

# SN74LS151

## 8-Input Multiplexer

The TTL/MSI SN74LS151 is a high speed 8-input Digital Multiplexer. It provides, in one package, the ability to select one bit of data from up to eight sources. The LS151 can be used as a universal function generator to generate any logic function of four variables. Both assertion and negation outputs are provided.

- Schottky Process for High Speed
- Multifunction Capability
- On-Chip Select Logic Decoding
- Fully Buffered Complementary Outputs
- Input Clamp Diodes Limit High Speed Termination Effects

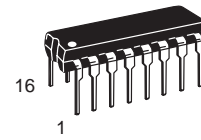
### GUARANTEED OPERATING RANGES

Symbol	Parameter	Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	4.75	5.0	5.25	V
T <sub>A</sub>	Operating Ambient Temperature Range	0	25	70	°C
I <sub>OH</sub>	Output Current – High			–0.4	mA
I <sub>OL</sub>	Output Current – Low			8.0	mA



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**LOW  
POWER  
SCHOTTKY**



**PLASTIC  
N SUFFIX  
CASE 648**



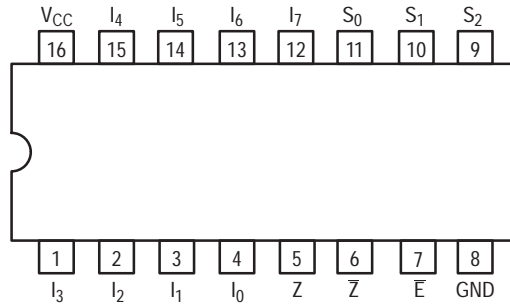
**SOIC  
D SUFFIX  
CASE 751B**

### ORDERING INFORMATION

Device	Package	Shipping
SN74LS151N	16 Pin DIP	2000 Units/Box
SN74LS151D	16 Pin	2500/Tape & Reel

# SN74LS151

## CONNECTION DIAGRAM DIP (TOP VIEW)



### PIN NAMES

$S_0 - S_2$	Select Inputs
$\bar{E}$	Enable (Active LOW) Input
$I_0 - I_7$	Multiplexer Inputs
Z	Multiplexer Output
$\bar{Z}$	Complementary Multiplexer Output

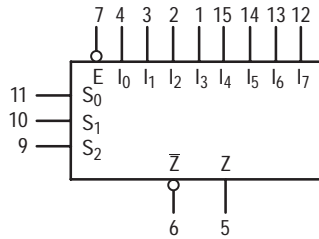
### LOADING (Note a)

	HIGH	LOW
$S_0 - S_2$	0.5 U.L.	0.25 U.L.
$\bar{E}$	0.5 U.L.	0.25 U.L.
$I_0 - I_7$	0.5 U.L.	0.25 U.L.
Z	10 U.L.	5 U.L.
$\bar{Z}$	10 U.L.	5 U.L.

### NOTES:

- 1 TTL Unit Load (U.L.) = 40  $\mu$ A HIGH/1.6 mA LOW.
- The Output LOW drive factor is 5 U.L. for Commercial (74) Temperature Ranges.

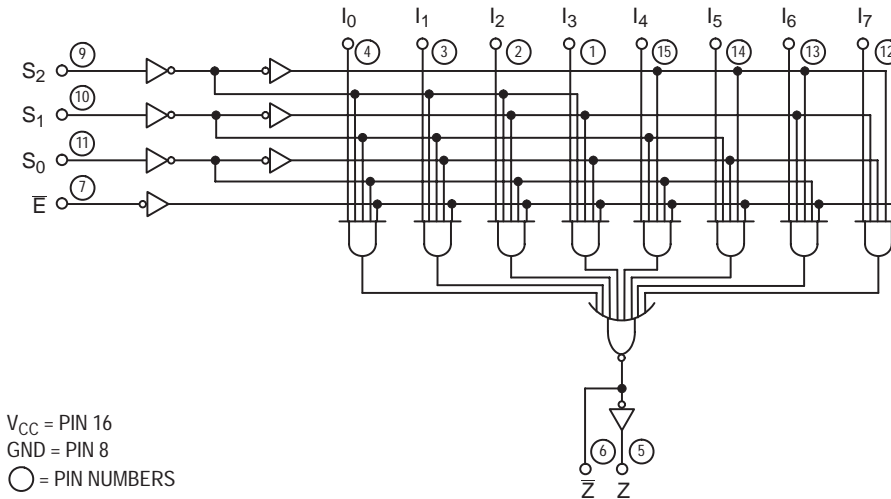
### LOGIC SYMBOL



$V_{CC}$  = PIN 16  
GND = PIN 8

# SN74LS151

## LOGIC DIAGRAM



### FUNCTIONAL DESCRIPTION

The LS151 is a logical implementation of a single pole, 8-position switch with the switch position controlled by the state of three Select inputs,  $S_0$ ,  $S_1$ ,  $S_2$ . Both assertion and negation outputs are provided. The Enable input ( $\bar{E}$ ) is active LOW. When it is not activated, the negation output is HIGH and the assertion output is LOW regardless of all other inputs. The logic function provided at the output is:

$$Z = \bar{E} \cdot (I_0 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_1 \cdot S_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_2 \cdot \bar{S}_0 \cdot S_1 \cdot \bar{S}_2 + I_3 \cdot S_0 \cdot S_1 \cdot \bar{S}_2 + I_4 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot S_2 + I_5 \cdot S_0 \cdot \bar{S}_1 \cdot S_2 + I_6 \cdot \bar{S}_0 \cdot S_1 \cdot S_2 + I_7 \cdot S_0 \cdot S_1 \cdot S_2)$$

The LS151 provides the ability, in one package, to select from eight sources of data or control information. By proper manipulation of the inputs, the LS151 can provide any logic function of four variables and its negation.

### TRUTH TABLE

$\bar{E}$	$S_2$	$S_1$	$S_0$	$I_0$	$I_1$	$I_2$	$I_3$	$I_4$	$I_5$	$I_6$	$I_7$	$\bar{Z}$	Z
H	X	X	X	X	X	X	X	X	X	X	X	H	L
L	L	L	L	L	X	X	X	X	X	X	X	H	L
L	L	L	L	H	X	X	X	X	X	X	X	L	H
L	L	L	H	X	L	X	X	X	X	X	X	H	L
L	L	L	H	X	H	X	X	X	X	X	X	L	H
L	L	H	L	X	X	L	X	X	X	X	X	H	L
L	L	H	L	X	X	H	X	X	X	X	X	L	H
L	L	H	H	X	X	X	L	X	X	X	X	H	L
L	L	H	H	X	X	X	H	X	X	X	X	L	H
L	H	L	L	X	X	X	X	L	X	X	X	H	L
L	H	L	L	X	X	X	X	H	X	X	X	L	H
L	H	L	H	X	X	X	X	X	L	X	X	H	L
L	H	L	H	X	X	X	X	X	H	X	X	L	H
L	H	H	L	X	X	X	X	X	X	L	X	H	L
L	H	H	L	X	X	X	X	X	X	H	X	L	H
L	H	H	H	X	X	X	X	X	X	X	L	H	L
L	H	H	H	X	X	X	X	X	X	X	H	L	H

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

# SN74LS151

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
$V_{IH}$	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs
$V_{IL}$	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage for All Inputs
$V_{IK}$	Input Clamp Diode Voltage		-0.65	-1.5	V	$V_{CC} = \text{MIN}$ , $I_{IN} = -18 \text{ mA}$
$V_{OH}$	Output HIGH Voltage	2.7	3.5		V	$V_{CC} = \text{MIN}$ , $I_{OH} = \text{MAX}$ , $V_{IN} = V_{IH}$ or $V_{IL}$ per Truth Table
$V_{OL}$	Output LOW Voltage		0.25	0.4	V	$I_{OL} = 4.0 \text{ mA}$
			0.35	0.5	V	$I_{OL} = 8.0 \text{ mA}$
$I_{IH}$	Input HIGH Current			20	$\mu\text{A}$	$V_{CC} = \text{MAX}$ , $V_{IN} = 2.7 \text{ V}$
				0.1	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 7.0 \text{ V}$
$I_{IL}$	Input LOW Current			-0.4	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 0.4 \text{ V}$
$I_{OS}$	Short Circuit Current (Note 1)	-20		-100	mA	$V_{CC} = \text{MAX}$
$I_{CC}$	Power Supply Current			10	mA	$V_{CC} = \text{MAX}$

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

## AC CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
$t_{PLH}$ $t_{PHL}$	Propagation Delay Select to Output Z		27 18	43 30	ns	$V_{CC} = 5.0 \text{ V}$ $C_L = 15 \text{ pF}$
$t_{PLH}$ $t_{PHL}$	Propagation Delay Select to Output $\bar{Z}$		14 20	23 32	ns	
$t_{PLH}$ $t_{PHL}$	Propagation Delay Enable to Output Z		26 20	42 32	ns	
$t_{PLH}$ $t_{PHL}$	Propagation Delay Enable to Output $\bar{Z}$		15 18	24 30	ns	
$t_{PLH}$ $t_{PHL}$	Propagation Delay Data to Output Z		20 16	32 26	ns	
$t_{PLH}$ $t_{PHL}$	Propagation Delay Data to Output $\bar{Z}$		13 12	21 20	ns	

## AC WAVEFORMS

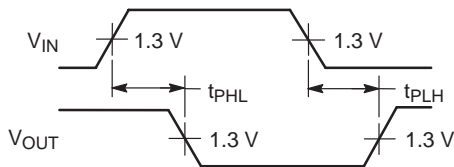


Figure 1.

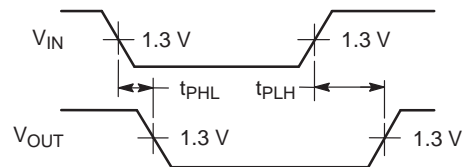


Figure 2.

# SN74LS151

## PACKAGE DIMENSIONS

**N SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 648-08**  
**ISSUE R**



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0° 10°		0° 10°	
S	0.020	0.040	0.51	1.01

# SN74LS151

## PACKAGE DIMENSIONS

### D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0° 7°		0° 7°	
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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