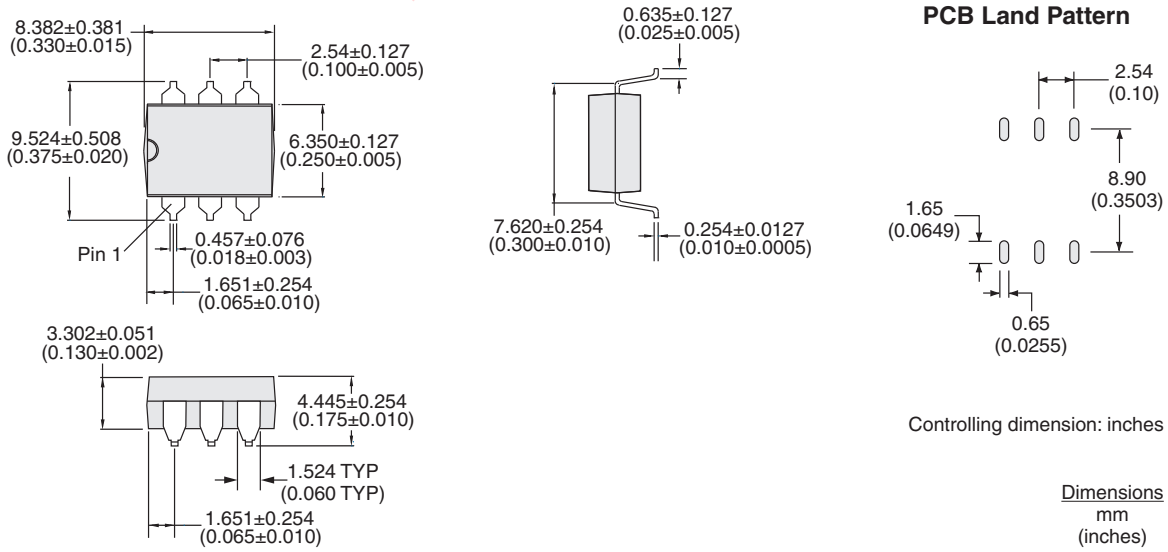
Dimensions
mm
(inches)

LCA710R




Dimensions
mm
(inches)

LCA710S




Controlling dimension: inches

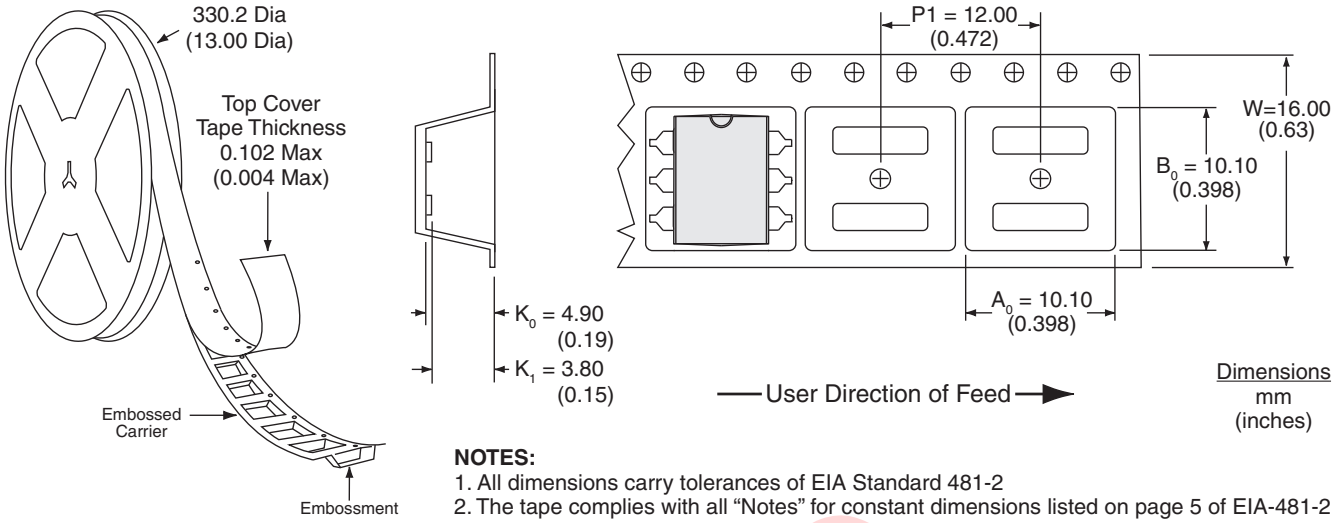
Dimensions
mm
(inches)

NFND



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LCA710RTR and LCA710STR Tape and Reel Packaging




**NOTES:**
1. All dimensions carry tolerances of EIA Standard 481-2
2. The tape complies with all “Notes” for constant dimensions listed on page 5 of EIA-481-2

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