Signetics

FAST 74F51
Gate

Dual 2-Wide 2-Input, 2-Wide 3-Input AND-OR-Invert Gate

FAST Products

Product Specification

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F51	3.0 ns	3.5 mA

ORDERING INFORMATION

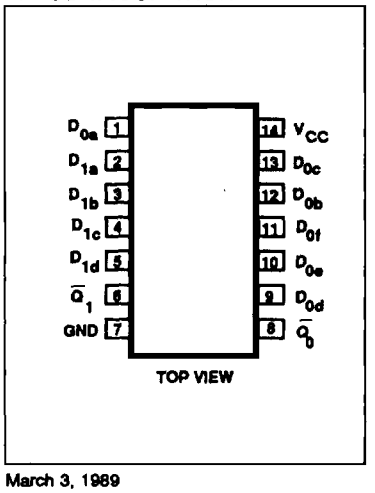
PACKAGES	COMMERCIAL RANGE V_{CC} = 5V±10%; T_A = 0°C to +70°C
14-Pin Plastic DIP	N74F51N
14-Pin Plastic SO	N74F51D

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

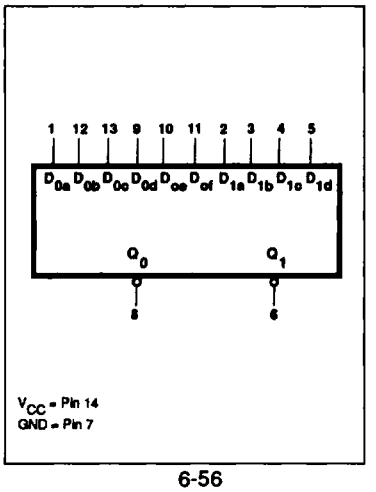
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D_{na}, D_{nb}, D_{nc}, D_{nd}, D_{ne}, D_{nf}	Data inputs	1.0/1.0	20µA/0.6mA
$\overline{Q}_0$, $\overline{Q}_1$	Data outputs	50/33	1.0mA/20mA

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

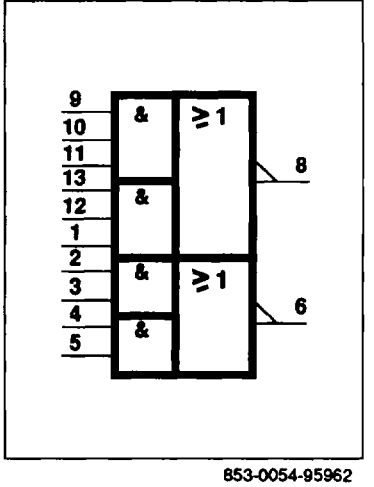
PIN CONFIGURATION



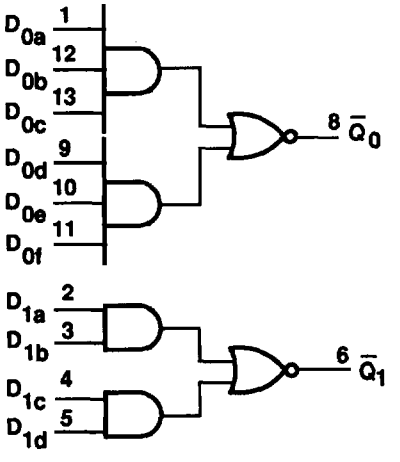
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



LOGIC DIAGRAM



V_{CC} = pin 14
GND = pin 7

FUNCTION TABLE for 3-Input Gates

INPUTS						OUTPUT
D_{0a}	D_{0b}	D_{0c}	D_{0d}	D_{0e}	D_{0f}	$\overline{Q}_0$
H	H	H	X	X	X	L
X	X	X	H	H	H	L
All other combinations						H

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

FUNCTION TABLE for 2-Input Gates

INPUTS				OUTPUT
D_{1a}	D_{1b}	D_{1c}	D_{1d}	$\overline{Q}_1$
H	H	X	X	L
X	X	H	H	L
All other combinations				H

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_{IK}	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

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

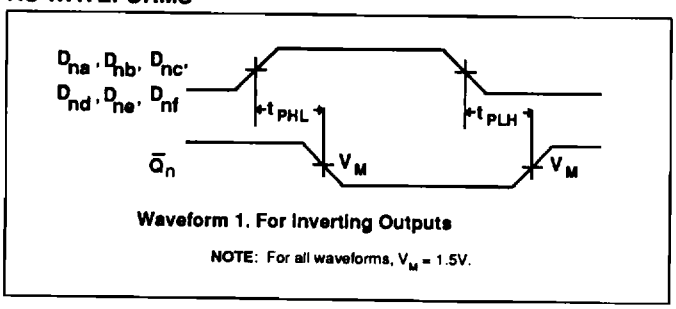
SYMBOL	PARAMETER		TEST CONDITIONS[1]		LIMITS			UNIT
					Min	Typ[2]	Max	
V_{OH}	High-level output voltage		V_{CC} = MIN, V_{IL} = MAX	±10%V_{CC}	2.5			V
			V_{IH} = MIN, I_{OH} = MAX	±5%V_{CC}	2.7	3.4		V
V_{OL}	Low-level output voltage		V_{CC} = MIN, V_{IL} = MAX	±10%V_{CC}		0.30	0.50	V
			V_{IH} = MIN, 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		-150	mA
I_{CC}	Supply current (total)	I_{CCH}	V_{CC} = MAX	V_{IN}=GND		1.8	3.0	mA
		I_{CCL}		V_{IN}=4.5V		5.5	7.5	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_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, V_{CC} = 5V, C_L = 50pF, R_L = 500Ω			T_A = 0°C to +70°C, V_{CC} = 5V ±10%, C_L = 50pF, R_L = 500Ω		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay D_{na}, D_{nb}, D_{nc}, D_{nd}, D_{ne}, D_{nf} to $\overline{Q}_n$	Waveform 1	2.0 1.0	3.5 2.5	5.5 4.0	1.5 1.0	6.5 4.5	ns

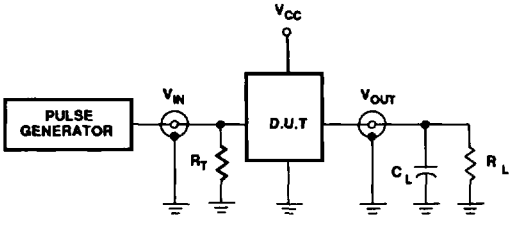
AC WAVEFORMS



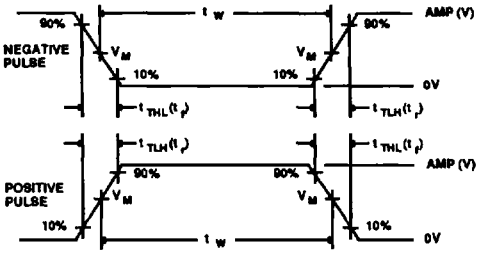
Waveform 1. For Inverting Outputs

NOTE: For all waveforms, V_M = 1.5V.

TEST CIRCUIT AND WAVEFORMS



Test Circuit For Totem-Pole 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_{THL}
74F	3.0V	1MHz	500ns	2.5ns	2.5ns