

74LVX245

Low Voltage Octal Bidirectional Transceiver

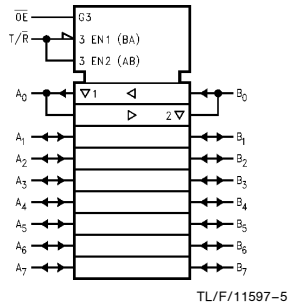
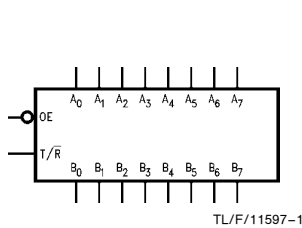
General Description

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

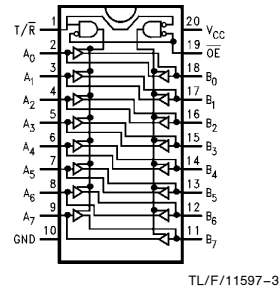
- Ideal for low power/low noise 3.3V applications
- Available in SOIC JEDEC, SOIC EIAJ, SSOP and TSSOP packages
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Logic Symbols



Connection Diagram

Pin Assignment for SSOP, SOIC and TSSOP



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	TSSOP
Order Number	74LVX245M 74LVX245MX	74LVX245SJ 74LVX245SJX	74LVX245MSCX	74LVX245MTC 74LVX245MTCX
See NS Package Number	M20B	M20D	MSC20	MTC20

TRI-STATE® is a registered trademark of National Semiconductor Corporation.

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 $\overline{T}/\overline{R}, \overline{OE}$ (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)	± 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 $\overline{T}/\overline{R}, \overline{OE}$ (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			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 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}	$I_{OH} = -50 \mu\text{A}$ $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -4 \text{mA}$	
V_{OL}	Low Level Output Voltage	2.0 3.0 3.0		0.0 0.0 0.36		0.1 0.1 0.44	V	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50 \mu\text{A}$ $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 4 \text{mA}$	
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

Symbol	Parameter	V _{CC} (V)	74LVX245		Units	Conditions C _L (pF)
			T _A = 25°C			
			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: Input t_r = t_f = 3 ns

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	74LVX245			74LVX245		Units	Conditions
			T _A = +25°C			T _A = -40°C to +85°C			
			Min	Typ	Max	Min	Max		
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

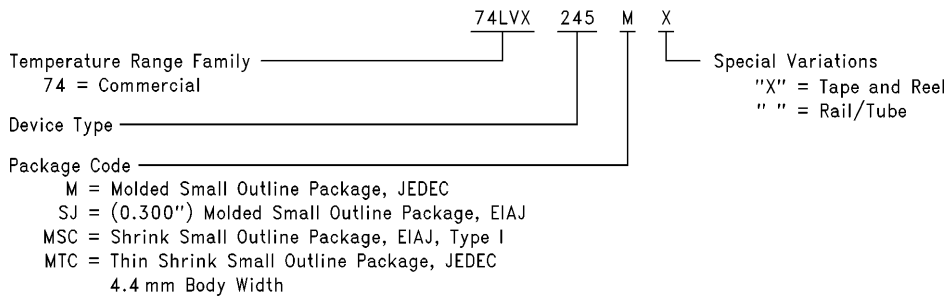
Symbol	Parameter	74LVX245			74LVX245		Units
		T _A = +25°C			T _A = -40°C to +85°C		
		Min	Typ	Max	Min	Max	
C _{IN}	Input Capacitance T/ \bar{R} , $\bar{O}\bar{E}$	4	10		10		pF
C _{I/O}	Output Capacitance A _n , B _n	8					pF
C _{PD}	Power Dissipation Capacitance (Note 1)	21					pF

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

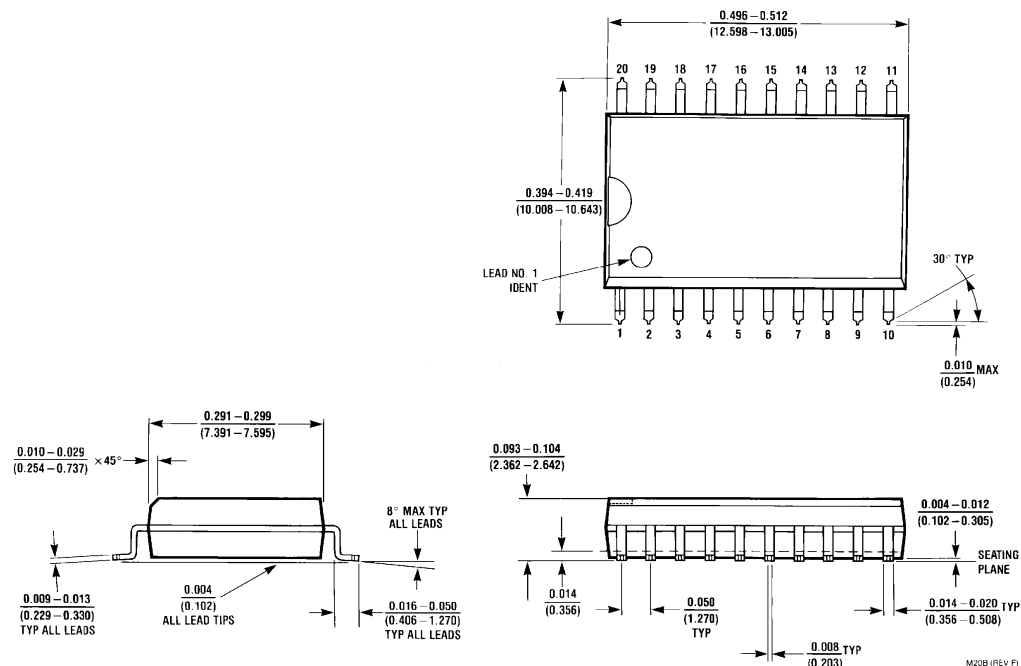
74LVX245 Ordering Information

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



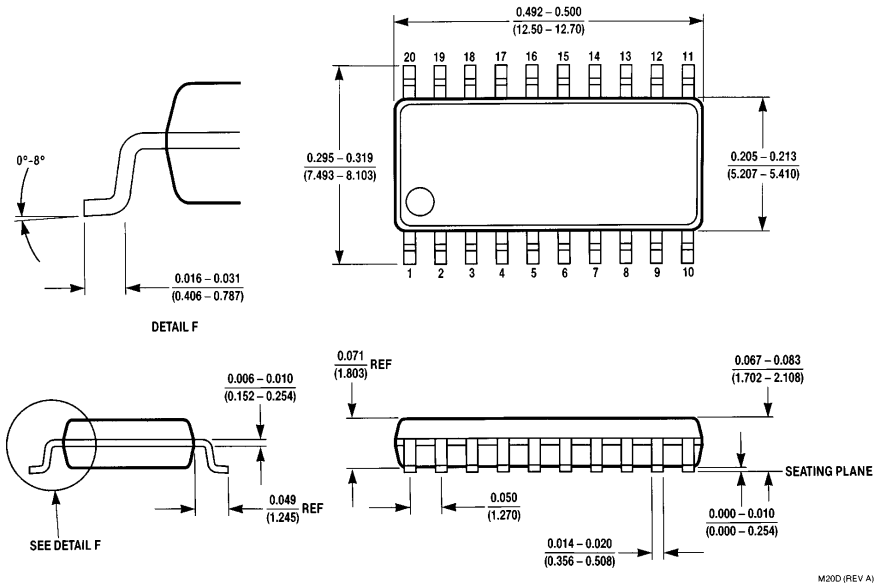
TL/F/11597-7

Physical Dimensions inches (millimeters)

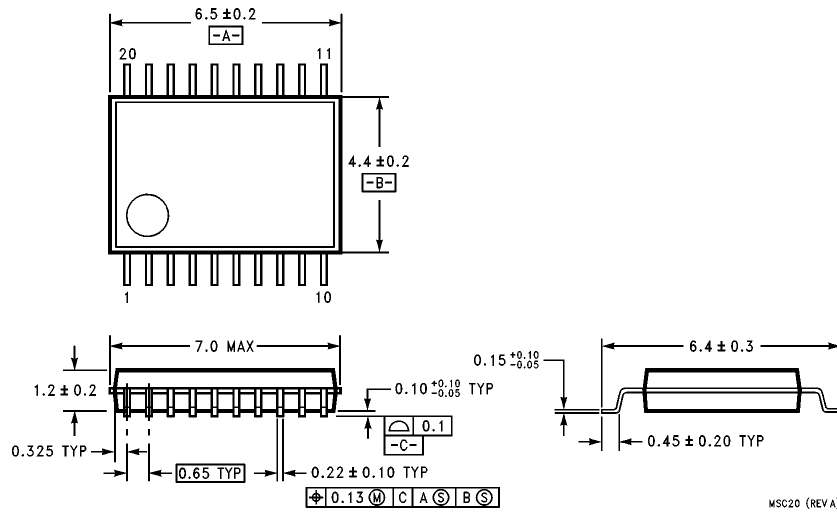


20-Lead Small Outline Integrated Circuit (M)
Order Number 74LVX245M or 74LVX245MX
NS Package Number M20B

Physical Dimensions inches (millimeters)



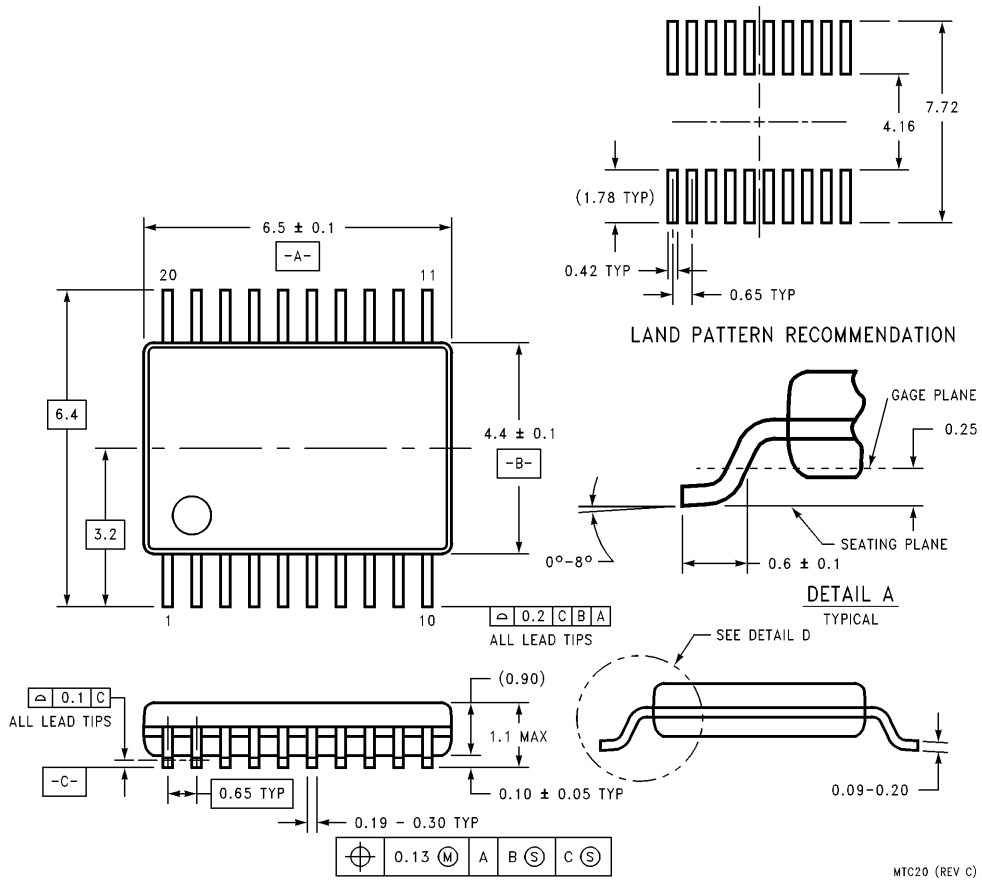
20-Lead Small Outline Package EIAJ SOIC (SJ)
Order Number 74LVX245SJ or 74LVX245SJX
NS Package Number M20D



Dimensions are in millimeters

20-Lead Plastic EIAJ SSOP Type I (MSC)
Order Number 74LVX245MSCX
NS Package Number MSC20

Physical Dimensions All dimensions in millimeters (Continued)



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

MTC20 (REV C)

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
 1111 West Bardin Road
 Arlington, TX 76017
 Tel: 1(800) 272-9959
 Fax: 1(800) 737-7018

National Semiconductor Europe
 Fax: (+49) 0-180-530 85 86
 Email: cnjwge@tevm2.nsc.com
 Deutsch Tel: (+49) 0-180-530 85 85
 English Tel: (+49) 0-180-532 78 32
 Français Tel: (+49) 0-180-532 93 58
 Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
 19th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: (852) 2737-1600
 Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
 Tel: 81-043-299-2309
 Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.