

# 74LVX245 Low Voltage Octal Bidirectional Transceiver

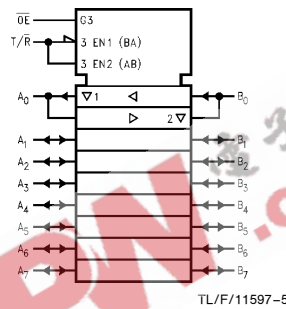
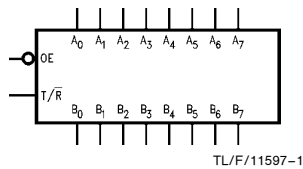
## General Description

The LVX245 contains eight non-inverting bidirectional buffers 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.

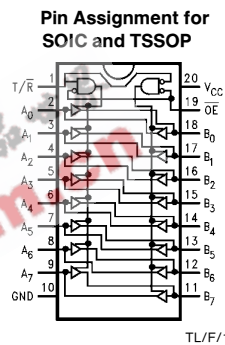
## Features

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

## Logic Symbols



## Connection Diagram



Pin Names	Description
$\overline{OE}$	Output Enable Input
T/ $\overline{R}$	Transmit/Receive Input
A <sub>0</sub> -A <sub>7</sub>	Side A TRI-STATE® Inputs or TRI-STATE Outputs
B <sub>0</sub> -B <sub>7</sub>	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	TSSOP
Order Number	74LVX245M 74LVX245MX	74LVX245SJ 74LVX245SJX	74LVX245MTC 74LVX245MTCX
See NS Package Number	M20B	M20D	MTC20

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### 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 ( $I_{IK}$ )	-20 mA
$V_I = -0.5V$	
DC Input Voltage T/ $\bar{R}$ , $\overline{OE}$ ( $V_I$ )	-0.5V to 7V
DC Diode Current ( $I_{OK}$ )	-20 mA
$V_O = -0.5V$	
$V_O = V_{CC} + 0.5V$	+20 mA
DC Bus I/O Voltage ( $V_{I/O}$ )	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current ( $I_O$ )	$\pm 25$ mA
DC $V_{CC}$ or Ground Current ( $I_{CC}$ or $I_{GND}$ )	$\pm 75$ 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/ $\bar{R}$ , $\overline{OE}$ ( $V_I$ )	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			74LVX245		Units	Conditions
			$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			
			Min	Typ	Max	Min	Max		
$V_{IH}$	High Level Input Voltage	2.0	1.5		1.5		V		
		3.0	2.0		2.0				
		3.6	2.4		2.4				
$V_{IL}$	Low Level Input Voltage	2.0		0.5		0.5	V		
		3.0		0.8		0.8			
		3.6		0.8		0.8			
$V_{OH}$	High Level Output Voltage	2.0	1.9	2.0		1.9	V	$V_{IN} = V_{IH}$ or $V_{IL}$ $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -4 \text{mA}$	
		3.0	2.9	3.0		2.9			
		3.0	2.58			2.48			
$V_{OL}$	Low Level Output Voltage	2.0		0.0	0.1		V	$V_{IN} = V_{IH}$ or $V_{IL}$ $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 4 \text{mA}$	
		3.0		0.0	0.1				
		3.0		0.36		0.44			
$I_{OZ}$	TRI-STATE Output Off-State Current	3.6		$\pm 0.25$		$\pm 2.5$	$\mu\text{A}$	$V_{IN} = V_{IH}$ or $V_{IL}$ $V_{OUT} = V_{CC}$ or GND	
$I_{IN}$	Input Leakage Current	3.6		$\pm 0.1$		$\pm 1.0$	$\mu\text{A}$	$V_{IN} = 5.5V$ or GND	
$I_{CC}$	Quiescent Supply Current	3.6		4.0		40.0	$\mu\text{A}$	$V_{IN} = V_{CC}$ or GND	

## Noise Characteristics

Symbol	Parameter	V <sub>CC</sub> (V)	74LVX245		Units	Conditions C <sub>L</sub> (pF)
			T <sub>A</sub> = 25°C			
			Typ	Limit		
V <sub>OLP</sub>	Quiet Output Maximum Dynamic V <sub>OL</sub>	3.3	0.5	0.8	V	50
V <sub>OLV</sub>	Quiet Output Minimum Dynamic V <sub>OL</sub>	3.3	-0.5	-0.8	V	50
V <sub>IHD</sub>	Minimum High Level Dynamic Input Voltage	3.3		2.0	V	50
V <sub>ILD</sub>	Maximum Low Level Dynamic Input Voltage	3.3		0.8	V	50

Note: Input t<sub>r</sub> = t<sub>f</sub> = 3 ns

## AC Electrical Characteristics

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

Note 1: Parameter guaranteed by design. t<sub>OSLH</sub> = |t<sub>PLHmin</sub> - t<sub>PLHn</sub>|, t<sub>OSSL</sub> = |t<sub>PHLm</sub> - t<sub>PHLn</sub>|

## Capacitance

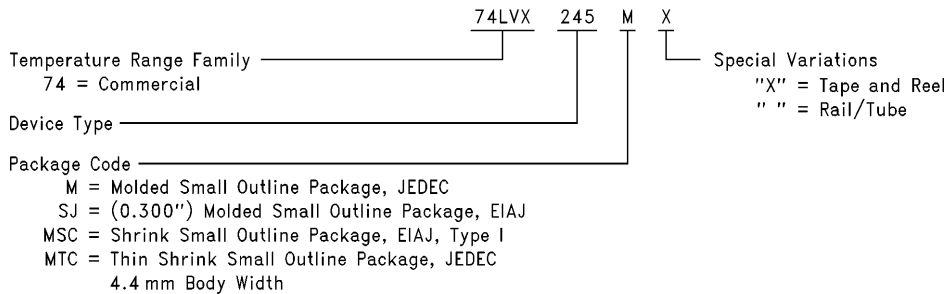
Symbol	Parameter	74LVX245			74LVX245		Units
		T <sub>A</sub> = +25°C			T <sub>A</sub> = -40°C to +85°C		
		Min	Typ	Max	Min	Max	
C <sub>IN</sub>	Input Capacitance T/ $\bar{R}$ , $\bar{OE}$	4	10		10		pF
C <sub>I/O</sub>	Output Capacitance A <sub>n</sub> , B <sub>n</sub>	8					pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 1)	21					pF

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

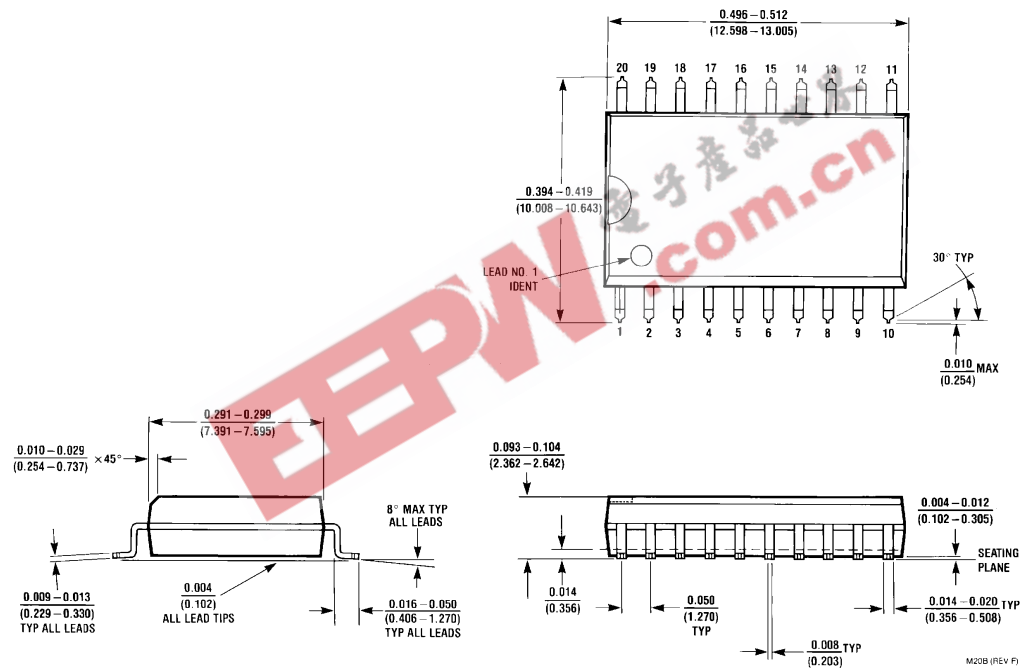
## 74LVX245 Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



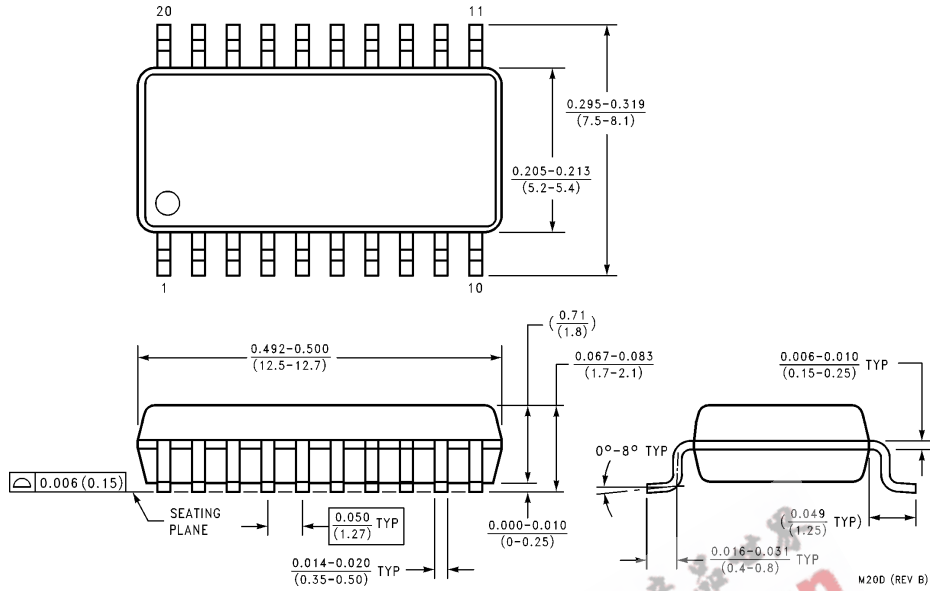
TL/F/11597-7

## Physical Dimensions inches (millimeters) unless otherwise noted



20-Lead Small Outline Integrated Circuit (M)  
 Order Number 74LVX245M or 74LVX245MX  
 NS Package Number M20B

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

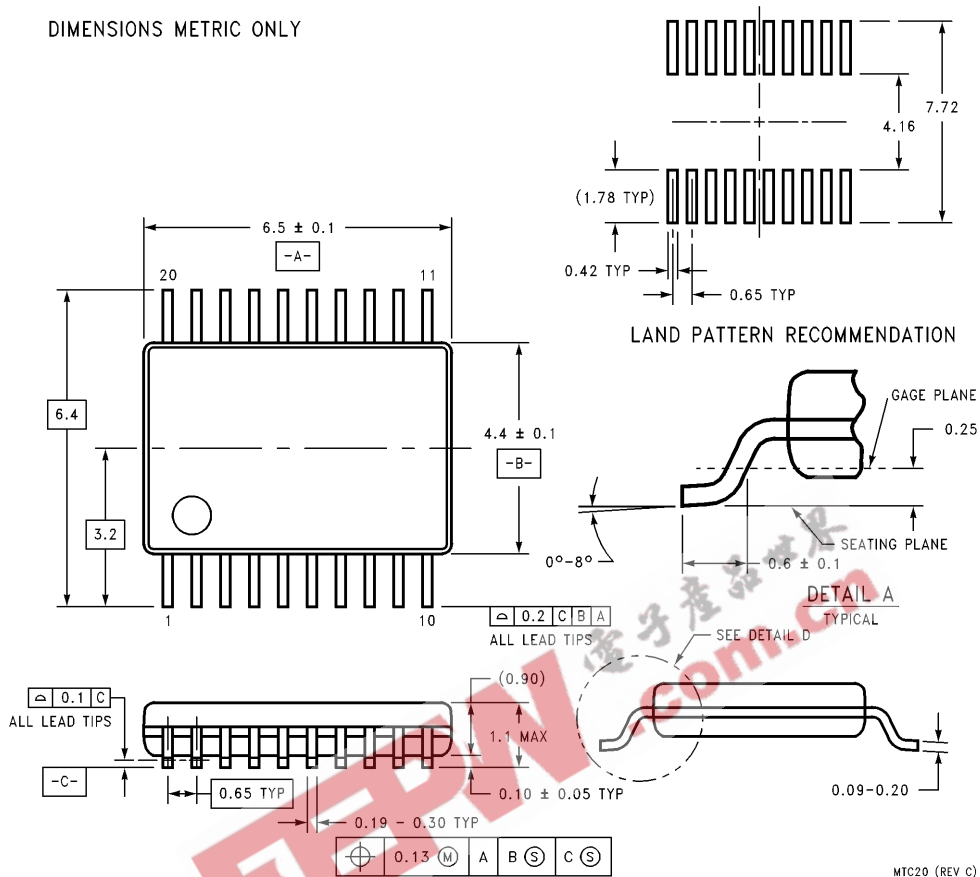


**20-Lead Small Outline Package EIAJ SOIC (SJ)**  
**Order Number 74LVX245SJ or 74LVX245SJX**  
**NS Package Number M20D**

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**Physical Dimensions** All dimensions in millimeters (Continued)

DIMENSIONS METRIC ONLY



**20-Lead Thin Shrink Small Outline Package, JEDEC**  
**Order Number 74LVX245MTC or 74LVX245MTCX**  
**NS Package Number MTC20**

MTC20 (REV C)

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