FAIRCHILD

SEMICONDUCTOR TM

April 1988
Revised July 1999

74F20
Dual 4-Input NAND Gate

General Description

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

Ordering Code:

Order Number	Package Number	Package Description
74F20SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
74F20SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F20PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbol

IEEE/IEC
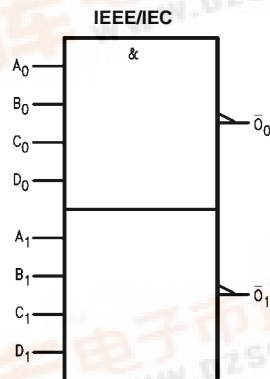
Connection Diagram
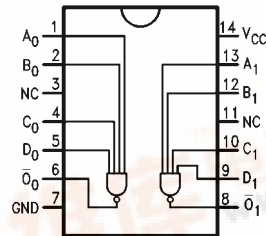
Unit Loading/Fan Out

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	Inputs	1.0/1.0	20 µA/−0.6 mA
$\overline{O}_n$	Outputs	50/33.3	−1 mA/20 mA

Absolute Maximum Ratings(Note 1)

Storage Temperature	−65°C to +150°C
Ambient Temperature under Bias	−55°C to +125°C
Junction Temperature under Bias	−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$_{CC}$
3-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	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

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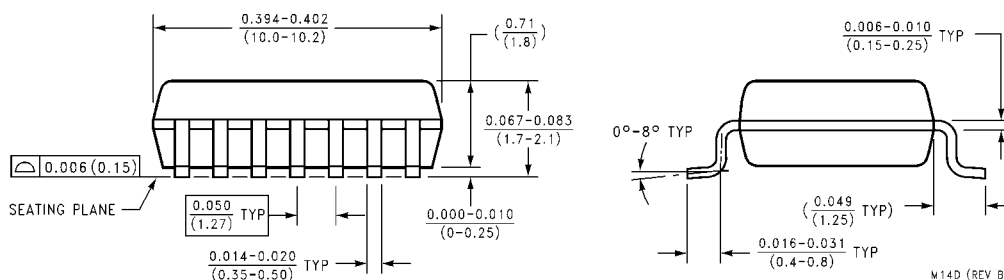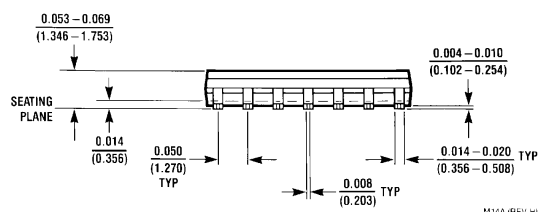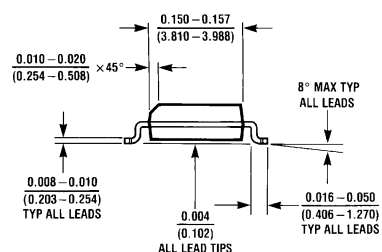
Note 2: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

Symbol	Parameter		Min	Typ	Max	Units	V$_{CC}$	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 mA
V$_{OH}$	Output HIGH	10% V$_{CC}$	2.5			V	Min	I$_{OH}$ = −1 mA
	Voltage	5% V$_{CC}$	2.7					I$_{OH}$ = −1 mA
V$_{OL}$	Output LOW	10% V$_{CC}$			0.5	V	Min	I$_{OL}$ = 20 mA
	Voltage							
I$_{IH}$	Input HIGH Current				5.0	µA	Max	V$_{IN}$ = 2.7V
I$_{BVI}$	Input HIGH Current Breakdown Test				7.0	µA	Max	V$_{IN}$ = 7.0V
I$_{CEX}$	Output HIGH Leakage Current				50	µA	Max	V$_{OUT}$ = V$_{CC}$
V$_{ID}$	Input Leakage Test		4.75			V	0.0	I$_{ID}$ = 1.9 µA All other pins grounded
I$_{OD}$	Output Leakage Circuit Current				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			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

Symbol	Parameter	T$_A$ = +25°C V$_{CC}$ = +5.0V C$_L$ = 50 pF			T$_A$ = −55° to +125°C V$_{CC}$ = +5.0V C$_L$ = 50 pF		T$_A$ = 0°C to +70°C V$_{CC}$ = +5.0V C$_L$ = 50 pF		Units
		Min	Typ	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	

Physical Dimensions inches (millimeters) unless otherwise noted

0.335 − 0.344
(8.509 − 8.738)

14 13 12 11 10 9 8

0.228 − 0.244
(5.791 − 6.198)

LEAD NO. 1
IDENT

1 2 3 4 5 6 7

30°
TYP

0.010 MAX
(0.254)

0.150 − 0.157
(3.810 − 3.988)

0.010 − 0.020
(0.254 − 0.508) × 45°

8° MAX TYP
ALL LEADS

0.008 − 0.010
(0.203 − 0.254)
TYP ALL LEADS

0.004
(0.102)
ALL LEAD TIPS

0.016 − 0.050
(0.406 − 1.270)
TYP ALL LEADS

0.053 − 0.069
(1.346 − 1.753)

0.004 − 0.010
(0.102 − 0.254)

SEATING
PLANE

0.014
(0.356)

0.050
(1.270)
TYP

0.008
(0.203)
TYP

0.014 − 0.020
(0.356 − 0.508)
TYP

M14A (REV H)

14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
Package Number M14A

14   8

0.295 − 0.319
(7.5 − 8.1)

0.205 − 0.213
(5.2 − 5.4)

1   7

0.394 − 0.402
(10.0 − 10.2)

(0.71)
(1.8)

0.067 − 0.083
(1.7 − 2.1)

0.006 (0.15)

SEATING PLANE

0.050
(1.27) TYP

0.000 − 0.010
(0 − 0.25)

0.014 − 0.020
(0.35 − 0.50) TYP

0.006 − 0.010
(0.15 − 0.25) TYP

0° − 8° TYP

(0.049
(1.25) TYP)

0.016 − 0.031
(0.4 − 0.8) TYP

M14D (REV B)

14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D

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

OPTION 1

OPTION 02
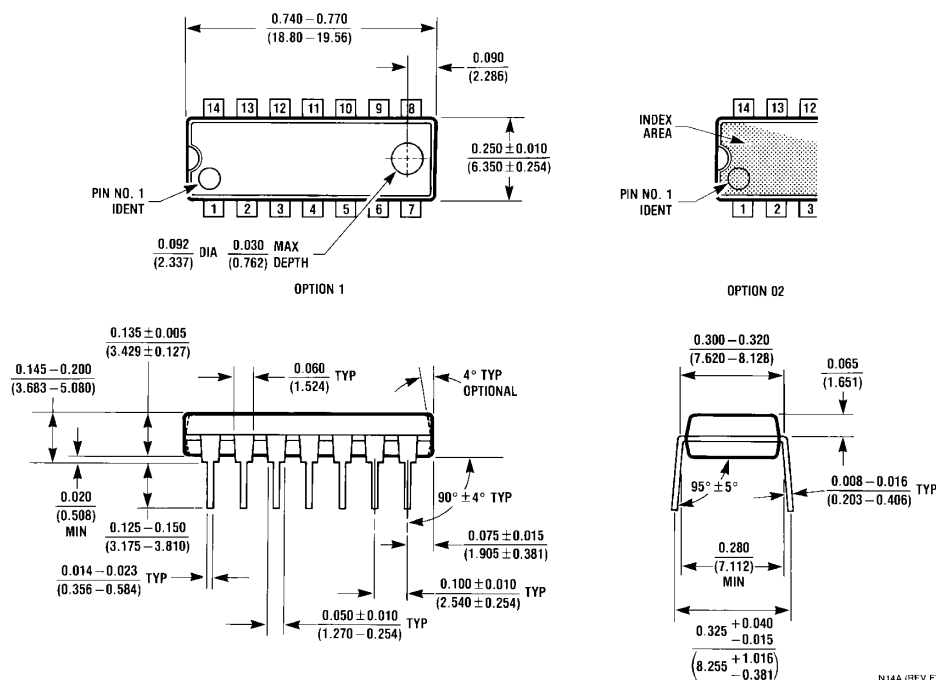
14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
Package Number N14A

N14A (REV F)

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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