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.

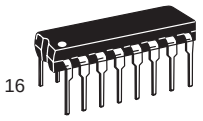
- Schottky Process for High Speed
- Multifunction Capability
- On-Chip Select Logic Decoding
- Fully Buffered Complementary Outputs
- Input Clamp Diodes Limit High Speed Termination Effects

GUARANTEED OPERATING RANGES

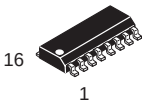
Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	4.75	5.0	5.25	V
T_A	Operating Ambient Temperature Range	0	25	70	°C
I_{OH}	Output Current – High			–0.4	mA
I_{OL}	Output Current – Low			8.0	mA

ON Semiconductor
Formerly a Division of Motorola
http://onsemi.com

LOW POWER SCHOTTKY



PLASTIC
N SUFFIX
CASE 648

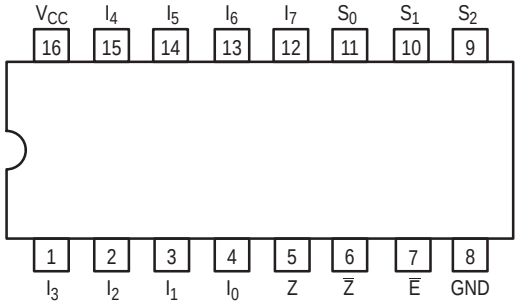


SOIC
D SUFFIX
CASE 751B

ORDERING INFORMATION

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

CONNECTION DIAGRAM DIP (TOP VIEW)



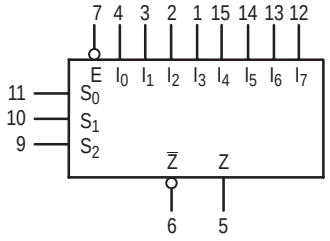
PIN NAMES		LOADING (Note a) HIGH	LOW
$S_0 - S_2$	Select Inputs	0.5 U.L.	0.25 U.L.
$\overline{E}$	Enable (Active LOW) Input	0.5 U.L.	0.25 U.L.
$I_0 - I_7$	Multiplexer Inputs	0.5 U.L.	0.25 U.L.
Z	Multiplexer Output	10 U.L.	5 U.L.
$\overline{Z}$	Complementary Multiplexer Output	10 U.L.	5 U.L.

NOTES:

a) 1 TTL Unit Load (U.L.) = 40 μA HIGH/1.6 mA LOW.

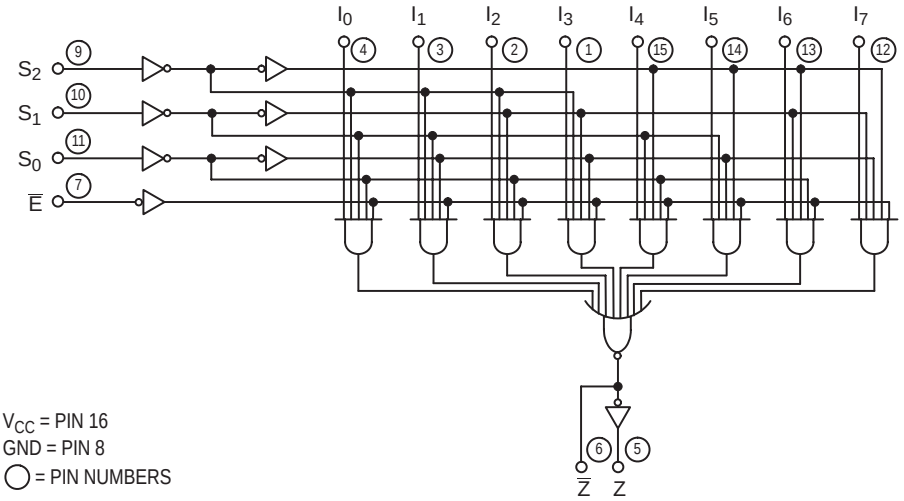
b) The Output LOW drive factor is 5 U.L. for Commercial (74) Temperature Ranges.

LOGIC SYMBOL



V_{CC} = PIN 16
GND = PIN 8

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 (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:

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

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

$\overline{E}$	S_2	S_1	S_0	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7	$\overline{Z}$	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

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} = MIN, I_{IN} = −18 mA	
V_{OH}	Output HIGH Voltage	2.7	3.5		V	V_{CC} = MIN, I_{OH} = 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 mA	V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
			0.35	0.5	V	I_{OL} = 8.0 mA	
I_{IH}	Input HIGH Current			20	μA	V_{CC} = MAX, V_{IN} = 2.7 V	
				0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current			−0.4	mA	V_{CC} = MAX, V_{IN} = 0.4 V	
I_{OS}	Short Circuit Current (Note 1)	−20		−100	mA	V_{CC} = MAX	
I_{CC}	Power Supply Current			10	mA	V_{CC} = 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°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 V C_L = 15 pF
t_{PLH} t_{PHL}	Propagation Delay Select to Output $\overline{Z}$		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 $\overline{Z}$		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 $\overline{Z}$		13 12	21 20	ns	

AC WAVEFORMS

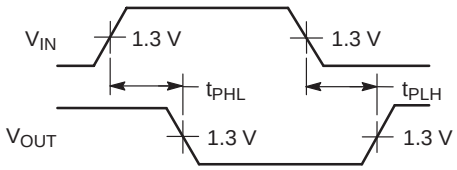


Figure 1.

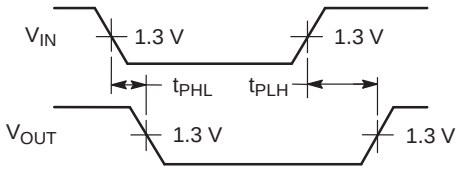
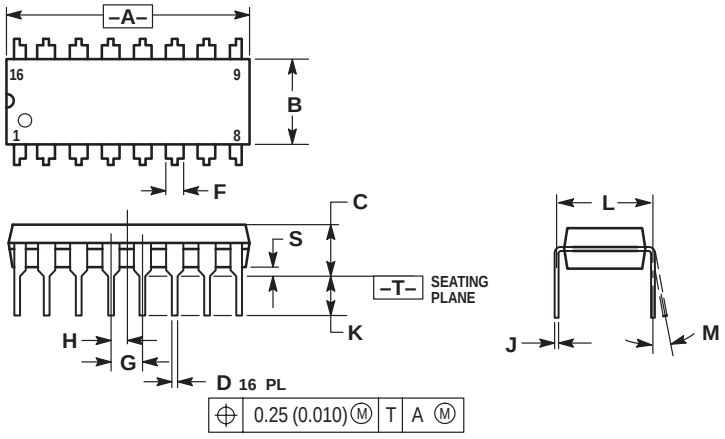


Figure 2.

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 648–08
ISSUE R

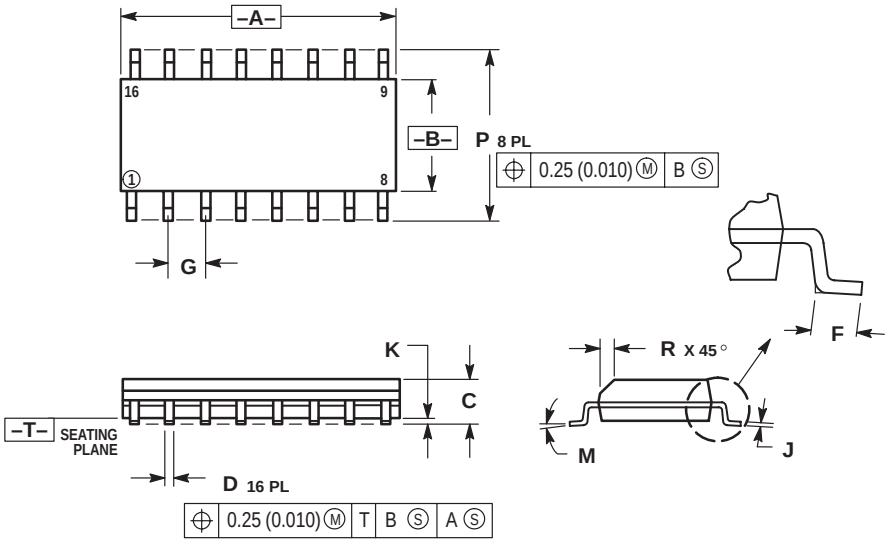


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	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

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.

	MILLIMETERS		INCHES	
DIM	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

Notes

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