National Semiconductor

December 1994

54F/74F11
Triple 3-Input AND Gate

General Description

This device contains three independent gates, each of which performs the logic AND function.

Ordering Code: See Section 0

DSXXX

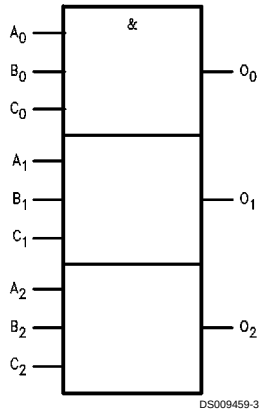
Commercial	Military	Package Number	Package Description
74F11PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line
	54F11DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F11SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F11SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F11FM (Note 2)	W14B	14-Lead Cerpack
	54F11LM (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

IEEE/IEC



DS009459-3

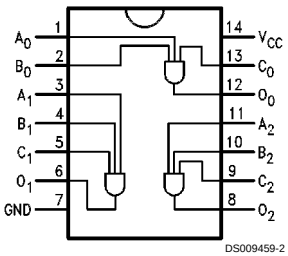
TRI-STATE® is a registered trademark of National Semiconductor Corporation.

© 1997 National Semiconductor Corporation

PrintDate=1997/08/26 PrintTime=16:09:23 9520 ds009459 Rev. No. 1 cmserv **Proof** 1

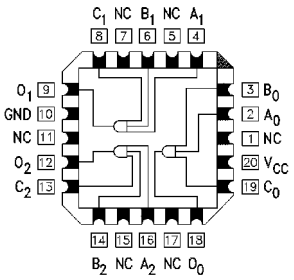
Connection Diagrams

Pin Assignment for DIP, SOIC and Flatpak



DS009459-2

Pin Assignment for LCC



DS009459-1

Unit Loading/Fan Out

See Section 0 for U.L. definitions

DSXXX

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A_n, B_n, C_n	Inputs	1.0/1.0	20 µA/−0.6 mA
O_n	Outputs	50/33.3	−1 mA/20 mA

PrintDate=1997/08/26 PrintTime=16:09:25 9520 ds009459 Rev. No. 1 cmserv **Proof**

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	54F 10% V_{CC}	2.5					I_{OH} = −1 mA
	Voltage	74F 10% V_{CC}	2.5			V	Min	I_{OH} = −1 mA
		74F 5% V_{CC}	2.7					I_{OH} = −1 mA
V_{OL}	Output LOW	54F 10% V_{CC}			0.5	V	Min	I_{OL} = 20 mA
	Voltage	74F 10% V_{CC}			0.5			I_{OL} = 20 mA
I_{IH}	Input HIGH	54F			20.0	µA	Max	V_{IN} = 2.7V
	Current	74F			5.0			
I_{BVI}	Input HIGH Current	54F			100	µA	Max	V_{IN} = 7.0V
	Breakdown Test	74F			7.0			
I_{CEX}	Output HIGH	54F			250	µA	Max	V_{OUT} = V_{CC}
	Leakage Current	74F			50			
V_{ID}	Input Leakage	74F	4.75			V	0.0	I_{ID} = 1.9 µA
	Test							All other pins grounded
I_{OD}	Output Leakage	74F			3.75	µA	0.0	V_{IOD} = 150 mV
	Circuit Current							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			4.1	6.2	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current			6.5	9.7	mA	Max	V_O = LOW

AC Electrical Characteristics

See Section 0 for Waveforms and Load Configurations

Symbol	Parameter	74F T_A = +25˚C, V_{CC} = +5.0V, C_L = 50 pF			54F T_A, V_{CC} = Mil, C_L = 50 pF		74F T_A, V_{CC} = Com, C_L = 50 pF		Units	Fig. No.
		Min	Typ	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay	3.0	4.2	5.6	2.5	7.5	3.0	6.6	ns	⧫⧫-⧫⧫
t_{PHL}	A_n, B_n, C_n to O_n	2.5	4.1	5.5	2.0	7.5	2.5	6.5		

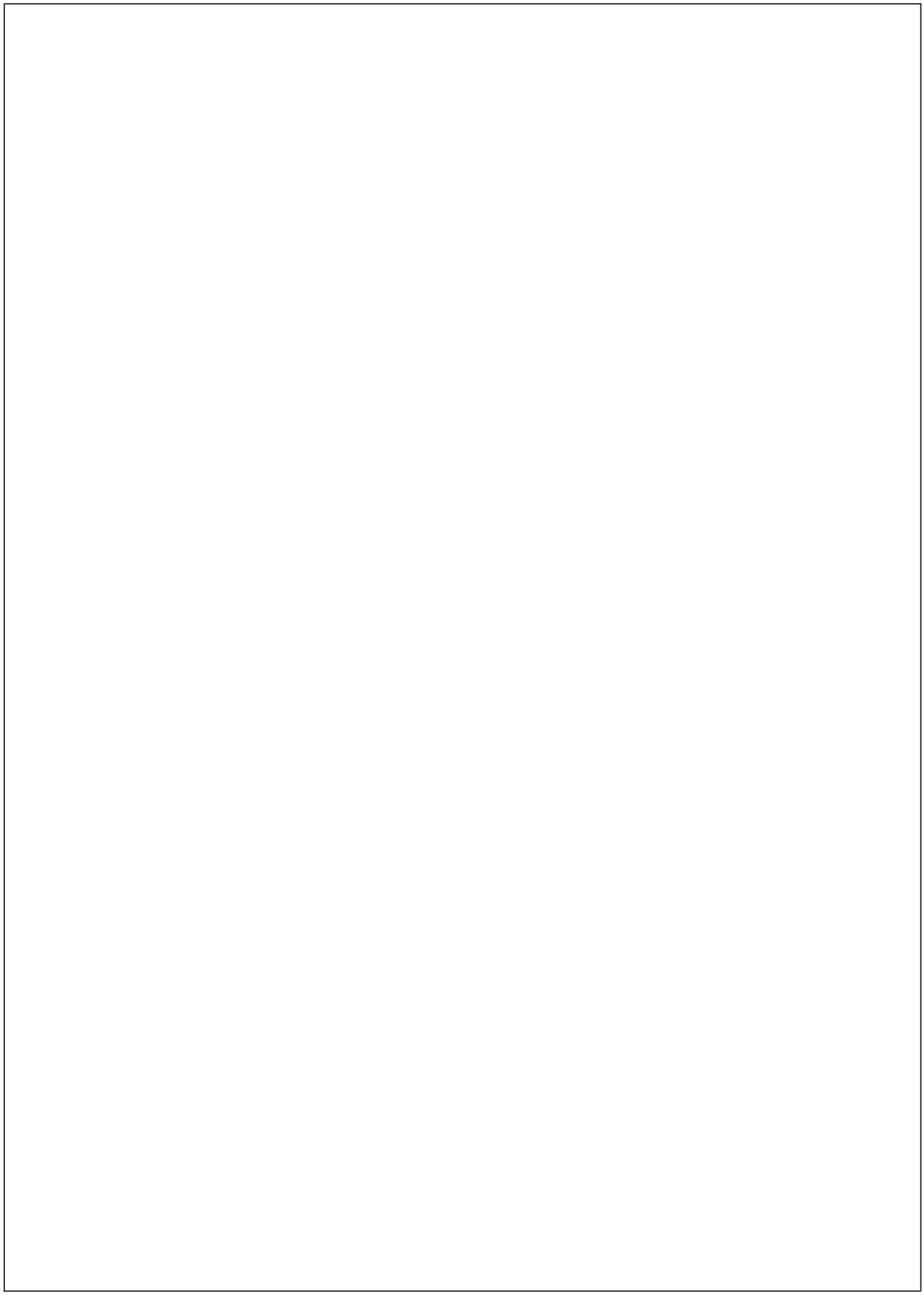
DSXXX

DSXXX

Book Extract End

PrintDate=1997/08/26 PrintTime=16:09:27 9520 ds009459 Rev. No. 1 cmserv **Proof** 3

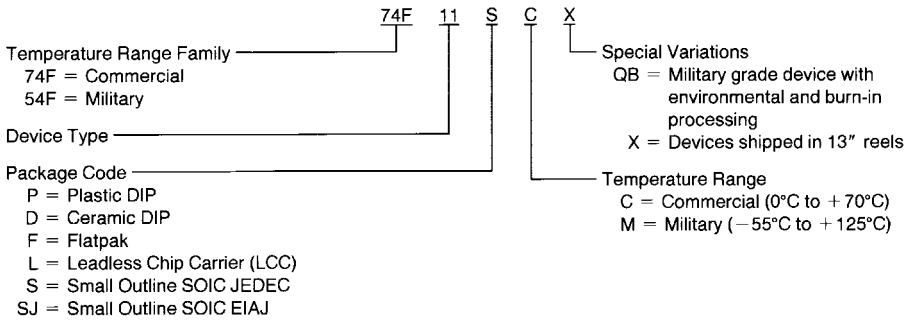
THIS PAGE IS IGNORED IN THE DATABOOK



PrintDate=1997/08/26 PrintTime=16:09:28 9520 ds009459 Rev. No. 1 cmserv **Proof**

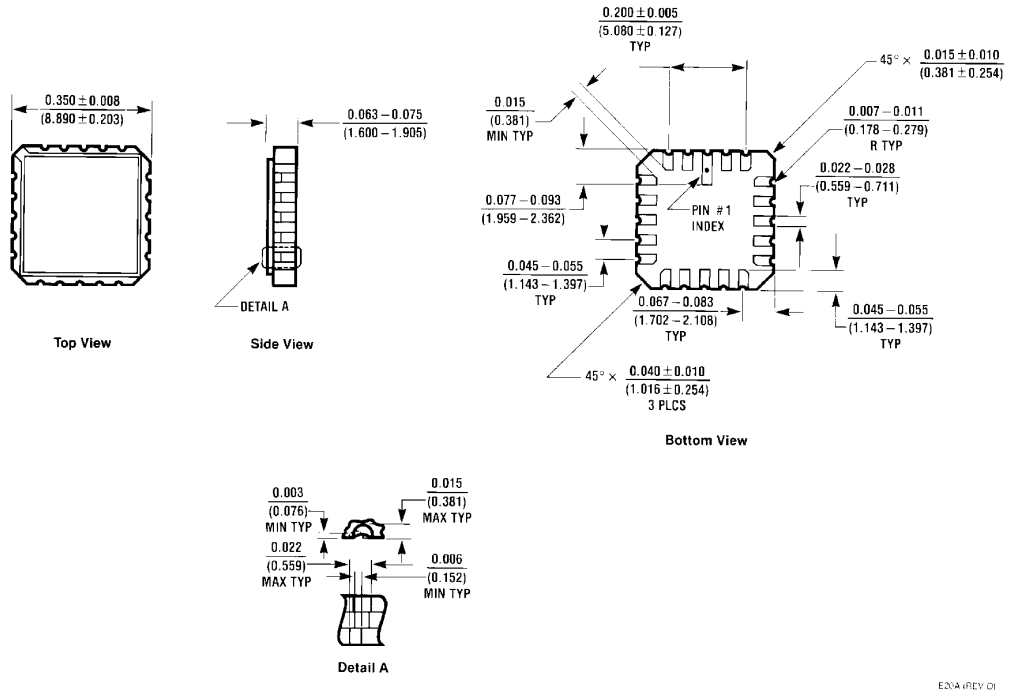
Ordering Information

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



DS009459-4

Physical Dimensions inches (millimeters) unless otherwise noted

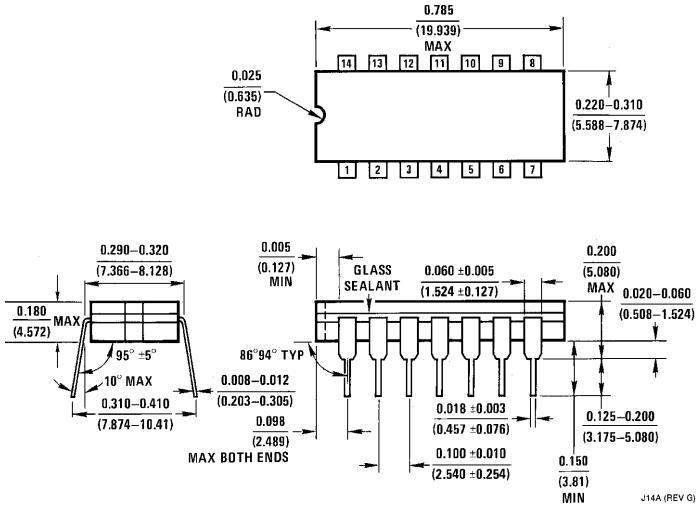


E20A (REV O)

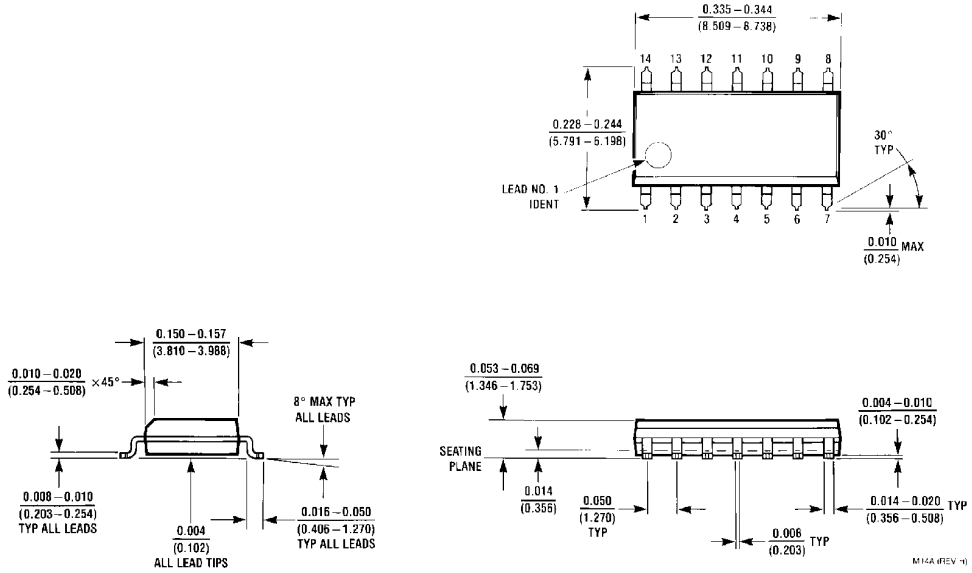
20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

PrintDate=1997/08/26 PrintTime=16:09:28 9520 ds009459 Rev. No. 1 cmserv **Proof** 5

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



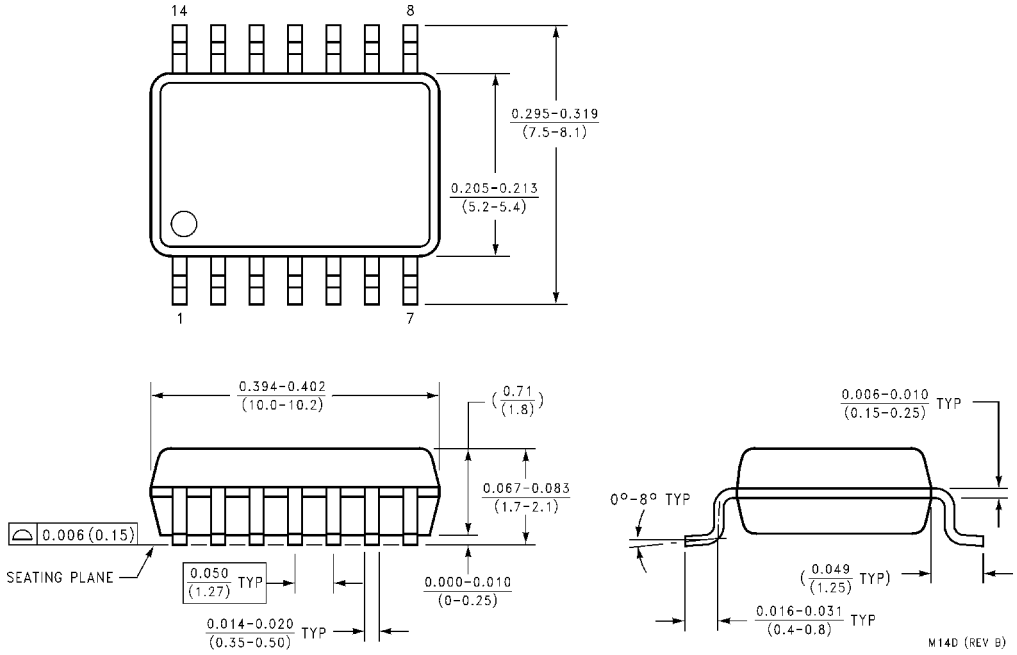
14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A



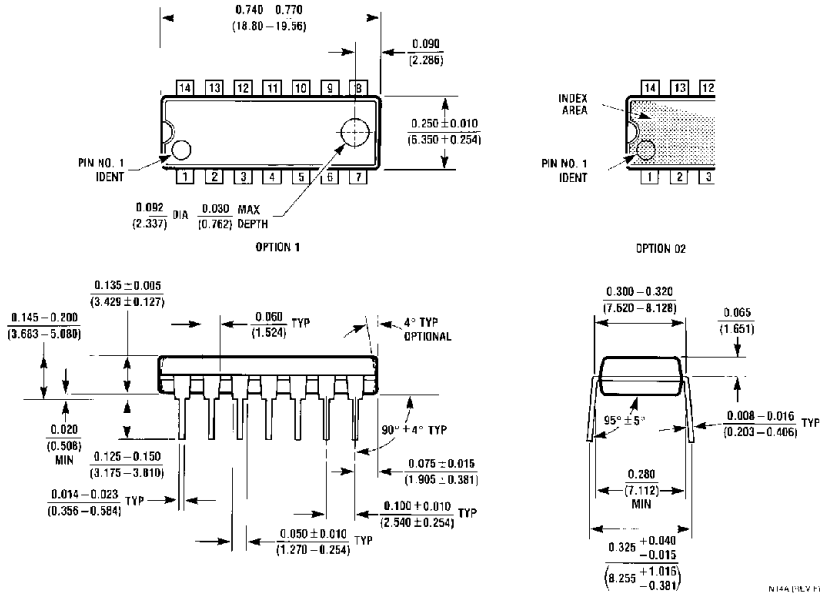
14-Lead (0.150" Wide) Molded Small Outline, JEDEC (S)
NS Package Number M14A

PrintDate=1997/08/26 PrintTime=16:09:29 9520 ds009459 Rev. No. 1 cmserv **Proof** 6

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



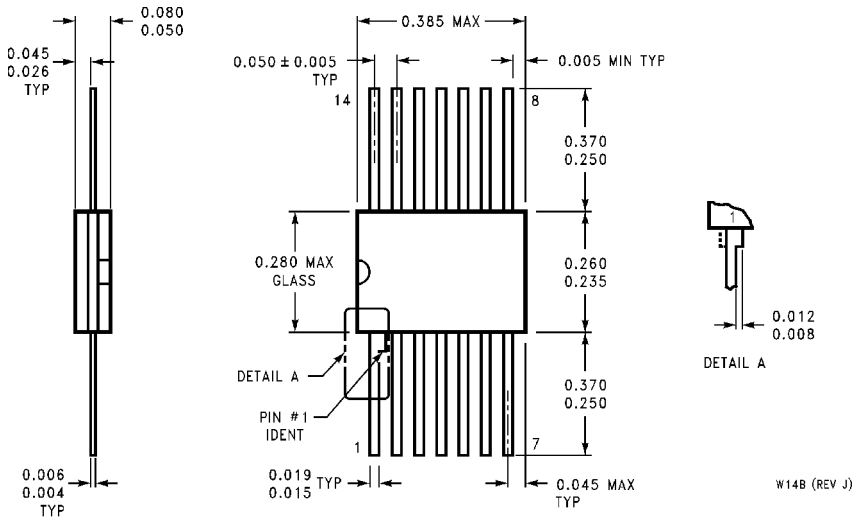
14-Lead (0.300" Wide) Molded Small Outline, EIAJ (SJ)
NS Package Number M14D



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

PrintDate=1997/08/26 PrintTime=16:09:30 9520 ds009459 Rev. No. 1 cmserv **Proof**

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



14-Lead Ceramic Flatpak (F)
NS Package Number W14B

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
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.

National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

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 Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.