

DATA SHEET

LM219/LM319

Dual voltage comparator

Product data
Supersedes data of 1994 Aug 31
File under Integrated Circuits, IC11 Handbook

2001 Aug 03

Dual voltage comparator

LM219/LM319

DESCRIPTION

The LM319 series are precision high-speed dual comparators fabricated on a single monolithic chip. They are designed to operate over a wide range of supply voltages down to a single 5 V logic supply and ground. Further, they have higher gain and lower input currents than devices like the $\mu A710$. The uncommitted collector of the output stage makes the LM319 compatible with RTL, DTL, and TTL as well as capable of driving lamps and relays at currents up to 25 mA.

Although designed primarily for applications requiring operation from digital logic supplies, the LM319 series are fully specified for power supplies up to ± 15 V. It features faster response than the LM111 at the expense of higher power dissipation. However, the high-speed, wide operating voltage range and low package count make the LM319 much more versatile than older devices like the $\mu A711$.

FEATURES

- Two independent comparators
- Operates from a single 5 V supply
- Typically 80 ns response time at ± 15 V
- Minimum fanout of 3 (each side)
- Maximum input current of 1 μA over temperature
- Inputs and outputs can be isolated from system ground
- High common-mode slew rate

PIN CONFIGURATION

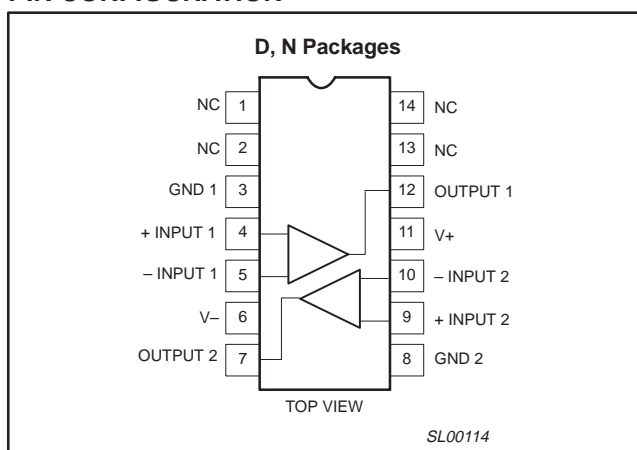


Figure 1. Pin Configuration

EQUIVALENT SCHEMATIC

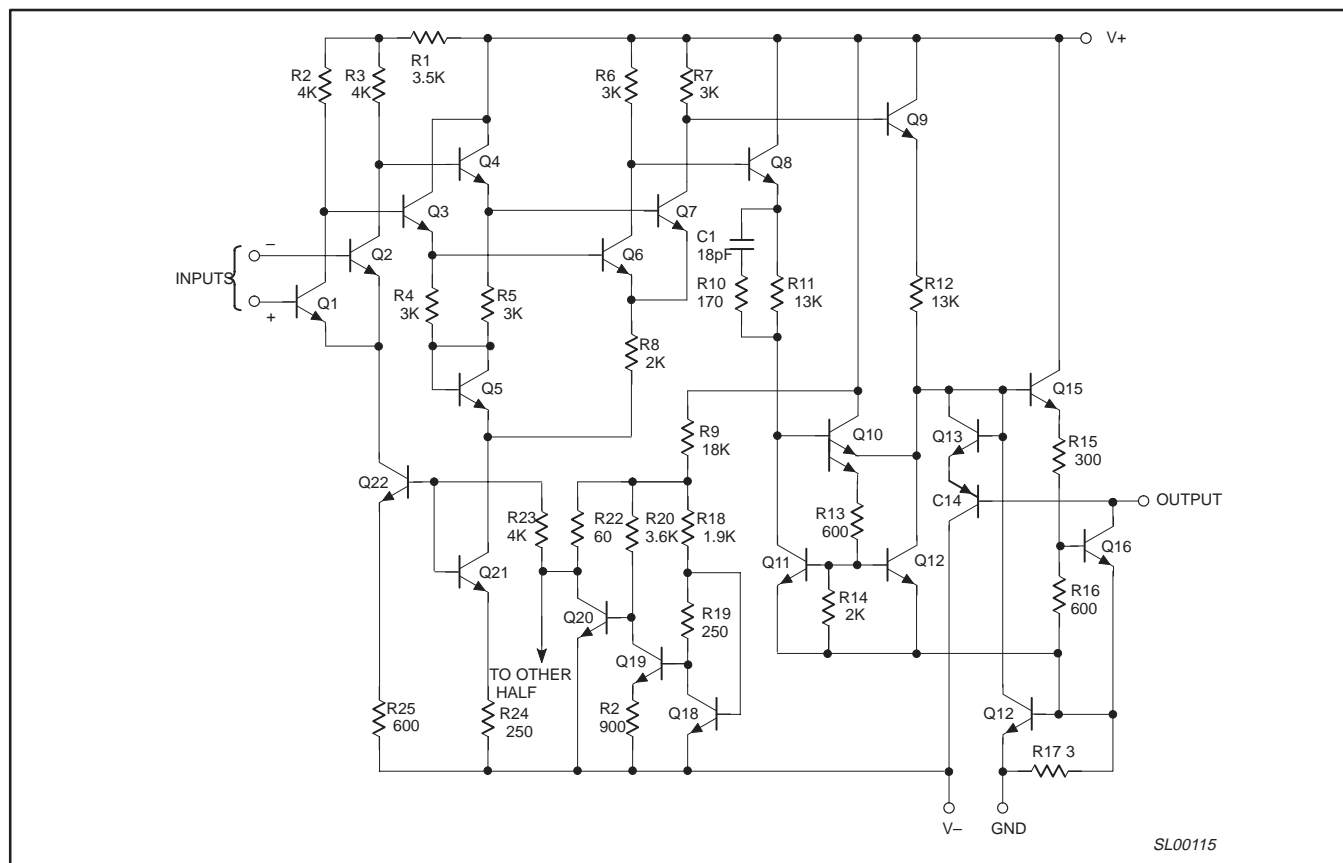


Figure 2. Equivalent Schematic

Dual voltage comparator

LM219/LM319

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Small Outline (SO) Package	–25 °C to +85 °C	LM219D	SOT108-1
14-Pin Plastic Small Outline (SO) Package	0 °C to +70 °C	LM319D	SOT108-1
14-Pin Plastic Dual In-Line Package (DIP)	0 °C to +70 °C	LM319N	SOT27-1

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_S	Total supply voltage	36	V
	Output to negative supply voltage	36	V
	Ground to negative supply voltage	25	V
	Ground to positive supply voltage	18	V
	Differential input voltage	±5	V
V_{IN}	Input voltage ¹	±15	V
	Maximum power dissipation, $T_{amb} = 25\text{ °C}$ (still-air) ²		
	N package	1420	mW
	D package	1040	mW
	Output short-circuit duration	10	s
T_{amb}	Operating temperature range	LM219 –25 to +85 LM319 0 to +70	°C
T_{stg}	Storage temperature range	–65 to +150	°C
T_{sld}	Lead soldering temperature (10 sec max)	230	°C

NOTES:

- For supply voltages less than ±15 V, the absolute maximum rating is equal to the supply voltage.
- Derate above 25 °C, at the following rates:
N package at 11.4 mW/°C
D package at 8.3 mW/°C

DC ELECTRICAL CHARACTERISTICS

$V_S = \pm 15\text{ V}$; $-25\text{ °C} \leq T_{amb} \leq +85\text{ °C}$ for LM219, $0\text{ °C} \leq T_{amb} \leq +70\text{ °C}$ for LM319, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	LM219			LM319			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Input offset voltage ^{1, 2}	$R_S \leq 5\text{ k}\Omega$; $T_{amb} = 25\text{ °C}$ Over temp.		0.7	4.0 7		2.0	8.0 10	mV
I_{OS}	Input offset current ^{1, 2}	$T_{amb} = 25\text{ °C}$ Over temp.		30	75 100		80	200 300	nA
I_B	Input bias current ¹	$T_{amb} = 25\text{ °C}$ Over temp.		150	500 1000		250	1000 1200	nA nA
A_V	Voltage gain	$T_{amb} = 25\text{ °C}$	8	40		8	40		V/mV
V_{OL}	Saturation voltage	$V_{IN} \leq -10\text{ mV}$; $I_{OUT} = 25\text{ mA}$; $T_{amb} = 25\text{ °C}$; $V_+ \geq 4.5\text{ V}$; $V_- = 0\text{ V}$ $V_{IN} \leq -10\text{ mV}$; $I_{OUT} = 3.2\text{ mA}$		0.75 0.3	1.5 0.6		0.75 0.3	1.5 0.4	V
I_{OH}	Output leakage current	$V_- = 0\text{ V}$; $V_{IN} \geq 10\text{ mV}$ $V_{OUT} = 35\text{ V}$; $T_{amb} = 25\text{ °C}$		0.2	10		0.2	10	μA
V_{IN}	Input voltage range	$V_S = \pm 15\text{ V}$ $V_+ = 5\text{ V}$, $V_- = 0\text{ V}$	1	±13	3	1	±13	3	V
V_{ID}	Differential input voltage				±5			±5	V
I_+	Positive supply current	$V_+ = 5\text{ V}$; $V_- = 0\text{ V}$; $T_{amb} = 25\text{ °C}$		4.3			4.3		mA
I_+	Positive supply current	$V_S = \pm 15\text{ V}$; $T_{amb} = 25\text{ °C}$		8.0	12.5		8.0	12.5	mA
I_-	Negative supply current	$V_S = \pm 15\text{ V}$; $T_{amb} = 25\text{ °C}$		3.0	5.0		3.0	5.0	mA

NOTES:

- V_{OS} , I_{OS} and I_B specifications apply for a supply voltage range of $V_S = \pm 15\text{ V}$ down to a single 5 V supply.
- The offset voltages and offset currents given are the maximum values required to drive the output to within 1 V of either supply with a 1 mA load. Thus these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.

Dual voltage comparator

LM219/LM319

AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
t_R	Response time ¹	$V_S = \pm 15\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$ $R_L = 500\text{ }\Omega$ (see test figure)		80		ns

NOTE:

1. The response time specified is for a 100 mV step with 5 mV overdrive.

TEST CIRCUIT

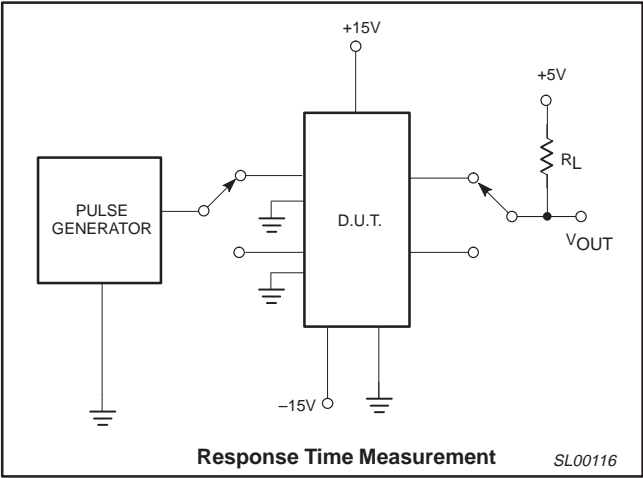
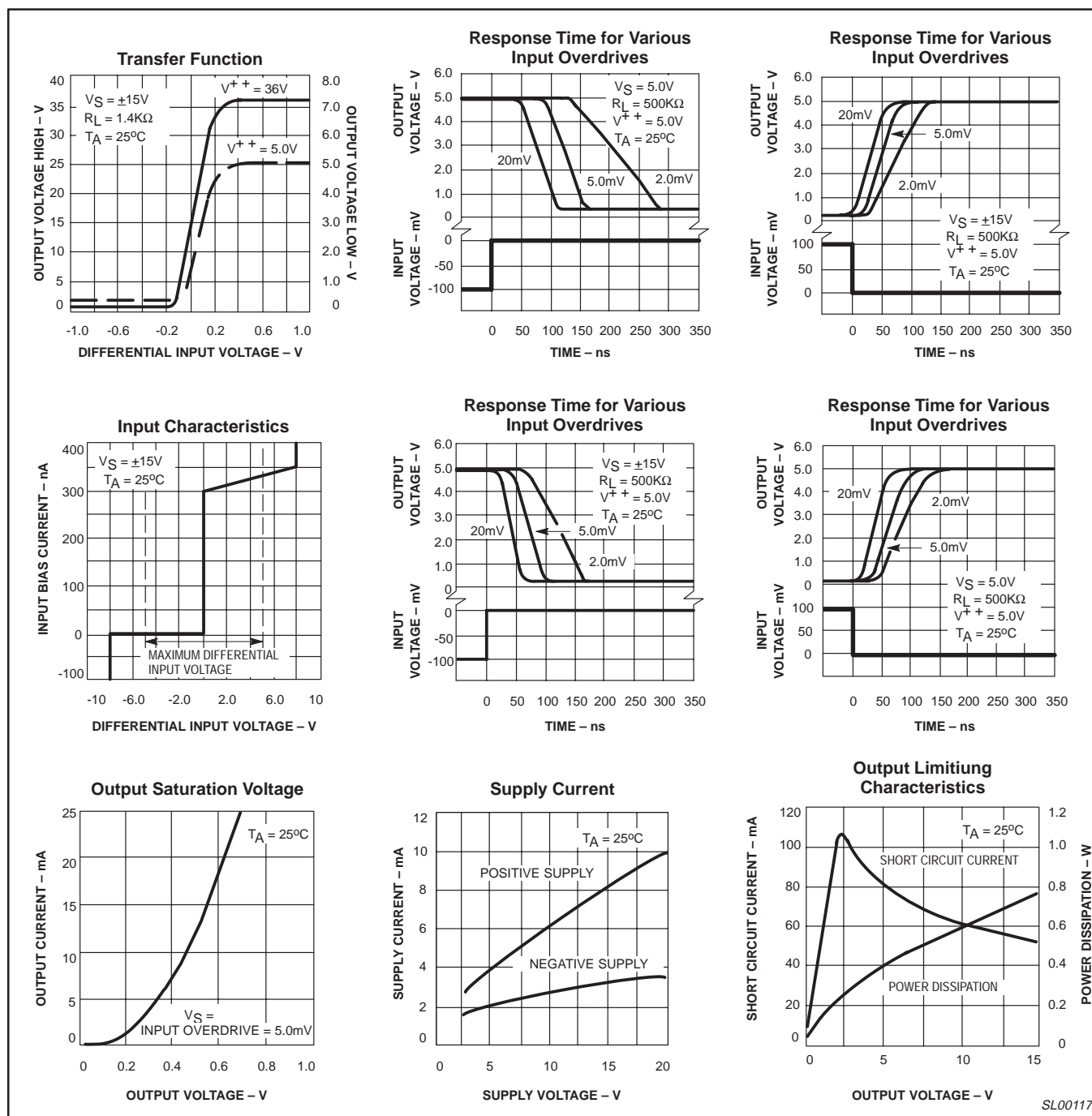


Figure 3. Test Circuit

Dual voltage comparator

LM219/LM319

TYPICAL PERFORMANCE CHARACTERISTICS



SL00117

Figure 4. Typical Performance Characteristics

Dual voltage comparator

LM219/LM319

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

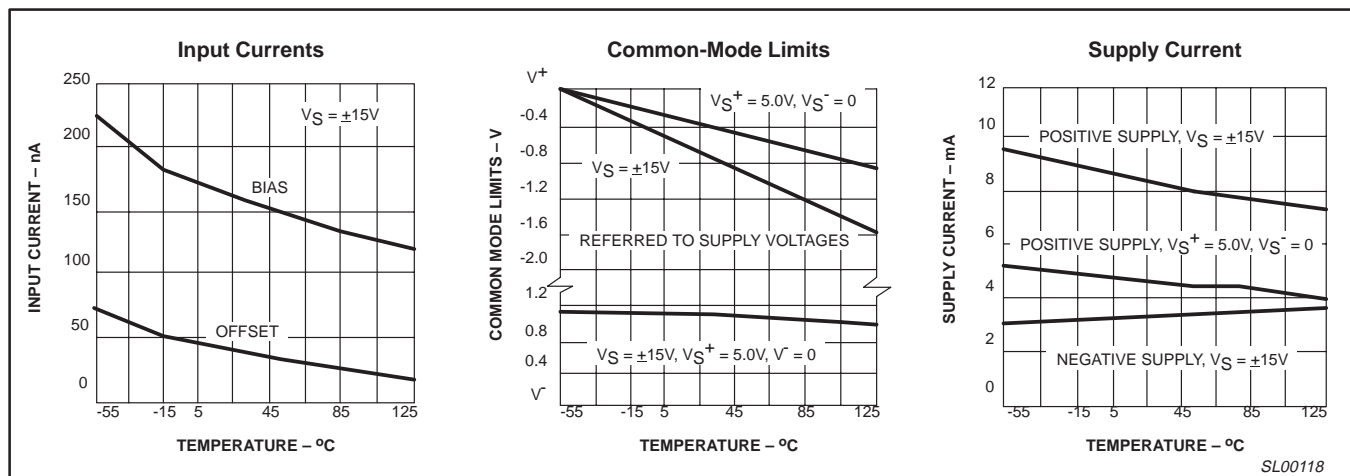


Figure 5. Typical Performance Characteristics

TYPICAL APPLICATIONS

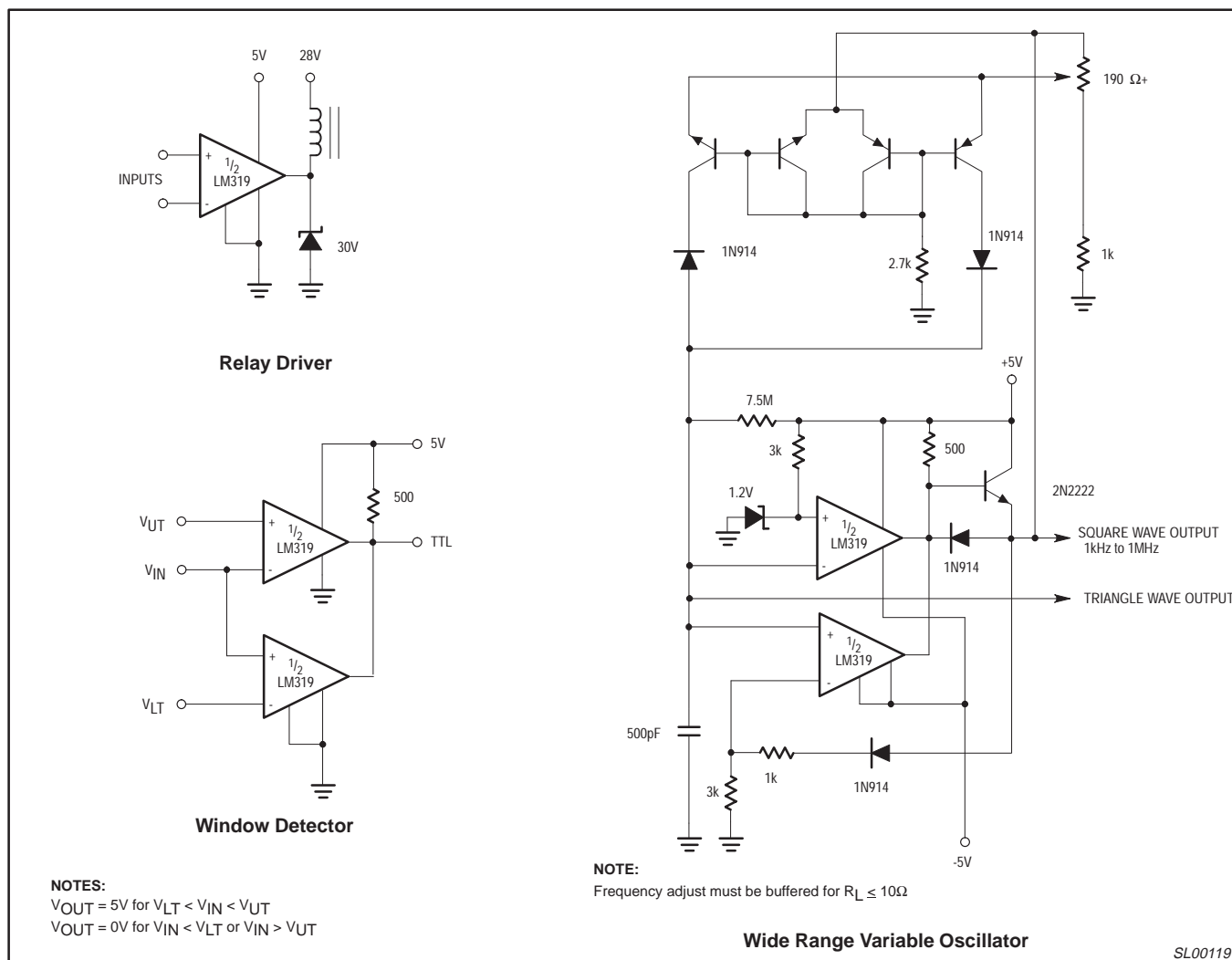


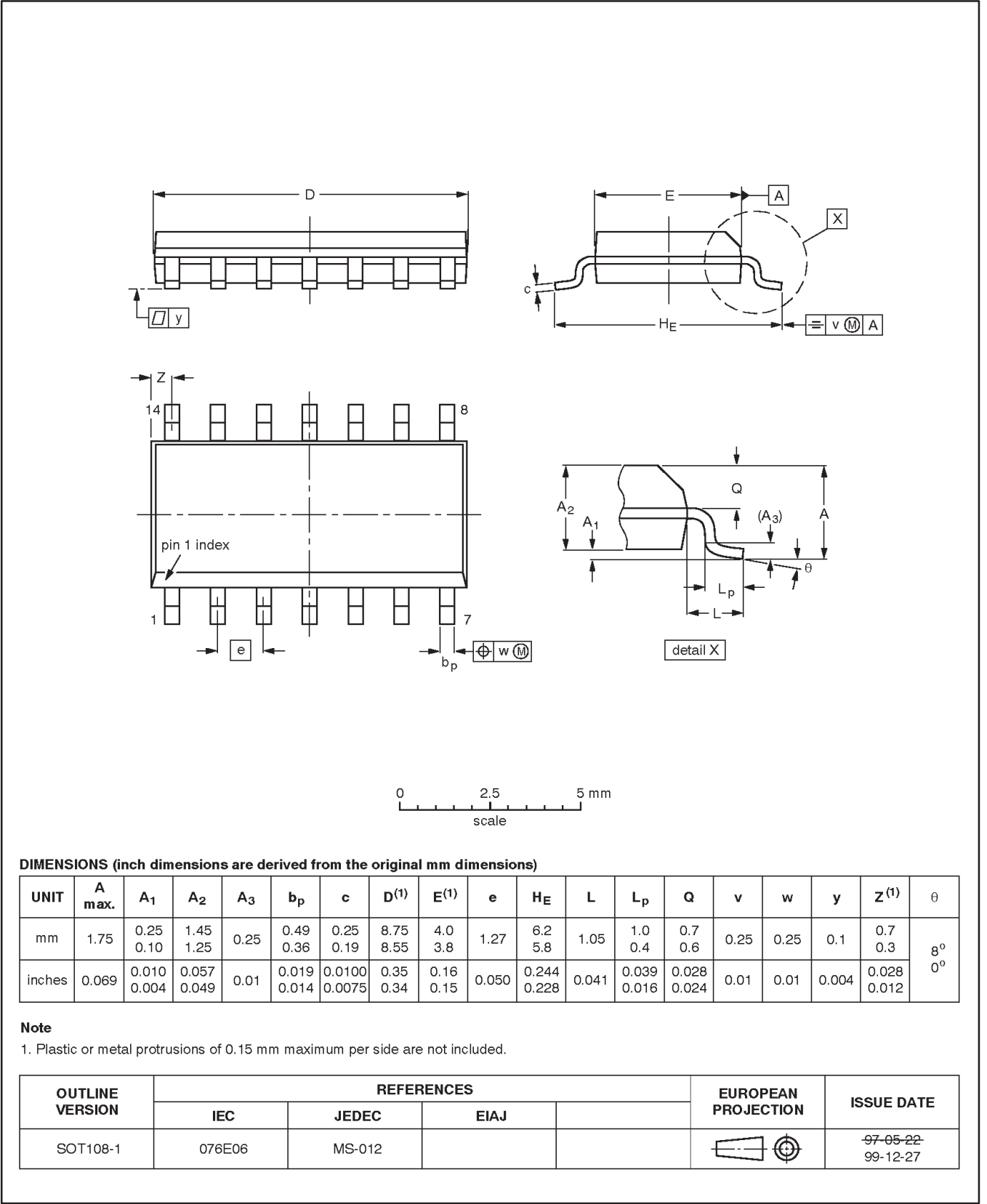
Figure 6. Typical Applications

Dual voltage comparator

LM219/LM319

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

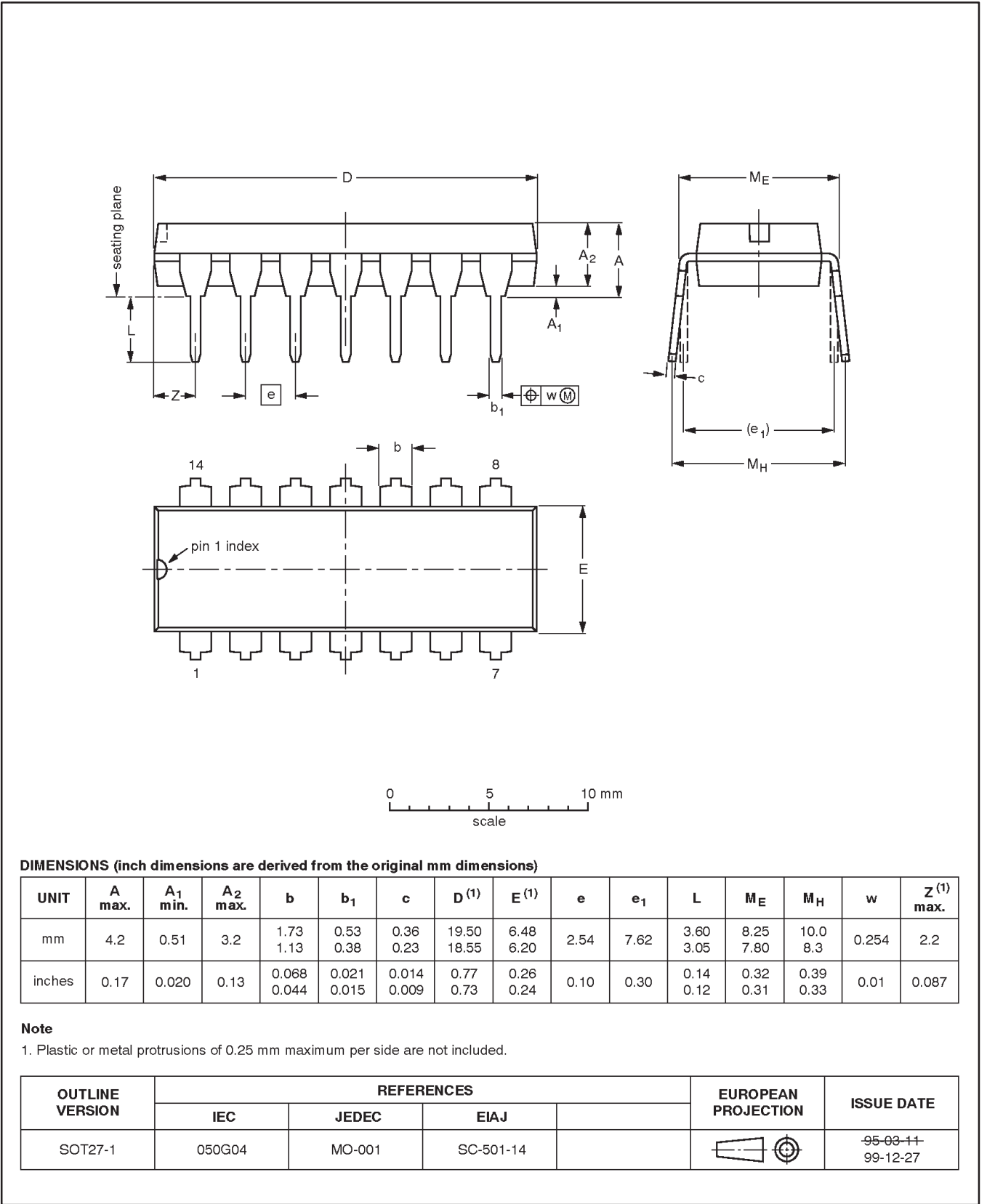


Dual voltage comparator

LM219/LM319

DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



Dual voltage comparator

LM219/LM319

NOTES

Dual voltage comparator

LM219/LM319

Data sheet status

Data sheet status ^[1]	Product status ^[2]	Definitions
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A.

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Disclaimers

Life support — These products are not designed for use in life support appliances, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Contact information

For additional information please visit
<http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

© Koninklijke Philips Electronics N.V. 2001
 All rights reserved. Printed in U.S.A.

Date of release: 12-01

For sales offices addresses send e-mail to:
sales.addresses@www.semiconductors.philips.com

Document order number:

9397 750 09221

Let's make things better.