LCC110P is a 350V, 120mA, 35Ω, 1-Form-C relay. This device is ideal for applications where a signal needs to be switched between two different lines. The small 8-lead package makes it an ideal space-saving replacement for a 1-Form-C electromechanical relay (EMR).

Features
- 3750V_{rms} Input/Output Isolation
- 1-Form-C Solid State Relay
- Low Drive Power Requirements
- High Reliability
- Arc-Free With No Snubbing Circuits
- FCC Compatible
- VDE Compatible
- No EMI/RFI Generation
- Small 8-pin Packages
- Flammability Rating UL 94 V-0
- Surface Mount Tape & Reel Versions 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

Parameter | Rating | Unit
--- | --- | ---
Blocking Voltage | 350 | V_{p}
Load Current | 120 | mA_{rms} / mA_{DC}
On-Resistance (max) | 35 | Ω

Applications
- Telecommunications
- Telecom Switching
- Tip/Ring Circuits
- Modem Switching (Laptop, Notebook, Pocket Size)
- Hook Switch
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- Ground Start
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Approvals
- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1175739
- EN/IEC 60950-1 Certified Component: Certificate available on our website

Ordering Information

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCC110</td>
<td>8-Pin DIP (50/Tube)</td>
</tr>
<tr>
<td>LCC110P</td>
<td>8-Pin Flatpack (50/Tube)</td>
</tr>
<tr>
<td>LCC110PTR</td>
<td>8-Pin Flatpack Tape &amp; Reel (1000/Reel)</td>
</tr>
<tr>
<td>LCC110S</td>
<td>8-Pin Surface Mount (50/Tube)</td>
</tr>
<tr>
<td>LCC110STR</td>
<td>8-Pin Surface Mount Tape &amp; Reel (1000/Reel)</td>
</tr>
</tbody>
</table>

Switching Characteristics for a 1-Form-C Device
Absolute Maximum Ratings @ 25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking Voltage</td>
<td>-</td>
<td>350</td>
<td>V_p</td>
</tr>
<tr>
<td>Reverse Input Voltage</td>
<td>-</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Input control Current</td>
<td>-</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Peak (10ms)</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Input Power Dissipation (^1)</td>
<td>-</td>
<td>150</td>
<td>mW</td>
</tr>
<tr>
<td>Total Power Dissipation (^2)</td>
<td>-</td>
<td>800</td>
<td>mW</td>
</tr>
<tr>
<td>Isolation Voltage, Input to Output</td>
<td>3750</td>
<td></td>
<td>V_{rms}</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40</td>
<td>+85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40</td>
<td>+125</td>
<td>°C</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous, AC/DC Configuration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak</td>
<td></td>
<td>I_L</td>
<td>-</td>
<td>-</td>
<td>120</td>
<td>mA_{rms} / mA_{DC}</td>
</tr>
<tr>
<td>t=10ms</td>
<td></td>
<td>I_{LPK}</td>
<td>-</td>
<td>-</td>
<td>±350</td>
<td>mA_{p}</td>
</tr>
<tr>
<td>On-Resistance, AC/DC Configuration</td>
<td></td>
<td>R_{ON}</td>
<td>-</td>
<td>23</td>
<td>35</td>
<td>Ω</td>
</tr>
<tr>
<td>Off-State Leakage Current</td>
<td></td>
<td>I_{LEAK}</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>μA</td>
</tr>
<tr>
<td>Switching Speeds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-On</td>
<td></td>
<td>t_{on}</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>ms</td>
</tr>
<tr>
<td>Turn-Off</td>
<td></td>
<td>t_{off}</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Output Capacitance</td>
<td></td>
<td>C_{OUT}</td>
<td>-</td>
<td>25</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td><strong>Input Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Control Current to Activate</td>
<td></td>
<td>I_F</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>mA</td>
</tr>
<tr>
<td>Input Voltage Drop</td>
<td></td>
<td>V_F</td>
<td>0.9</td>
<td>1.35</td>
<td>1.56</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Input Current</td>
<td></td>
<td>V_R</td>
<td>5</td>
<td>I_{R}</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td><strong>Common Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitance, Input to Output</td>
<td></td>
<td>C_{IO}</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

Note: If both poles operate simultaneously, then load current must be derated in order not to exceed package power dissipation value.
**COMMON PERFORMANCE DATA***

Typical LED Forward Voltage Drop
(N=50)

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

LED Forward Voltage Drop (V)
- 1.17
- 1.19
- 1.21
- 1.23
- 1.25

Temperature (ºC)
- -40
- -20
- 0
- 20
- 40
- 60
- 80
- 100
- 120

Leakage (mA)
- 0.020
- 0.018
- 0.016
- 0.014
- 0.012
- 0.010
- 0.008
- 0.006
- 0.004
- 0.002
- 0

Energy Rating Curve
- Load Current (A)
- 0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1
- 10ms
- 100ms
- 1s
- 10s
- 100s

**FORM-A RELAY PERFORMANCE DATA***

**Typical Turn-On Time**
(N=50, I f=8mA, I L=120mA

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

Turn-On Time (ms)
- 1.2
- 2.0
- 2.8
- 3.6
- 4.4
- 5.2

**Typical Turn-Off Time**
(N=50, I f=8mA, I L=120mA

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

Turn-Off Time (ms)
- 0.05
- 0.14
- 0.23
- 0.32
- 0.41
- 0.50

**Typical On-Resistance Distribution**
(N=50, I f=8mA, I L=120mA

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

On-Resistance (Ω)
- 19.5
- 21.5
- 23.5
- 25.5

**Typical IF for Switch Operation**
(N=50, I L=120mA

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

LED Current (mA)
- 1.2
- 2.0
- 2.8
- 3.6
- 4.4
- 5.2

**Typical IF for Switch Dropout**
(N=50, I L=120mA

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

LED Current (mA)
- 1.2
- 2.0
- 2.8
- 3.6
- 4.4
- 5.2

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

- Device Count (N)
  - 25
  - 20
  - 15
  - 10
  - 5
  - 0

Blocking Voltage (V P)
- 400
- 420
- 440
- 460
- 480
- 500
- 520

*Unless otherwise noted, data presented in these graphs is typical of device operation at 25ºC.

For guaranteed parameters not indicated in the written specifications, please contact our application department.
FORM-A RELAY PERFORMANCE DATA*

*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.
For guaranteed parameters not indicated in the written specifications, please contact our application department.
FORM-B RELAY PERFORMANCE DATA*

Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.
For guaranteed parameters not indicated in the written specifications, please contact our application department.

*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.
FORM-B RELAY PERFORMANCE DATA*

*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.
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. IXYS Integrated Circuits 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.

<table>
<thead>
<tr>
<th>Device</th>
<th>Moisture Sensitivity Level (MSL) Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCC110 / LCC110S / LCC110P</td>
<td>MSL 1</td>
</tr>
</tbody>
</table>

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 Classification Temperature (Tc) of this product and the maximum dwell time the body temperature of this device may be (Tc - 5)°C or greater. The classification temperature sets the Maximum Body Temperature allowed for this device during lead-free reflow processes. For through-hole devices, and any other processes, the guidelines of J-STD-020 must be observed.

<table>
<thead>
<tr>
<th>Device</th>
<th>Classification Temperature (Tc)</th>
<th>Dwell Time (tD)</th>
<th>Max Reflow Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCC110</td>
<td>250°C</td>
<td>30 seconds</td>
<td>1</td>
</tr>
<tr>
<td>LCC110S</td>
<td>250°C</td>
<td>30 seconds</td>
<td>3</td>
</tr>
<tr>
<td>LCC110P</td>
<td>260°C</td>
<td>30 seconds</td>
<td>3</td>
</tr>
</tbody>
</table>

Board Wash

IXYS Integrated Circuits 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 flux or solvents that are Chlorine- or Fluorine-based.
Mechanical Dimensions

LCC110

PCB Hole Pattern

Dimensions

mm
(inches)

LCC110S

PCB Land Pattern

Dimensions

mm
(inches)

LCC110P

PCB Land Pattern

Dimensions

mm
(inches)
LCC110STR Tape & Reel

LCC110PTR Tape & Reel

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

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