

54F/74F86

2-Input Exclusive-OR Gate

General Description

This device contains four independent gates, each of which performs the logic exclusive-OR function.

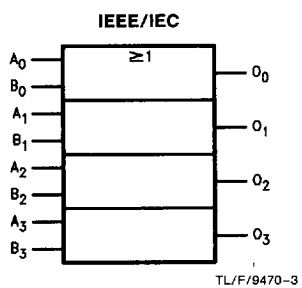
Ordering Code: See Section 11

Commercial	Military	Package Number	Package Description
74F86PC		N14A	14-Lead (0.300" Wide) Molded Dual-in-Line
	54F86DM (Note 2)	J14A	14-Lead Ceramic Dual-in-Line
74F86SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F86SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F86FM (Note 2)	W14B	14-Lead Cerpack
	54F86LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

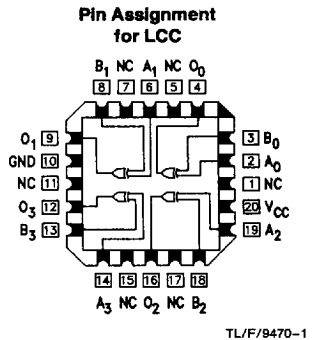
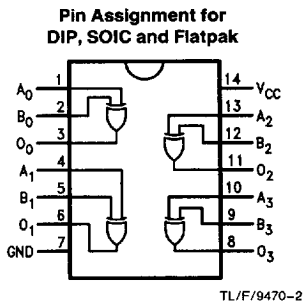
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbol



Connection Diagrams



Unit Loading/Fan Out: See Section 2 for U.L. definitions

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I _{IH} /I _{IL} Output I _{OH} /I _{OL}
A _n , B _n	Inputs	1.0/1.0	20 μA/ -0.6 mA
O _n	Outputs	50/33.3	-1 mA/20 mA

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +175°C
Plastic	-55°C to +150°C
V _{CC} Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V _{CC} = 0V)	
Standard Output	-0.5V to V _{CC}
TRI-STATE® Output	-0.5V to +5.5V

Current Applied to Output in LOW State (Max) twice the rated I_{OL} (mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55°C to +125°C
Commercial	0°C to +70°C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions	
		Min	Typ	Max				
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal	
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal	
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA	
V _{OH}	Output HIGH Voltage	54F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC}	2.5 2.5 2.7		V	Min	I _{OH} = -1 mA I _{OH} = -1 mA I _{OH} = -1 mA	
V _{OL}	Output LOW Voltage	54F 10% V _{CC} 74F 10% V _{CC}		0.5 0.5	V	Min	I _{OL} = 20 mA I _{OL} = 20 mA	
I _{IH}	Input HIGH Current	54F 74F		20.0 5.0	μA	Max	V _{IN} = 2.7V	
I _{BVI}	Input HIGH Current Breakdown Test	54F 74F		100 7.0	μA	Max	V _{IN} = 7.0V	
I _{CEX}	Output HIGH Leakage Current	54F 74F		250 50	μA	Max	V _{OUT} = V _{CC}	
I _{ID}	Input Leakage Test	74F	4.75		V	0.0	I _{ID} = 1.9 μA All other pins grounded	
I _{OD}	Output Leakage Circuit Current	74F		3.75	μA	0.0	V _{IOD} = 150 mV All other pins grounded	
I _{IL}	Input LOW Current			-0.6	mA	Max	V _{IN} = 0.5V	
I _{OS}	Output Short-Circuit Current		-60	-150	mA	Max	V _{OUT} = 0V	
I _{CCH}	Power Supply Current			12	18	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current			18	28	mA	Max	V _O = LOW

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AC Electrical Characteristics: See Section 2 for Waveforms and Load Configurations

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Symbol	Parameter	54F			54F		74F		Units	Fig. No.
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A , V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF			
		Min	Typ	Max	Min	Max	Min	Max		
t _{PLH} t _{PHL}	Propagation Delay A _n , B _n to O _n (Other Input LOW)	3.0	4.0	5.5	2.5	7.0	3.0	6.5	ns	2-3
t _{PLH} t _{PHL}	Propagation Delay A _n , B _n to O _n (Other Input HIGH)	3.5	5.3	7.0	3.5	8.5	3.5	8.0	ns	2-3