

## 54F/74F38 Quad Two-Input NAND Buffer (Open Collector)

### General Description

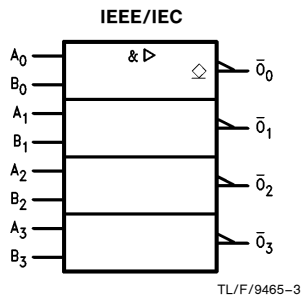
This device contains four independent gates, each of which performs the logic NAND function. The open-collector outputs require external pull-up resistors for proper logical operation.

Commercial	Military	Package Number	Package Description
74F38PC		N14E	14-Lead (0.300" Wide) Molded Dual-In-Line
	54F38DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F38SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F38SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F38FM (Note 2)	W14B	14-Lead Cerpack
	54F38LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

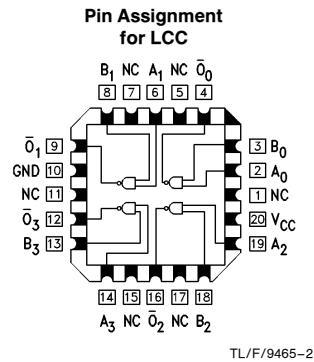
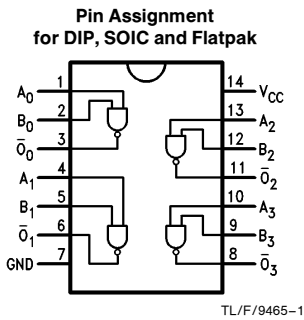
**Note 1:** Devices also available in 13" reel. Use suffix = SCX and SJX.

**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

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$A_n, B_n$ $\bar{O}_n$	Inputs Outputs	1.0/2.0 OC*/106.6 (80)	20 $\mu$ A/ -1.2 mA OC*/64 mA (48 mA)

\*OC = Open Collector

Function Table

Inputs		Output
A	B	$\bar{O}$
L	L	H
L	H	H
H	L	H
H	H	L

H = HIGH Voltage Level

L = LOW Voltage Level

## Absolute Maximum Ratings (Note 1)

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

Current Applied to Output in LOW State (Max) twice the rated I<sub>OL</sub> (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	
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

## DC Electrical Characteristics

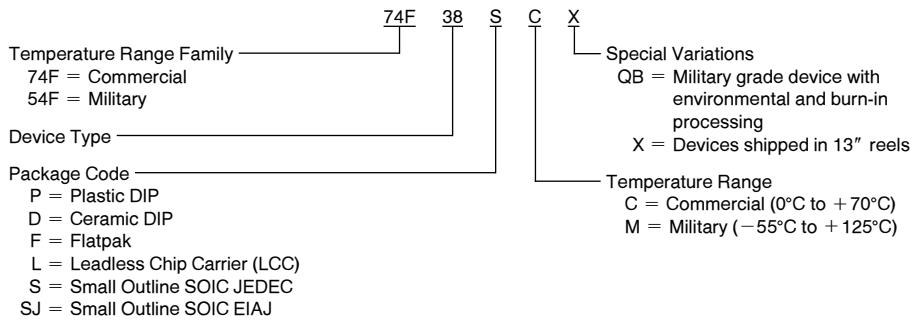
Symbol	Parameter	54F/74F			Units	V <sub>CC</sub>	Conditions
		Min	Typ	Max			
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA
V <sub>OL</sub>	Output LOW Voltage	54F 10% V <sub>CC</sub> 74F 10% V <sub>CC</sub>		0.55 0.55	V	Min	I <sub>OL</sub> = 48 mA I <sub>OL</sub> = 64 mA
I <sub>IH</sub>	Input HIGH Current	54F 74F		20.0 5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test	54F 74F		100 7.0	μA	Max	V <sub>IN</sub> = 7.0V
V <sub>ID</sub>	Input Leakage Test	74F	4.75		V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current	74F		3.75	μA	0.0	V <sub>IOD</sub> = 150 mV All Other Pins Grounded
I <sub>IL</sub>	Input LOW Current			-1.2	mA	Max	V <sub>IN</sub> = 0.5V
I <sub>OHC</sub>	Open Collector, Output OFF Leakage Test			250	μA	Min	V <sub>OUT</sub> = V <sub>CC</sub>
I <sub>CCCH</sub>	Power Supply Current		2.1	7.0	mA	Max	V <sub>O</sub> = HIGH
I <sub>CCCL</sub>	Power Supply Current		26.0	30.0	mA	Max	V <sub>O</sub> = LOW

## AC Electrical Characteristics

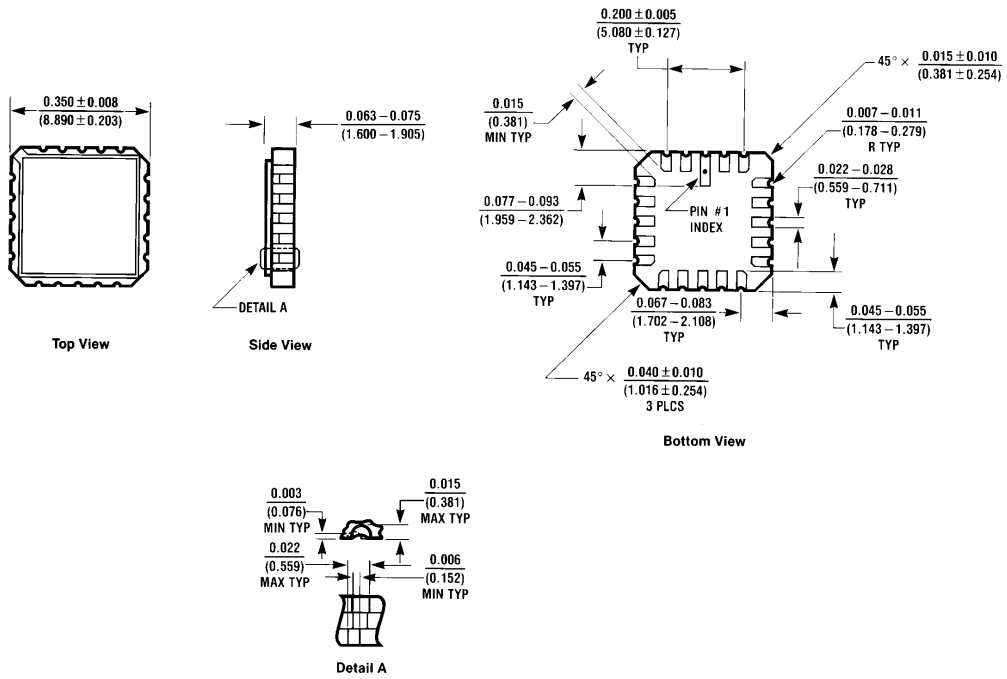
Symbol	Parameter	74F			54F		74F		Units
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF			T <sub>A</sub> , V <sub>CC</sub> = Mil C <sub>L</sub> = 50 pF		T <sub>A</sub> , V <sub>CC</sub> = Com C <sub>L</sub> = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	6.5	9.7	12.5	6.5	14.5	6.5	13.0	ns
t <sub>PHL</sub>	A <sub>n</sub> , B <sub>n</sub> to $\bar{O}_n$	1.5	2.1	5.0	1.0	5.5	1.5	5.5	

## 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)

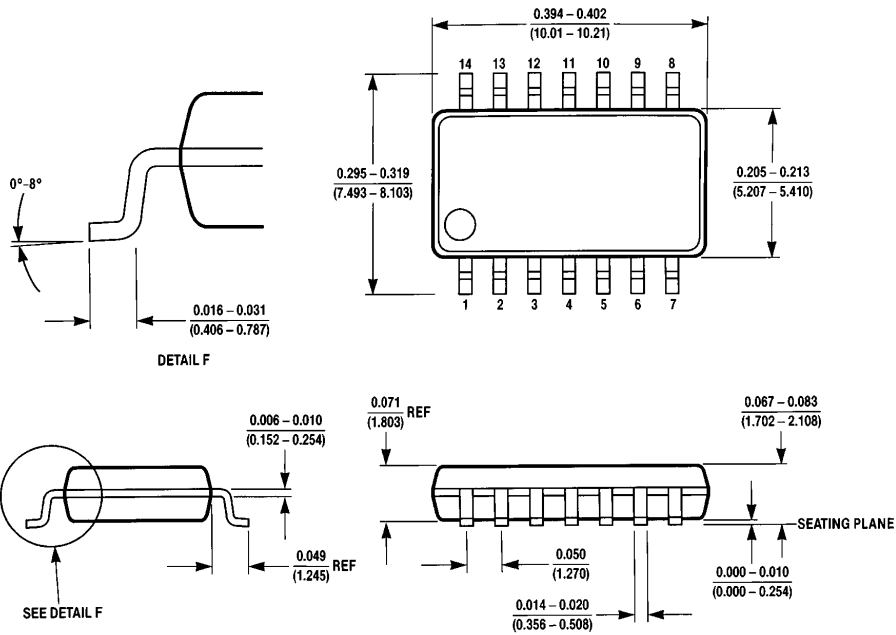


**20-Lead Ceramic Leadless Chip Carrier (L)  
 NS Package Number E20A**

E20A (REV D)

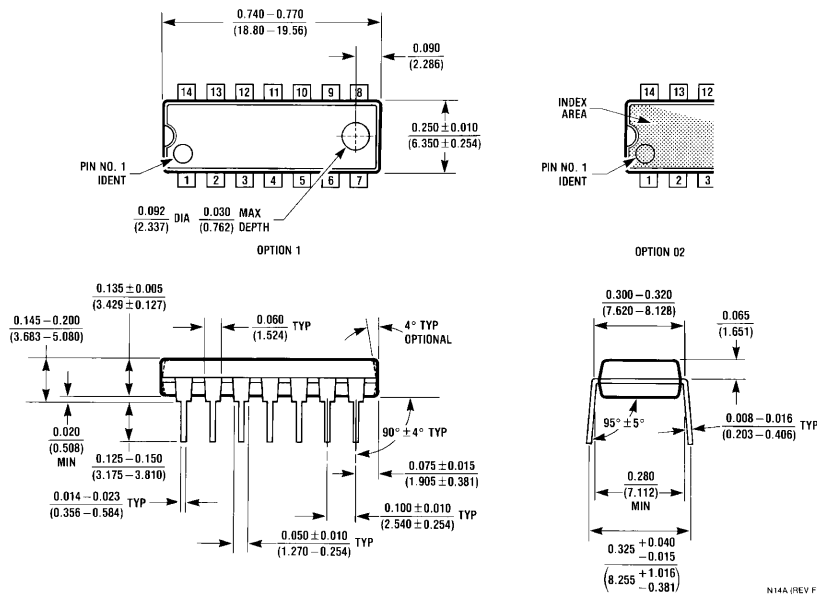


**Physical Dimensions** inches (millimeters) (Continued)



M14D (REV A)

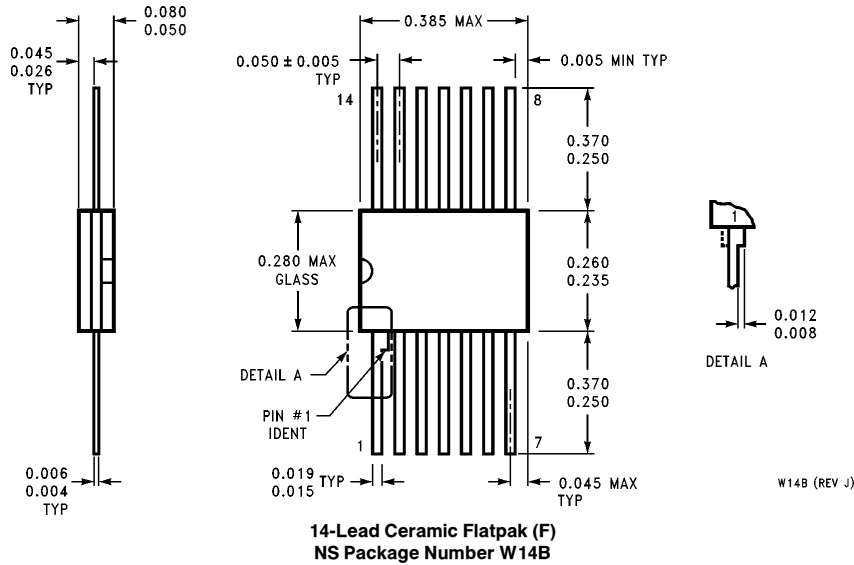
**14-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)**  
NS Package Number M14D



N14A (REV F)

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

**Physical Dimensions** inches (millimeters) (Continued)



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

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