National Semiconductor

74LVX245
Low Voltage Octal Bidirectional Transceiver

General Description

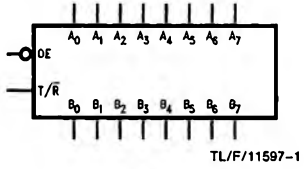
The LVX245 contains eight non-inverting bidirectional buffers is intended for bus-oriented applications. The Transmit/Receive (T/R) input determines the direction of data flow through the bidirectional transceiver. Transmit (active-HIGH) enables data from A ports to B ports; Receive (active-LOW) enables data from B ports to A ports. The Output Enable input, when HIGH, disables both A and B ports by placing them in a HIGH-Z condition.

Features

- Ideal for low power/low noise 3.3V applications
- Available in SOIC JEDEC, SOIC EIAJ and SSOP packages
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Ordering Code: See Section 11

Logic Symbols



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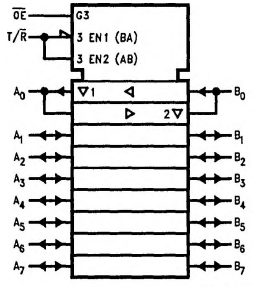

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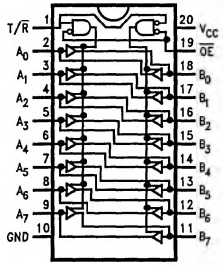
Connection Diagram

Pin Assignment for SSOP and SOIC



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Pin Names	Description
$\overline{OE}$	Output Enable Input
T/$\overline{R}$	Transmit/Receive Input
A_0–A_7	Side A TRI-STATE® Inputs or TRI-STATE Outputs
B_0–B_7	Side B TRI-STATE Inputs or TRI-STATE Outputs

Truth Table

Inputs		Outputs
$\overline{OE}$	T/$\overline{R}$	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	HIGH-Z State

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

	SOIC JEDEC	SOIC EIAJ	SSOP TYPE I
Order Number	74LVX245M 74LVX245MX	74LVX245SJ 74LVX245SJX	74LVX245MSCX
See NS Package Number	M20B	M20D	MSC20

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	−0.5V to +7.0V
DC Input Diode Current (I_{IK})	
V_I = −0.5V	−20 mA
DC Input Voltage T/$\overline{R}$, $\overline{OE}$ (V_I)	−0.5V to 7V
DC Diode Current (I_{OK})	
V_O = −0.5V	−20 mA
V_O = V_{CC} + 0.5V	+20 mA
DC Bus I/O Voltage ($V_{I/O}$)	−0.5V to V_{CC} + 0.5V
DC Output Source or Sink Current (I_O)	±25 mA
DC V_{CC} or Ground Current (I_{CC} or I_{GND})	±75 mA
Storage Temperature (T_{STG})	−65°C to +150°C
Power Dissipation	180 mW

Note: *The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.*

Recommended Operating Conditions

Supply Voltage (V_{CC})	2.0V to 3.6V
Input Voltage T/$\overline{R}$, $\overline{OE}$ (V_I)	0V to 5.5V
Bus I/O Voltage ($V_{I/O}$)	0V to V_{CC}
Operating Temperature (T_A)	−40°C to +85°C
Input Rise and Fall Time ($\Delta t/\Delta V$)	0 ns/V to 100 ns/V

DC Electrical Characteristics

Symbol	Parameter	V_{CC}	74LVX245 T_A = +25°C			74LVX245 T_A = −40°C to +85°C		Units	Conditions	
			Min	Typ	Max	Min	Max			
V_{IH}	High Level Input Voltage	2.0 3.0 3.6	1.5 2.0 2.4			1.5 2.0 2.4		V		
V_{IL}	Low Level Input Voltage	2.0 3.0 3.6			0.5 0.8 0.8		0.5 0.8 0.8	V		
V_{OH}	High Level Output Voltage	2.0 3.0 3.0	1.9 2.9 2.58	2.0 3.0		1.9 2.9 2.48		V	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −50 μA I_{OH} = −50 μA I_{OH} = −4 mA
V_{OL}	Low Level Output Voltage	2.0 3.0 3.0		0.0 0.0	0.1 0.1 0.36		0.1 0.1 0.44	V	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50 μA I_{OL} = 50 μA I_{OL} = 4 mA
I_{OZ}	TRI-STATE Output Off-State Current	3.6			±0.25		±2.5	μA	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND	
I_{IN}	Input Leakage Current	3.6			±0.1		±1.0	μA	V_{IN} = 5.5V or GND	
I_{CC}	Quiescent Supply Current	3.6			4.0		40.0	μA	V_{IN} = V_{CC} or GND	

Noise Characteristics: See Section 2 for Test Methodology

Symbol	Parameter	V_{CC} (V)	74LVX245 $T_A = 25°C$ Typ	74LVX245 $T_A = 25°C$ Limit	Units	Conditions C_L (pF)
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	3.3	0.5	0.8	V	50
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	3.3	−0.5	−0.8	V	50
V_{IHD}	Minimum High Level Dynamic Input Voltage	3.3		2.0	V	50
V_{ILD}	Maximum Low Level Dynamic Input Voltage	3.3		0.8	V	50

Note: Input $t_r = t_f = 3$ ns

AC Electrical Characteristics: See Section 2 for Test Methodology

Symbol	Parameter	V_{CC} (V)	74LVX245 $T_A = +25°C$ Min	Typ	Max	74LVX245 $T_A = -40°C$ to $+85°C$ Min	Max	Units	Conditions
t_{PLH} t_{PHL}	Propagation Delay Time	2.7		6.1	10.7	1.0	13.5	ns	$C_L = 15$ pF
				8.6	14.2	1.0	17.0		$C_L = 50$ pF
		3.3 ±0.3		4.7	6.8	1.0	8.0		$C_L = 15$ pF
				7.2	10.1	1.0	11.5		$C_L = 50$ pF
t_{PZL} t_{PZH}	TRI-STATE Output Enable Time	2.7		9.0	16.9	1.0	20.5	ns	$C_L = 15$ pF, $R_L = 1$ kΩ
				11.5	20.4	1.0	24.0		$C_L = 50$ pF, $R_L = 1$ kΩ
		3.3±0.3		7.1	11.0	1.0	13.0		$C_L = 15$ pF, $R_L = 1$ kΩ
				9.6	14.5	1.0	16.5		$C_L = 50$ pF, $R_L = 1$ kΩ
t_{PLZ} t_{PHZ}	TRI-STATE Output Disable Time	2.7		11.5	18.0	1.0	21.0	ns	$C_L = 50$ pF, $R_L = 1$ kΩ
		3.3 ±0.3		9.6	12.8	1.0	14.5		$C_L = 50$ pF, $R_L = 1$ kΩ
t_{OSLH} t_{OSHL}	Output to Output Skew (Note 1)	2.7			1.5		1.5	ns	$C_L = 50$ pF (Note 1)

Note 1: Parameter guaranteed by design. $t_{OSLH} = |t_{PLHm} - t_{PLHn}|$, $t_{OSHL} = |t_{PHLm} - t_{PHLn}|$

Capacitance

Symbol	Parameter	74LVX245 $T_A = +25°C$ Min	Typ	Max	74LVX245 $T_A = -40°C$ to $+85°C$ Min	Max	Units
C_{IN}	Input Capacitance T/$\overline{R}$, $\overline{OE}$		4	10		10	pF
$C_{I/O}$	Output Capacitance A_n, B_n		8				pF
C_{PD}	Power Dissipation Capacitance (Note 1)		21				pF

Note 1: C_{PD} 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: $I_{CC(opr.)} = \frac{C_{PD} \times V_{CC} \times f_{IN} + I_{CC}}{8 \text{ (per bit)}}$