

# DATA SHEET

**NE527**

Voltage comparator

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

2001 Aug 03

# Voltage comparator

# NE527

## DESCRIPTION

The NE527 is a high-speed analog voltage comparator which, for the first time, mates state-of-the-art Schottky diode technology with the conventional linear process. This allows simultaneous fabrication of high speed TTL gates with a precision linear amplifier on a single monolithic chip. The NE527 is similar in design to the Philips Semiconductors NE529 voltage comparator except that it incorporates an "Emitter-Follower" input stage for extremely low input currents. This opens the door to a whole new range of applications for analog voltage comparators.

## FEATURES

- 15 ns propagation delay
- Complementary output gates
- TTL or ECL compatible outputs
- Wide common-mode and differential voltage range
- Typical gain of 5000

## PIN CONFIGURATIONS

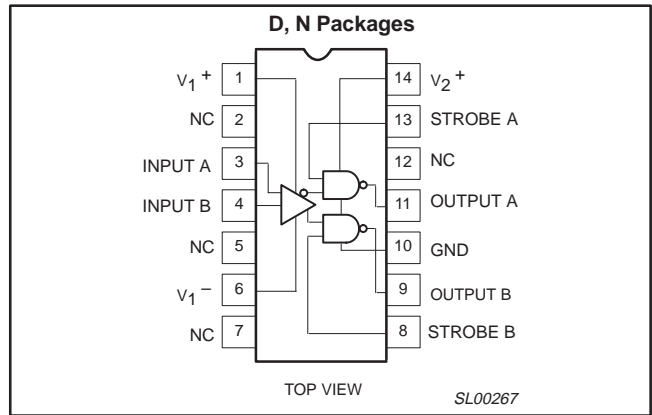


Figure 1. Pin Configuration

## APPLICATIONS

- A/D conversion
- ECL-to-TTL interface
- TTL-to-ECL interface
- Memory sensing
- Optical data coupling

## ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	0 °C to +70 °C	NE527N	SOT27-1
14-Pin Small Outline (SO) Package	0 °C to +70 °C	NE527D	SOT108-1

## EQUIVALENT SCHEMATIC

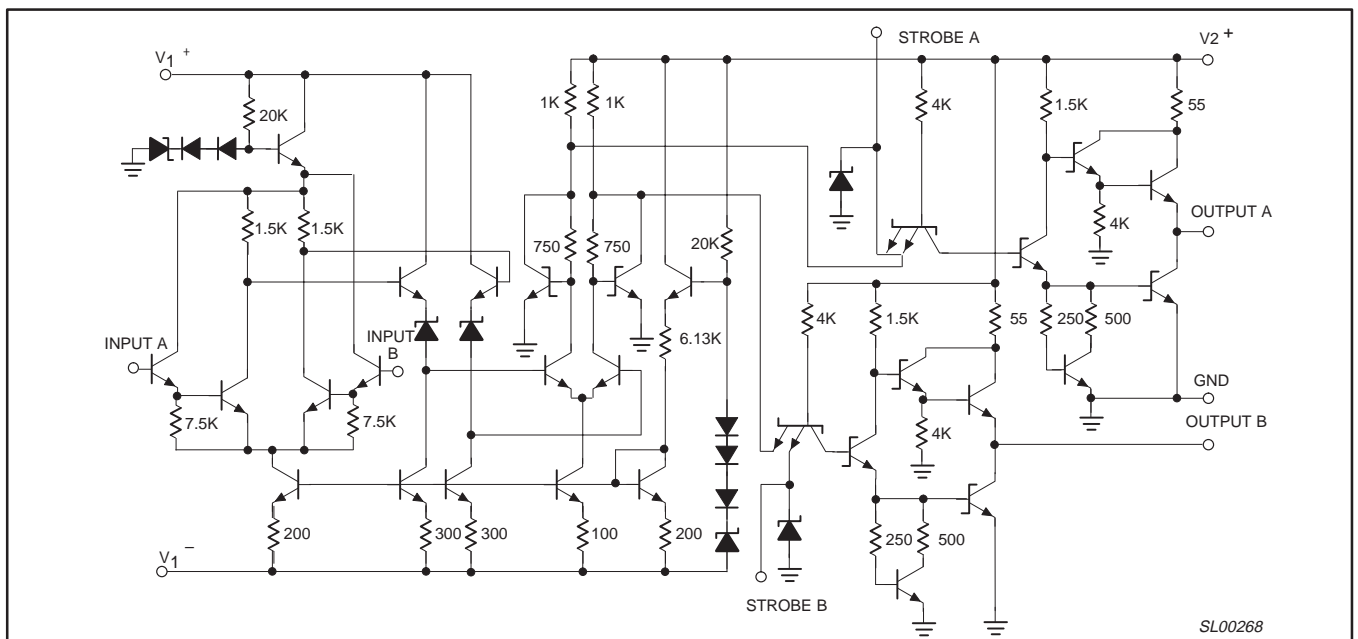


Figure 2. Equivalent Schematic

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## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V <sub>1+</sub>	Positive supply voltage	+15	V
V <sub>1-</sub>	Negative supply voltage	-15	V
V <sub>2+</sub>	Gate supply voltage	+7	V
V <sub>OUT</sub>	Output voltage	+7	V
V <sub>IN</sub>	Differential input voltage	±5	V
V <sub>CM</sub>	Input common mode voltage	±6	V
P <sub>D</sub>	Max power dissipation <sup>1</sup> 25 °C ambient (still air)		
	N package D package	1420 1040	mW mW
T <sub>amb</sub>	Operating temperature range	0 to +70	°C
T <sub>stg</sub>	Storage temperature range	-65 to +150	°C
T <sub>sld</sub>	Lead soldering temperature (10sec max)	+230	°C

**NOTES:**

- Derate above 25 °C, at the following rates:  
 N package 11.4 mW/°C  
 D package 8.3 mW/°C

## BLOCK DIAGRAM

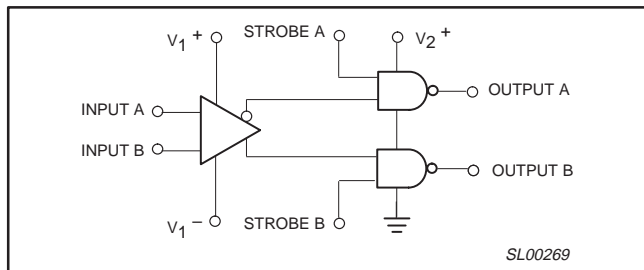


Figure 3. Block Diagram

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**DC ELECTRICAL CHARACTERISTICS** $V_{1+} = 10\text{V}$ ;  $V_{1-} = -10\text{V}$ ;  $V_{2+} = +5.0\text{V}$ ; unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	NE527			UNIT
			Min	Typ	Max	
<b>Input characteristics</b>						
$V_{OS}$	Input offset voltage @ 25 °C over temperature range				6 10	mV
$I_{BIAS}$	Input bias current @ 25 °C over temperature range				2 4	$\mu\text{A}$
$I_{OS}$	Input offset current @ 25 °C over temperature range	$V_{IN} = 0\text{V}$			0.75 1	$\mu\text{A}$
$V_{CM}$	Common-mode voltage range		-5		+5	V
<b>Gate characteristics</b>						
$V_{OUT}$	Output Voltage "1" State "0" State	$V_{2+} = 4.75\text{V}$ ; $I_{SOURCE} = -1\text{mA}$ $V_{2+} = 4.75\text{V}$ ; $I_{SINK} = 10\text{mA}$	2.7	3.3		V V
	Strobe inputs "0" Input current <sup>1</sup> "1" Input current @ 25 °C <sup>1</sup> Over temperature range "0" Input voltage "1" Input voltage	$V_{2+} = 5.25\text{V}$ ; $V_{STROBE} = 0.5\text{V}$ $V_{2+} = 5.25\text{V}$ ; $V_{STROBE} = 2.7\text{V}$ $V_{2+} = 5.25\text{V}$ ; $V_{STROBE} = 2.7\text{V}$ $V_{2+} = 4.75\text{V}$ $V_{2+} = 4.75\text{V}$			-2 100 200 0.8	$\text{mA}$ $\mu\text{A}$ $\mu\text{A}$ V V
$I_{SC}$	Short-circuit output current	$V_{2+} = 5.25\text{V}$ ; $V_{OUT} = 0\text{V}$	-18		-70	$\text{mA}$
<b>Power supply requirements</b>						
$V_{1+}$ $V_{1-}$ $V_{2+}$	Supply voltage		5 -6 4.75		10 -10 5.25	V V V
$I_{1+}$ $I_{1-}$ $I_{2+}$	Supply current	$V_{1+} = 10\text{V}$ ; $V_{1-} = -10\text{V}$ $V_{2+} = 5.25\text{V}$ Over temp. Over temp. Over temp.			5 10 20	$\text{mA}$ $\text{mA}$ $\text{mA}$

**NOTE:**

1. See Logic Function Table.

**AC ELECTRICAL CHARACTERISTICS** $T_{amb} = 25\text{°C}$ , unless otherwise specified. (See AC test circuit)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
$t_{PLH}$ $t_{PHL}$	Transient response propagation delay time Low-to-High High-to-Low	$V_{IN} = \pm 100\text{mV}$ step		16 14	26 24	ns ns
	Delay between output A and B			2	5	ns
$t_{ON}$ $t_{OFF}$	Strobe delay time Turn-on time Turn-off time			6 6		ns ns

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## TYPICAL PERFORMANCE CHARACTERISTICS

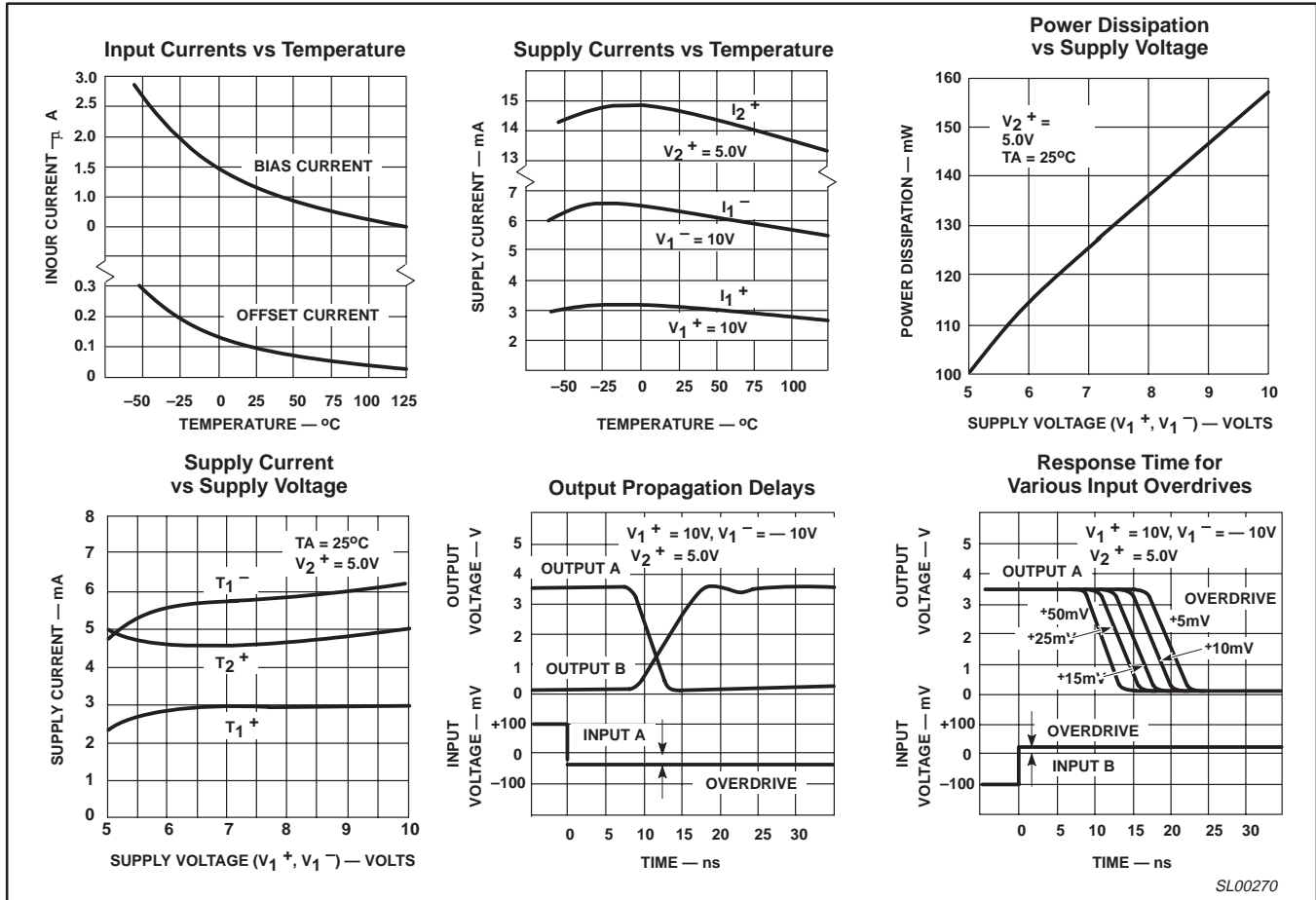


Figure 4. Typical Performance Characteristics

## RESPONSE TIME TEST CIRCUIT

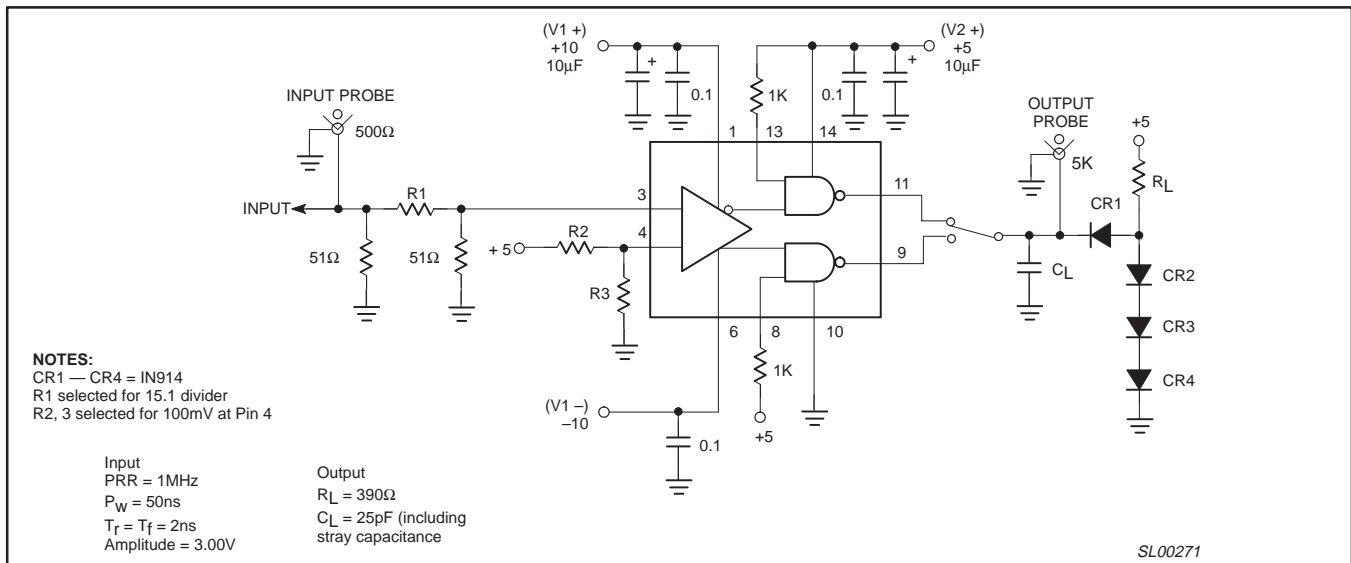


Figure 5. Response Time Test Circuit

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## APPLICATIONS

One of the main features of the device is that supply voltages ( $V_{1+}$ ,  $V_{1-}$ ) need not be balanced, as in the following diagrams. For proper operation, however, negative supply ( $V_{1-}$ ) should always be at least 6 V more than the ground terminal (Pin 6). Input common-mode

range should be limited to values of 2 V less than the supply voltages ( $V_{1+}$  and  $V_{1-}$ ) up to a maximum of  $\pm 5$  V as supply voltages are increased. It is also important to note that Output A is in phase with Input A and Output B is in phase with Input B.

## LOGIC FUNCTION

$V_{ID}$ (A <sup>+</sup> , B <sup>-</sup> )	STROBE A	STROBE B	OUTPUT A	OUTPUT B	COMMENT
$V_{ID} \leq -V_{OS}$	H	X	L	H	Read $I_{IHA}$ , $I_{ILB}$
$-V_{OS} < V_{ID} < V_{OS}$	H	H	Undefined	Undefined	
$V_{ID} \geq V_{OS}$	X	H	H	L	Read $I_{ILA}$ , $I_{IHB}$
X	L	L	H	H	

## TYPICAL APPLICATIONS

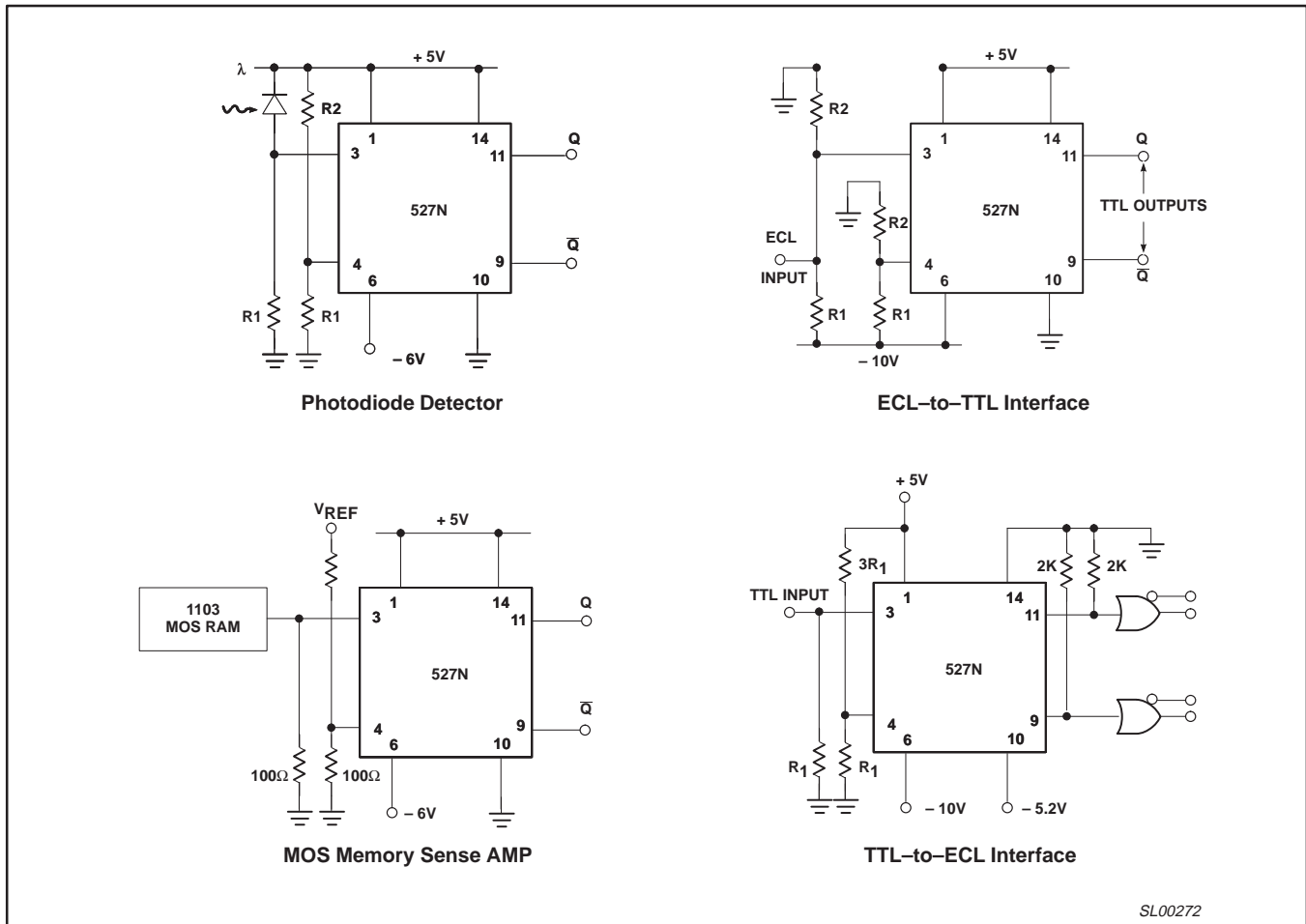


Figure 6. Typical Applications

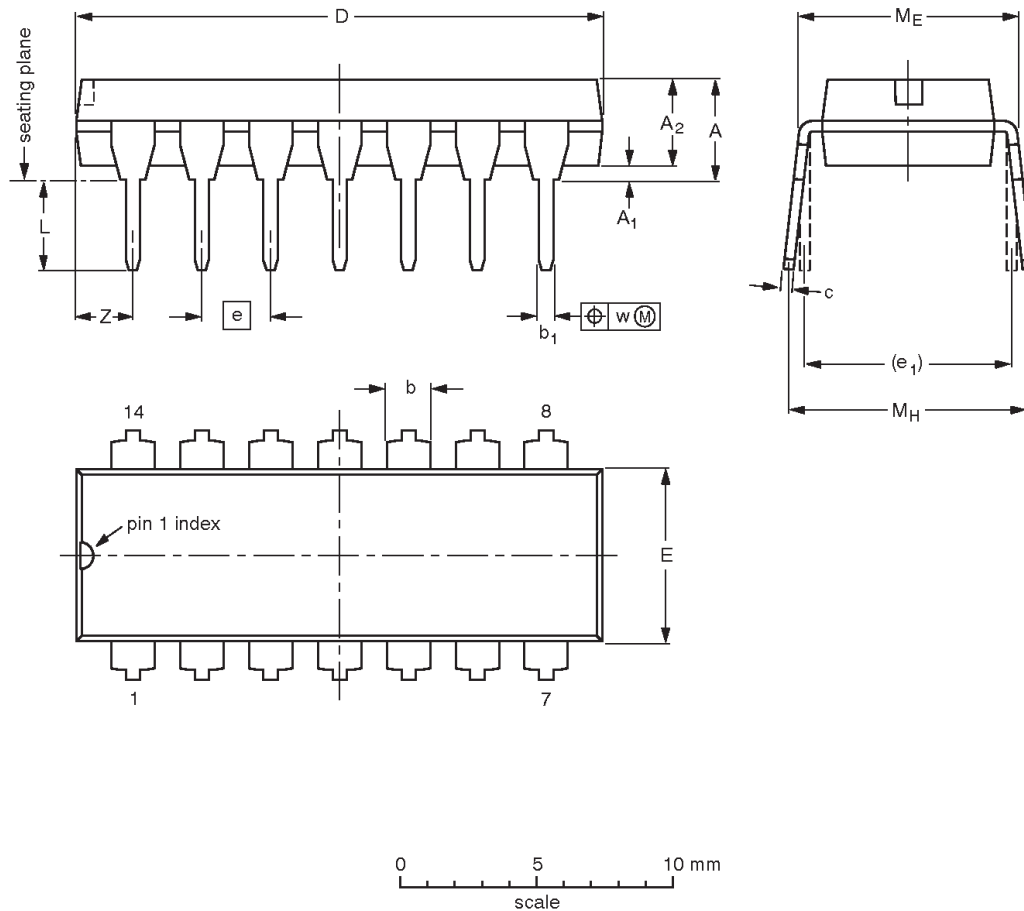
SL00272

# Voltage comparator

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

**SOT27-1**



**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

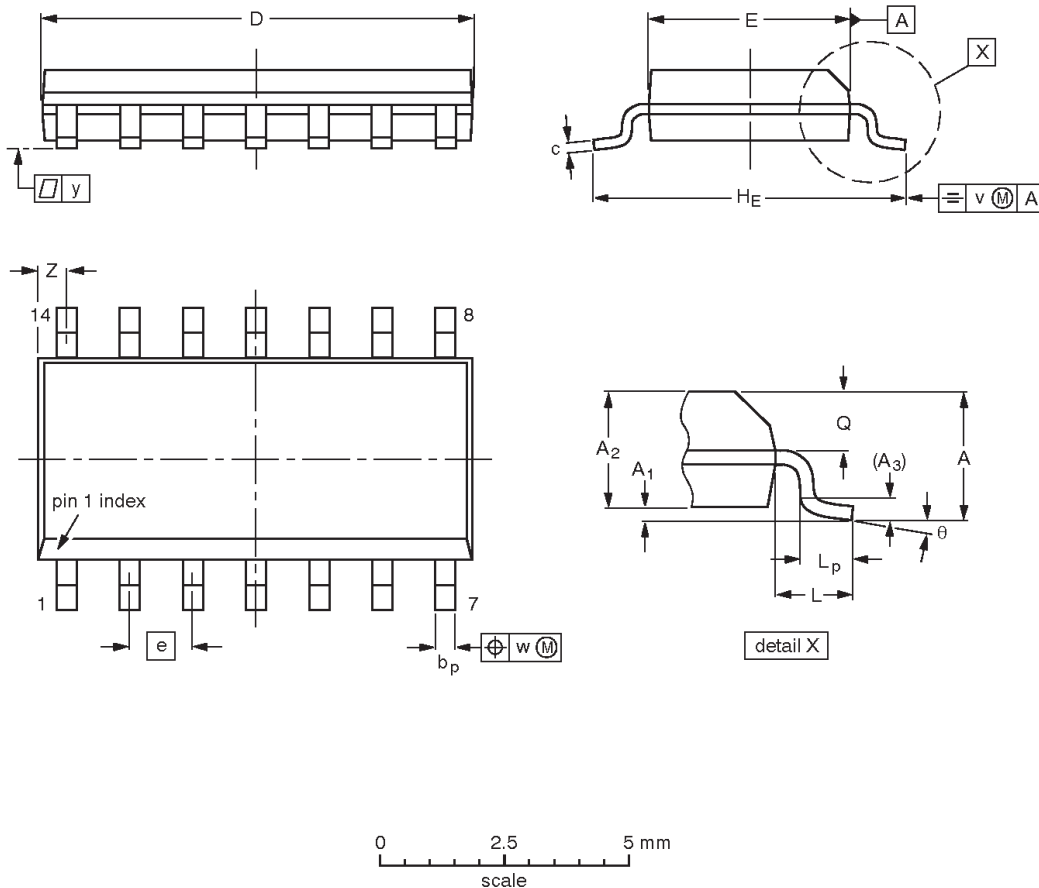
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001	SC-501-14			95-03-11 99-12-27

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

SOT108-1



**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

**Note**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT108-1	076E06	MS-012				97-05-22 99-12-27



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**NOTES**

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## Data sheet status

Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup>	Definitions
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