

# Low Voltage Quad 2-Input Multiplexer

## 74LVX157

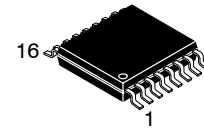
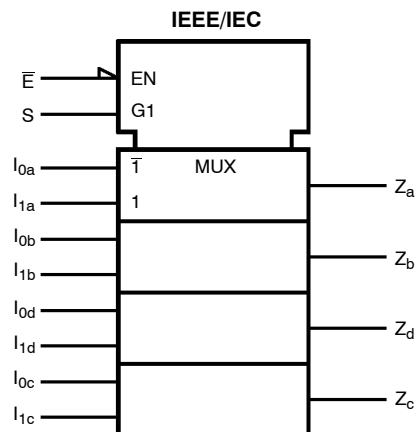
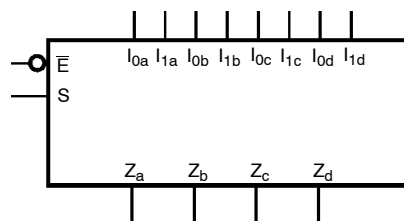
### General Description

The LVX157 is a high-speed quad 2-input multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four outputs present the selected data in the true (noninverted) form. The LVX157 can also be used as a function generator.

### Features

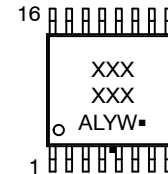
- Input Voltage Level Translation from 5 V to 3 V
- Ideal for Low Power/Low Noise 3.3 V Applications
- Guaranteed Simultaneous Switching Noise Level and Dynamic Threshold Performance
- This Device is Halide Free and Pb-Free

### Logic Symbols



TSSOP 16  
CASE 948AH

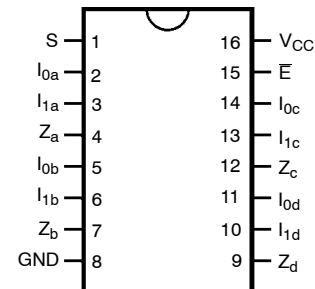
### MARKING DIAGRAM



XXXXXX = Specific Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

### CONNECTION DIAGRAM



### PIN DESCRIPTION

Pins	Function
I0a-I0d	Source 0 Data Inputs
I1a-I1d	Source 1 Data Inputs
E	Enable Input
S	Select Input
Za-Zd	Outputs

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

TRUTH TABLE

INPUTS				OUTPUT
E	S	I <sub>0</sub>	I <sub>1</sub>	Z
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

H = HIGH Voltage Level; L = LOW Voltage Level, X = Immaterial

### Functional Description

The LVX157 is a quad 2-input multiplexer. It selects four bits of data from two sources under the control of a common Select input (S). The Enable input (E) is active-LOW. When E is HIGH, all of the outputs (Z) are forced LOW regardless

of all other inputs. The LVX157 is 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:

$$Z_a = \bar{E} \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S})$$

$$Z_b = \bar{E} \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S})$$

$$Z_c = \bar{E} \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S})$$

$$Z_d = \bar{E} \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S})$$

A common use of the LVX157 is the moving of data from two groups of registers to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The LVX157 can generate any four of the sixteen different functions of two variables with one variable common. This is useful for implementing gating functions.

### Logic Diagram

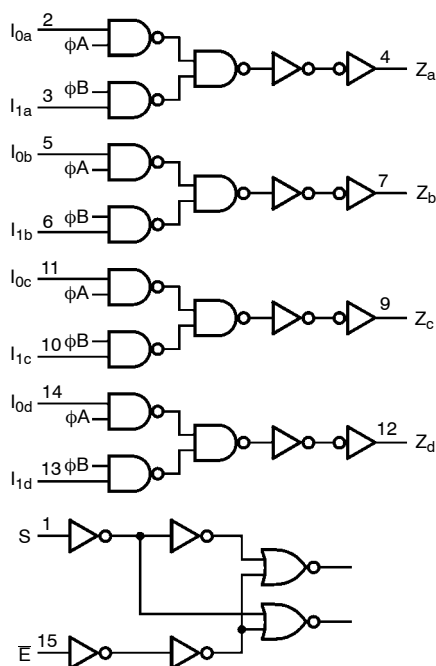


Figure 1. Logic Diagram

**MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	–0.5 to +6.5	V
V <sub>IN</sub>	DC Input Voltage	–0.5 to +6.5	V
V <sub>OUT</sub>	DC Output Voltage	–0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IN</sub>	DC Input Current, per Pin	±20	mA
I <sub>OUT</sub>	DC Output Current, per Pin	±25	mA
I <sub>CC</sub>	DC Supply Current, V <sub>CC</sub> and GND Pins	±75	mA
I <sub>IK</sub>	Input Clamp Current	–20	mA
I <sub>OK</sub>	Output Clamp Current	±20	mA
T <sub>STG</sub>	Storage Temperature Range	–65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature Under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance (Note 1)	159	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 25 °C	787	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating	Oxygen Index: 28 to 34 UL 94 V-0 @ 0.125 in	
V <sub>ESD</sub>	ESD Withstand Voltage (Note 2)	Human Body Model Charged Device Model 2000 N/A	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Measured with minimum pad spacing on an FR4 board, using 76mm-by-114mm, 2-ounce copper trace no air flow per JESD51-7.
2. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.

**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	DC Supply Voltage	2.0	3.6	V
V <sub>in</sub>	DC Input Voltage (Note 3)	0	5.5	V
V <sub>out</sub>	DC Output Voltage (Note 3)	0	V <sub>CC</sub>	V
T <sub>A</sub>	Operating Temperature	–40	+85	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	0	100	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

3. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V<sub>CC</sub>). Unused outputs must be left open.

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V <sub>CC</sub>	T <sub>A</sub> = 25 °C			T <sub>A</sub> = -40 to 85 °C		Unit
				Min	Typ	Max	Min	Max	
V <sub>IH</sub>	High-Level Input Voltage		2.0 3.0 3.6	1.5 2.0 2.4	– – –	– – –	1.5 2.0 2.4	– – –	V
V <sub>IL</sub>	Low-Level Input Voltage		2.0 3.0 3.6	– – –	– – –	0.5 0.8 0.8	– – –	0.5 0.8 0.8	V
V <sub>OH</sub>	High-Level Output Voltage (V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> )	I <sub>OH</sub> = -50 µA I <sub>OH</sub> = -50 µA I <sub>OH</sub> = -4 mA	2.0 3.0 3.0	1.9 2.9 2.58	2.0 3.0 –	– – –	1.9 2.9 2.48	– – –	V
V <sub>OL</sub>	Low-Level Output Voltage (V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> )	I <sub>OL</sub> = 50 µA I <sub>OL</sub> = 50 µA I <sub>OL</sub> = 4 mA	2.0 3.0 3.0	– – –	0.0 0.0 –	0.1 0.1 0.36	– – –	0.1 0.1 0.44	V
I <sub>IN</sub>	Input Leakage Current	V <sub>in</sub> = 5.5 V or GND	3.6	–	–	±0.1	–	±1.0	µA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>in</sub> = V <sub>CC</sub> or GND	3.6	–	–	4.0	–	40.0	µA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## NOISE CHARACTERISTICS (Note 4)

Symbol	Characteristic	C <sub>L</sub> (pF)	V <sub>CC</sub> (V)	T <sub>A</sub> = 25 °C		Unit
				Typ	Max	
V <sub>OLP</sub>	Quiet Output Maximum Dynamic V <sub>OL</sub>	50	3.3	0.3	0.5	V
V <sub>OLV</sub>	Quiet Output Minimum Dynamic V <sub>OL</sub>	50	3.3	-0.3	-0.5	V
V <sub>IHD</sub>	Minimum HIGH Level Dynamic Input Voltage	50	3.3	–	2.0	V
V <sub>ILD</sub>	Maximum LOW Level Dynamic Input Voltage	50	3.3	–	0.8	V

4. Input t<sub>r</sub> = t<sub>f</sub> = 3 ns

## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	C <sub>L</sub> (pF)	V <sub>CC</sub> (V)	T <sub>A</sub> = 25 °C			T <sub>A</sub> = -40 to 85 °C		Unit
				Min	Typ	Max	Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay Time, I <sub>n</sub> to Z <sub>n</sub>	15	2.7	–	6.6	12.5	1.0	15.5	ns
		50		–	9.1	16.0	1.0	19.0	
		15 50	3.3 ± 0.3	– –	5.1 7.6	7.9 11.4	1.0 1.0	9.5 13.0	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay Time, S to Z <sub>n</sub>	15	2.7	–	8.9	16.9	1.0	20.5	ns
		50		–	11.4	20.4	1.0	24.0	
		15 50	3.3 ± 0.3	– –	7.0 9.5	11.0 14.5	1.0 1.0	13.0 16.5	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay Time, E to Z <sub>n</sub>	15	2.7	–	9.1	17.6	1.0	20.5	ns
		50		–	11.6	21.1	1.0	24.0	
		15 50	3.3 ± 0.3	– –	7.2 9.7	11.5 15.0	1.0 1.0	13.5 17.0	
t <sub>OSHL</sub> , t <sub>OSLH</sub>	Output to Output Skew (Note 5)	50	2.7 3.3	– –	– –	1.5 1.5	– –	1.5 1.5	ns

5. Parameter guaranteed by design.

$$t_{OSLH} = |t_{PLHm} - t_{PLHn}|$$

$$t_{OSHL} = |t_{PHLm} - t_{PHLn}|$$

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### CAPACITIVE CHARACTERISTICS

Symbol	Parameter	T <sub>A</sub> = 25 °C			T <sub>A</sub> = -40 to 85 °C		Unit
		Min	Typ	Max	Min	Max	
C <sub>in</sub>	Input Capacitance	–	4	10	–	10	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 6)	–	20	–	–	–	pF

6. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:  $I_{CC(opr.)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

### ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
74LVX157MTCX	LVX 157	TSSOP-16 (Pb-Free)	2500 Units / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

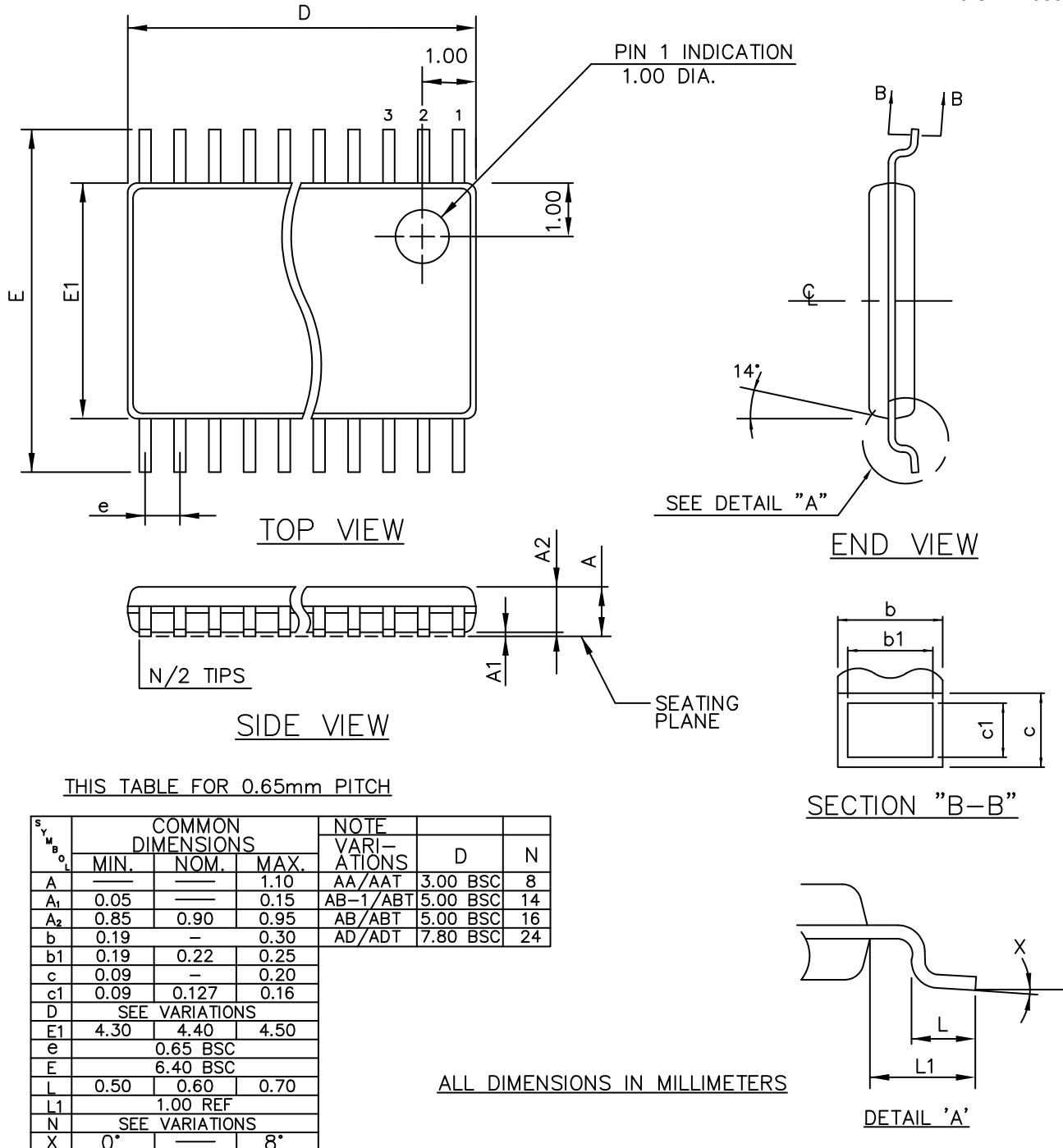
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### REVISION HISTORY

Revision	Description of Changes	Date
2	Converted the Data Sheet to <b>onsemi</b> format with the updates in Ordering Information Table, Recommended Operating Table, Maximum Rating Table.	05/06/2025

**TSSOP 16**  
**CASE 948AH**  
**ISSUE O**

DATE 19 SEP 2008



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