

54F/74F86

2-Input Exclusive-OR Gate

General Description

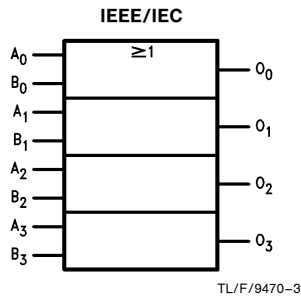
This device contains four independent gates, each of which performs the logic exclusive-OR function.

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

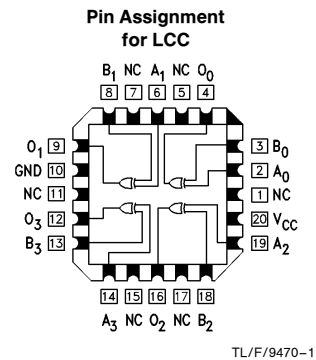
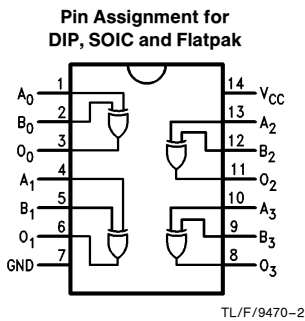
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB, FMOB and LMOB.

Logic Symbol



Connection Diagrams



Unit Loading/Fan Out

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 μ A / -0.6 mA
O_n	Outputs	50/33.3	-1 mA / 20 mA

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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

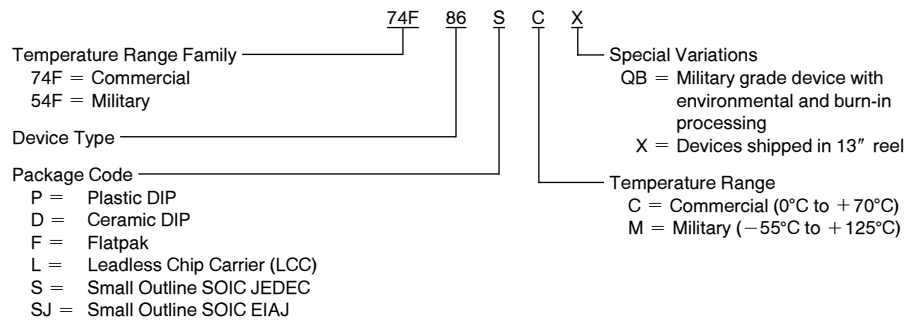
Symbol	Parameter		54F/74F			Units	V _{CC}	Conditions
			Min	Typ	Max			
V _{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage					V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage					V	Min	I _{IN} = –18 mA
V _{OH}	Output HIGH Voltage	54F 10% V _{CC} 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}
V _{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

AC Electrical Characteristics

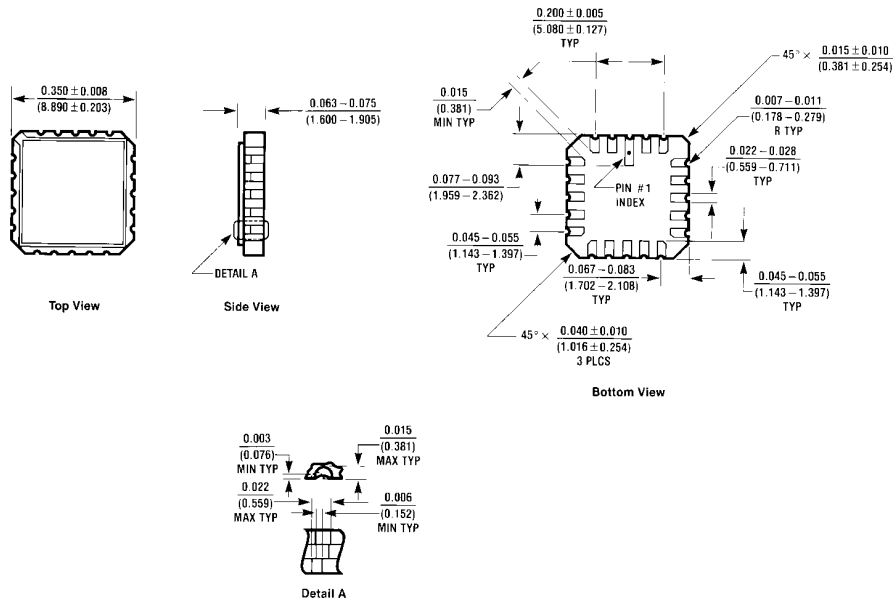
Symbol	Parameter	74F			54F		74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{pF}$		
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay A_n, B_n to O_n (Other Input LOW)	3.0	4.0	5.5	2.5	7.0	3.0	6.5	ns
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

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



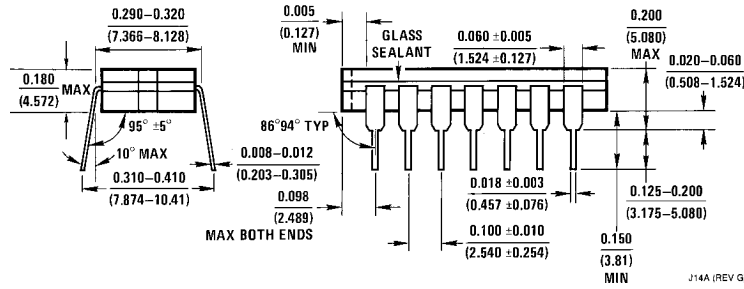
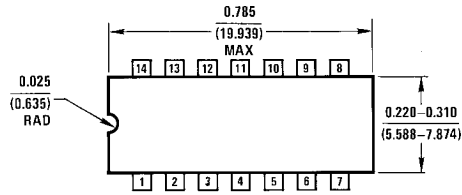
Physical Dimensions inches (millimeters)



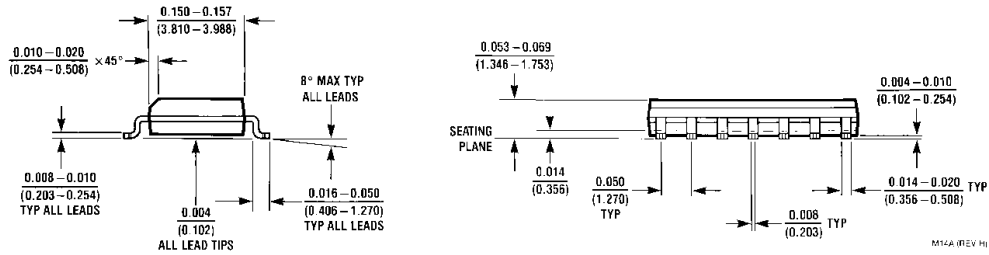
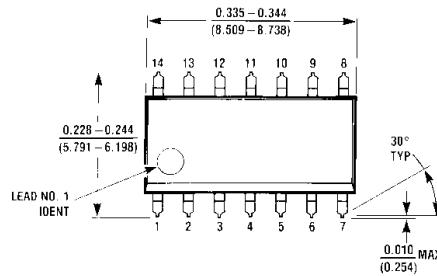
20-Terminal Ceramic Leadless Chip Carrier (L)
 NS Package Number E20A

L27A (REV. 01)

Physical Dimensions inches (millimeters) (Continued)

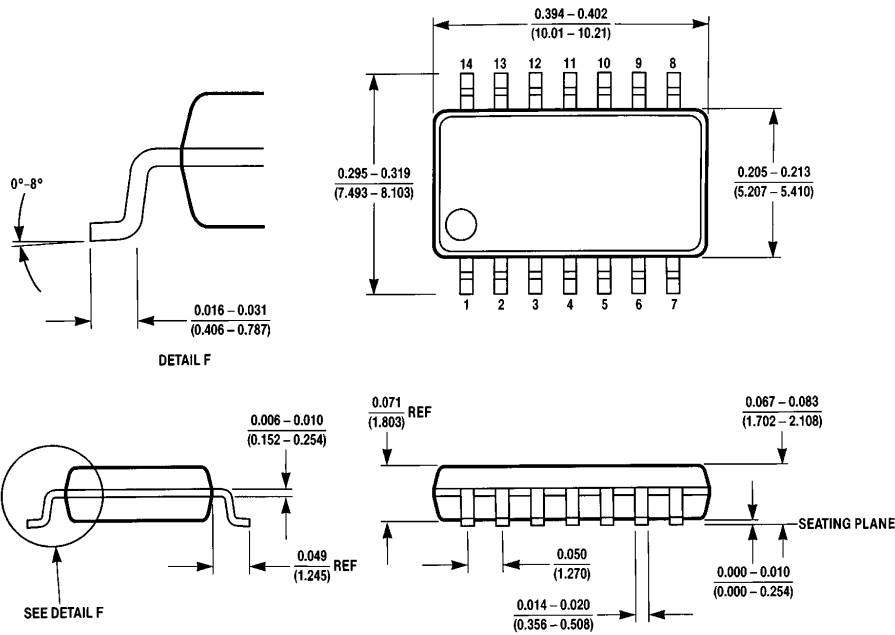


14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A



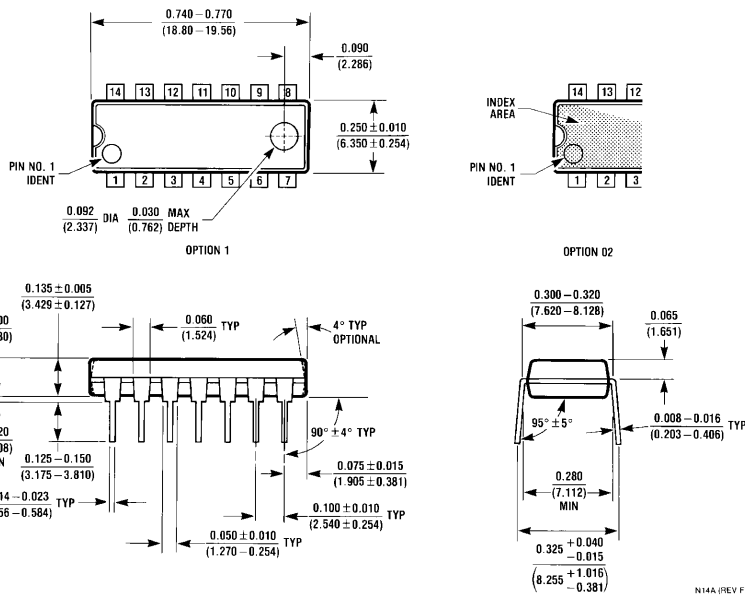
14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M14A

Physical Dimensions inches (millimeters) (Continued)



M14D (REV A)

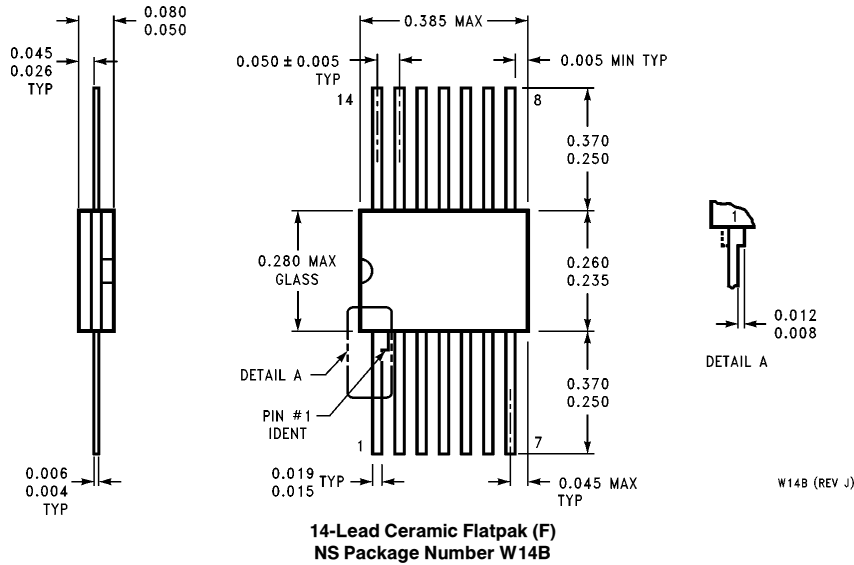
**14-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M14D**



N14A (REV F)

**14-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N14A**

Physical Dimensions inches (millimeters) (Continued)



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