

December 1994

54F/74F08 Quad 2-Input AND Gate

General Description

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

Features

- Guaranteed 4000V minimum ESD protection

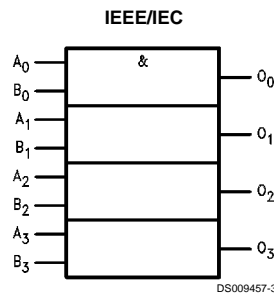
Ordering Code: See Section 0

Commercial	Military	Package Number	Package Description
74F08PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line
	54F08DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F08SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F08SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F08FM (Note 2)	W14B	14-Lead Cerpack
	54F08LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

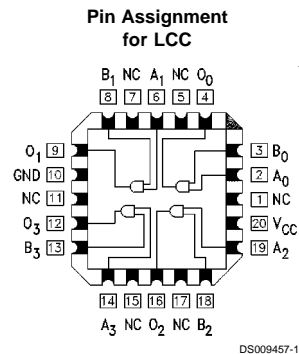
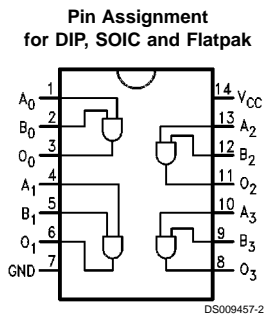
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

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

Logic Symbol



Connection Diagrams



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

Unit Loading/Fan Out

See Section 0 for U.L. definitions

DSXXX

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

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)
ESD Last Passing Voltage (Min)	4000V

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.

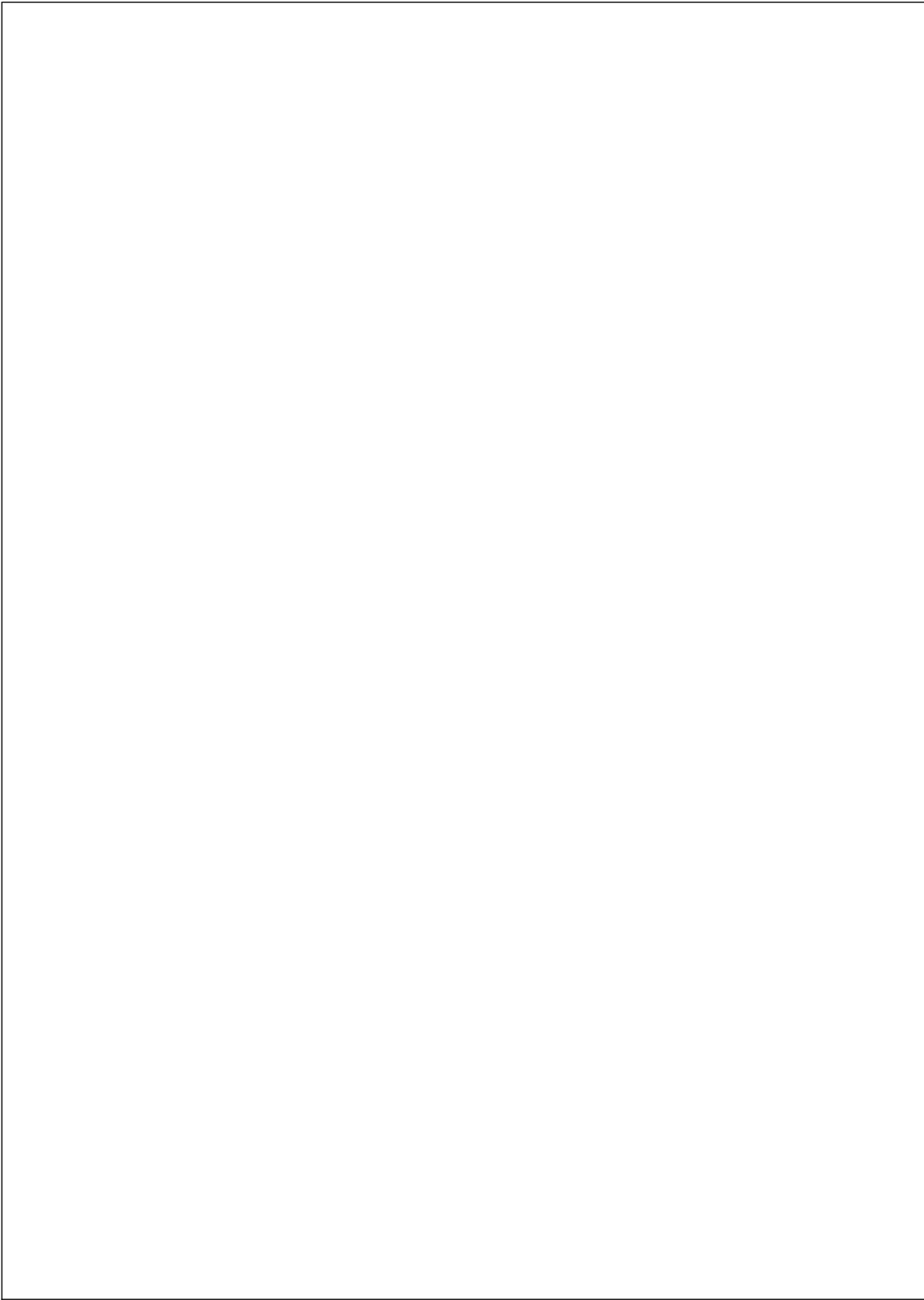
DC Electrical Characteristics

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	5.5			8.3	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current	8.6			12.9	mA	Max	V _O = LOW

AC Electrical Characteristics

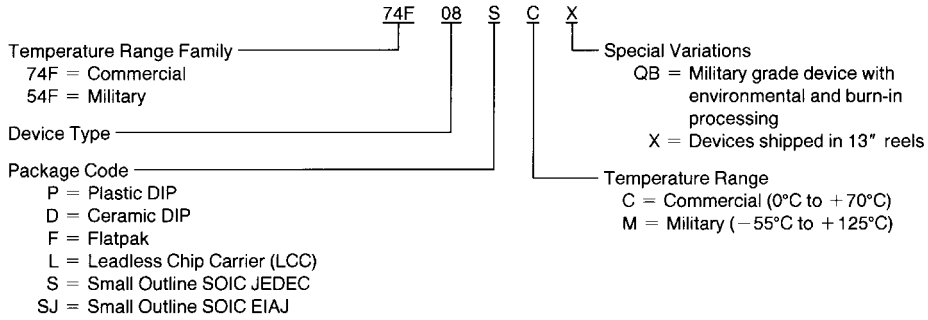
See Section 0 for Waveforms and Load Configurations

Symbol	Parameter	74F			54F		74F		Units	Fig. No.
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A , V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF			
		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 to O _n	2.5	4.0	5.3	2.0	7.5	2.5	6.3		



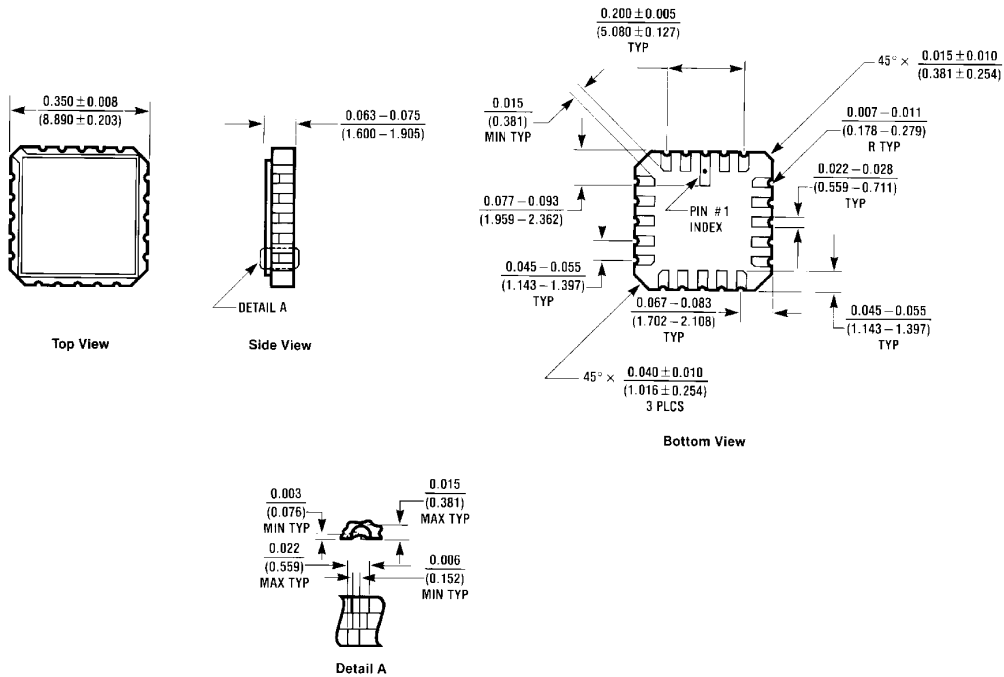
Ordering Information

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



DS009457-4

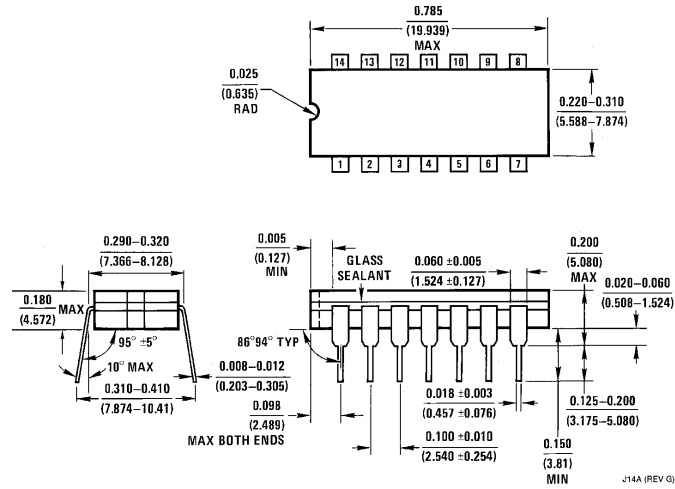
Physical Dimensions inches (millimeters) unless otherwise noted



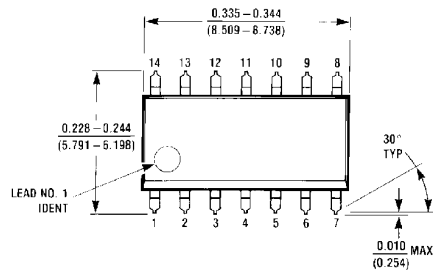
E20A (REV. 01)

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

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

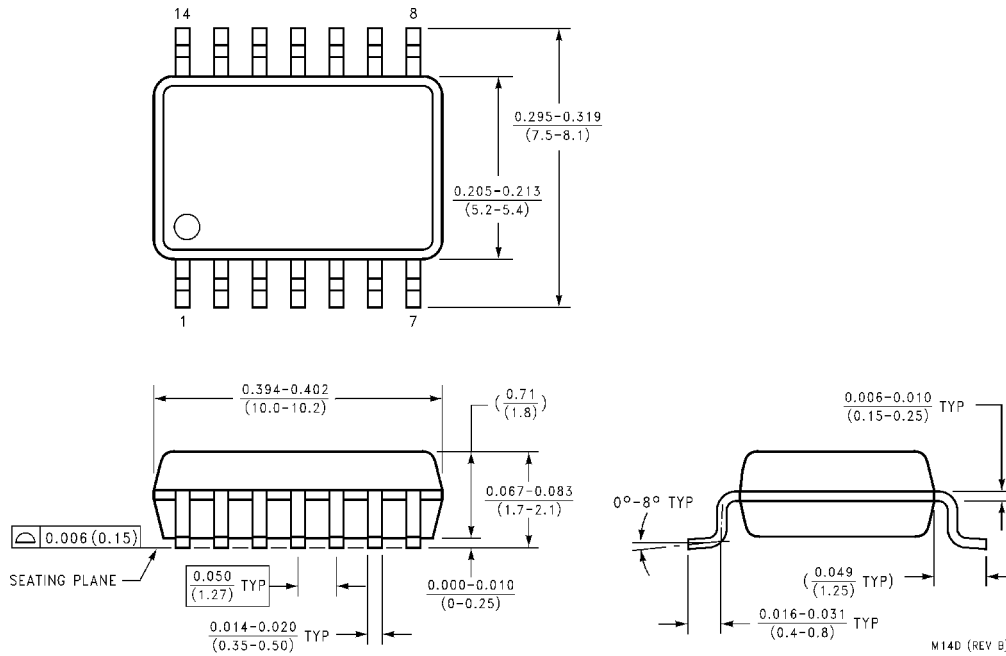


14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A

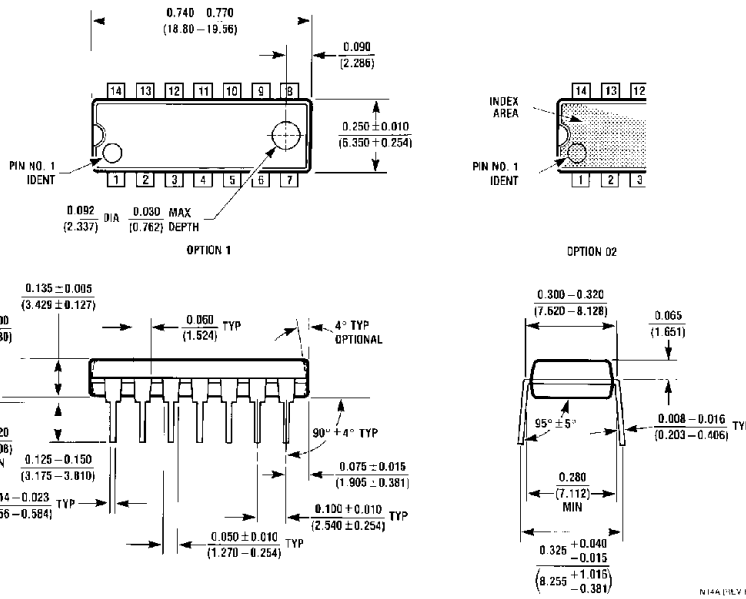


14-Lead (0.150" Wide) Molded Small Outline, JEDEC (S)
NS Package Number M14A

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

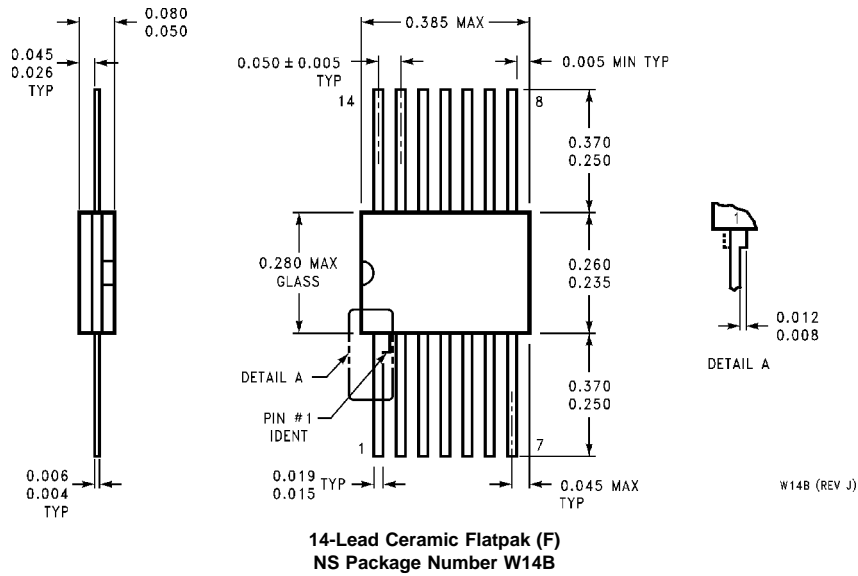


**14-Lead (0.300" Wide) Molded Small Outline, EIAJ (SJ)
NS Package Number M14D**



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


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



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