

Triple 3-input NOR gate

74F27

FEATURE

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

TYPE	TYPICAL PROPAGA- TION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F27	3.0ns	6.5mA

ORDERING INFORMATION

DESCRIPTION	ORDER CODE	
	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	N74F27N	I74F27N
14-pin plastic SO	N74F27D	I74F27D

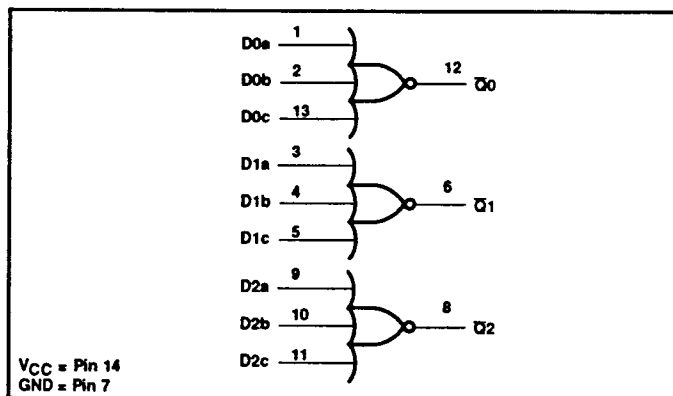
INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/ LOW	LOAD VALUE HIGH/ LOW
Dna, Dnb, Dnc	Data inputs	1.0/1.0	20 μA /0.6mA
$\bar{Q}_n$	Data output	50/33	1.0mA/20mA

Note to input and output loading and fan out table

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

LOGIC DIAGRAM



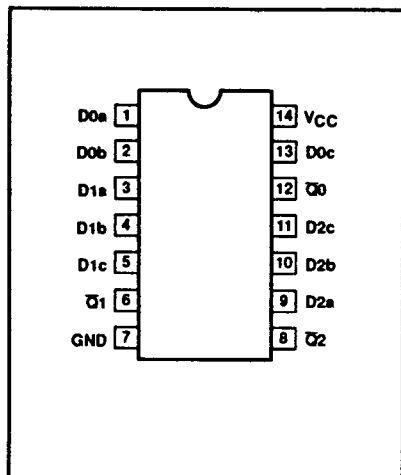
FUNCTION TABLE

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

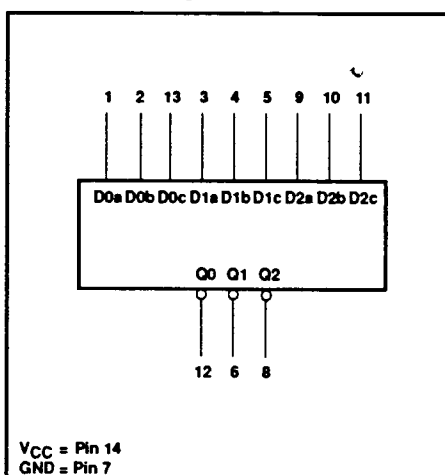
Notes to function table

- H = High voltage level
- L = Low voltage level

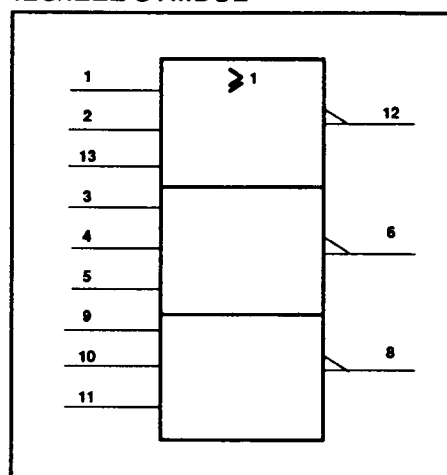
PIN CONFIGURATION



LOGIC SYMBOL



IEC/IEEE SYMBOL



Triple 3-input NOR gate

74F27

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_{sig}	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
		$V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 5\% V_{CC}$	2.7	3.4		V
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$	$\pm 10\% V_{CC}$		0.30	0.50	V
		$V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 5\% V_{CC}$		0.30	0.50	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	$V_{CC} = \text{MAX}, V_I = 0.5\text{V}$				-0.6	mA
I_{OS}	Short-circuit output current ³	$V_{CC} = \text{MAX}$		-60		-150	mA
I_{CC}	Supply current (total)	I_{CCH} $V_{CC} = \text{MAX}$	$V_{IN} = \text{GND}$		4.0	5.5	mA
		I_{CCL} $V_{CC} = \text{MAX}$	$V_{IN} = 4.5\text{V}$		8.5	12.0	mA

Notes to DC electrical characteristics

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

Triple 3-input NOR gate

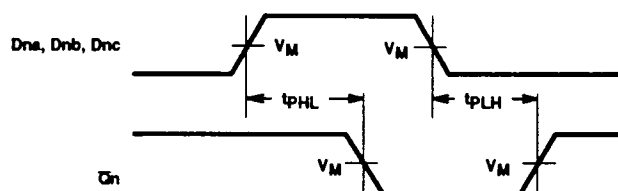
74F27

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
			$T_{amb} = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{pF}$ $R_L = 500\Omega$			$T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}$ $R_L = 500\Omega$		$T_{amb} = -40^{\circ}\text{C to } +85^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}$ $R_L = 500\Omega$			
			MIN	TYP	MAX	MIN	MAX	MIN	MAX		
t_{PLH} t_{PHL}	Propagation delay D_{na}, D_{nb}, D_{nc} to $\bar{Q}_n$	Waveform 1	2.0 1.0	3.5 2.5	5.0 4.5	1.5 1.0	5.5 4.5	1.0 1.0	7.0 5.5	ns	

AC WAVEFORMS

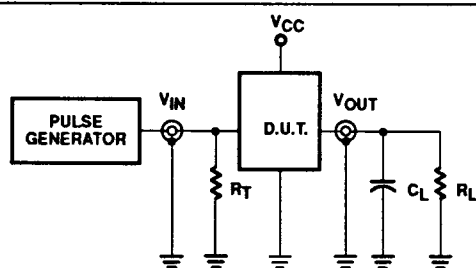


Waveform 1. Propagation delay for inverting outputs

Note to AC Waveforms

1. For all waveforms, $V_M = 1.5\text{V}$.

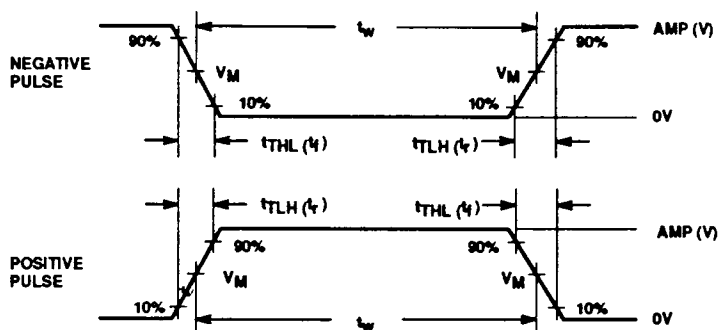
TEST CIRCUIT AND WAVEFORMS



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