

Dual 4-input NAND buffer

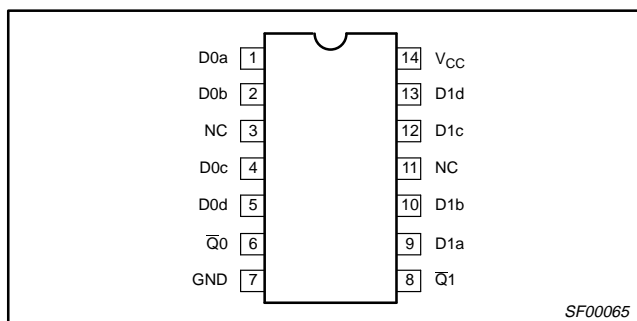
74F40

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F40	3.5ns	6mA

ORDERING INFORMATION

DESCRIPTION	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$
14-pin plastic DIP	N74F40N
14-pin plastic SO	N74F40D

PIN CONFIGURATION

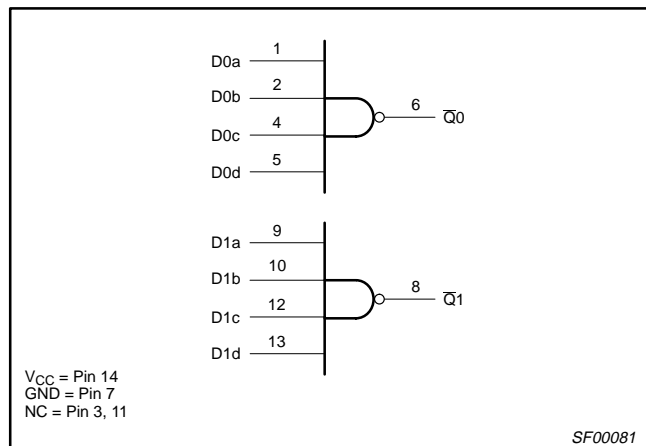


INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Dna, Dnb, Dnc, Dnd	Data inputs	1.0/2.0	20 μ A/1.2mA
$\bar{Q}0, \bar{Q}1$	Data outputs	750/106.7	15mA/64mA

NOTE: One (1.0) FAST unit load is defined as: 20 μ A in the High state and 0.6mA in the Low state.

LOGIC DIAGRAM



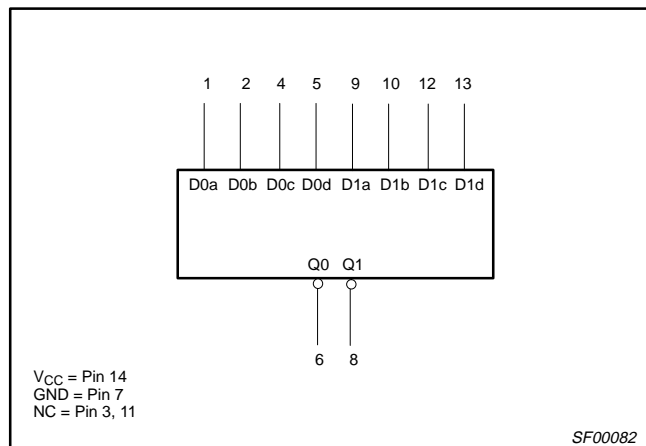
FUNCTION TABLE

INPUTS				OUTPUT
Dna	Dnb	Dnc	Dnd	\bar{Q}_n
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	X	H
H	H	H	H	L

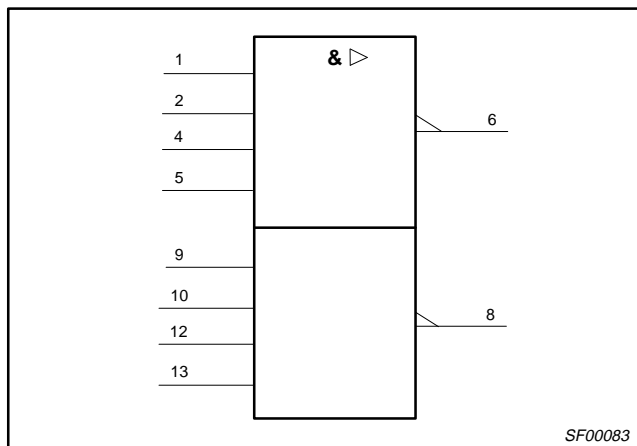
NOTES:

- H = High voltage level
- L = Low voltage level
- X = Don't care

LOGIC SYMBOL



IEC/IEEE SYMBOL



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ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits 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	128	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
		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			-15	mA
I _{OL}	Low-level output current			64	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 ¹	LIMITS			UNIT	
			MIN	TYP ²	MAX		
V _{OH}	High-level output voltage	V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN	I _{OH} = -1mA	±10%V _{CC}	2.5		V
				±5%V _{CC}	2.7	3.4	
			I _{OH} = -15mA	±10%V _{CC}	2.0		V
				±5%V _{CC}	2.0		
V _{OL}	Low-level output voltage	V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN	I _{OL} = MAX	±10%V _{CC}		0.55	V
				±5%V _{CC}		0.42	
V _{IK}	Input clamp voltage	V _{CC} = MIN, I _I = I _{IK}			-0.73	-1.2	V
I _I	Input current at maximum input voltage	V _{CC} = MAX, V _I = 7.0V				100	μA
I _{IH}	High-level input current	V _{CC} = MAX, V _I = 2.7V				20	μA
I _{IL}	Low-level input current	V _{CC} = MAX, V _I = 0.5V				-0.6	mA
I _{OS}	Short-circuit output current ³	V _{CC} = MAX			-100	-225	mA
I _{CC}	Supply current (total)	V _{CC} = MAX	V _{IN} = GND		1.75	4.0	mA
				V _{IN} = 4.5V		11	

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
- 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.

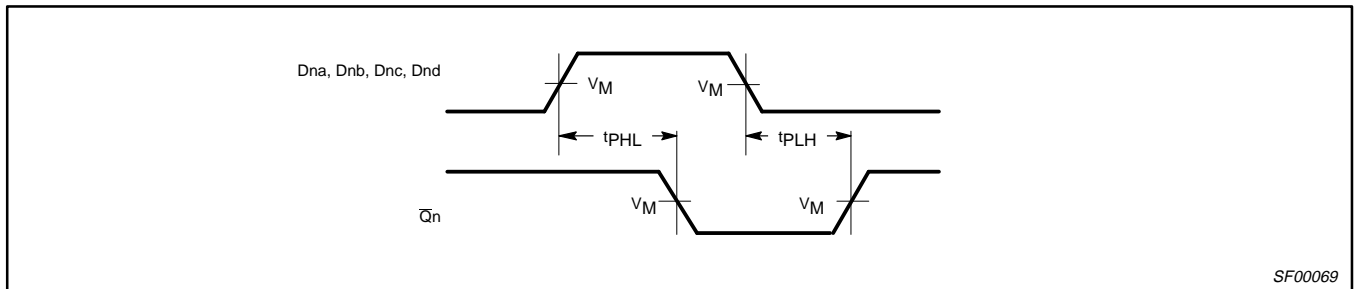
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AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			$V_{CC} = +5.0V$ $T_{amb} = +25^{\circ}C$ $C_L = 50pF, R_L = 500\Omega$			$V_{CC} = +5.0V \pm 10\%$ $T_{amb} = 0^{\circ}C \text{ to } +70^{\circ}C$ $C_L = 50pF, R_L = 500\Omega$		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay Dna, Dnb, Dnc, Dnd to \bar{Q}_n	Waveform 1	2.0 1.5	4.0 3.0	6.0 5.0	1.5 1.0	7.0 5.5	ns

AC WAVEFORMS



Waveform 1. Propagation Delay for Inverting Outputs

NOTE:

For all waveforms, $V_M = 1.5V$.

TEST CIRCUIT AND WAVEFORMS

Test Circuit for Totem-Pole Outputs

DEFINITIONS:

- R_L = Load resistor; see AC electrical characteristics for value.
- C_L = 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}
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns