



## QUAD 2-INPUT NOR BUFFER

### DESCRIPTION

The T54LS28/T74LS28 is a high speed QUAD 2-INPUT NOR BUFFER fabricated in LOW POWER SCHOTTKY technology.

**B1**  
Plastic Package

**D1/D2**  
Ceramic Package

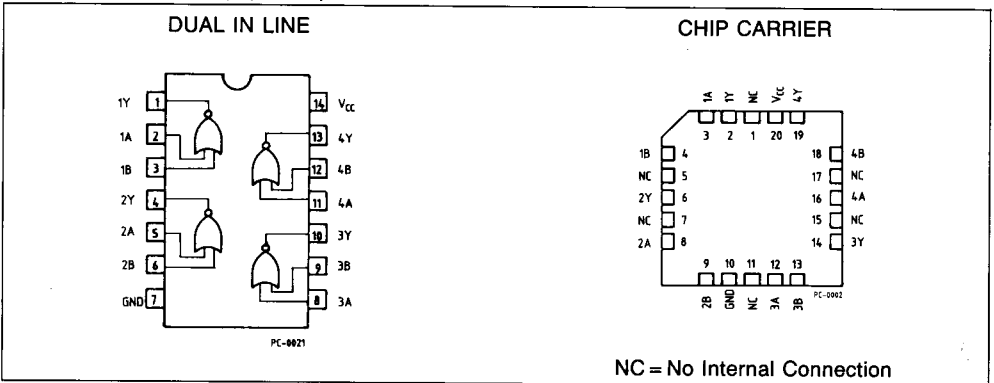
**M1**  
Micro Package

**C1**  
Plastic Chip Carrier

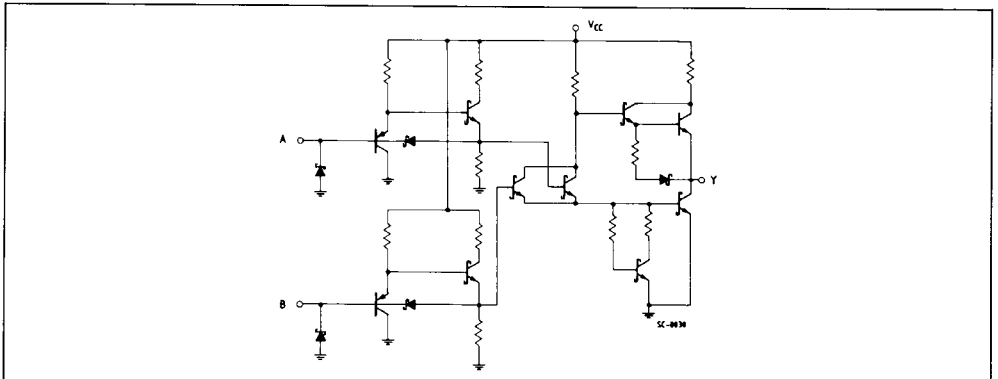
**ORDERING NUMBERS:**

T54LS28 D2	T74LS28 C1
T74LS28 D1	T74LS28 M1
T74LS28 B1	

### PIN CONNECTION (top view)



### SCHEMATIC





## LOGIC DIAGRAM AND TRUTH TABLE



A	B	Y
H	X	L
X	H	L
L	L	H

L = LOW Voltage Level  
H = HIGH Voltage Level  
X = Don't Care

## ABSOLUTE MAXIMUM RATINGS

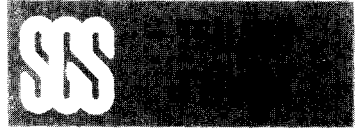
Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to 7	V
V <sub>I</sub>	Input Voltage, Applied to Input	-0.5 to 15	V
V <sub>O</sub>	Output Voltage, Applied to Output	-0.5 to 10	V
I <sub>I</sub>	Input Current, Into Inputs	-30 to 5	mA
I <sub>O</sub>	Output Current, Into Outputs	50	mA

Stresses in excess of those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions in excess of those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## GUARANTEED OPERATING RANGES

Part Numbers	Supply Voltage			Temperature
	Min	Typ	Max	
T54LS28D2	4.5 V	5.0 V	5.5 V	-55°C to +125°C
T74LS28XX	4.75 V	5.0 V	5.25 V	0°C to +70°C

XX = package type.



### DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE

Symbol	Parameter		Limits			Test Conditions (Note 1)	Units
			Min.	Typ.	Max.		
$V_{IH}$	Input HIGH Voltage		2.0			Guaranteed input HIGH Voltage for all inputs	V
$V_{IL}$	Input LOW Voltage	54			0.7	Guaranteed input LOW Voltage for all inputs	V
		74			0.8		
$V_{CD}$	Input Clamp Diode Voltage			-0.85	-1.5	$V_{CC} = \text{MIN}, I_{IN} = -18\text{mA}$	V
$V_{OH}$	Output HIGH Voltage	54	2.5	3.06		$V_{CC} = \text{MIN}, I_{OH} = -1.2\text{mA}, V_{IN} = V_{IL}$	V
		74	2.7				
$V_{OL}$	Output LOW Voltage	54,74		0.22	0.4	$I_{OL} = 12\text{mA}$ $V_{CC} = \text{MIN}, V_{IN} = V_{IH}$	V
		74		0.26	0.5		
$I_{IH}$	Input HIGH Current			0.1 0.1	20 100	$V_{CC} = \text{MAX}, V_{IN} = 2.7\text{V}$ $V_{CC} = \text{MAX}, V_{IN} = 7.0\text{V}$	$\mu\text{A}$ $\mu\text{A}$
$I_{IL}$	Input LOW Current			1.7	-0.4	$V_{CC} = \text{MAX}, V_{IN} = 0.4\text{V}$	mA
$I_{OS}$	Output Short Circuit Current (Note 2)		-20		-100	$V_{CC} = \text{MAX}, V_{OUT} = 0\text{V}$	mA
$I_{CCH}$	Supply Current HIGH			2.1	3.6	$V_{CC} = \text{MAX}$	mA
$I_{CCL}$	Supply Current LOW			11	13.8	$V_{CC} = \text{MAX}$	mA

### AC CHARACTERISTICS: $T_A = 25^\circ\text{C}$ (See page 576 for AC test circuit and waveforms)

Symbol	Parameter		Limits			Test Conditions	Units
			Min.	Typ.	Max.		
$t_{PLH}$	Turn Off Delay, Input to Output			12	24	$V_{CC} = 5.0\text{V}, R_L = 667\Omega$ $C_L = 45\text{pF}$	ns
$t_{PHL}$	Turn On Delay, Input to Output			12	24		ns

#### Notes:

- 1) For conditions shown as MIN or MAX, use the appropriate value specified under guaranteed operating ranges.
- 2) Not more than one output should be shorted at a time.
- 3) Typical values are at  $V_{CC} = 5.0\text{V}, T_A = 25^\circ\text{C}$ .