

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/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

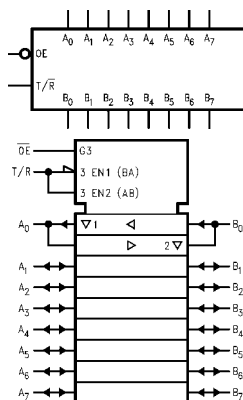
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Ordering Code

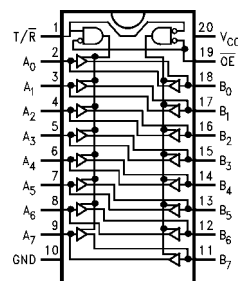
| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| 74LVX245M | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74LVX245SJ | M20D | Pb-Free 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74LVX245MTC | 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 |
|--------------------------------|----------------------------------|
| OE | Output Enable Input |
| T/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 |
|--------|-----|---------------------|
| OE | T/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 $\overline{T/R}, \overline{OE}$ (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 $\overline{T/R}, \overline{OE}$ (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} | $T_A = +25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | Units | Conditions |
|----------|--|----------|---------------------------|-----|-------|---|------|-------|--|
| | | | Min | Typ | Max | Min | Max | | |
| V_{IH} | HIGH Level | 2.0 | 1.5 | | | 1.5 | | V | |
| | Input | 3.0 | 2.0 | | | 2.0 | | | |
| | Voltage | 3.6 | 2.4 | | | 2.4 | | | |
| V_{IL} | LOW Level | 2.0 | | | 0.5 | | 0.5 | V | |
| | Input | 3.0 | | | 0.8 | | 0.8 | | |
| | Voltage | 3.6 | | | 0.8 | | 0.8 | | |
| V_{OH} | HIGH Level | 2.0 | 1.9 | 2.0 | | 1.9 | | V | $V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -4 \text{ mA}$ |
| | Output | 3.0 | 2.9 | 3.0 | | 2.9 | | | |
| | Voltage | 3.0 | 2.58 | | | 2.48 | | | |
| V_{OL} | LOW Level | 2.0 | | 0.0 | 0.1 | | 0.1 | V | $V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 4 \text{ mA}$ |
| | Output | 3.0 | | 0.0 | 0.1 | | 0.1 | | |
| | Voltage | 3.0 | | | 0.36 | | 0.44 | | |
| I_{OZ} | 3-STATE Output Off-State Current | 3.6 | | | ±0.25 | | ±2.5 | μA | $V_{IN} = V_{IH} \text{ or } V_{IL}$ $V_{OUT} = V_{CC} \text{ or GND}$ |
| I_{IN} | Input Leakage Current | 3.6 | | | ±0.1 | | ±1.0 | μA | $V_{IN} = 5.5V \text{ or GND}$ |
| I_{CC} | Quiescent Supply Current | 3.6 | | | 4.0 | | 40.0 | μA | $V_{IN} = V_{CC} \text{ or GND}$ |

Noise Characteristics (Note 3)

| Symbol | Parameter | V_{CC} (V) | $T_A = 25^\circ\text{C}$ | | 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 $t_r = t_f = 3 \text{ ns}$

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 Enable Time | 2.7 | | 9.0 | 16.9 | 1.0 | 20.5 | ns | C _L = 15 pF, R _L = 1 kΩ |
| t _{PZH} | | | | 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 (Note 4) | 2.7 | | | 1.5 | | 1.5 | ns | C _L = 50 pF (Note 4) |
| t _{OSHL} | | 3.3 | | | 1.5 | | 1.5 | | |

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

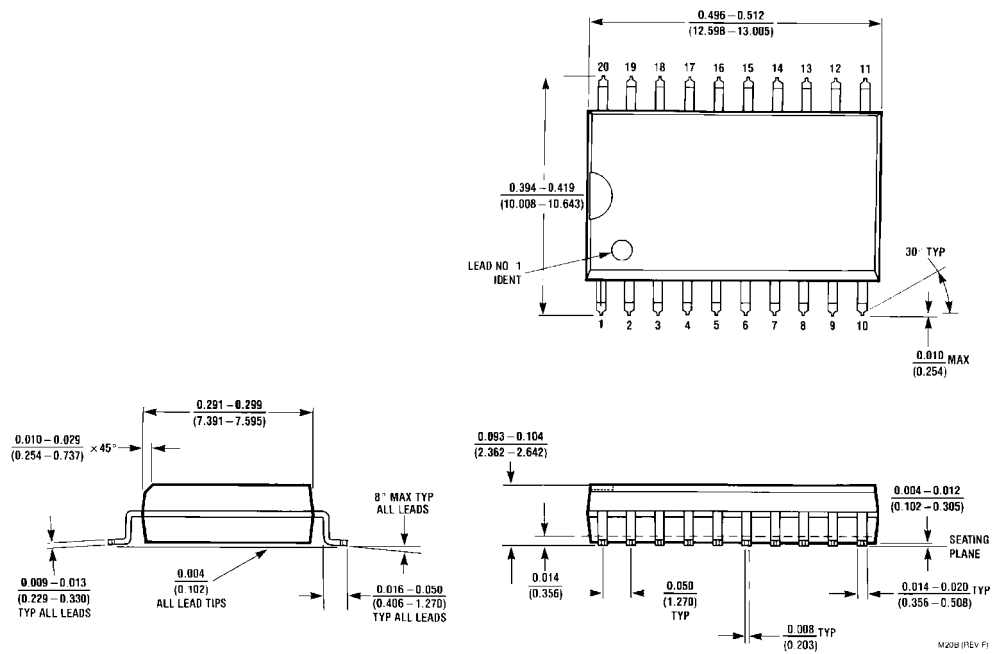
Capacitance

| Symbol | Parameter | T _A = +25°C | | | T _A = -40°C to +85°C | | Units |
|-----------------|--|------------------------|-----|-----|---------------------------------|-----|-------|
| | | Min | Typ | Max | Min | Max | |
| C _{IN} | Input Capacitance T/R, $\overline{\text{OE}}$ | | 4 | 10 | | 10 | pF |
| C _{IO} | Output Capacitance A _n , B _n | | 8 | | | | pF |
| C _{PD} | Power Dissipation Capacitance (Note 5) | | 21 | | | | pF |

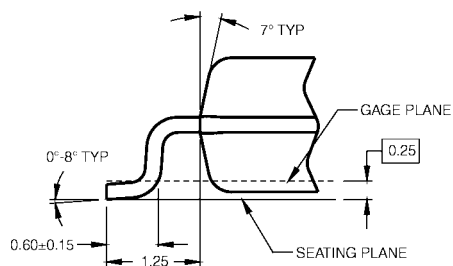
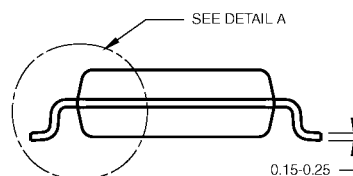
Note 5: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

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

Physical Dimensions inches (millimeters) unless otherwise noted



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



DETAIL A

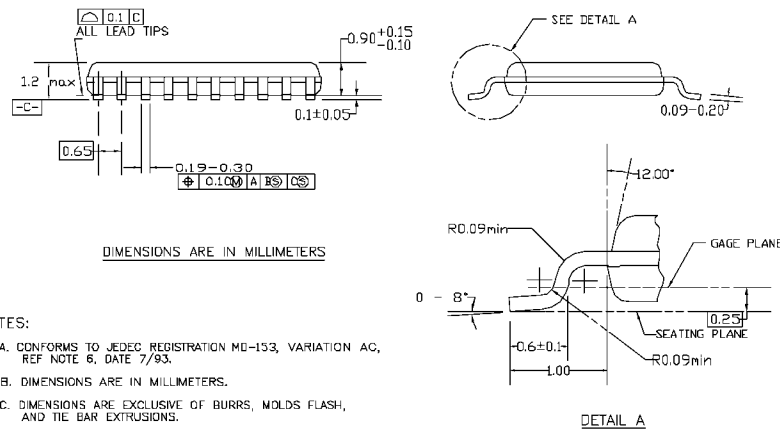
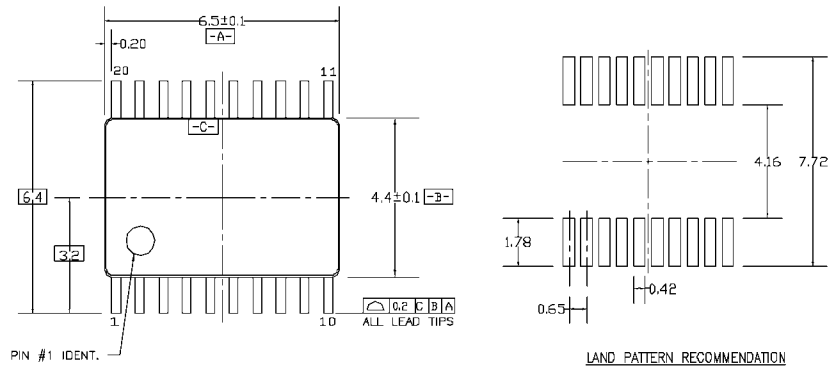
NOTES:

- 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:

- CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AG, REF NOTE 6, DATE 7/93.
- DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.
- DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC20REV D1

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

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

LIFE SUPPORT POLICY

FAIRCHILD'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 FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

- 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 (c) 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.
- A critical component in 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.

www.fairchildsemi.com

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative