INTEGRATED CIRCUITS

DATA SHEET



74ALS10ATriple 3-Input NAND gate

Product specification IC05 Data Handbook

1991 Feb 08





Triple 3-input NAND gate

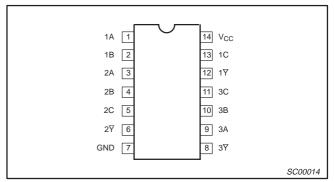
74ALS10A

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74ALS10A	4.0ns	1.8mA

ORDERING INFORMATION

	ORDER CODE		
DESCRIPTION	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	DRAWING NUMBER	
14-pin plastic DIP	74ALS10AN	SOT27-1	
14-pin plastic SO	74ALS10AD	SOT108-1	

PIN CONFIGURATION

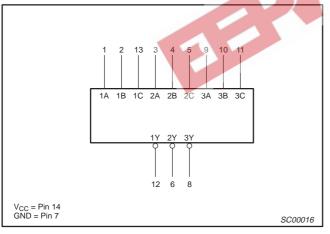


INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION		74ALS (U.L.) HIGH/L <mark>OW</mark>	LOAD VALUE HIGH/LOW		
nA, nB, nC	Data inputs	20 3	1.0/1.0	20μA/0.1mA		
n∀	Data outputs	1.35	20/80	0.4mA/8mA		

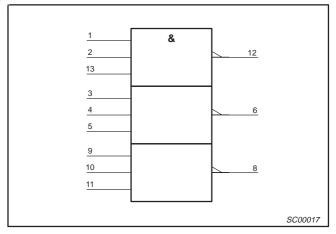
NOTE: One (1.0) ALS unit load is defined as: 20μA in the High state and 0.1mA in the Low state.

LOGIC SYMBOL

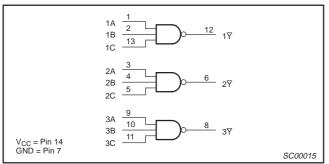


IEC/IEEE SYMBOL

3...



LOGIC DIAGRAM



FUNCTION TABLE

	INPUTS		OUTPUT
nA	nB	nC	nΫ
Н	Н	Н	L
L	Х	Х	Н
Х	L	Х	Н
Х	Х	L	Н

H = High voltage level

L = Low voltage level

X = Don't care

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ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V _{CC}	Supply voltage	-0.5 to +7.0	V
V _{IN}	Input voltage	-0.5 to +7.0	V
I _{IN}	Input current	−30 to +5	mA
V _{OUT}	Voltage applied to output in High output state	−0.5 to V _{CC}	V
I _{OUT}	Current applied to output in Low output state	16	mA
T _{amb}	Operating free-air temperature range	0 to +70	°C
T _{stg}	Storage temperature range	-65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	- %-	LIMITS		UNIT
STWIBOL	FARAMETER	MIN	NOM	MAX	ONIT
V _{CC}	Supply voltage	4.5	5.0	5.5	V
V _{IH}	High-level input voltage	2.0			V
V _{IL}	Low-level input voltage			0.8	V
I _{Ik}	Input clamp current			-18	mA
I _{OH}	High-level output current			-0.4	mA
I _{OL}	Low-level output current			8	mA
T _{amb}	Operating free-air temperature range	0		+70	°C

DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER		TEST CONDITIONS	e1		LIMITS			
STWIBUL	PARAMETER		TEST CONDITIONS	5'	MIN	TYP ²	MAX	UNIT	
V _{OH}	High-level output voltage		$V_{CC}\pm 10\%$, $V_{IL}=MAX$, $V_{IH}=MIN$	$I_{OH} = -0.4 \text{mA}$	V _{CC} – 2			V	
V	Low-level output voltage		V _{CC} = MIN, V _{IL} = MAX,	I _{OL} = 4mA		0.25	0.40	V	
V _{OL}	Low-level output voltage		V _{IH} = MIN	I _{OL} = 8mA		0.35	0.50	V	
V_{IK}	Input clamp voltage		$V_{CC} = MIN, I_I = I_{IK}$		-0.73	-1.5	V		
I _I	Input current at maximum input vo	oltage	$V_{CC} = MAX, V_I = 7.0V$			0.1	mA		
I _{IH}	High-level input current		$V_{CC} = MAX, V_I = 2.7V$			20	μΑ		
I _{IL}	Low-level input current		$V_{CC} = MAX, V_I = 0.5V$			-0.1	mA		
Io	Output current ³		$V_{CC} = MAX, V_O = 2.25V$	-30		-112	mA		
1	Complete company (total)		\/ MAY	$V_I = 0V$		0.5	0.6	mA	
Icc	Supply current (total)	I _{CCL}	V _{CC} = MAX	V _I = 4.5V		1.6	2.2	mA	

NOTES

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.

2. All typical values are at $V_{CC} = 5V$, $T_{amb} = 25^{\circ}C$.

3. The output conditions have been chosen to produce a current that closely approximate one half of the true short-circuit output current, I_{OS}.

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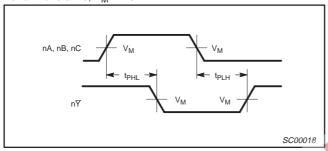
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AC ELECTRICAL CHARACTERISTICS

			LIM	ITS	
SYMBOL	PARAMETER	TEST CONDITION	T _{amb} = 0°0 V _{CC} = +5. C _L = 50pF,	UNIT	
			MIN	MAX	
t _{PLH} t _{PHL}	Propagation delay nA, nB, nC to $\overline{\text{NY}}$	Waveform 1	2.0 2.0	11.0 10.0	ns

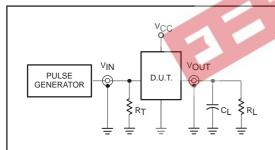
AC WAVEFORMS

For all waveforms, $V_M = 1.3V$.



Waveform 1. Propagation Delay for Data to Output

TEST CIRCUIT AND WAVEFORMS



Test Circuit for Totem-pole Outputs

NEGATIVE PULSE VM VM 10% 10% 10% 10% VM VM VM VM VM 10% 10% AMP (V) AMP (V) AMP (V) O.3V

DEFINITIONS:

R_L = Load resistor;

see AC electrical characteristics for value.

CL = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

Input Pulse Definition

	Family		INPUT PULSE REQUIREMENTS												
		Amplitude	V_{M}	Rep.Rate	t _w	t _{TLH}	t _{THL}								
	74ALS	3.5V	1.3V	1MHz	500ns	2.0ns	2.0ns								

SC00005

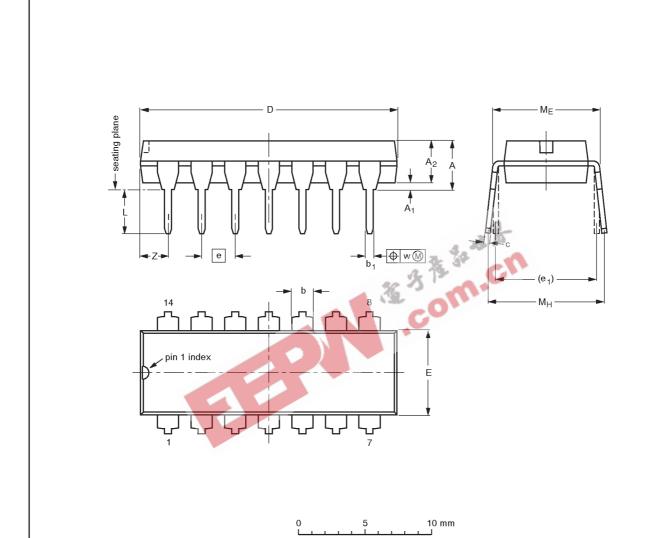
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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



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

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	С	D ⁽¹⁾	E ⁽¹⁾	е	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	

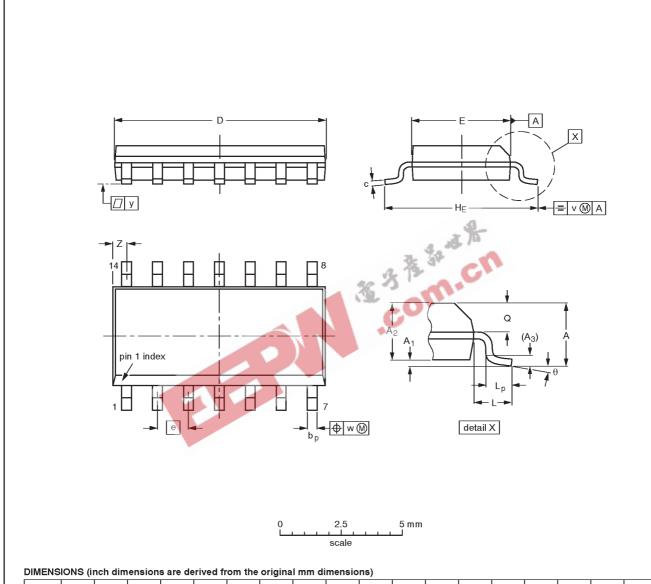
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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



	WENGING (Mich difficions are derived from the original film difficions)																	
UNIT	A max.	Α1	A ₂	A ₃	bp	O	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Ø	v	w	у	Z ⁽¹⁾	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°
inches	1.0.060	0.0098 0.0039		0.01	ı	0.0098 0.0075	0.35 0.34	0.16 0.15	0.050	0.24 0.23	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	0°

Note

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

OUTLINE VERSION	REFERENCES			EUROPEAN	ISSUE DATE	
	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE
SOT108-1	076E06\$	MS-012AB				91-08-13- 95-01-23

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DEFINITION					
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.			
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