

SN74LS257B SN74LS258B

Quad 2-Input Multiplexer with 3-State Outputs

The LSTTL/MSI SN74LS257B and the SN74LS258B are Quad 2-Input Multiplexers with 3-state outputs. Four bits of data from two sources can be selected using a Common Data Select input. The four outputs present the selected data in true (non-inverted) form. The outputs may be switched to a high impedance state with a HIGH on the common Output Enable (E_O) Input, allowing the outputs to interface directly with bus oriented systems. It is fabricated with the Schottky barrier diode process for high speed and is completely compatible with all ON Semiconductor TTL families.

- Schottky Process For High Speed
- Multiplexer Expansion By Tying Outputs Together
- Non-Inverting 3-State Outputs
- Input Clamp Diodes Limit High Speed Termination Effects
- Special Circuitry Ensures Glitch Free Multiplexing
- ESD > 3500 Volts

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			-2.6	mA
I_{OL}	Output Current – Low			24	mA

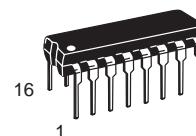


ON Semiconductor

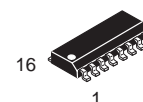
Formerly a Division of Motorola

<http://onsemi.com>

**LOW
POWER
SCHOTTKY**



**PLASTIC
N SUFFIX
CASE 648**



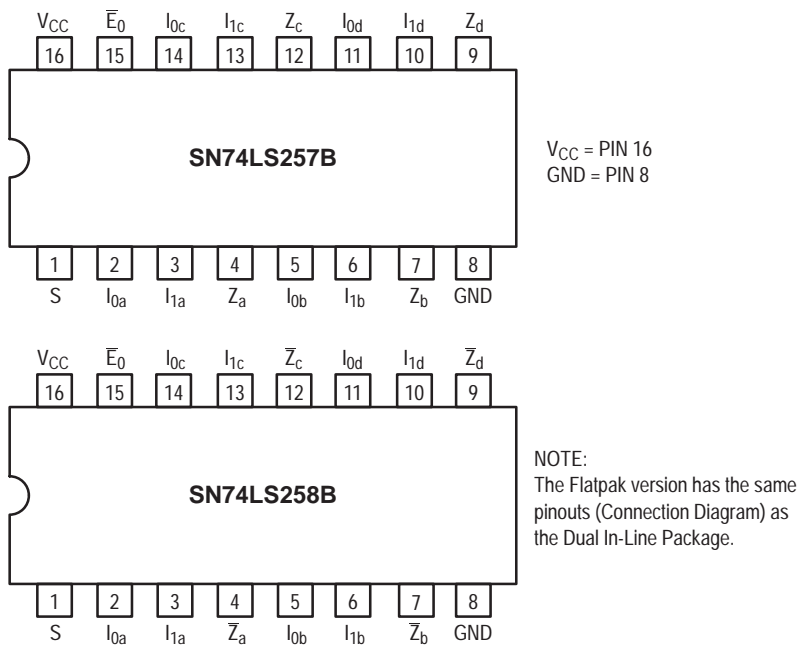
**SOIC
D SUFFIX
CASE 751B**

ORDERING INFORMATION

Device	Package	Shipping
SN74LS257BN	16 Pin DIP	2000 Units/Box
SN74LS257BD	16 Pin	2500/Tape & Reel
SN74LS258BN	16 Pin DIP	2000 Units/Box
SN74LS258BD	16 Pin	2500/Tape & Reel

SN74LS257B SN74LS258B

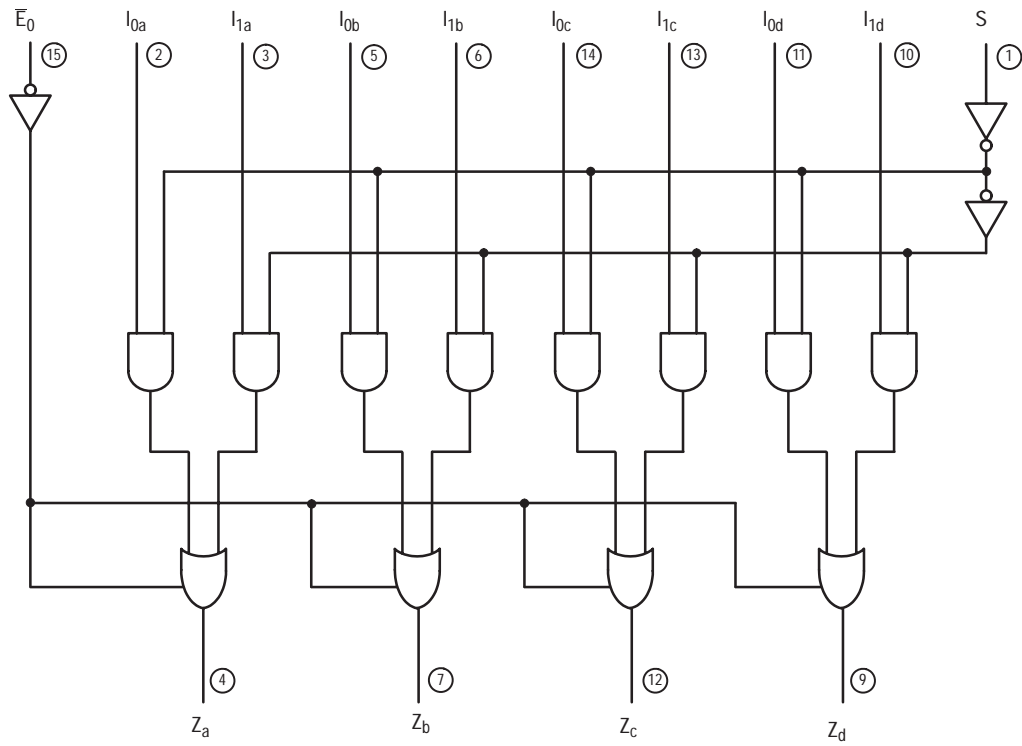
CONNECTION DIAGRAM DIP (TOP VIEW)



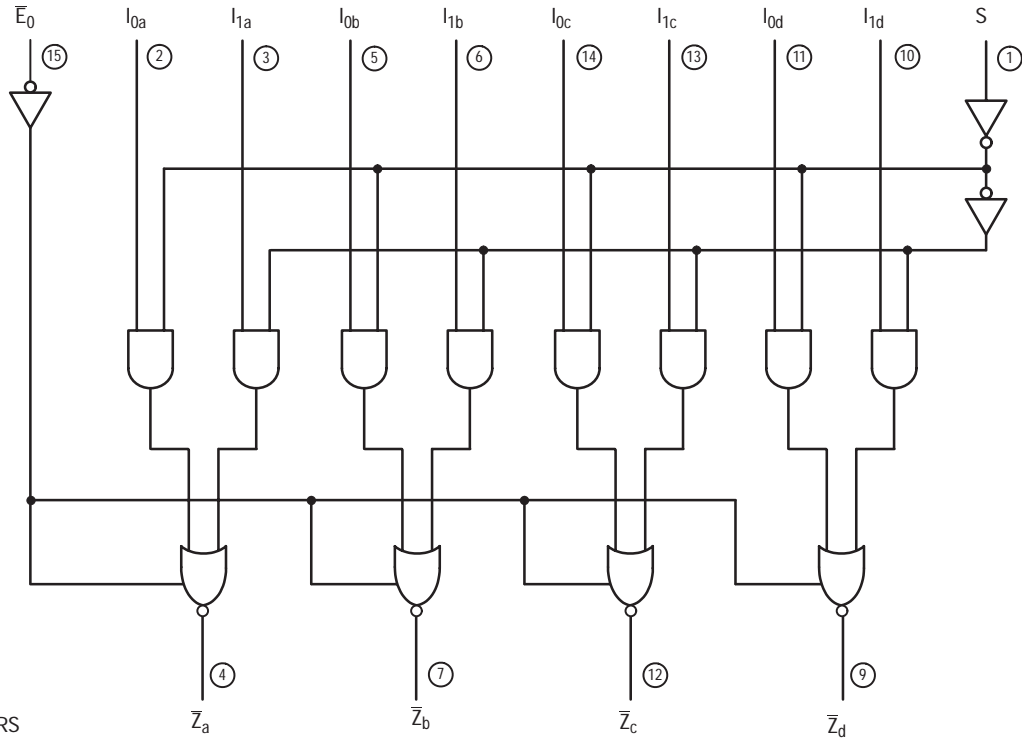
SN74LS257B SN74LS258B

LOGIC DIAGRAMS

SN74LS257B



SN74LS258B



V_{CC} = PIN 16
 GND = PIN 8
 ○ = PIN NUMBERS

SN74LS257B SN74LS258B

FUNCTIONAL DESCRIPTION

The LS257B and LS258B are Quad 2-Input Multiplexers with 3-state outputs. They select four bits of data from two sources each under control of a Common Data Select Input. When the Select Input is LOW, the I_0 inputs are selected and when Select is HIGH, the I_1 inputs are selected. The data on the selected inputs appears at the outputs in true (non-inverted) form for the LS257B and in the inverted form for the LS258B.

The LS257B and LS258B are the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select Input. The logic equations for the outputs are shown below:

LS257B

$$\begin{aligned} Z_a &= \bar{E}_0 \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S}) \\ Z_b &= \bar{E}_0 \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S}) \\ Z_c &= \bar{E}_0 \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S}) \\ Z_d &= \bar{E}_0 \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S}) \end{aligned}$$

When the Output Enable Input (\bar{E}_0) is HIGH, the outputs are forced to a high impedance "off" state. If the outputs are tied together, all but one device must be in the high impedance state to avoid high currents that would exceed the maximum ratings. Designers should ensure that Output Enable signals to 3-state devices whose outputs are tied together are designed so there is no overlap.

LS258B

$$\begin{aligned} Z_a &= \bar{E}_0 \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S}) \\ Z_b &= \bar{E}_0 \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S}) \\ Z_c &= \bar{E}_0 \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S}) \\ Z_d &= \bar{E}_0 \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S}) \end{aligned}$$

TRUTH TABLE

OUTPUT ENABLE	SELECT INPUT	DATA INPUTS		OUTPUTS LS257B	OUTPUTS LS258B
\bar{E}_0	S	I_0	I_1	Z	\bar{Z}
H	X	X	X	(Z)	(Z)
L	H	X	L	L	H
L	H	X	H	H	L
L	L	L	X	L	H
L	L	H	X	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
(Z) = High Impedance (off)

SN74LS257B SN74LS258B

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	2.4	3.1		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	$I_{OL} = 12 \text{ mA}$
			0.35	0.5	V	$I_{OL} = 24 \text{ mA}$
I_{OZH}	Output Off Current — HIGH			20	μA	$V_{CC} = \text{MAX}$, $V_{OUT} = 2.7 \text{ V}$
I_{OZL}	Output Off Current — LOW			-20	μA	$V_{CC} = \text{MAX}$, $V_{OUT} = 0.4 \text{ V}$
I_{IH}	Input HIGH Current Other Inputs S Inputs			20 40	μA	$V_{CC} = \text{MAX}$, $V_{IN} = 2.7 \text{ V}$
	Other Inputs S Inputs			0.1 0.2	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 7.0 \text{ V}$
I_{IL}	Input LOW Current All Inputs			-0.4	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 0.4 \text{ V}$
I_{OS}	Short Circuit Current (Note 1)	-30		-130	mA	$V_{CC} = \text{MAX}$
I_{CC}	Power Supply Current Total, Output HIGH	LS257B LS258B		10 9.0	mA	$V_{CC} = \text{MAX}$
	Total, Output LOW	LS257B LS258B		16 14	mA	
	Total, Output 3-State	LS257B LS258B		19 16	mA	

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

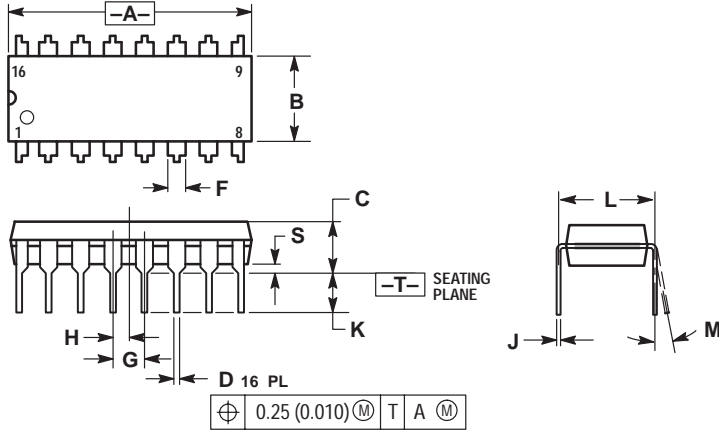
AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0 \text{ V}$) See SN74LS251 for Waveforms

Symbol	Parameter	Limits			Unit	Test Conditions	
		Min	Typ	Max			
t_{PLH} t_{PHL}	Propagation Delay, Data to Output		10 12	13 15	ns	Figures 1 & 2	$C_L = 45 \text{ pF}$
t_{PLH} t_{PHL}	Propagation Delay, Select to Output		14 14	21 21	ns	Figures 1 & 2	
t_{PZH}	Output Enable Time to HIGH Level		20	25	ns	Figures 4 & 5	$C_L = 45 \text{ pF}$ $R_L = 667 \Omega$
t_{PZL}	Output Enable Time to LOW Level		20	25	ns	Figures 3 & 5	
t_{PLZ}	Output Disable Time to LOW Level		16	25	ns	Figures 3 & 5	$C_L = 5.0 \text{ pF}$ $R_L = 667 \Omega$
t_{PHZ}	Output Disable Time from HIGH Level		18	25	ns	Figures 4 & 5	

SN74LS257B SN74LS258B

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 648-08
ISSUE R



NOTES:

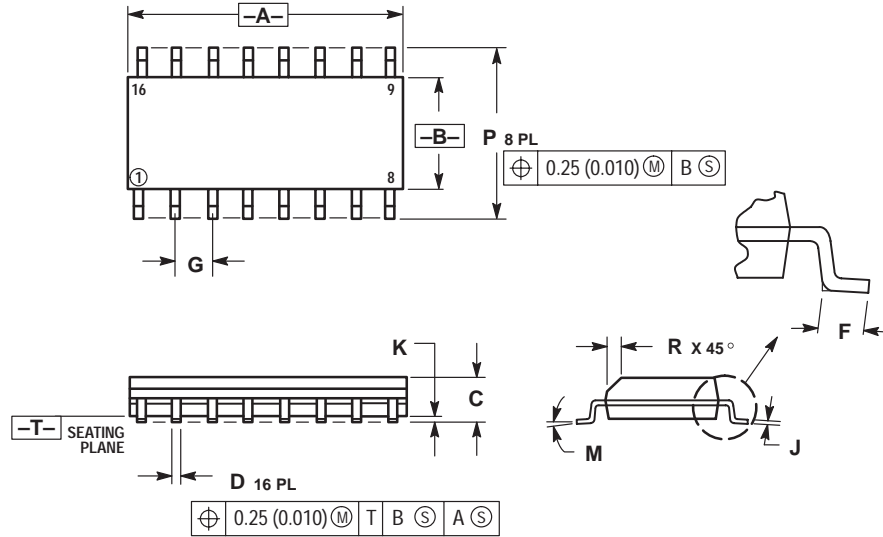
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

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

SN74LS257B SN74LS258B

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

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

North America Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (M–F 2:30pm to 5:00pm Munich Time)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (M–F 2:30pm to 5:00pm Toulouse Time)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (M–F 1:30pm to 5:00pm UK Time)
Email: ONlit@hibbertco.com

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue–Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong 800-4422-3781
Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center

4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-8549
Phone: 81-3-5487-8345
Email: r14153@onsemi.com

Fax Response Line: 303-675-2167
800-344-3810 Toll Free USA/Canada

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.