

FAST 74F38 Buffer

Quad Two-Input NAND Buffer (Open Collector)

FAST Products

Product Specification

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F38	7.0 ns	13 mA

ORDERING INFORMATION

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$; $T_A = 0^\circ C$ to $+70^\circ C$
14-Pin Plastic DIP	N74F38N
14-Pin Plastic SO	N74F38D

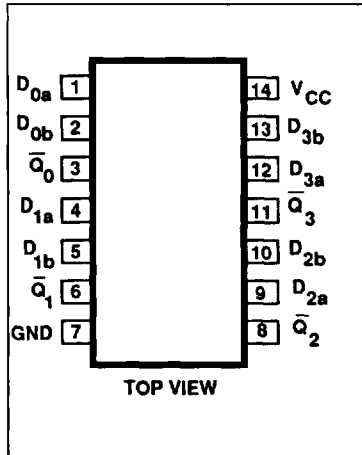
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D_{na} , D_{nb}	Data inputs	1.0/2.0	20 μ A/1.2mA
Q_n	Data outputs	OC/106.7	OC/64mA

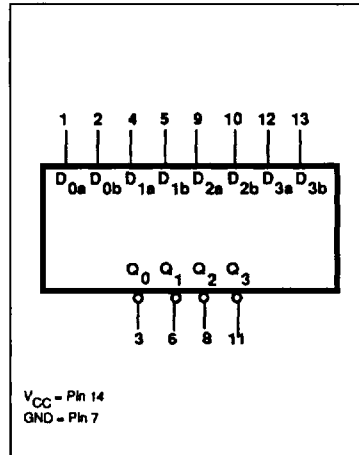
NOTE:

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

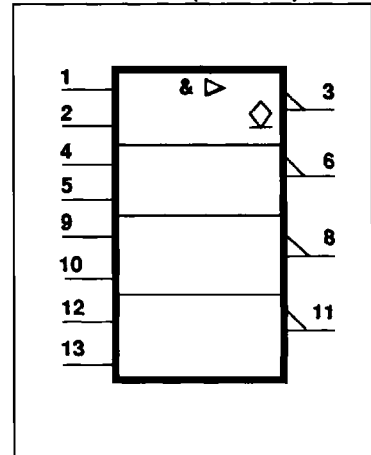
PIN CONFIGURATION



LOGIC SYMBOL



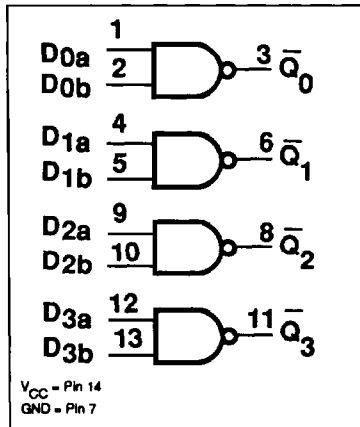
LOGIC SYMBOL (IEEE/IEC)



Buffer

FAST 74F38

LOGIC DIAGRAM



FUNCTION TABLE

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

H = High voltage level
 L = Low voltage level

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_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_{IK}	Input clamp current			-18	mA
V_{OH}	High-level output voltage			4.5	V
I_{OL}	Low-level output current			64	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		
I_{OH}	High-level output current	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{IH} = \text{MIN}, V_{OH} = \text{MAX}$				250	μA	
V_{OL}	Low-level output current	$V_{CC} = \text{MIN}$ $V_{IL} = \text{MAX}$ $V_{IH} = \text{MIN}$	$I_{OL} = 48\text{mA}$	$\pm 10\%V_{CC}$.38	.55	V	
			$I_{OL} = 64\text{mA}$	$\pm 5\%V_{CC}$.42	.55	V	
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$				-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	$V_{CC} = \text{MAX}, V_I = 0.5\text{V}$				-1.2	mA	
I_{CC}	Supply current [total]	I_{CCH}	$V_{CC} = \text{MAX}$	$V_{IN} = \text{GND}$	4.0	7.0	mA	
		I_{CCL}			$V_{IN} = 4.5\text{V}$	22	30	mA

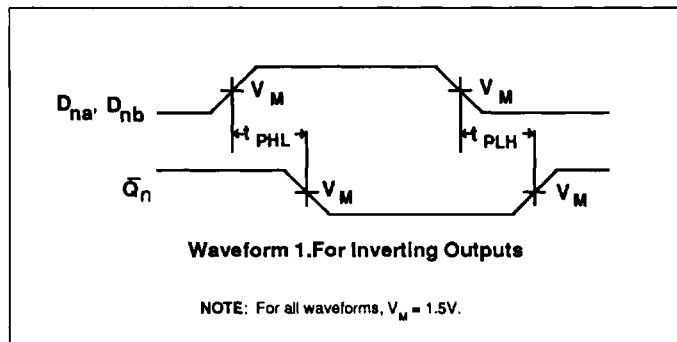
NOTES:

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 $V_{CC} = 5\text{V}, T_A = 25^\circ\text{C}$.

AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			$T_A = +25^\circ\text{C}$ $V_{CC} = 5\text{V}$ $C_L = 50\text{pF}$ $R_L = 500\Omega$			$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = 5\text{V} \pm 10\%$ $C_L = 50\text{pF}$ $R_L = 500\Omega$		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay D_{na}, D_{nb} to \bar{Q}_n	Waveform 1	7.5 1.5	10.0 3.0	12.5 5.0	7.5 1.5	13.0 5.5	ns

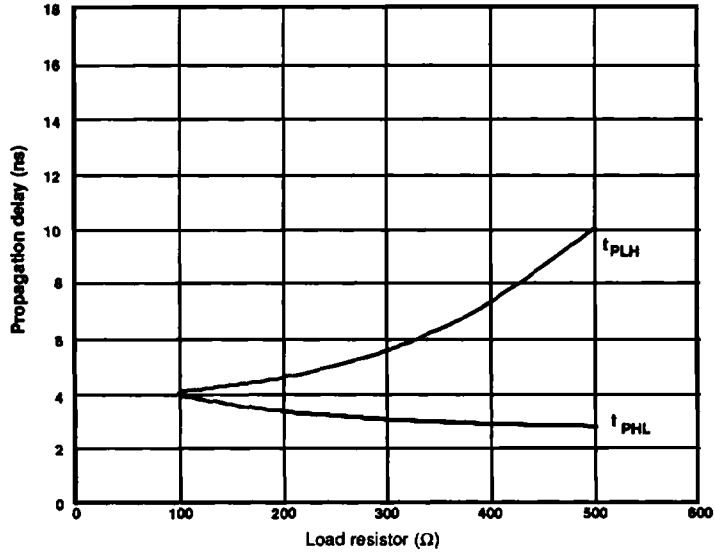
AC WAVEFORMS



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FAST 74F38

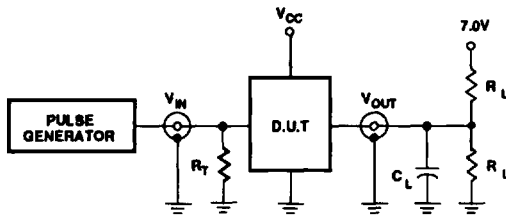
TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



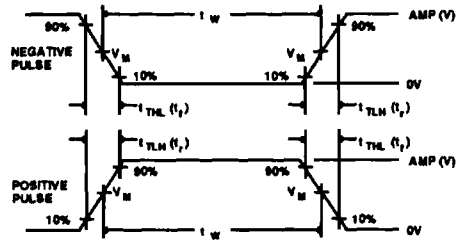
NOTE:

When using Open-Collector parts, the value of the pull-up resistor greatly affects the value of the t_{PLH} . For example, changing the specified pull-up resistor value from 500Ω to 100Ω will improve the t_{PLH} up to 50% with only a slight increase in the t_{PHL} . However, if the value of the pull-up resistor is changed, the user must make certain that the total I_{OL} current through the resistor and the total I_{IL} 's of the receivers does not exceed the I_{OL} maximum specification.

TEST CIRCUIT AND WAVEFORMS



Test Circuit For Open Collector Outputs



$V_M = 1.5V$
Input Pulse Definition

DEFINITIONS

- R_L = Load resistor; see AC CHARACTERISTICS for value.
- C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.
- R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_{TLH}	t_{TLL}
74F	3.0V	1MHz	500ns	2.5ns	2.5ns