

November 1994

54F/74F20 Dual 4-Input NAND Gate

General Description

This device contains two independent gates, each of which performs the logic NAND function.

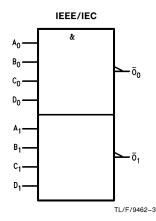
Commercial	Military	Package Number	Package Description		
74F20PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line		
	54F20DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line		
74F20SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC		
74F20SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ		
	54F20FM (Note 2)	W14B	14-Lead Cerpack		
	54F20LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C		

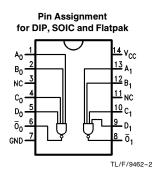
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

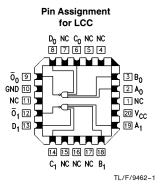
Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbol

Connection Diagrams







Unit Loading/Fan Out

		54F/74F				
Pin Names	Description	U.L. HIGH/LOW	Input I _{IH} /I _{IL} Output I _{OH} /I _{OL}			
A_n, B_n, C_n, D_n \overline{O}_n	Inputs Outputs	1.0/1.0 50/33.3	20 μA/-0.6 mA -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.

V_{CC} Pin Potential to

Voltage Applied to Output

in HIGH State (with $V_{CC} = 0V$)

 $\begin{array}{ll} \mbox{Standard Output} & -0.5\mbox{V to V}_{\mbox{CC}} \\ \mbox{TRI-STATE} \mbox{$^{\circ}$ Output} & -0.5\mbox{V to } +5.5\mbox{V} \end{array}$

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

Supply Voltage

Military + 4.5V to + 5.5V Commercial + 4.5V to + 5.5V

DC Electrical Characteristics

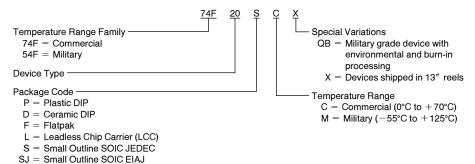
Symbol	Parameter		54F/74F			Units	v _{cc}	Conditions	
Symbol			Min	Тур	Max	Onits	VCC	Conditions	
V_{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal	
V_{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal	
V_{CD}	Input Clamp Diode Voltage				-1.2	V	Min	$I_{IN} = -18 \text{ mA}$	
V _{OH}	Output HIGH Voltage	54F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC}	2.5 2.5 2.7			V	Min	$I_{OH} = -1 \text{ mA}$ $I_{OH} = -1 \text{ mA}$ $I_{OH} = -1 \text{ mA}$	
V _{OL}	Output LOW Voltage	54F 10% V _{CC} 74F 10% V _{CC}			0.5 0.5	٧	Min	$I_{OL} = 20 \text{ mA}$ $I_{OL} = 20 \text{ mA}$	
I _{IH}	Input HIGH Current	54F 74F			20.0 5.0	μΑ	Max	V _{IN} = 2.7V	
I _{BVI}	Input HIGH Current Breakdown Test	54F 74F			100 7.0	μΑ	Max	V _{IN} = 7.0V	
I _{CEX}	Output HIGH Leakage Current	54F 74F			250 50	μΑ	Max	$V_{OUT} = V_{CC}$	
V _{ID}	Input Leakage Test	74F	4.75			٧	0.0	$I_{\text{ID}} = 1.9 \mu\text{A}$ All other pins grounded	
I _{OD}	Output Leakage Circuit Current	74F			3.75	μΑ	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	$V_{OUT} = 0V$	
Icch	Power Supply Current			0.9	1.4	mA	Max	V _O = HIGH	
I _{CCL}	Power Supply Current			3.4	5.1	mA	Max	$V_O = LOW$	

AC Electrical Characteristics

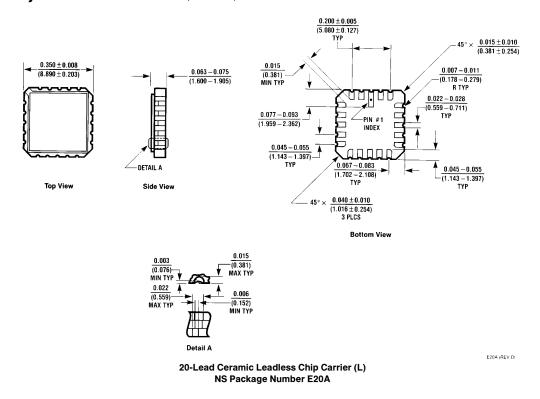
					54F T _A , V _{CC} = Mil C _L = 50 pF		$74F$ $T_{A}, V_{CC} = Com$ $C_{L} = 50 \text{ pF}$		Units
Symbol	Parameter								
		Min	Тур	Max	Min	Max	Min	Max	
t _{PLH}	Propagation Delay	2.4	3.7	5.0	2.0	7.0	2.4	6.0	ns
t _{PHL}	A_n , B_n , C_n , D_n to \overline{O}_n	1.5	3.2	4.3	1.5	6.5	1.5	5.3	115

Ordering Information

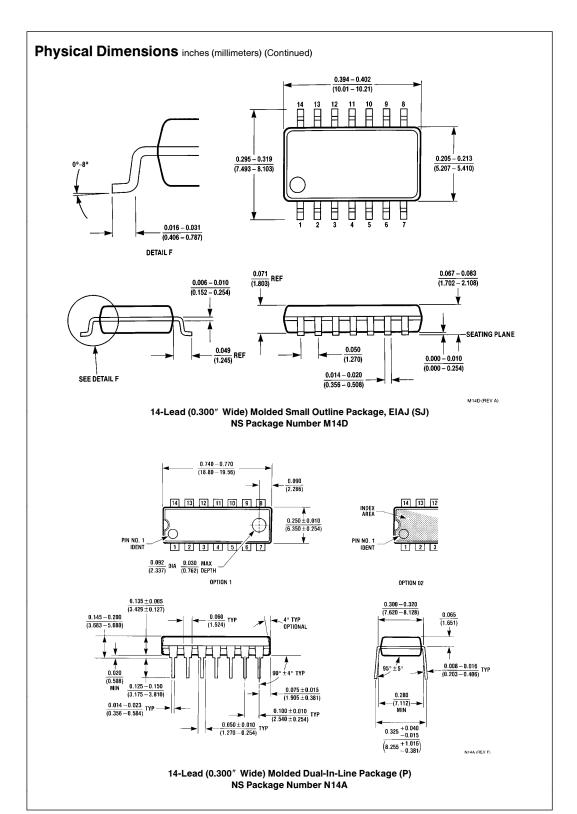
The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



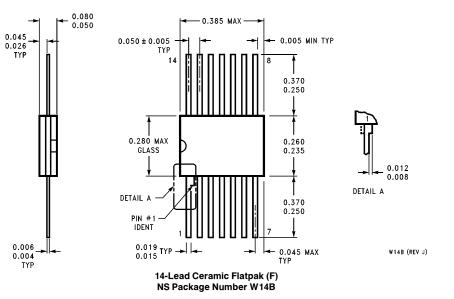
Physical Dimensions inches (millimeters)



Physical Dimensions inches (millimeters) (Continued) 0.785 (19.939) MAX 14 13 12 11 10 9 8 0.025 (0.635) RAD 0.220-0.310 (5.588-7.874) 1 2 3 4 5 6 7 0.290-0.320 (7.366-8.128) 0.005 0.200 (5.080) MAX 0.020-0.060 (D.127) MIN GLASS SEALANT 0.060 ± 0.005 (1.524 ±0.127) 0.180 MAX (0.508-1.524) (4.572) 95° ±5' 86°94° TYP 0.008-0.012 0.310-0.410 (0.203-0.305) D.018 ±0.003 0.125-0.200 0.098 (7.874-10.41) (0.457 ±0.076) (2.489) MAX BOTH ENDS (3.175-5.080) 0.100 ±0.010 0.150 (2.540 ±0.254) (3.81) MIN J14A (REV G) 14-Lead Ceramic Dual-In-Line Package (D) NS Package Number J14A $\frac{0.335 - 0.344}{(8.509 - 8.738)}$ LEAD NO. 1 IDENT 0.150 - 0.157 (3.810 - 3.988) $\frac{0.053 - 0.069}{(1.346 - 1.753)}$ 8° MAX TYP ALL LEADS $\frac{0.004 - 0.010}{(0.102 - 0.254)}$ 0.014 (0.356) 0.008 - 0.010 0.050 (1.270) TYP 0.014-0.020 (0.356-0.508) 0.016 - 0.050 (0.406 - 1.270) TYP ALL LEADS (0.203-0.254) TYP ALL LEADS - 0.008 (0.203) TYP 0.004 (0.102) ALL LEAD TIPS M14A (REV H) 14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S) NS Package Number M14A



Physical Dimensions inches (millimeters) (Continued)



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National Semiconductor Corporation 2900 Semiconductor Drive P.O. Box 58090 Santa Clara, CA 95052-8090 Tel: 1(800) 272-9959 TWX: (910) 339-9240 National Semiconductor GmbH Livry-Gargan-Str. 10 D-82256 Fürstenfeldbruck Germany Tel: (81-41) 35-0 Telex: 527649 Fax: (81-41) 35-1

National Semiconductor Japan Ltd. Sumitomo Chemical Engineering Center Bldg. 7F 1-7-1, Nakase, Mihama-Ku Chiba-City, Ciba Prefecture 261

National Semiconductor Hong Kong Ltd. 13th Floor, Straight Block, Ocean Centre, 5 Canton Rd. Tsimshatsui, Kowloon Hong Kong Tel: (852) 2737-1600 Fax: (852) 2736-9960

National Semiconductores Do Brazil Ltda. Rue Deputado Lacorda Franco 120-3A Sao Paulo-SP Brazil 05418-000 Tel: (55-11) 212-5066 Telex: 391-1131931 NSBR BR Fax: (55-11) 212-1181 National Semiconductor (Australia) Pty, Ltd. Building 16 Business Park Drive Monash Business Park Nottinghill, Mellbourne Victoria 3168 Australia Tel: (3) 558-9999 Fax: (3) 558-9998