

DATA SHEET

74F00
Quad 2-input NAND gate

Product specification

1990 Oct 04

IC15 Data Handbook

Quad 2-input NAND gate

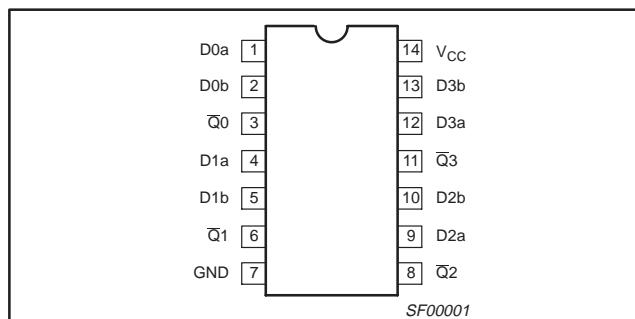
74F00

FEATURE

- Industrial temperature range available (-40°C to $+85^{\circ}\text{C}$)

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F00	3.4ns	4.4mA

PIN CONFIGURATION



ORDERING INFORMATION

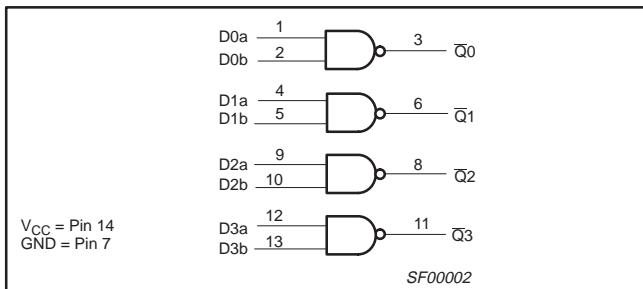
DESCRIPTION	ORDER CODE		PKG DWG #
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$	INDUSTRIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	
14-pin plastic DIP	N74F00N	I74F00N	SOT27-1
14-pin plastic SO	N74F00D	I74F00D	SOT108-1

INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D _{na} , D _{nb}	Data inputs	1.0/1.0	20 μA /0.6mA
Q _n	Data output	50/33	1.0mA/20mA

NOTE: One (1.0) FAST unit load is defined as: 20 μA in the high state and 0.6mA in the low state.

LOGIC DIAGRAM



FUNCTION TABLE

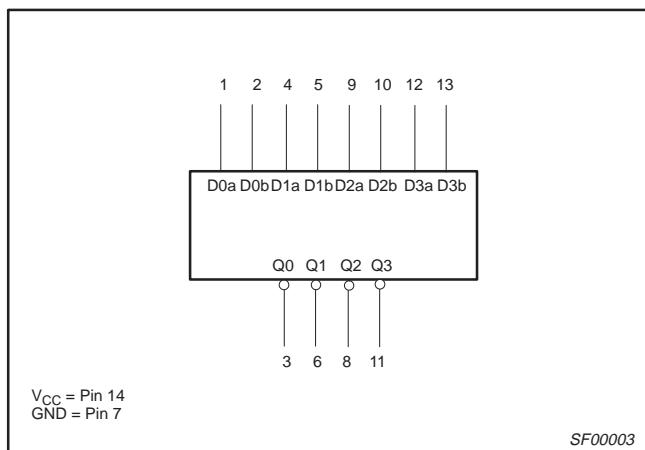
INPUTS		OUTPUT
D _{na}	D _{nb}	Q _n
L	L	H
L	H	H
H	L	H
H	H	L

NOTES:

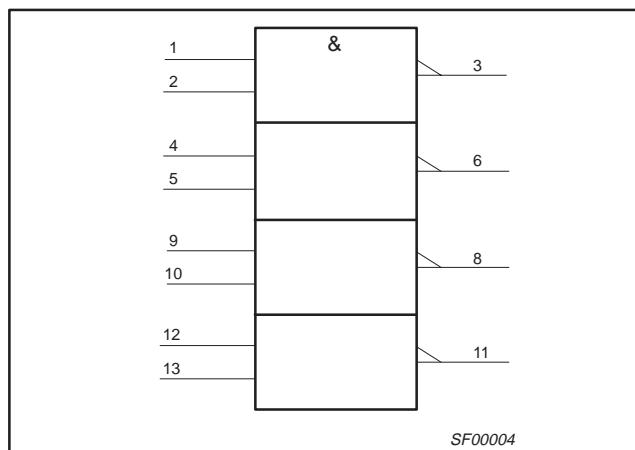
H = High voltage level

L = Low voltage level

LOGIC SYMBOL



IEC/IEEE SYMBOL



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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	40	mA	
T_{amb}	Operating free air temperature range	Commercial range	0 to +70	°C
		Industrial range	-40 to +85	°C
T_{stg}	Storage temperature range	-65 to +150	°C	

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
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			-1	mA
I_{OL}	Low-level output current			20	mA
T_{amb}	Operating free air temperature range	Commercial range	0	+70	°C
		Industrial range	-40	+85	°C

DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	TEST CONDITIONS ¹		LIMITS			UNIT	
				MIN	TYP ²	MAX		
V_{OH}	High-level output voltage	$V_{CC} = \text{MIN}$, $V_{IL} = \text{MAX}$	$\pm 10\%V_{CC}$	2.5			V	
				$\pm 5\%V_{CC}$	2.7	3.4		
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}$, $V_{IL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.30	0.50	V	
				$\pm 5\%V_{CC}$		0.30		
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN}$, $I = I_{IK}$			-0.73	-1.2	V	
I_I	Input current at maximum input voltage	$V_{CC} = \text{MAX}$, $V_I = 7.0\text{V}$				100	µA	
I_{IH}	High-level input current	$V_{CC} = \text{MAX}$, $V_I = 2.7\text{V}$				20	µA	
I_{IL}	Low-level input current	$V_{CC} = \text{MAX}$, $V_I = 0.5\text{V}$				-0.6	mA	
I_{OS}	Short-circuit output current ³	$V_{CC} = \text{MAX}$		-60		-150	mA	
I_{CC}	Supply current (total)	I_{CCH}	$V_{CC} = \text{MAX}$	$V_{IN} = \text{GND}$		1.9	2.8	mA
		I_{CCL}	$V_{CC} = \text{MAX}$	$V_{IN} = 4.5\text{V}$		6.8	10.2	

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 $V_{CC} = 5\text{V}$, $T_{amb} = 25^\circ\text{C}$.
3. Not more than one output should be shorted at a time. For testing I_{OS} , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a high output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

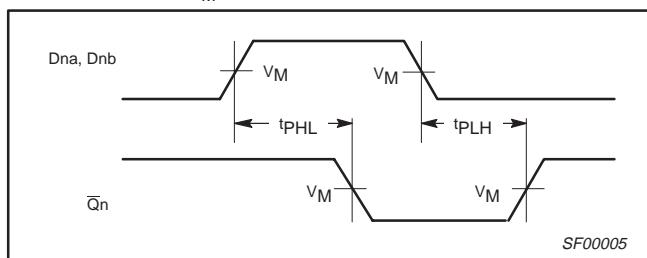
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AC ELECTRICAL CHARACTERISTICS

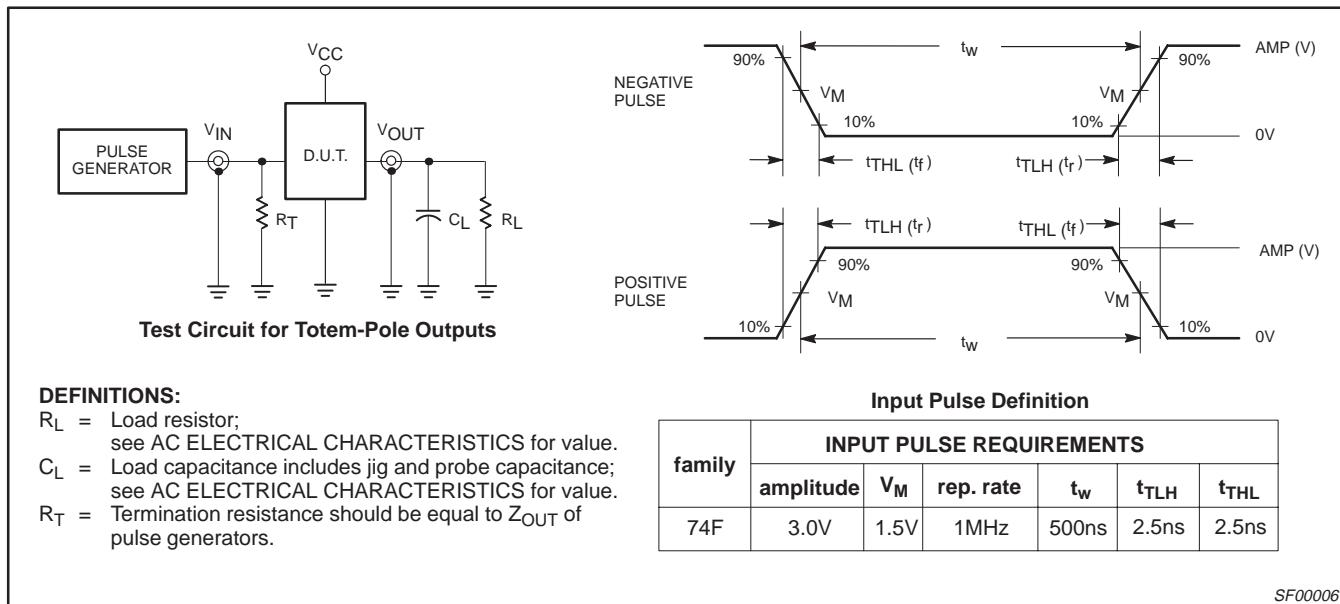
SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT	
			V _{CC} = +5.0V T _{amb} = +25°C C _L = 50pF, R _L = 500Ω			V _{CC} = +5.0V ± 10% T _{amb} = 0°C to +70°C C _L = 50pF, R _L = 500Ω		V _{CC} = +5.0V ± 10% T _{amb} = -40°C to +85°C C _L = 50pF, R _L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	MIN		
t _{PLH} t _{PHL}	Propagation delay D _{na} , D _{nb} to \bar{Q}_n	Waveform 1	2.4 2.0	3.7 3.2	5.0 4.3	2.4 2.0	6.0 5.3	2.0 1.5	6.5 6.0	ns

AC WAVEFORMS

For all waveforms, V_M = 1.5V.

Waveform 1. Propagation delay for inverting outputs

TEST CIRCUIT AND WAVEFORM

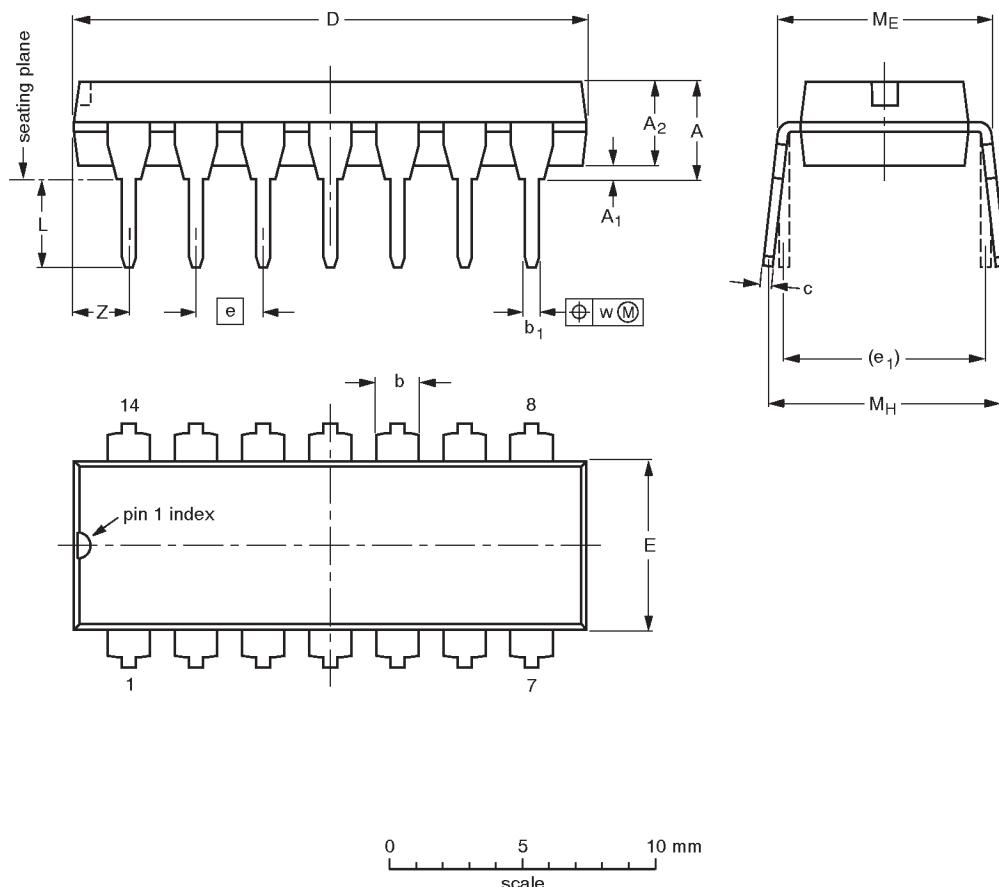


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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



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

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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

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

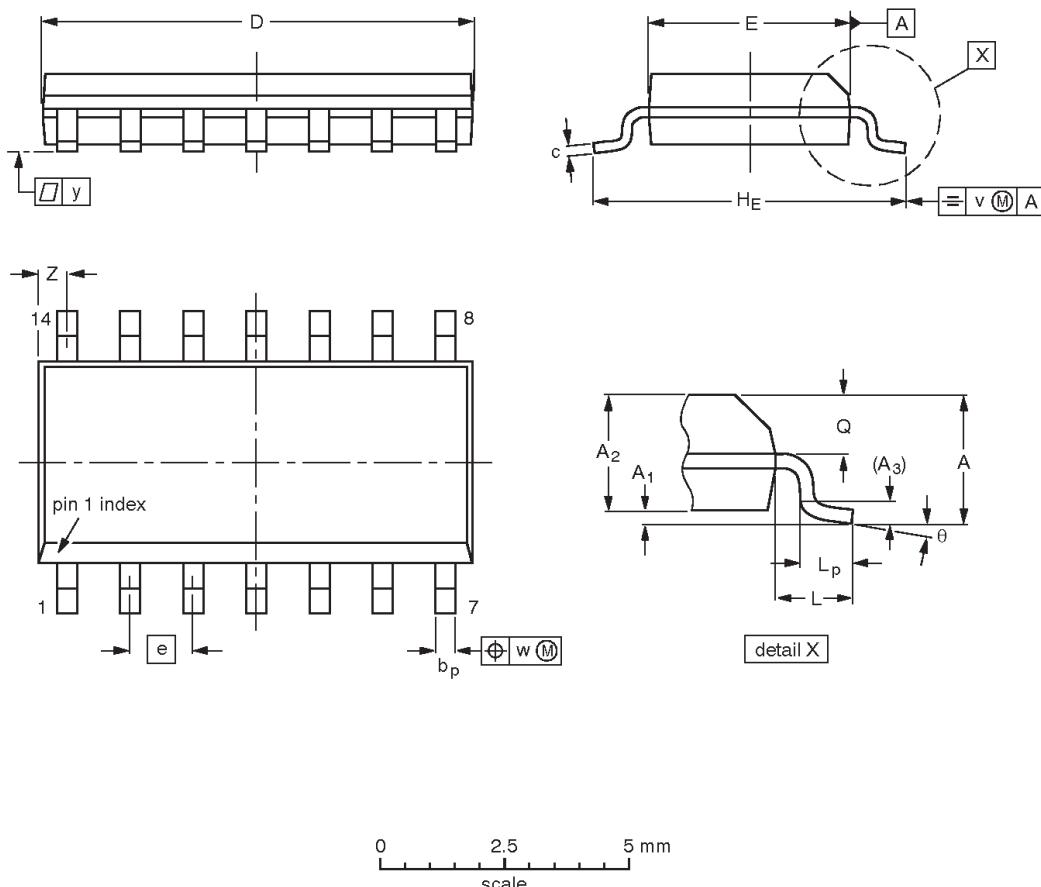
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001AA				92-11-17 95-03-11

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

SOT108-1



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	0.25	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 0.004	0.010 0.049	0.057	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	076E06S	MS-012AB				-95-01-23 97-05-22

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NOTES

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Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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[1] Please consult the most recently issued datasheet before initiating or completing a design.

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