April 1993
Revised April 2005

74LVX245
Low Voltage Octal Bidirectional Transceiver

General Description

The LVX245 contains eight non-inverting bidirectional buffers and is intended for bus-oriented applications. The Transmit/Receive ($T/\overline{R}$) 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 impedance condition.

Features

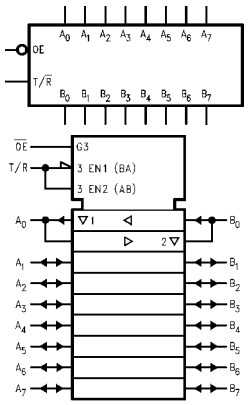
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Ordering Code

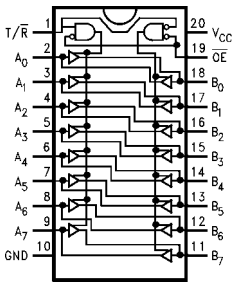
Order Number	Package Number	Package Description
74LVX245M	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74LVX245SJ	M20D	Pb-Free 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LVX245MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.
Pb-Free package per JEDEC J-STD-020B.

Logic Symbols



Connection Diagram



Pin Descriptions

Pin Names	Description
$\overline{OE}$	Output Enable Input
$T/\overline{R}$	Transmit/Receive Input
A_0–A_7	Side A Inputs or 3-STATE Outputs
B_0–B_7	Side B Inputs or 3-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

Absolute Maximum Ratings (Note 1)

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

Recommended Operating Conditions (Note 2)

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

Note 1: 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 tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC}	T_A = +25°C			T_A = −40°C to +85°C		Units	Conditions	
			Min	Typ	Max	Min	Max			
V_{IH}	HIGH Level	2.0	1.5			1.5				
	Input	3.0	2.0			2.0		V		
	Voltage	3.6	2.4			2.4				
V_{IL}	LOW Level	2.0			0.5		0.5			
	Input	3.0			0.8		0.8	V		
	Voltage	3.6			0.8		0.8			
V_{OH}	HIGH Level	2.0	1.9	2.0		1.9			V_{IN} = V_{IH} or V_{IL}	I_{OH} = −50 μA
	Output	3.0	2.9	3.0		2.9		V		I_{OH} = −50 μA
	Voltage	3.0	2.58			2.48				I_{OH} = −4 mA
V_{OL}	LOW Level	2.0		0.0	0.1		0.1		V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50 μA
	Output	3.0		0.0	0.1		0.1	V		I_{OL} = 50 μA
	Voltage	3.0			0.36		0.44			I_{OL} = 4 mA
I_{OZ}	3-STATE	3.6			±0.25		±2.5	μA	V_{IN} = V_{IH} or V_{IL}	
	Output								V_{OUT} = V_{CC} or GND	
	Off-State Current									
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 (Note 3)

Symbol	Parameter	V_{CC} (V)	T_A = 25°C		Units	Conditions C_L (pF)
			Typ	Limit		
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 3: Input t_r = t_f = 3 ns

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$			$T_A = -40°C$ to $+85°C$		Units	Conditions
			Min	Typ	Max	Min	Max		
t_{PLH}	Propagation Delay Time	2.7		6.1	10.7	1.0	13.5	ns	$C_L = 15$ pF
t_{PHL}				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}	3-STATE Output	2.7		9.0	16.9	1.0	20.5	ns	$C_L = 15$ pF, $R_L = 1$ kΩ
t_{PZH}	Enable Time			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}	3-STATE Output	2.7		11.5	18.0	1.0	21.0	ns	$C_L = 50$ pF, $R_L = 1$ kΩ
t_{PHZ}	Disable Time	3.3 ± 0.3		9.6	12.8	1.0	14.5		$C_L = 50$ pF, $R_L = 1$ kΩ
t_{OSLH}	Output to Output Skew	2.7			1.5		1.5	ns	$C_L = 50$ pF (Note 4)
t_{OSHL}	(Note 4)	3.3			1.5		1.5		

Note 4: Parameter guaranteed by design. $t_{OSLH} = |t_{PLHm} - t_{PLHn}|$, $t_{OSHL} = |t_{PHLm} - t_{PHLn}|$

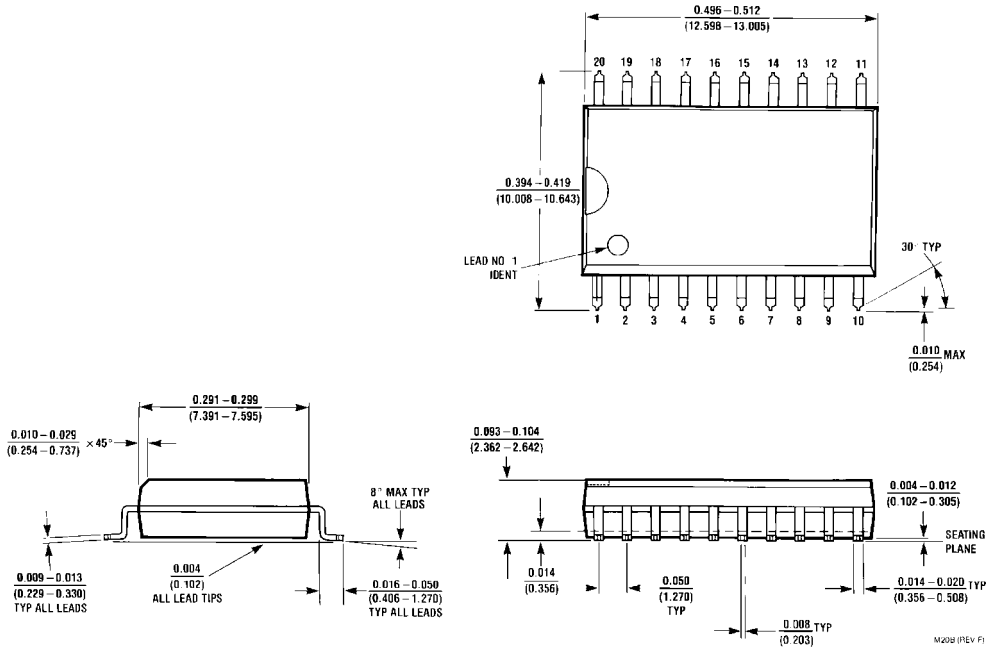
Capacitance

Symbol	Parameter	$T_A = +25°C$			$T_A = -40°C$ to $+85°C$		Units
		Min	Typ	Max	Min	Max	
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 5)		21				pF

Note 5: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

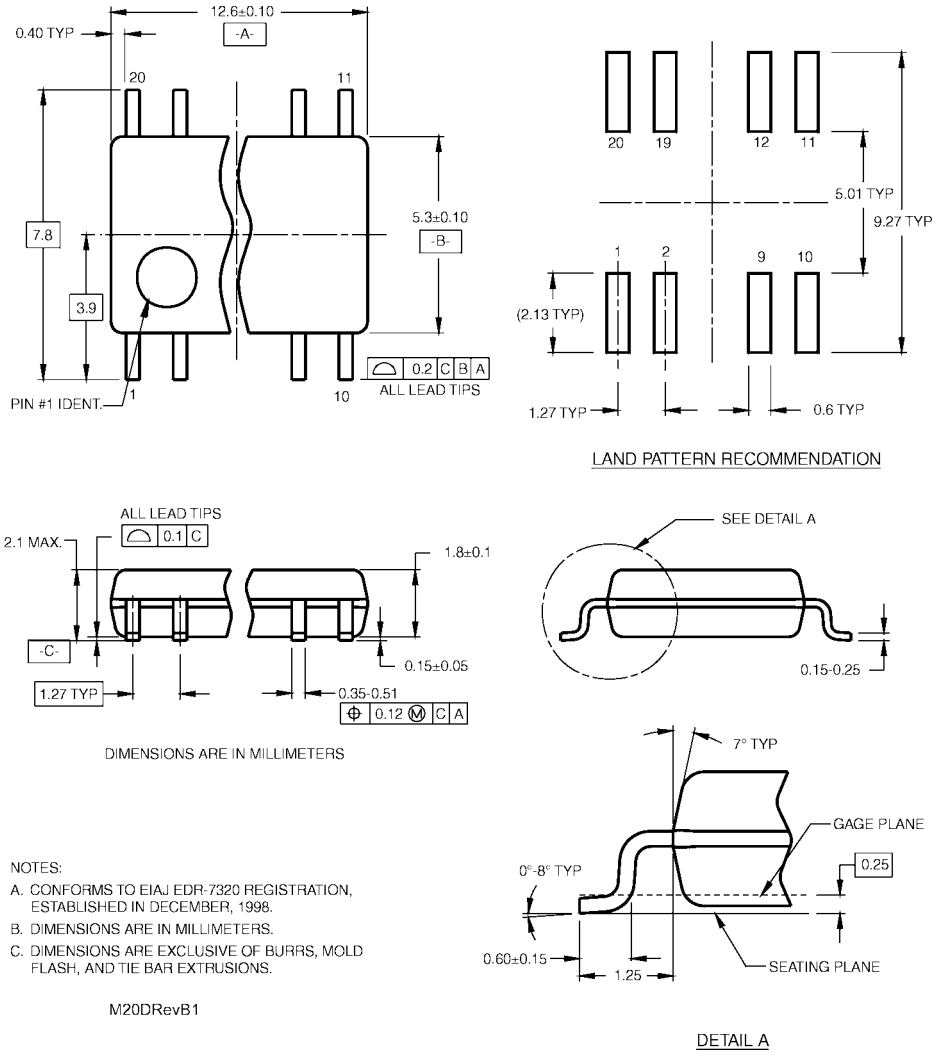
Average operating current can be obtained by the equation: $I_{CC(opr.)} = \frac{C_{PD} \times V_{CC} \times f_{IN} + I_{CC}}{8 \text{ (per bit)}}$

Physical Dimensions inches (millimeters) unless otherwise noted



20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
Package Number M20B

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

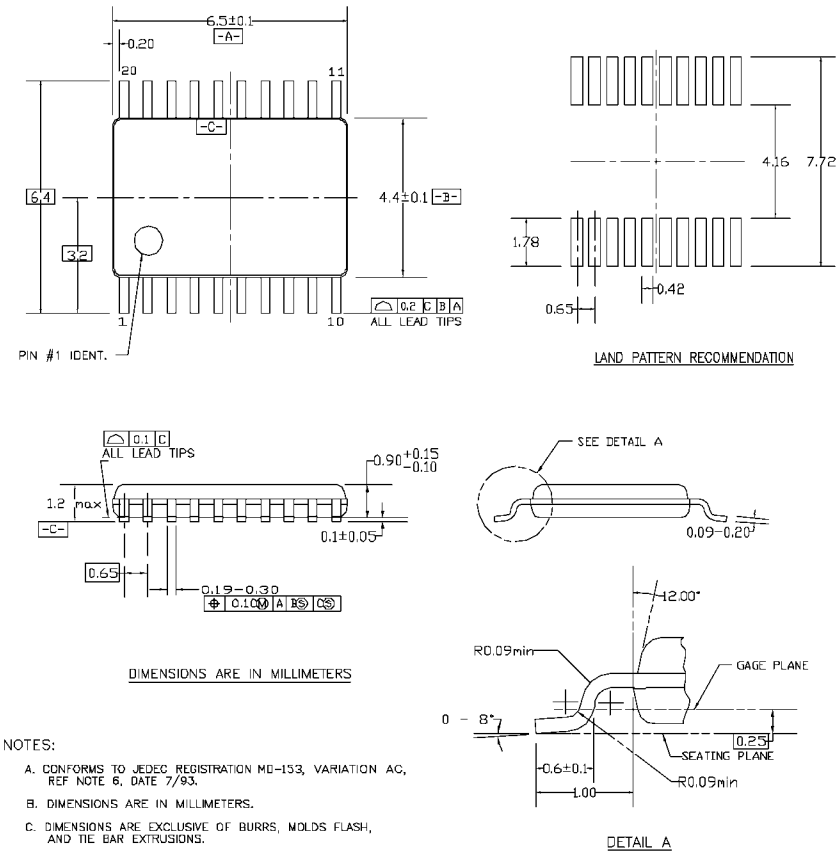
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

Pb-Free 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M20D

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AC, REF NOTE 6, DATE 7/93.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.

D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC20REVD1

20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC20

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