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December 1994

## National Semiconductor

### 54F/74F08 **Quad 2-Input AND Gate**

### **General Description**

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Features

Guaranteed 4000V minimum ESD protection

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

### Ordering Code: See Section 0

Commercial	Military	Package Number	Package Description
74F08PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line
The COMP.	54F08DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F08SC (Note 1)	T. A.	M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F08SJ (Note 1)	V Wn	M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
N.IV. CON	54F08FM (Note 2)	W14B	14-Lead Cerpack
1007.0	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**



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N COM TW

W.100Y.COM.

## W.100X.COM.TW Unit Loading/Fan Out

100X.COM.T

V.100<u>Y.C</u>PNI.TW

W.100Y.COM.TW

WWW.100Y.CON

WWW.100Y.COM.TW WWW.1007.COM.TW WWW.100Y.COM.TW

WWW.190Y.COM.TW

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Names	Description	U.L. HIGH/LOW	Input I <sub>IH</sub> /I <sub>IL</sub> Output I <sub>OH</sub> /I <sub>OL</sub>
<sub>'n</sub> , B <sub>n</sub>	Inputs	1.0/1.0	20 μA/–0.6 mA
) <sub>n</sub>	Outputs	50/33.3	–1 mA/20 mA

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# WWW.100Y.COM.T Absolute Maximum Ratings (Note 3)

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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 <sub>CC</sub> 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 <sub>CC</sub> = 0V)					
Standard Output	-0.5V to V <sub>CC</sub>				
TRI-STATE <sup>®</sup> Output	-0.5V to +5.5V				

Current Applied to Output in LOW State (Max) ESD Last Passing Voltage (Min)

twice the rated  $I_{OL}$  (mA) 4000V

### Recommended Operating Conditions

Free Air Ambient Temperature Military Commercial Supply Voltage Military Commercial

-55°C to +125°C 0°C to +70°C

+4.5V to +5.5V +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 <sub>cc</sub>	Conditions		
	. ON.COM		Min	Тур	Max		WT.	W 11 100Y		
VIH	Input HIGH Voltage		2.0			(V)		Recognized as a HIGH Signal		
VIL	Input LOW Voltage	NT.N		-	0.8	V	1.1	Recognized as a LOW Signal		
V <sub>CD</sub>	Input Clamp Diode Voltage			NNY	-1.2	V	Min	$I_{IN} = -18 \text{ mA}$		
V <sub>он</sub>	Output HIGH	54F 10% V <sub>CC</sub>	2.5		N.10.		DNr	$I_{OH} = -1 \text{ mA}$		
	Voltage	74F 10% V <sub>CC</sub>	2.5		-11	v	Min	$I_{OH} = -1 \text{ mA}$		
	WW.Los C	74F 5% V <sub>CC</sub>	2.7		111.2		Our.	I <sub>OH</sub> = -1 mA		
Vol	Output LOW	54F 10% V <sub>CC</sub>			0.5	V	Min	I <sub>OL</sub> = 20 mA		
	Voltage	74F 10% V <sub>CC</sub>			0.5	Yoo.		I <sub>OL</sub> = 20 mA		
I <sub>IH</sub>	Input HIGH	54F	đ		20.0	μA	Max	V <sub>IN</sub> = 2.7V		
	Current	74F			5.0	100		M.T.		
I <sub>BVI</sub>	Input HIGH Current	54F	N		100	μA	Max	V <sub>IN</sub> = 7.0V		
	Breakdown Test	74F			7.0	W.10		OM. L		
I <sub>CEX</sub>	Output HIGH	54F	N		250	μA	Max	$V_{OUT} = V_{CC}$		
	Leakage Current	74F			50	NN.		COM		
VID	Input Leakage	74F	4.75			V	0.0	I <sub>ID</sub> = 1.9 μA		
	Test		1		1		100	All Other Pins Grounded		
I <sub>OD</sub>	Output Leakage	74F	Nr.	-	3.75	μA	0.0	V <sub>IOD</sub> = 150 mV		
	Circuit Current	1001.00	TAR		1		1100	All Other Pins Grounded		
I <sub>IL</sub>	Input LOW Current	V.F	Dian	IN	-0.6	mA	Max	$V_{IN} = 0.5V$		
l <sub>os</sub>	Output Short-Circuit C	Current	-60	-60 -150 m		mA	Max	V <sub>OUT</sub> = 0V		
I <sub>CCH</sub>	Power Supply Curren	Non Y.		5.5	8.3	mA	Max	V <sub>o</sub> = HIGH		
I <sub>CCL</sub>	Power Supply Curren	W.100	CON	8.6	12.9	mA	Max	V <sub>O</sub> = LOW		

### **AC Electrical Characteristics**

AC E See Sec	lectrical Chara tion 0 for Waveforms a	acteristi	i <b>CS</b>	COM-						
Symbol	Parameter	$74F$ $T_{A} = +25^{\circ}C$ $V_{CC} = +5.0V$ $C_{L} = 50 \text{ pF}$			54F T <sub>A</sub> , V <sub>CC</sub> = Mil C <sub>L</sub> = 50 pF		$74F$ $T_A, V_{CC} = Com$ $C_L = 50 \text{ pF}$		Units	Fig. No.
		Min	Тур	Max	Min	Max	Min	Max	1	
t <sub>PLH</sub>	Propagation Delay	3.0	4.2	5.6	2.5	7.5	3.0	6.6	ns	<b>**-**</b>
t <sub>PHL</sub>	$A_n$ , $B_n$ to $O_n$	2.5	4.0	5.3	2.0	7.5	2.5	6.3		

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- 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.



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