

DATA SHEET

NE521

**High-speed dual-differential
comparator/sense amp**

Product data

2001 Aug 03

Supersedes data of 1994 Aug 31

File under Integrated Circuits, IC11 Handbook

**Philips
Semiconductors**



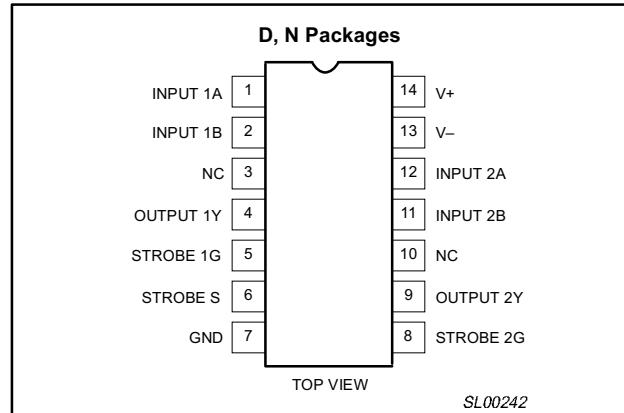
PHILIPS

High-speed dual-differential comparator/sense amp**NE521****FEATURES**

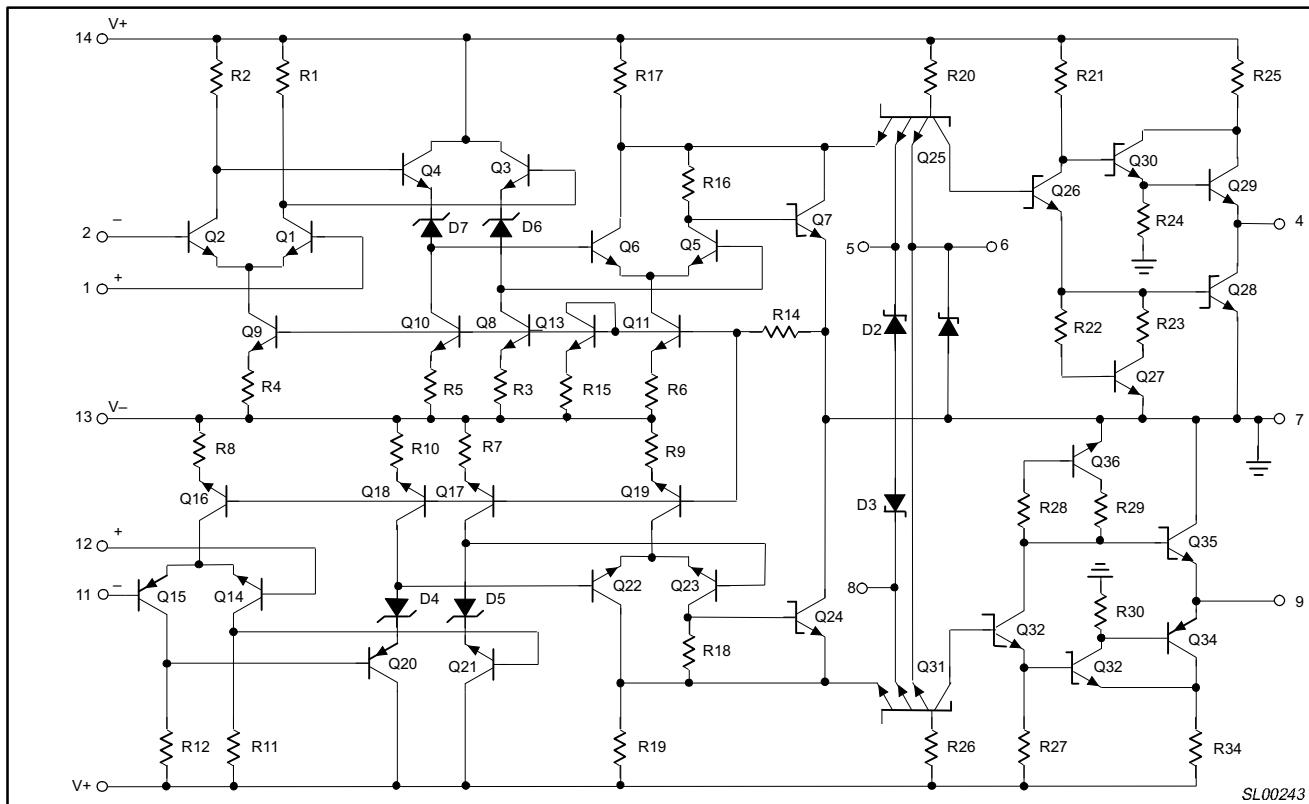
- 12 ns maximum guaranteed propagation delay
- 20 μ A maximum input bias current
- TTL compatible strobes and outputs
- Large common-mode input voltage range
- Operates from standard supply voltages

APPLICATIONS

- MOS memory sense amp
- A-to-D conversion
- High-speed line receiver

PIN CONFIGURATION**Figure 1. Pin Configuration****ORDERING INFORMATION**

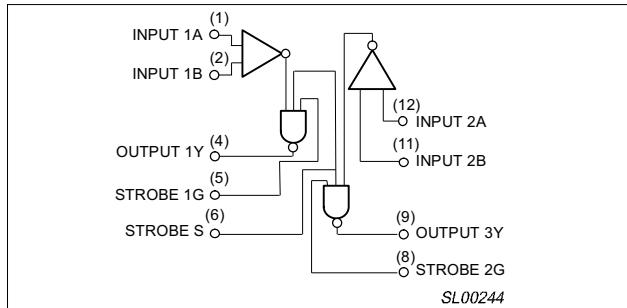
DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	0 °C to +70 °C	NE521N	SOT27-1
14-Pin SO Package	0 °C to +70 °C	NE521D	SOT108-1

EQUIVALENT SCHEMATIC**Figure 2. Equivalent Schematic**

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BLOCK DIAGRAM



LOGIC FUNCTIONS

V_{ID} A^+, B^-	STROBE S	STROBE G	OUTPUT (Y)
$V_{ID} \leq -V_{OS}$	H	H	L
$-V_{OS} < V_{ID} < V_{OS}$	H	H	Undefined
$V_{ID} \geq V_{OS}$	H	H	H
X	L	X	H
X	X	L	H

Figure 3. Block Diagram

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_+	Supply voltage Positive	+7	V
V_-	Negative	-7	V
V_{IDR}	Differential input voltage	± 6	V
V_{IN}	Input voltage Common mode Strobe/gate	± 5 +5.25	V V
P_D	Maximum power dissipation ¹ $T_{amb} = 25^\circ\text{C}$ (still-air) N package D package	1420 1040	mW mW
T_{amb}	Operating temperature range	0 to 70	$^\circ\text{C}$
T_{stg}	Storage temperature range	-65 to +150	$^\circ\text{C}$
T_{sld}	Lead soldering temperature (10 sec. max)	+230	$^\circ\text{C}$

NOTES:

1. Derate above 25°C at the following rates:

N package at $11.4 \text{ mW}/^\circ\text{C}$

D package at $8.3 \text{ mW}/^\circ\text{C}$

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DC ELECTRICAL CHARACTERISTICS

 $V_+ = +5 \text{ V}$; $V_- = -5 \text{ V}$; $T_{\text{amb}} = 0 \text{ }^{\circ}\text{C}$ to $+70 \text{ }^{\circ}\text{C}$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
V_{OS}	Input offset voltage At $25 \text{ }^{\circ}\text{C}$ Over temperature range	$V_+ = +4.75 \text{ V}$; $V_- = -4.75 \text{ V}$		6	7.5 10	mV mV
I_{BIAS}	Input bias current At $25 \text{ }^{\circ}\text{C}$ Over temperature range	$V_+ = +5.25 \text{ V}$, $V_- = -5.25 \text{ V}$		7.5 20 40	μA μA	μA μA
I_{OS}	Input offset current At $25 \text{ }^{\circ}\text{C}$ Over temperature range	$V_+ = +5.25 \text{ V}$, $V_- = -5.25 \text{ V}$		1.0 5 12	μA μA	μA μA
V_{CM}	Common-mode voltage range	$V_+ = +4.75 \text{ V}$, $V_- = -4.75 \text{ V}$	-3		+3	V
I_{IH}	Input current High	$V_+ = +5.25 \text{ V}$, $V_- = -5.25 \text{ V}$ $V_{\text{IH}} = 2.7 \text{ V}$ 1G or 2G strobe Common strobe S			50 100	μA μA
I_{IL}	Input Current Low	$V_{\text{IL}} = 0.5 \text{ V}$ 1G or 2G strobe Common strobe S			-2.0 -4.0	mA mA
V_{OH} V_{OL}	Output voltage High Low	$V_{\text{I(S)}} = 2.0 \text{ V}$ $V_+ = +4.75 \text{ V}$; $V_- = -4.75 \text{ V}$; $I_{\text{LOAD}} = -1 \text{ mA}$ $V_+ = +5.25 \text{ V}$; $V_- = -5.25 \text{ V}$; $I_{\text{LOAD}} = 20 \text{ mA}$	2.7	3.4	0.5	V V
V_+ V_-	Supply voltage Positive Negative		4.75 -4.75	5.0 -5.0	5.25 -5.25	V V
$I_{\text{CC}+}$ $I_{\text{CC}-}$	Supply current Positive Negative	$V_+ = 5.25 \text{ V}$; $V_- = -5.25 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$			27 -15 35 -28	mA
I_{SC}	Short-circuit output current		-40		-100	mA

AC ELECTRICAL CHARACTERISTICS

 $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$; $R_L = 280\Omega$; $C_L = 15 \text{ pF}$; $V_+ = 5 \text{ V}$; $V_- = 5 \text{ V}$

SYMBOL	PARAMETER	FROM INPUT	TO OUTPUT	LIMITS			UNIT
				Min	Typ	Max	
Large-signal switching speed							
$t_{\text{PLH(D)}}$	Propagation delay Low to high ¹	Amp	Output		8	12	
$t_{\text{PHL(D)}}$	High to low ¹	Amp	Output		6	9	ns
$t_{\text{PLH(S)}}$	Low to high ²	Strobe	Output		4.5	10	
$t_{\text{PHL(S)}}$	High to low ²	Strobe	Output		3.0	6	
f_{MAX}	Max. operating frequency			40	55		MHz

NOTES:

1. Response time measured from 0 V point of $\pm 100 \text{ mV}_{\text{P-P}}$ 10 MHz square wave to the 1.5 V point of the output.
2. Response time measured from 1.5 V point of input to 1.5 V point of the output.

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TYPICAL PERFORMANCE CHARACTERISTICS

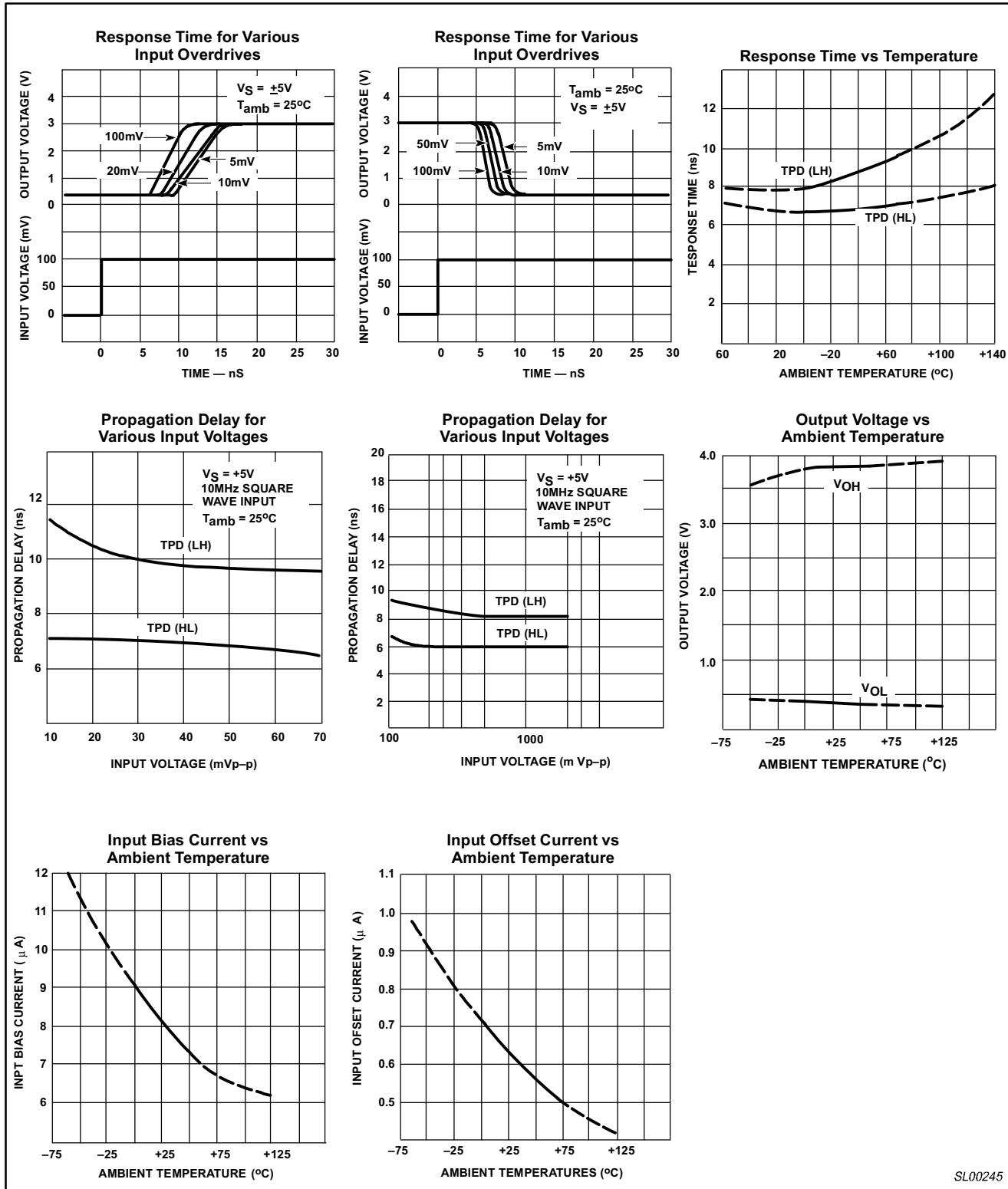


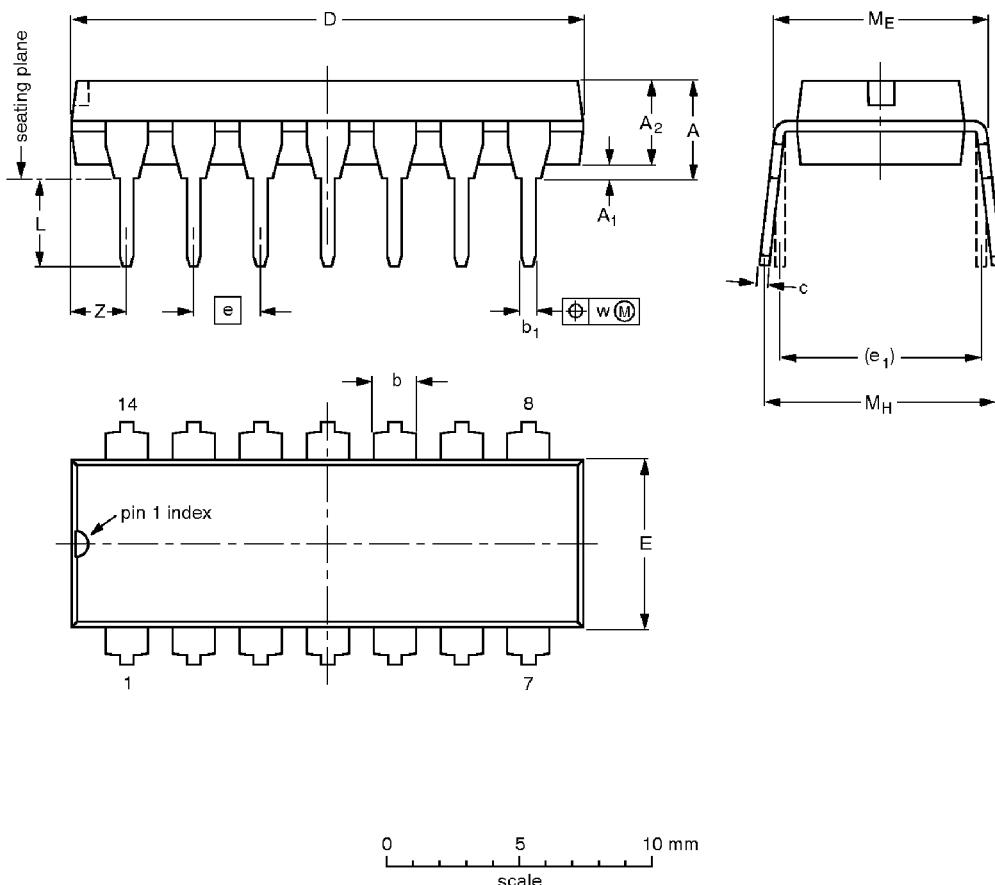
Figure 4. Typical Performance Characteristics

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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 ₁ min.	A ₂ max.	b	b ₁	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	L	M _E	M _H	w	Z ⁽¹⁾ 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

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

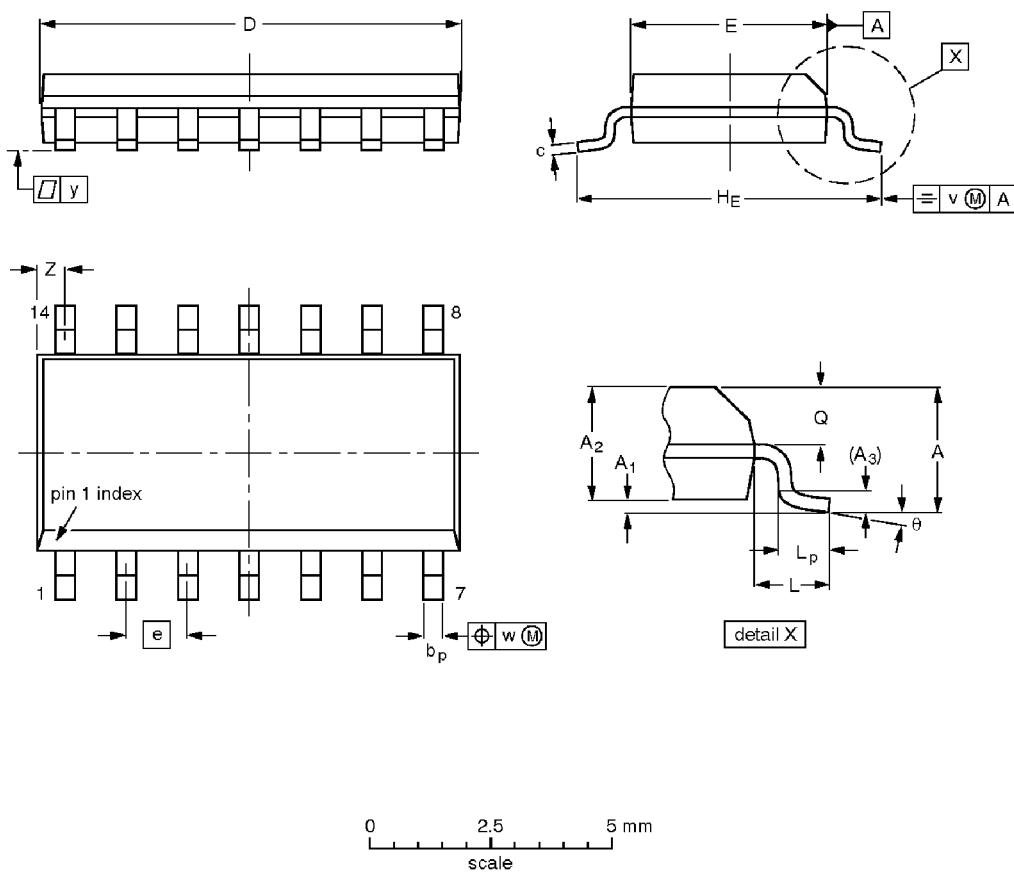
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001	SC-501-14			95-03-11 99-12-27

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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 ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _E	L	L _p	Q	v	w	y	Z ⁽¹⁾	θ
mm	1.75 0.10	0.25 1.25	1.45 0.36	0.25	0.49 0.19	0.25	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 0.004	0.010 0.049	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

- 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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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.
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