The LT®119A is an improved version of the LM119 dual comparator. It features lower input offset voltage and offset current, higher voltage gain, guaranteed common mode rejection and input protection diodes.

The LT119A is capable of operation over a supply range from 5V to ±15V and can drive 25mA loads from each open collector output. A separate ground pin allows the LT119A to isolate system grounds.

Linear Technology Corporation’s advanced processing, design techniques and reliability make the LT119A/LT319A an ideal choice over previous devices in most comparator applications.
ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage .................. 36V
Output to Negative Supply Voltage .... 36V
Ground to Negative Supply Voltage ...... 25V
Ground to Positive Supply Voltage ...... 18V
Differential Input Voltage (Note 6) ...... ±5V
Differential Input Current (Note 6) ...... ±5mA
Input Voltage (Note 2) ................

Output Short-Circuit Duration ................ 10s
Operating Temperature Range
LT119A, LM119 OBSOLETE ........ –55°C to 125°C
LT319A, LM319 .................... 0°C to 70°C

Storage Temperature Range ........ –65°C to 150°C
Lead Temperature (Soldering, 10 sec) ...... 300°C

PIN CONFIGURATION

ORDER INFORMATION

LEAD FREE FINISH PART MARKING PACKAGE DESCRIPTION SPECIFIED TEMPERATURE RANGE
LT319AN#PBF LT319AN 14-Lead Plastic DIP 0°C to 70°C
LM319N#PBF LM319N 14-Lead Plastic DIP 0°C to 70°C

OBSOLETE PACKAGES

LT119AH#PBF LT119AH 10-Lead TO-5 Metal Can –55°C to 125°C
LM119H#PBF LM119H 10-Lead TO-5 Metal Can –55°C to 125°C
LT319AH#PBF LT319AH 10-Lead TO-5 Metal Can 0°C to 70°C
LM319H#PBF LM319H 10-Lead TO-5 Metal Can 0°C to 70°C
LT119AJ#PBF LT119AJ 14-Lead Ceramic DIP –55°C to 125°C
LM119J#PBF LM119J 14-Lead Ceramic DIP –55°C to 125°C
LT319AJ#PBF LT319AJ 14-Lead Ceramic DIP 0°C to 70°C
LM319J#PBF LM319J 14-Lead Ceramic DIP 0°C to 70°C

Consult LTC Marketing for parts specified with wider operating temperature ranges.
Consult LTC Marketing for information on nonstandard lead based finish parts.
For more information on lead free part markings, go to: http://www.linear.com/leadfree/
For more information on tape and reel specifications, go to: http://www.linear.com/tapeandreel/
### ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at $T_A = 25^\circ C$. (Note 3)

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>LT119A</th>
<th>LM119</th>
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<tr>
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<td></td>
<td>MIN</td>
<td>TYP</td>
<td>MAX</td>
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<td>$V_{OS}$</td>
<td>Input Offset Voltage</td>
<td>$V_S = \pm 15V, V_{CM} = 0$</td>
<td>0.3</td>
<td>0.5</td>
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<tr>
<td></td>
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<td>(Note 4)</td>
<td>0.5</td>
<td>1.0</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1.2</td>
<td>2.0</td>
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<tr>
<td></td>
<td>CMRR</td>
<td>Common Mode Rejection Ratio</td>
<td>90</td>
<td>106</td>
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<tr>
<td>$I_{OS}$</td>
<td>Input Offset Current</td>
<td>(Note 4)</td>
<td>20</td>
<td>40</td>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>75</td>
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<tr>
<td>$I_B$</td>
<td>Input Bias Current</td>
<td>(Note 4)</td>
<td>150</td>
<td>500</td>
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<td></td>
<td></td>
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<td></td>
<td>1000</td>
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<tr>
<td>$A_V$</td>
<td>Voltage Gain</td>
<td>(Note 5)</td>
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<td>40</td>
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<td></td>
<td>Response Time</td>
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<td>Saturation Voltage</td>
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<td></td>
<td></td>
<td>$V^+ \geq 4.5V, V^- = 0V$</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>$V_{IN} \leq -6mV, I_{SINK} \leq 3.2mA$</td>
<td>0.23</td>
<td>0.4</td>
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<tr>
<td></td>
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<td>$T_A \geq 0^\circ C$</td>
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<td>$T_A = 0^\circ C$</td>
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<tr>
<td></td>
<td>Output Leakage Current</td>
<td>$V_{IN} \geq 5mV, V_{OUT} \to V^- = 35V$</td>
<td>0.2</td>
<td>2</td>
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<td></td>
<td></td>
<td></td>
<td>1</td>
<td>10</td>
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<tr>
<td></td>
<td>Input Voltage Range</td>
<td>$V_S = \pm 15V$</td>
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<td>$V^+ = 5V, V^- = 0V$</td>
<td>$3$</td>
<td>$1$</td>
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<td></td>
<td>Differential Input Voltage</td>
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<td>$\pm 5$</td>
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<td>$I_S$</td>
<td>Supply Current</td>
<td>$V^+ = 5V, V^- = 0V$</td>
<td>4.3</td>
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<td></td>
<td>Positive Supply Current</td>
<td>$V_S = \pm 15V$</td>
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<td>Negative Supply Current</td>
<td>$V_S = \pm 15V$</td>
<td>3</td>
<td>4.5</td>
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<td>$I_{OS}$</td>
<td>Input Offset Current</td>
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<td>Input Bias Current</td>
<td>(Note 4)</td>
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<td>$V_S = \pm 15V$</td>
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<td>$3$</td>
</tr>
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<td></td>
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<tr>
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<td>Positive Supply Current</td>
<td>$V_S = \pm 15V$</td>
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<td>12.5</td>
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<td>Negative Supply Current</td>
<td>$V_S = \pm 15V$</td>
<td>3</td>
<td>5</td>
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</tbody>
</table>
**ELECTRICAL CHARACTERISTICS**

**Note 1:** Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

**Note 2:** For supply voltages less than ±15V, the maximum input voltage is equal to the supply voltage.

**Note 3:** Unless otherwise noted, supply voltage equals ±15V and $V_{CM} = 0\, \text{V}$, $T_A = 25\, \text{°C}$. The ground pin is grounded. Note that the maximum voltage allowed between the ground pin and $V^+$ is 18V. Do not tie the ground pin to $V^-$ when the power supply voltage exceeds ±9V. The offset voltage, offset current and bias current specifications apply for all supply voltages between ±15V and 5V unless otherwise specified.

**Note 4:** The offset voltages and currents given are the maximum values required to drive the output within 1V of either supply with a 1mA load, thus these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.

**Note 5:** Response time specified is for a 100mV input step with 5mV overdrive.

**Note 6:** Inputs are protected with back-to-back 5.6V zener diodes. This limits maximum differential input voltage to ±5V if current is unlimited. Larger differential input drive is allowed if input current is limited to ±5mA with external resistance.

**TYPICAL PERFORMANCE CHARACTERISTICS**
**TYPICAL PERFORMANCE CHARACTERISTICS**

### Output Saturation Voltage

- **$T_J = 25^\circ C$**
- $V_S = \pm 15V$
- Input Overdrive = 5mV

### Supply Current

- **$T_J = 25^\circ C$**
- Positive Supply
- Negative Supply

### Output Limiting Characteristics

- **$T_J = 25^\circ C$**
- Short-Circuit Current after 3 minutes
- Power Dissipation

### Common Mode Limits

- $V_S = \pm 15V$
- Referred to Supply Voltages
- $V_S = \pm 15V, V^+, V^- = 0V$

### TYPICAL APPLICATIONS

#### Relay Driver

- 1/2 LT319A
- 5V, 28V
- 1N4148
- 68k
- 0.15µF

#### High Noise Immunity 60Hz Sync Circuit

- 1/2 LT319A
- 5V, 68k
- 10k
- 10k
- 3.3k
- 0.15µF
- 60Hz Input 10Vp-p (TYP)
TYPICAL APPLICATIONS

Voltage Controlled Crystal Oscillator
With 100ppm Trim Range

Voltage Controlled High Speed One Shot
TYPICAL APPLICATIONS

10-Bit Serial Output A/D Converter

5 Microsecond Sample-and-Hold with Zero Hold Step

*TRIM FOR ZERO VOLTS OUT WITH ZERO VOLTS IN
† POLYSTYRENE CAPACITOR

*1% FILM
POLYSTYRENE, MOUNT CAPACITORS CLOSE TOGETHER

CONVERSION TIME = 10ms
* = 1%
CAPACITORS ARE POLYSTYRENE MOUNT IN CLOSE PROXIMITY
PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

N Package
14-Lead PDIP (Narrow .300 Inch)
(Reference LTC DWG # 05-08-1510 Rev I)

J Package
14-Lead CERDIP (Narrow .300 Inch, Hermetic)
(Reference LTC DWG # 05-08-1110)

NOTE:
1. DIMENSIONS ARE INCHES
   MILLIMETERS
2. THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
   MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH (0.254mm)

NOTE:
LEAD DIMENSIONS APPLY TO SOLDER DIP/PLATE
OR TIN PLATE LEADS

OBSELETE PACKAGE
PACKAGE DESCRIPTION

Please refer to http://www.linear.com/designtools/packaging/ for the most recent package drawings.

H Package
10-Lead TO-5 Metal Can
(Reference LTC DWG # 05-08-1322)

*LEAD DIAMETER IS UNCONTROLLED BETWEEN THE REFERENCE PLANE AND THE SEATING PLANE
**FOR SOLDER DIP LEAD FINISH, LEAD DIAMETER IS .016 – .024 (0.406 – 0.610)

OBSOLETE PACKAGE
# REVISION HISTORY
(Revision history begins at Rev C)

<table>
<thead>
<tr>
<th>REV</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>PAGE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3/12</td>
<td>$V_{\text{SAT}}$ Conditions corrected from $V_{\text{IN}} \leq 6\text{mA}$ to $V_{\text{IN}} \leq 6\text{mV}$</td>
<td>3</td>
</tr>
</tbody>
</table>
TYPICAL APPLICATION

5kHz to 2MHz V→F Converter

ALL DIODES 1N4148
† SET SCALE FACTOR