

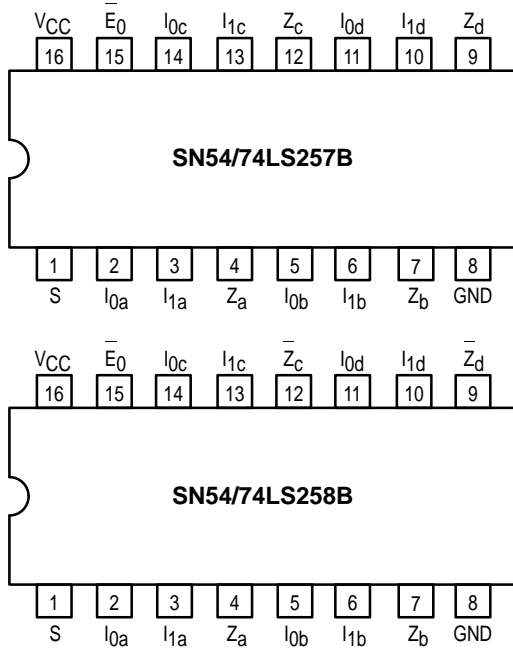


QUAD 2-INPUT MULTIPLEXER WITH 3-STATE OUTPUTS

The LSTTL/MSI SN54/74LS257B and the SN54/74LS258B 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 (\bar{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 Motorola 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

CONNECTION DIAGRAM DIP (TOP VIEW)

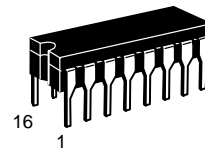


V_{CC} = PIN 16
GND = PIN 8

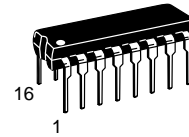
NOTE:
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-Line Package.

SN54/74LS257B
SN54/74LS258B

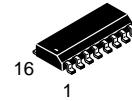
QUAD 2-INPUT MULTIPLEXER WITH 3-STATE OUTPUTS
LOW POWER SCHOTTKY



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08



D SUFFIX
SOIC
CASE 751B-03

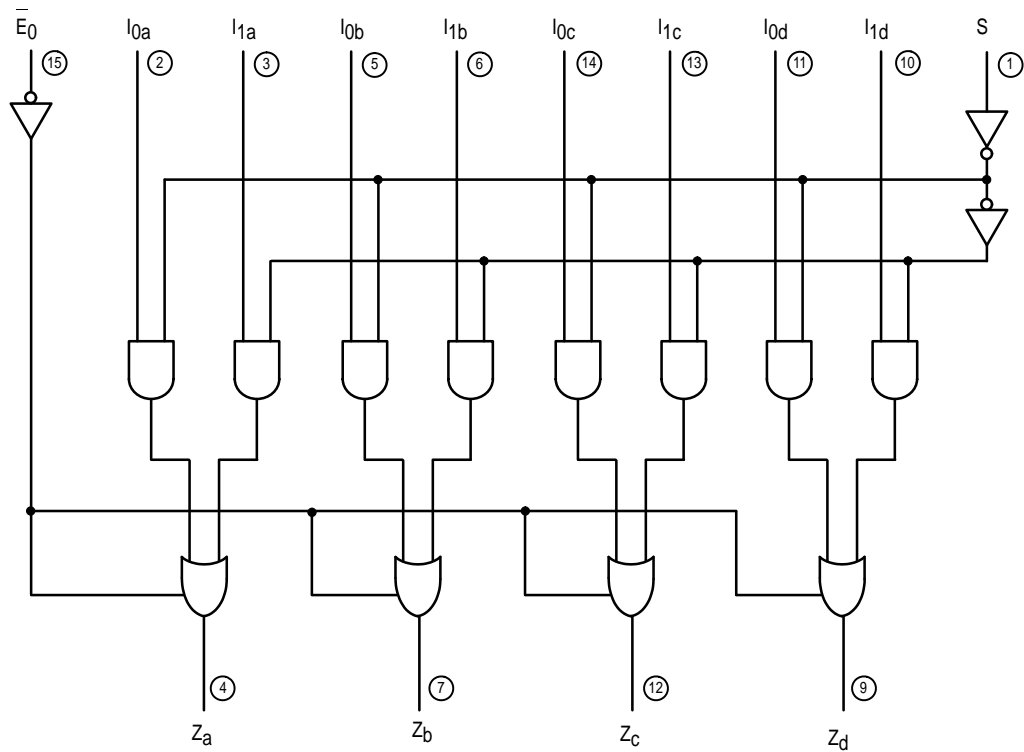
ORDERING INFORMATION

| | |
|------------|---------|
| SN54LSXXXJ | Ceramic |
| SN74LSXXXN | Plastic |
| SN74LSXXXD | SOIC |

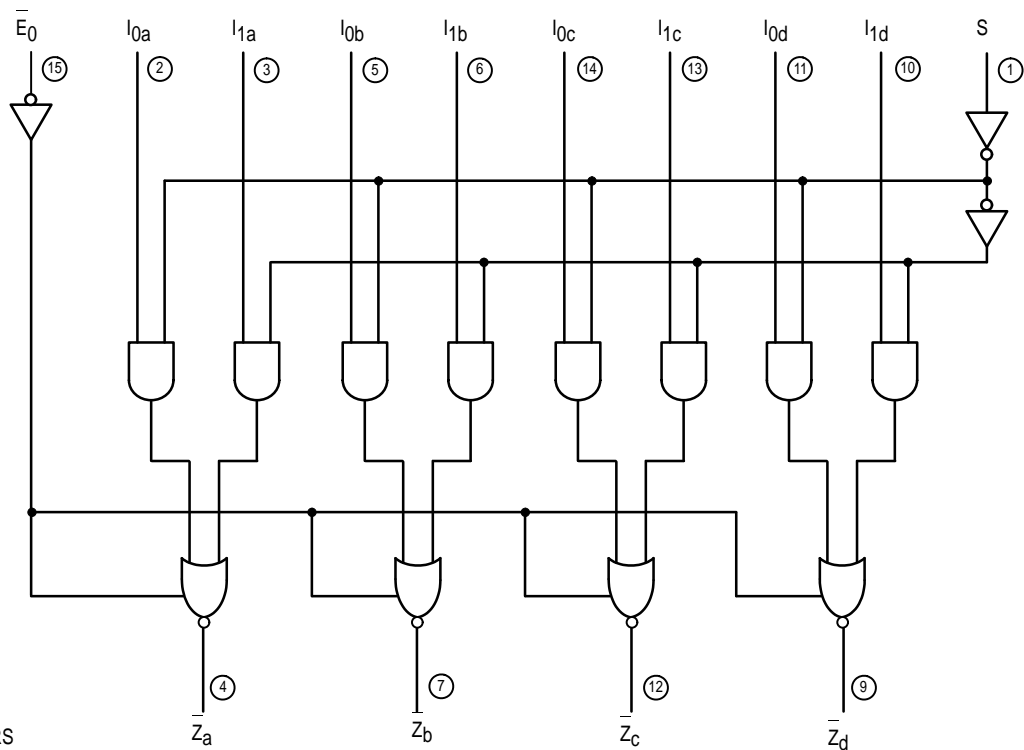
SN54/74LS257B • SN54/74LS258B

LOGIC DIAGRAMS

SN54/74LS257B



SN54/74LS258B



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

SN54/74LS257B • SN54/74LS258B

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 I₀ inputs are selected and when Select is HIGH, the I₁ 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:

When the Output Enable Input ($\overline{E_0}$) 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.

LS257B

$$Z_a = \overline{E_0} \cdot (I_{1a} \cdot S + I_{0a} \cdot \overline{S}) \quad Z_b = \overline{E_0} \cdot (I_{1b} \cdot S + I_{0b} \cdot \overline{S})$$

$$Z_c = E_0 \cdot (I_{1c} \cdot S + I_{0c} \cdot \overline{S}) \quad Z_d = E_0 \cdot (I_{1d} \cdot S + I_{0d} \cdot \overline{S})$$

LS258B

$$Z_a = \overline{E_0} \cdot (I_{1a} \cdot S + I_{0a} \cdot \overline{S}) \quad \overline{Z_b} = \overline{E_0} \cdot (I_{1b} \cdot S + I_{0b} \cdot \overline{S})$$

$$Z_c = E_0 \cdot (I_{1c} \cdot S + I_{0c} \cdot \overline{S}) \quad \overline{Z_d} = E_0 \cdot (I_{1d} \cdot S + I_{0d} \cdot \overline{S})$$

TRUTH TABLE

| OUTPUT ENABLE | SELECT INPUT | DATA INPUTS | | OUTPUTS LS257B | OUTPUTS LS258B |
|------------------|--------------|----------------|----------------|----------------|----------------|
| $\overline{E_0}$ | S | I ₀ | I ₁ | Z | \overline{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)

GUARANTEED OPERATING RANGES

| Symbol | Parameter | | Min | Typ | Max | Unit |
|-----------------|-------------------------------------|----|------|-----|------|------|
| V _{CC} | Supply Voltage | 54 | 4.5 | 5.0 | 5.5 | V |
| | | 74 | 4.75 | 5.0 | 5.25 | |
| T _A | Operating Ambient Temperature Range | 54 | -55 | 25 | 125 | °C |
| | | 74 | 0 | 25 | 70 | |
| I _{OH} | Output Current — High | 54 | | | -1.0 | mA |
| | | 74 | | | -2.6 | |
| I _{OL} | Output Current — Low | 54 | | | 12 | mA |
| | | 74 | | | 24 | |

SN54/74LS257B • SN54/74LS258B

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 | 54 | | | 0.7 | V | Guaranteed Input LOW Voltage for All Inputs | |
| | | 74 | | | 0.8 | | | |
| V _{IK} | Input Clamp Diode Voltage | | | -0.65 | -1.5 | V | V _{CC} = MIN, I _{IN} = -18 mA | |
| V _{OH} | Output HIGH Voltage | 54 | 2.4 | 3.4 | | V | V _{CC} = MIN, I _{OH} = MAX, V _{IN} = V _{IH} or V _{IL} per Truth Table | |
| | | 74 | 2.4 | 3.1 | | V | | |
| V _{OL} | Output LOW Voltage | 54, 74 | | 0.25 | 0.4 | V | I _{OL} = 12 mA | V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table |
| | | 74 | | 0.35 | 0.5 | V | I _{OL} = 24 mA | |
| I _{OZH} | Output Off Current — HIGH | | | | 20 | μA | V _{CC} = MAX, V _{OUT} = 2.7 V | |
| I _{OZL} | Output Off Current — LOW | | | | -20 | μA | V _{CC} = MAX, V _{OUT} = 0.4 V | |
| I _{IH} | Input HIGH Current Other Inputs S Inputs | | | | 20 40 | μA | V _{CC} = MAX, V _{IN} = 2.7 V | |
| | Other Inputs S Inputs | | | | 0.1 0.2 | mA | V _{CC} = MAX, V _{IN} = 7.0 V | |
| I _{IL} | Input LOW Current All Inputs | | | | -0.4 | mA | V _{CC} = MAX, V _{IN} = 0.4 V | |
| I _{OS} | Short Circuit Current (Note 1) | | -30 | | -130 | mA | V _{CC} = MAX | |
| I _{CC} | Power Supply Current Total, Output HIGH | LS257B | | | 10 | mA | V _{CC} = MAX | |
| | | LS258B | | | 9.0 | | | |
| | Total, Output LOW | LS257B | | | 16 | mA | | |
| | LS258B | | | 14 | | | | |
| | Total, Output 3-State | LS257B | | | 19 | mA | | |
| | | LS258B | | | 16 | | | |

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, V_{CC} = 5.0 V) See SN54LS251 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 pF |
| t _{PLH} t _{PHL} | Propagation Delay, Select to Output | | | 14 14 | 21 21 | | | |
| t _{PZH} | Output Enable Time to HIGH Level | | | 20 | 25 | ns | Figures 4 & 5 | C _L = 45 pF R _L = 667 Ω |
| t _{PZL} | Output Enable Time to LOW Level | | | 20 | 25 | | | |
| t _{PLZ} | Output Disable Time to LOW Level | | | 16 | 25 | ns | Figures 3 & 5 | C _L = 5.0 pF R _L = 667 Ω |
| t _{PHZ} | Output Disable Time from HIGH Level | | | 18 | 25 | | | |