

December 1994

54F/74F02

Quad 2-Input NOR Gate

General Description

This device contains four independent gates, each of which performs the logic NOR function.

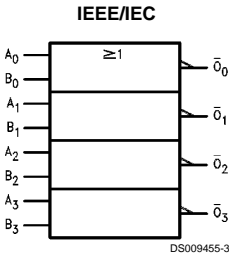
Ordering Code: See Section 0

Commercial	Military	Package Number	Package Description
74F02PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line
	54F02DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F02SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F02SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F02FM (Note 2)	W14B	14-Lead Cerpack
	54F02LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

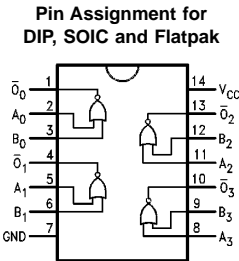
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

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

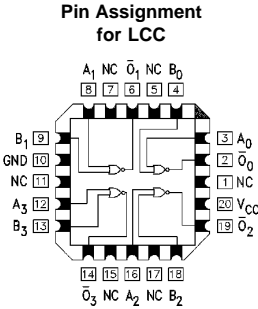
Logic Symbol



Connection Diagrams



DS009455-2



DS009455-1

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Unit Loading/Fan Out

See Section 0 for U.L. definitions

Pin Names	Description	54F74F	
		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
\overline{O}_n	Outputs	50/33.3	–1 mA/20 mA

DSXXX

Absolute Maximum Ratings (Note 3)

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 4)	–0.5V to +7.0V
Input Current (Note 4)	–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)

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

Note 3: 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 4: Either voltage limit or current limit is sufficient to protect inputs.

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}	2.5			V	Min	I _{OH} = –1 mA
		74F 10% V _{CC}	2.5					I _{OH} = –1 mA
		74F 5% V _{CC}	2.7					I _{OH} = –1 mA
V _{OL}	Output LOW Voltage	54F 10% V _{CC}			0.5	V	Min	I _{OL} = 20 mA
		74F 10% V _{CC}			0.5			I _{OL} = 20 mA
I _{IH}	Input HIGH Current	54F			20.0	μA	Max	V _{IN} = 2.7V
		74F			5.0			
I _{BVI}	Input HIGH Current Breakdown Test	54F			100	μA	Max	V _{IN} = 7.0V
		74F			7.0			
I _{CEX}	Output HIGH Leakage Current	54F			250	μA	Max	V _{OUT} = V _{CC}
		74F			50			
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			3.7	5.6	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current			8.7	13.0	mA	Max	V _O = LOW

AC Electrical Characteristics

See Section 0 for Waveforms and Load Configurations

Symbol	Parameter	74F			54F		74F		Units	Fig. No.
		$T_A = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{ pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$			
		Min	Typ	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay	2.5	4.4	5.5	2.5	7.5	2.5	6.5	ns	◆◆◆◆
t_{PHL}	A_n, B_n to \overline{O}_n	1.5	3.2	4.3	1.5	6.5	1.5	5.3		

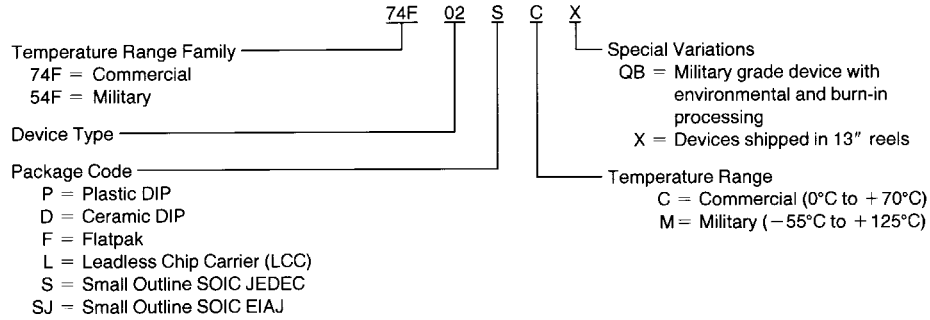
DSXXX

DSXXX

Book
Extract
End

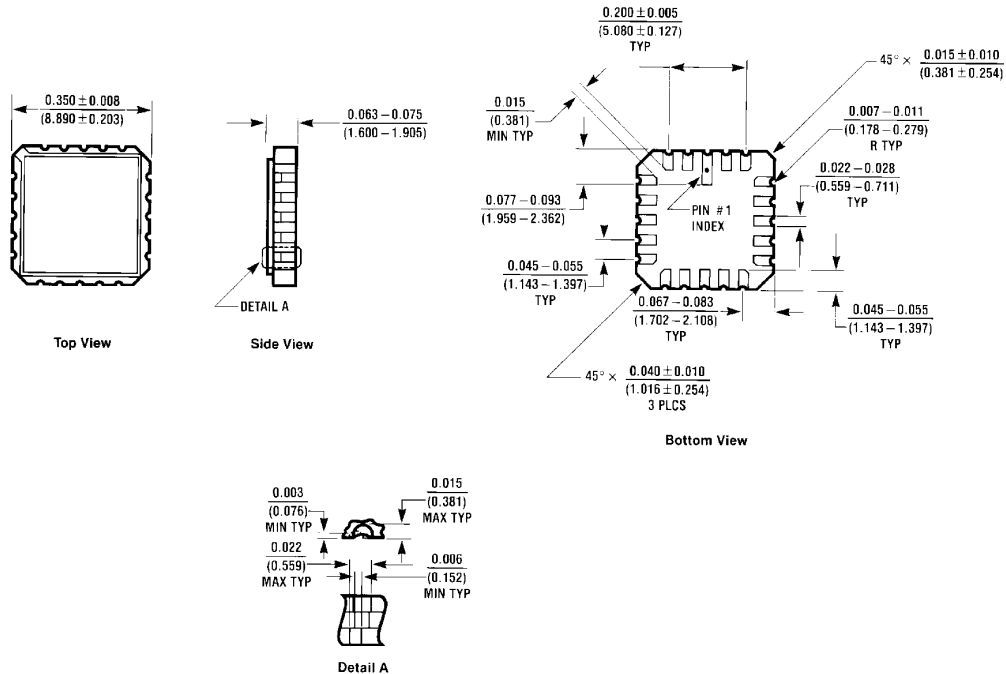
Ordering Information

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



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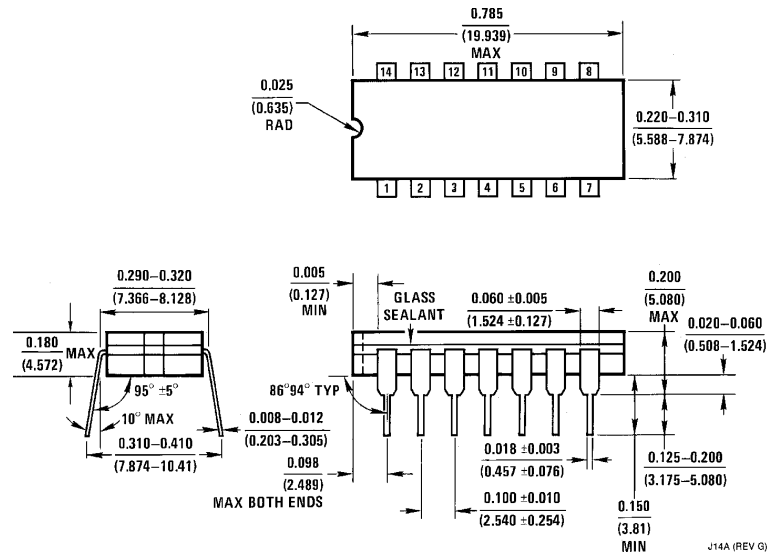
Physical Dimensions inches (millimeters) unless otherwise noted



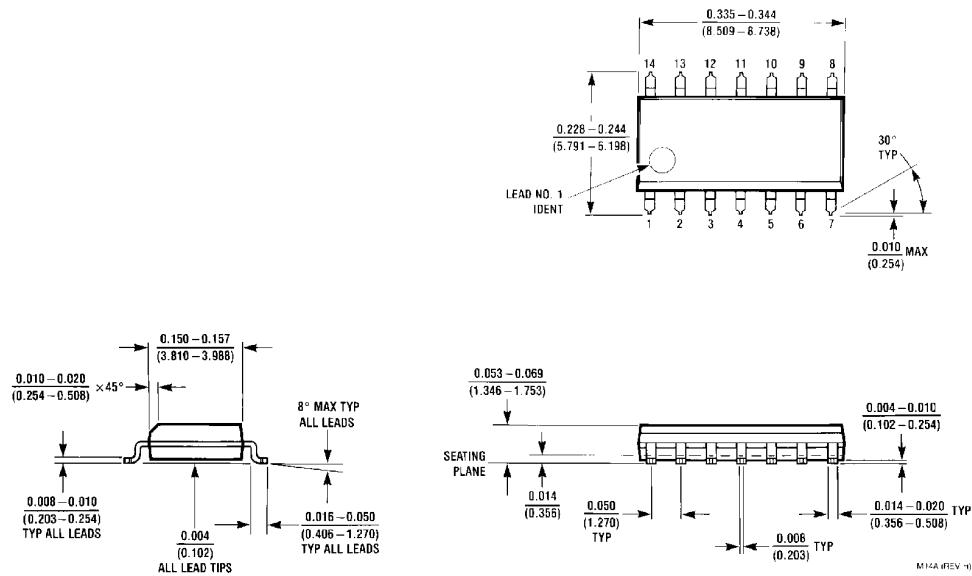
E20A (REV 01)

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

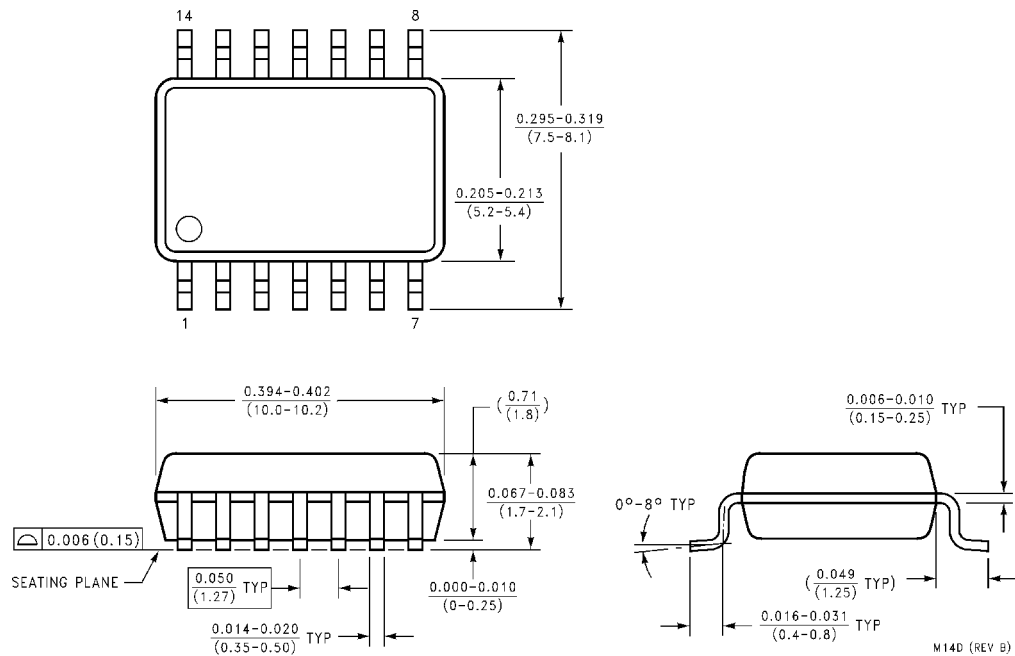
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



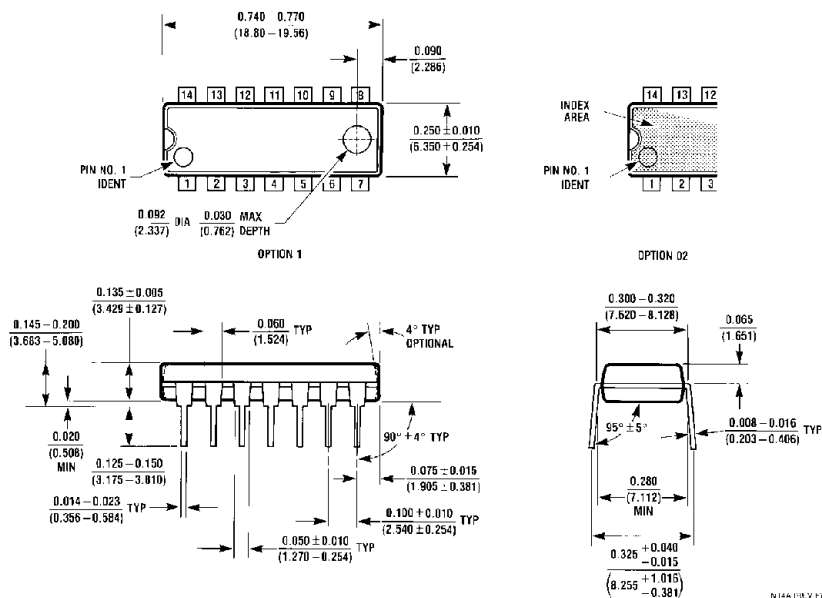
14-Lead Ceramic Dual In-Line Package (D)
NS Package Number J14A



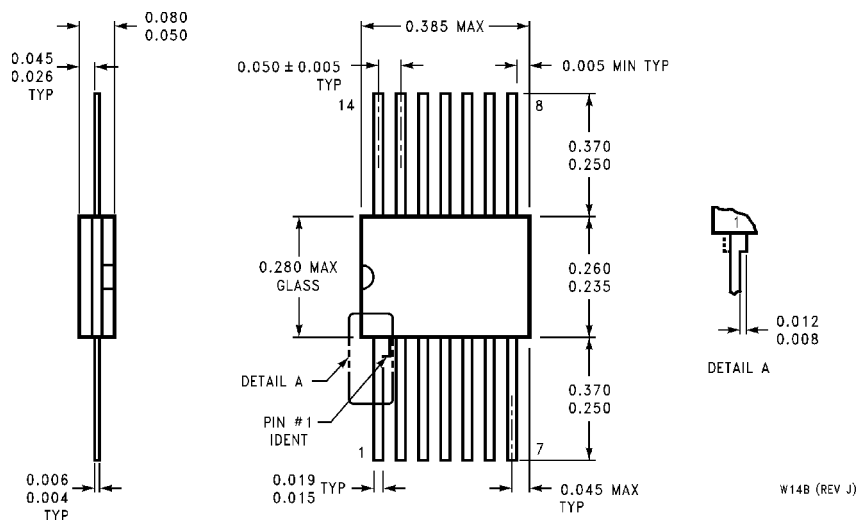
14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M14A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

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



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

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)**LIFE SUPPORT POLICY**

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