

Product specification Supersedes data of 1997 Feb 03 IC24 Data Handbook 1998 Apr 20



PHILIPS

74LV08

Quad 2-input AND gate

FEATURES

- Wide operating voltage: 1.0 to 5.5 V
- Optimized for Low Voltage applications: 1.0 to 3.6 V
- Accepts TTL input levels between V_{CC} = 2.7 V and V_{CC} = 3.6 V
- Typical V_{OLP} (output ground bounce) < 0.8 V at V_{CC} = 3.3 V, T_{amb} = 25°C.
- Typical V_{OHV} (output V_{OH} undershoot) > 2 V at V_{CC} = 3.3 V, T_{amb} = 25°C.
- Output capability: standard
- I_{CC} category: SSI

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25°C; t_r = $t_f \leq$ 2.5 ns

DESCRIPTION

The 74LV08 is a low-voltage Si-gate CMOS device and is pin and function compatible with 74HC/HCT08.

The 74LV08 provides the 2-input AND function.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t _{PHL} /t _{PLH}	Propagation delay nA, nB to nY	C _L = 15 pF; V _{CC} = 3.3 V	7	ns
Cl	Input capacitance		3.5	pF
C _{PD}	Power dissipation capacitance per gate	See Notes 1 and 2	10	pF

NOTES:

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μ W) $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where: f_i = input frequency in MHz; C_L = output load capacitance in pF; f_o = output frequency in MHz; V_{CC} = supply voltage in V; $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

2. The condition is $V_I = GND$ to V_{CC} .

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	PKG. DWG. #
14-Pin Plastic DIL	–40°C to +125°C	74LV08 N	74LV08 N	SOT27-1
14-Pin Plastic SO	–40°C to +125°C	74LV08 D	74LV08 D	SOT108-1
14-Pin Plastic SSOP Type II	–40°C to +125°C	74LV08 DB	74LV08 DB	SOT337-1
14-Pin Plastic TSSOP Type I	–40°C to +125°C	74LV08 PW	74LV08PW DH	SOT402-1

PIN DESCRIPTION

PIN NUMBER	SYMBOL	FUNCTION
1, 4, 9, 12	1A – 4A	Data inputs
2, 5, 10, 13	1Y – 4B	Data inputs
3, 6, 8, 11	1Y – 4Y	Data outputs
7	GND	Ground (0 V)
14	V _{CC}	Positive supply voltage

FUNCTION TABLE

INP	JTS	OUTPUTS
nA	nB	nY
L	L	L
L	Н	L
н	L	L
н	н	н

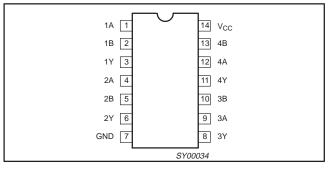
NOTES:

H = HIGH voltage level

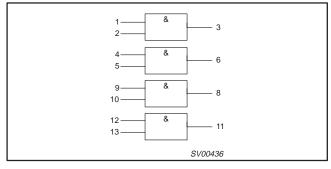
L = LOW voltage level

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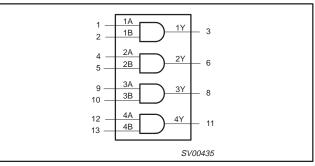
PIN CONFIGURATION



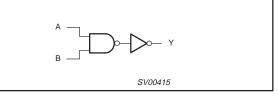
LOGIC SYMBOL (IEEE/IEC)



LOGIC SYMBOL



LOGIC DIAGRAM (ONE GATE)



RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT
V _{CC}	DC supply voltage	See Note1	1.0	3.3	5.5	V
VI	Input voltage		0	-	V _{CC}	V
Vo	Output voltage		0	-	V _{CC}	V
T _{amb}	Operating ambient temperature range in free air	See DC and AC characteristics	-40 -40		+85 +125	°C
t _r , t _f	Input rise and fall times	$\begin{array}{l} V_{CC} = 1.0V \mbox{ to } 2.0V \\ V_{CC} = 2.0V \mbox{ to } 2.7V \\ V_{CC} = 2.7V \mbox{ to } 3.6V \\ V_{CC} = 3.6V \mbox{ to } 5.5V \end{array}$	- - -	- - -	500 200 100 50	ns/V

NOTE:

1. The LV is guaranteed to function down to V_{CC} = 1.0V (input levels GND or V_{CC}); DC characteristics are guaranteed from V_{CC} = 1.2V to V_{CC} = 5.5V.

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ABSOLUTE MAXIMUM RATINGS^{1, 2}

In accordance with the Absolute Maximum Rating System (IEC 134). Voltages are referenced to GND (ground = 0V).

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V _{CC}	DC supply voltage		-0.5 to +7.0	V
$\pm I_{\text{IK}}$	DC input diode current	$V_{\rm I} < -0.5 \text{ or } V_{\rm I} > V_{\rm CC} + 0.5 V$	20	mA
± I _{OK}	DC output diode current	$V_{\rm O}$ < -0.5 or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5V	50	mA
$\pm I_{O}$	DC output source or sink current – standard outputs	$-0.5V < V_O < V_{CC} + 0.5V$	25	mA
$^{\pm I_{GND},}_{\pm I_{CC}}$	DC V _{CC} or GND current for types with – standard outputs		50	mA
T _{stg}	Storage temperature range		-65 to +150	°C
P _{TOT}	Power dissipation per package – plastic DIL – plastic mini-pack (SO) – plastic shrink mini-pack (SSOP and TSSOP)	for temperature range: -40 to +125°C above +70°C derate linearly with 12 mW/K above +70°C derate linearly with 8 mW/K above +60°C derate linearly with 5.5 mW/K	750 500 400	mW

NOTES:

1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions. Voltages are referenced to GND (ground = 0V).

					LIMITS				
SYMBOL	PARAMETER	TEST CONDITIONS	-40	°C to +8	5°C	-40°C to	o +125°C		
			MIN	TYP. ¹	MAX	MIN	MAX	1	
		$V_{CC} = 1.2V$	0.9			0.9			
VIH	HIGH level Input	$V_{CC} = 2.0V$	1.4			1.4		v	
VIH	voltage	V _{CC} = 2.7 to 3.6V	2.0			2.0] `	
		V _{CC} = 4.5 to 5.5V	0.7*V _{CC}			0.7*V _{CC}		1	
	V _{IL} LOW level Input voltage	V _{CC} = 1.2V			0.3		0.3		
V.		$V_{CC} = 2.0V$			0.6		0.6	v	
٧Ľ		V _{CC} = 2.7 to 3.6V			0.8		0.8	1 `	
		V _{CC} = 4.5 to 5.5			0.3*V _{CC}		0.3*V _{CC}	1	
		$V_{CC} = 1.2V; V_I = V_{IH} \text{ or } V_{IL;} - I_O = 100 \mu A$		1.2					
		$V_{CC} = 2.0V; V_I = V_{IH} \text{ or } V_{IL;} - I_O = 100 \mu A$	1.8	2.0		1.8		1	
V _{OH}	HIGH level output voltage; all outputs	$V_{CC} = 2.7V; V_I = V_{IH} \text{ or } V_{IL;} - I_O = 100 \mu A$	2.5	2.7		2.5		V	
	voltage, an outputs	$V_{CC} = 3.0V; V_I = V_{IH} \text{ or } V_{IL;} - I_O = 100 \mu A$	2.8	3.0		2.8		1	
		$V_{CC} = 4.5V; V_I = V_{IH} \text{ or } V_{IL;} - I_O = 100 \mu A$	4.3	4.5		4.3		1	
Vон	HIGH level output voltage;	$V_{CC} = 3.0V$; $V_I = V_{IH}$ or V_{IL} ; $-I_O = 6mA$	2.40	2.82		2.20		v	
VOH	STANDARD outputs	V_{CC} = 4.5V; V_{I} = V_{IH} or $V_{IL;}$ – I_{O} = 12mA	3.60	4.20		3.50			
		V_{CC} = 1.2V; V_I = V_{IH} or V_{IL} ; I_O = 100 μ A		0					
		V_{CC} = 2.0V; V_I = V_{IH} or V_{IL} ; I_O = 100 μ A		0	0.2		0.2		
V _{OL}	LOW level output voltage; all outputs	V_{CC} = 2.7V; V_I = V_{IH} or V_{IL} ; I_O = 100 μ A		0	0.2		0.2	V	
		$V_{CC} = 3.0V$; $V_I = V_{IH}$ or V_{IL} ; $I_O = 100\mu A$		0	0.2		0.2		
		V_{CC} = 4.5V; V_I = V_{IH} or V_{IL} ; I_O = 100 μ A		0	0.2		0.2		
V _{OL}	LOW level output voltage;	V_{CC} = 3.0V; V_{I} = V_{IH} or $V_{IL;}$ I_{O} = 6mA		0.25	0.40		0.50	v	
V OL	STANDARD outputs	$V_{CC} = 4.5V$; $V_I = V_{IH}$ or V_{IL} ; $I_O = 12mA$		0.35	0.55		0.65		

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DC ELECTRICAL CHARACTERISTICS (Continued)

Over recommended operating conditions. Voltages are referenced to GND (ground = 0V).

					LIMITS			
SYMBOL	PARAMETER	TEST CONDITIONS	-40	°C to +8	5°C	-40°C to	UNIT	
			MIN	TYP. ¹	MAX	MIN	MAX	
lı	Input leakage current	V_{CC} = 5.5V; V_{I} = V_{CC} or GND			1.0		1.0	μΑ
I _{CC}	Quiescent supply current; SSI	$V_{CC} = 5.5V; V_I = V_{CC} \text{ or GND}; I_O = 0$			20.0		40	μA
ΔI _{CC}	Additional quiescent supply current	$V_{CC} = 2.7V$ to 3.6V; $V_{I} = V_{CC} - 0.6V$			500		850	μΑ

NOTE:

1. All typical values are measured at $T_{amb} = 25^{\circ}C$.

AC CHARACTERISTICS

GND = 0V; $t_r = t_f \le 2.5 \text{ns}$; $C_L = 50 \text{pF}$; $R_L = 1 \text{K}\Omega$

		WAVEFORM	CONDITION		LIMITS					
SYMBOL	PARAMETER		CONDITION		40 to +85 °	С	–40 to +125 °C		UNIT	
			V _{CC} (V)	MIN	TYP ¹	MAX	MIN	MAX		
		Play Figures 1, 2	1.2		45					
				2.0		15	26		33	
t _{PHL} /t _{PLH}	Propagation delay nA, nB to nY		2.7		11	17		21	ns	
			3.0 to 3.6		9 ²	15		19		
			4.5 to 5.5			11		14		

NOTES:

1. Unless otherwise stated, all typical values are measured at $T_{amb} = 25^{\circ}C$.

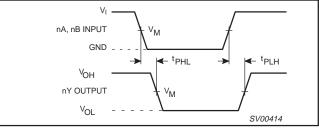
2. Typical values are measured at V_{CC} = 3.3 V.

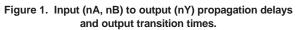
AC WAVEFORMS

 V_M = 1.5 V at $V_{CC} \geq$ 2.7 V and \leq 3.6 V;

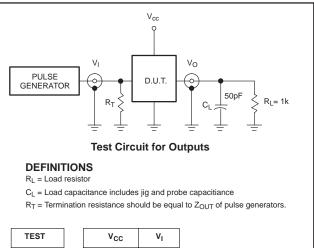
 $V_{M} = 0.5 \times V_{CC}$ at $V_{CC} < 2.7$ V and ≥ 4.5 V;

 $\rm V_{OL}$ and $\rm V_{OH}$ are the typical output voltage drop that occur with the output load.





TEST CIRCUIT



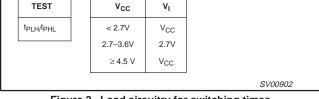
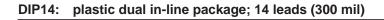


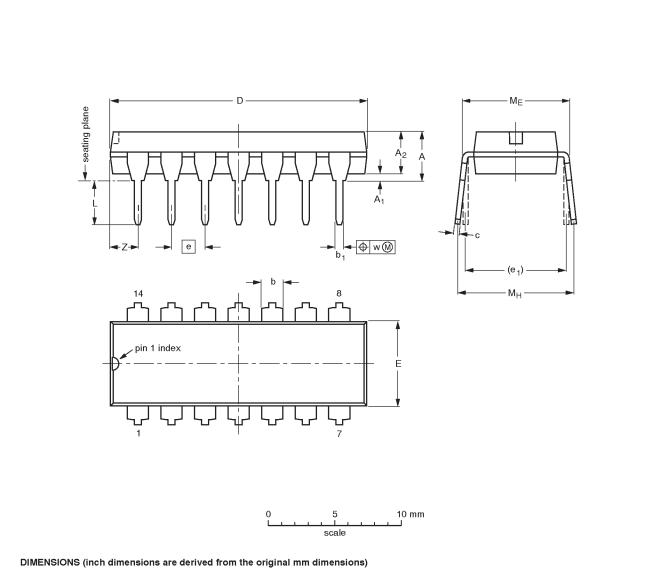
Figure 2. Load circuitry for switching times.

Product specification

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SOT27-1





UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	с	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

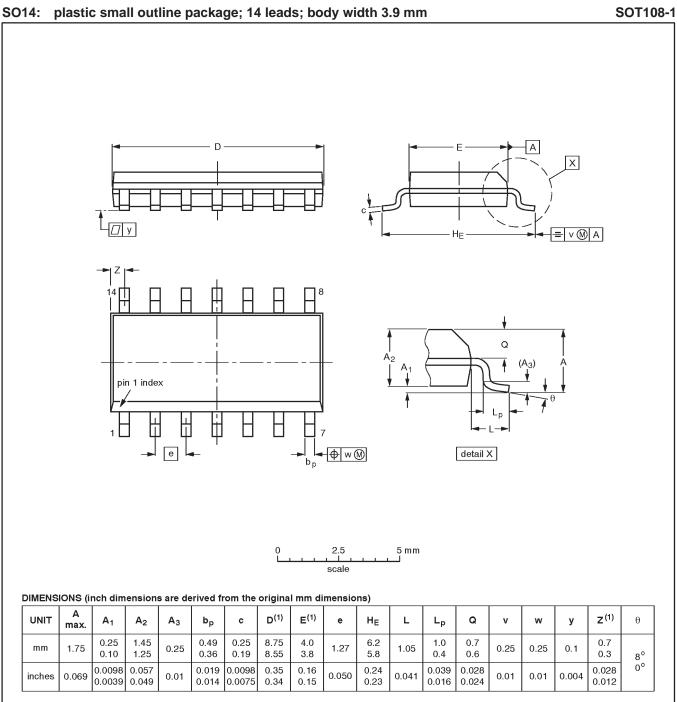
Note

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

OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	EIAJ	PROJECTION	ISSUE DATE	
SOT27-1	050G04	MO-001AA			-92-11-17 95-03-11	

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Product specification

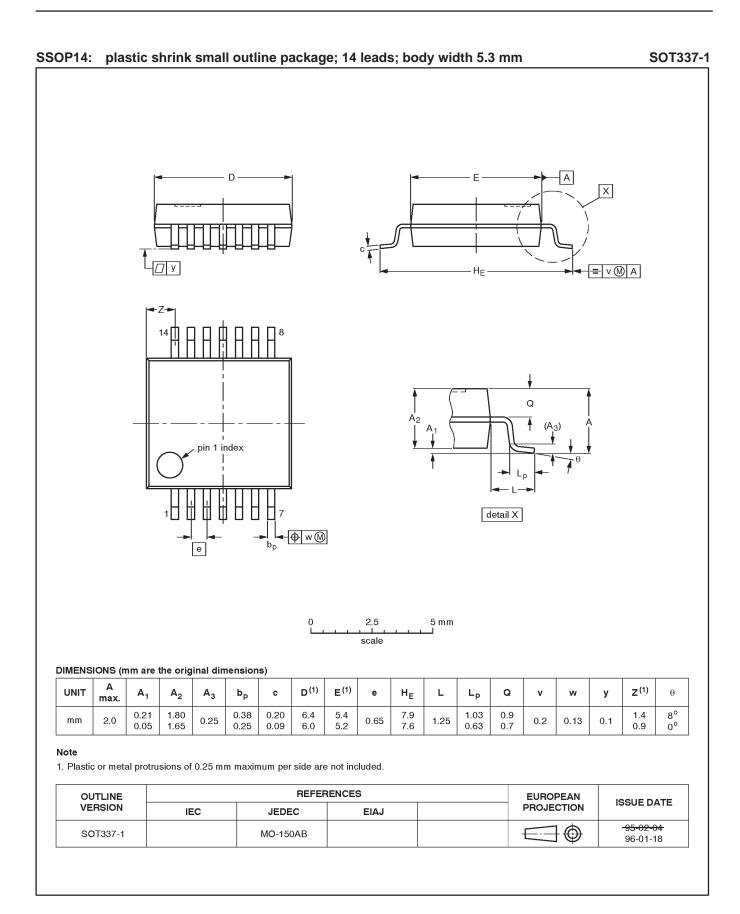


Note

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

OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE
SOT108-1	076E06S	MS-012AB				91-08-13 95-01-23

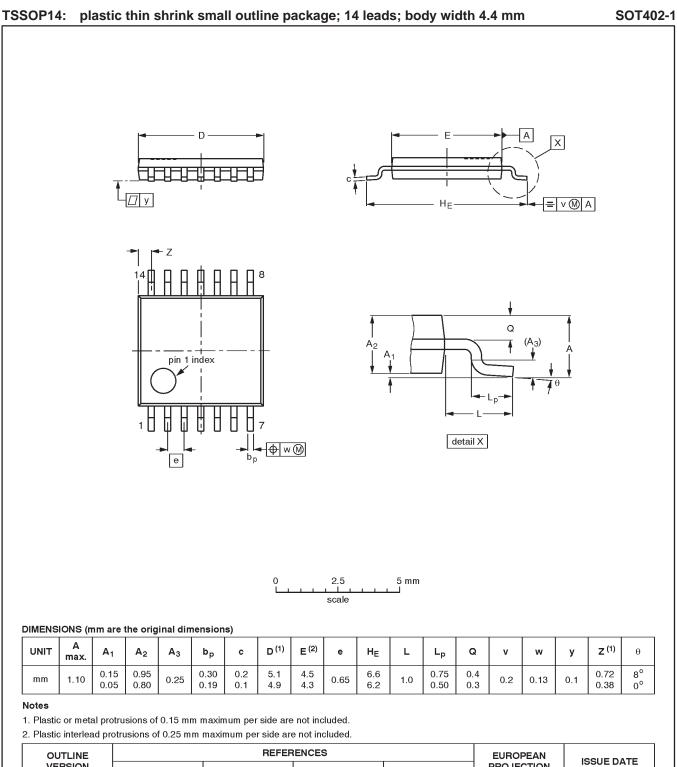
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95-04-04



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DEFINITIONS		
Data Sheet Identification	Product Status	Definition
Objective Specification	Formative or in Design	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
Preliminary Specification	Preproduction Product	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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