

FAST 74F20 Gate

Dual 4-Input NAND Gate

FAST Products

Product Specification

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F20	3.5 ns	2.2 mA

ORDERING INFORMATION

PACKAGES	COMMERCIAL RANGE
	$V_{CC} = 5V \pm 10\%$; $T_A = 0^\circ C$ to $+70^\circ C$
14-Pin Plastic DIP	N74F20N
14-Pin Plastic SO	N74F20D

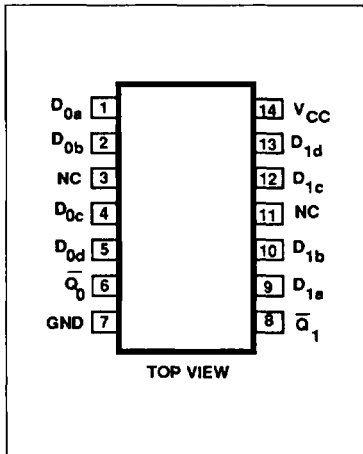
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D_{na} , D_{nb} , D_{nc} , D_{nd}	Data inputs	1.0/1.0	20 μ A/0.6mA
\bar{Q}_0 , \bar{Q}_1	Data outputs	50/33	1.0mA/20mA

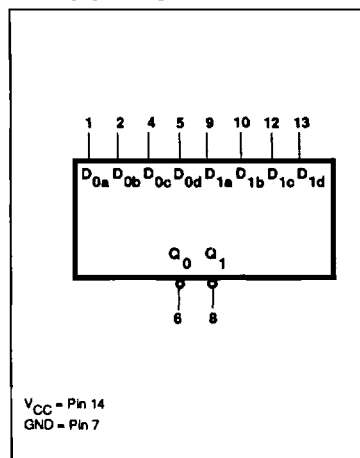
NOTE:

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

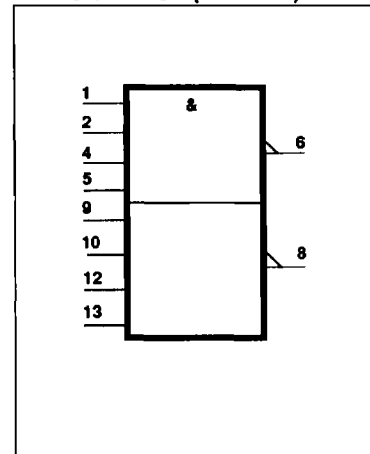
PIN CONFIGURATION



LOGIC SYMBOL



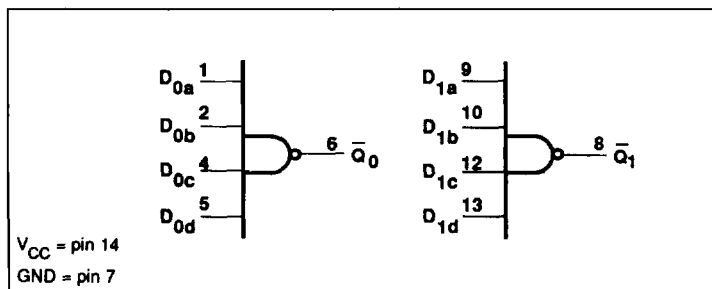
LOGIC SYMBOL (IEEE/IEC)



Gate

FAST 74F20

LOGIC DIAGRAM



FUNCTION TABLE

INPUTS				OUTPUT
D_{na}	D_{nb}	D_{nc}	D_{nd}	\bar{Q}_n
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H
H	H	H	H	L

H = High voltage level

L = Low voltage level

X = Don't care

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	40	mA
T_A	Operating free-air temperature range	0 to +70	°C
T_{STG}	Storage temperature	-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_K	Input clamp current			-18	mA
I_{OH}	High-level output current			-1	mA
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature range	0		70	°C

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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	±10%V _{CC}	2.5		V	
		V _{IH} = MIN, I _{OH} = MAX	±5%V _{CC}	2.7	3.4	V	
V _{OL}	Low-level output voltage	V _{CC} = MIN, V _{IL} = MAX	±10%V _{CC}		0.30	0.50	V
		V _{IH} = MIN, I _{OL} = MAX	±5%V _{CC}		0.30	0.50	V
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			-60		mA
I _{CC}	Supply current (total)	V _{CC} = MAX	V _{IN} =GND		0.9	1.4	mA
				V _{IN} =4.5V		3.4	5.1

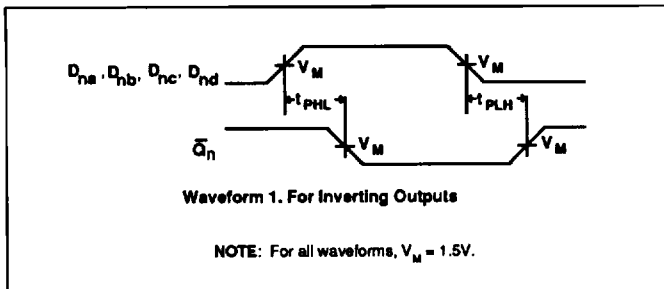
NOTES:

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_A = 25°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.

AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T _A = +25°C			T _A = 0°C to +70°C		
			Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation delay D _{na} , D _{nb} , D _{nc} , D _{nd} 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	ns

AC WAVEFORMS



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TEST CIRCUIT AND WAVEFORMS

