

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[Fairchild Semiconductor](#)

[74LVTH2245SJ](#)

For any questions, you can email us directly:

sales@integrated-circuit.com



January 2008



74LVT2245, 74LVTH2245

Low Voltage Octal Bidirectional Transceiver with 3-STATE Inputs/Outputs and 25Ω Series Resistors in the B Port Outputs

Features

- Input and output interface capability to systems at 5V V_{CC}
- Equivalent 25Ω series resistor on B Port outputs
- Bushold data inputs eliminate the need for external pull-up resistors to hold unused inputs (74LVTH2245), also available without bushold feature (74LVT2245)
- Live insertion/extraction permitted
- Power Up/Down high impedance provides glitch-free bus loading
- Outputs source/sink -12mA/+12mA on B Port, -32mA/+64mA on A Port
- Latch-up performance exceeds 500mA
- ESD performance:
 - Human-body model > 2000V
 - Machine model > 200V
 - Charged-device model > 1000V

General Description

The LVT2245 and LVTH2245 contain eight non-inverting bidirectional buffers with 3-STATE outputs and are 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 state. The equivalent 25Ω-series resistor in the B Port helps reduce output overshoot and undershoot.

The LVTH2245 data inputs include bushold, eliminating the need for external pull-up resistors to hold unused inputs.

These transceivers are designed for low voltage (3.3V) V_{CC} applications, but with the capability to provide a TTL interface to a 5V environment. The LVT2245 and LVTH2245 are fabricated with an advanced BiCMOS technology to achieve high speed operation similar to 5V ABT while maintaining low power dissipation.

Ordering Information

| Order Number | Package Number | Package Description |
|---------------|----------------|-----------------------------------------------------------------------------|
| 74LVT2245WM | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74LVTH2245SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74LVT2245MTC | MTC20 | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |
| 74LVTH2245WM | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74LVTH2245SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74LVTH2245MTC | MTC20 | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |

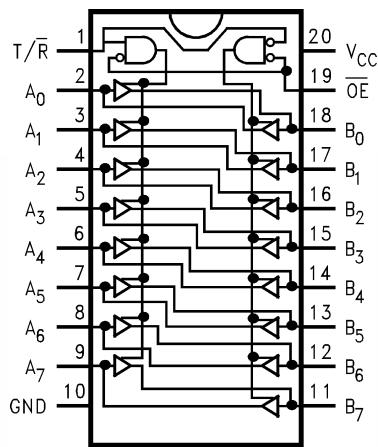
Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering number.



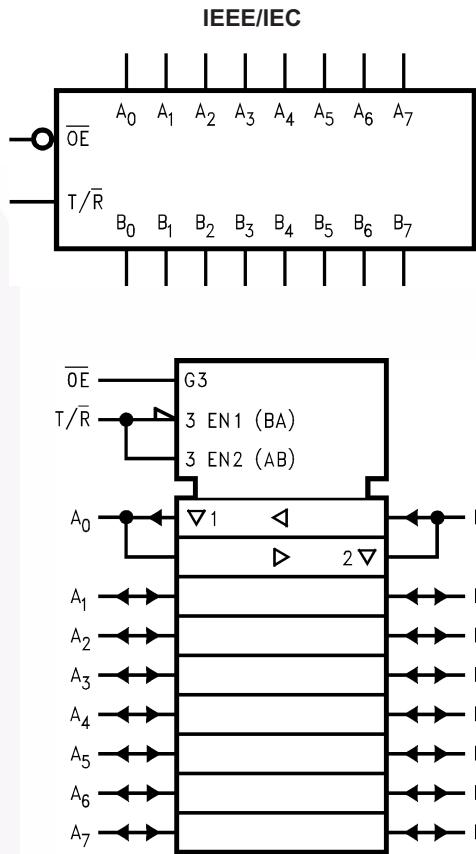
All packages are lead free per JEDEC: J-STD-020B standard.

74LVT2245, 74LVTH2245 — Low Voltage Octal Bidirectional Transceiver with 3-STATE Inputs/Outputs and 25Ω Series Resistors in the B Port Outputs

Connection Diagram



Logic Symbols



Pin Description

| 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

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol | Parameter | Rating |
|-----------|-----------------------------------------------------------|-----------------|
| V_{CC} | Supply Voltage | –0.5V to +4.6V |
| V_I | DC Input Voltage | –0.5V to +7.0V |
| V_O | DC Output Voltage Output in 3-STATE | –0.5V to +7.0V |
| | Output in HIGH or LOW State ⁽¹⁾ | –0.5V to +7.0V |
| I_{IK} | DC Input Diode Current, $V_I < GND$ | –50mA |
| I_{OK} | DC Output Diode Current, $V_O < GND$ | –50mA |
| I_O | DC Output Current, $V_O > V_{CC}$ Output at HIGH State | 64mA |
| | Output at LOW State | 128mA |
| I_{CC} | DC Supply Current per Supply Pin | ±64mA |
| I_{GND} | DC Ground Current per Ground Pin | ±128mA |
| T_{STG} | Storage Temperature | –65°C to +150°C |

Note:

1. I_O Absolute Maximum Rating must be observed.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

| Symbol | Parameter | Min | Max | Units |
|-----------------------|---------------------------------------------|--------|-----|-------|
| V_{CC} | Supply Voltage | 2.7 | 3.6 | V |
| V_I | Input Voltage | 0 | 5.5 | V |
| I_{OH} | HIGH-Level Output Current | A Port | –32 | mA |
| | | B Port | –12 | |
| I_{OL} | LOW-Level Output Current | A Port | 64 | mA |
| | | B Port | 12 | |
| T_A | Free Air Operating Temperature | –40 | +85 | °C |
| $\Delta t / \Delta V$ | $V_{IN} = 0.8V\text{--}2.0V, V_{CC} = 3.0V$ | 0 | 10 | ns/V |

DC Electrical Characteristics

| Symbol | Parameter | V _{CC} (V) | Conditions | T _A = -40°C to +85°C | | Units |
|-------------------------------------|--------------------------------------------------|---------------------|-----------------------------------------------------------------------------|---------------------------------|------|-------|
| | | | | Min. | Max. | |
| V _{IK} | Input Clamp Diode Voltage | 2.7 | I _I = -18mA | | -1.2 | V |
| V _{IH} | Input HIGH Voltage | 2.7–3.6 | V _O ≤ 0.1V or V _O ≥ V _{CC} - 0.1V | 2.0 | | V |
| V _{IL} | Input LOW Voltage | 2.7–3.6 | | | 0.8 | V |
| V _{OH} | Output HIGH Voltage | A Port | I _{OH} = -8mA | 2.4 | | V |
| | | | I _{OH} = -32mA | 2.0 | | |
| | | B Port | I _{OH} = -12mA | 2.0 | | |
| | | | I _{OH} = -100μA | V _{CC} -0.2 | | |
| V _{OL} | Output LOW Voltage | A Port | I _{OL} = 24mA | | 0.5 | V |
| | | | I _{OL} = 16mA | | 0.4 | |
| | | | I _{OL} = 32mA | | 0.5 | |
| | | | I _{OL} = 64mA | | 0.55 | |
| | | B Port | I _{OL} = 12mA | | 0.8 | |
| | | | I _{OL} = 100μA | | 0.2 | |
| I _{I(HOLD)} ⁽²⁾ | Bushold Input Minimum Drive | 3.0 | V _I = 0.8V | 75 | | μA |
| | | | V _I = 2.0V | -75 | | |
| I _{I(OD)} ⁽²⁾ | Bushold Input Over-Drive Current to Change State | 3.0 | (3) | 500 | | μA |
| | | | (4) | -500 | | |
| I _I | Input Current | 3.6 | V _I = 5.5V | | 10 | μA |
| | | Control Pins | V _I = 0V or V _{CC} | | ±1 | |
| | | | V _I = 0V | | -5 | |
| | | Data Pins | V _I = V _{CC} | | 1 | |
| I _{OFF} | Power Off Leakage Current | 0 | 0V ≤ V _I or V _O ≤ 5.5V | | ±100 | μA |
| I _{PU/PD} | Power Up/Down, 3-STATE Current | 0–1.5 | V _O = 0.5V to 3.0V, V _I = GND or V _{CC} | | ±100 | μA |
| I _{OZL} | 3-STATE Output Leakage Current | 3.6 | V _O = 0.5V | | -5 | μA |
| I _{OZL} ⁽²⁾ | 3-STATE Output Leakage Current | 3.6 | V _O = 0.0V | | -5 | μA |
| I _{OZH} | 3-STATE Output Leakage Current | 3.6 | V _O = 3.0V | | 5 | μA |
| I _{OZH} ⁽²⁾ | 3-STATE Output Leakage Current | 3.6 | V _O = 3.6V | | 5 | μA |
| I _{OZH+} | 3-STATE Output Leakage Current | 3.6 | V _{CC} < V _O ≤ 5.5V | | 10 | μA |
| I _{CCH} | Power Supply Current | 3.6 | Outputs High | | 0.19 | mA |
| I _{CCL} | Power Supply Current | 3.6 | Outputs Low | | 5 | mA |
| I _{CCZ} | Power Supply Current | 3.6 | Outputs Disabled | | 0.19 | mA |
| I _{CCZ} ⁺ | Power Supply Current | 3.6 | V _{CC} ≤ V _O ≤ 5.5V, Outputs Disabled | | 0.19 | mA |
| ΔI _{CC} | Increase in Power Supply Current ⁽⁵⁾ | 3.6 | One Input at V _{CC} - 0.6V, Other Inputs at V _{CC} or GND | | 0.2 | mA |

Notes:

2. Applies to Bushold versions only (74LVTH2245).
3. An external driver must source at least the specified current to switch from LOW-to-HIGH.
4. An external driver must sink at least the specified current to switch from HIGH-to-LOW.
5. This is the increase in supply current for each input that is at the specified voltage level rather than V_{CC} or GND.

Dynamic Switching Characteristics⁽⁶⁾

| Symbol | Parameter | V _{CC} (V) | Conditions | | T _A = 25°C | | | Units |
|------------------|----------------------------------------------|---------------------|----------------------------------------------|-----|-----------------------|------|------|-------|
| | | | C _L = 50pF, R _L = 500Ω | (7) | Min. | Typ. | Max. | |
| V _{OLP} | Quiet Output Maximum Dynamic V _{OL} | 3.3 | | | | 0.8 | | V |
| V _{OLV} | Quiet Output Minimum Dynamic V _{OL} | 3.3 | (7) | | | -0.8 | | V |

Notes:

6. Characterized in SOIC package. Guaranteed parameter, but not tested.
 7. Max number of outputs defined as (n). n-1 data inputs are driven 0V to 3V. Output under test held LOW.

AC Electrical Characteristics

| Symbol | Parameter | T _A = -40°C to +85°C, C _L = 50pF, R _L = 500Ω | | | | Units | |
|---------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------|------|------------------------|------|-------|----|
| | | V _{CC} = 3.3V ± 0.3V | | V _{CC} = 2.7V | | | |
| | | Min. | Max. | Min. | Max. | | |
| t _{PLH} | Propagation Delay Data to B Port Output | 1.2 | 4.4 | 1.2 | 5.1 | ns | |
| | | 1.2 | 4.4 | 1.2 | 5.1 | | |
| t _{PHL} | Propagation Delay Data to A Port Output | 1.2 | 3.6 | 1.2 | 4.0 | ns | |
| | | 1.2 | 3.5 | 1.2 | 4.0 | | |
| t _{PZH} | Output Enable Time for B Port Output | 1.3 | 6.2 | 1.3 | 7.3 | ns | |
| | | 1.7 | 6.2 | 1.7 | 7.3 | | |
| t _{PZL} | Output Enable Time for A Port Output | 1.3 | 5.5 | 1.3 | 7.1 | ns | |
| | | 1.7 | 5.7 | 1.7 | 6.7 | | |
| t _{PHZ} | Output Disable Time for B Port Output | 2.0 | 5.9 | 2.0 | 6.5 | ns | |
| | | 2.0 | 5.4 | 2.0 | 5.7 | | |
| t _{PLZ} | Output Disable Time for A Port Output | 2.0 | 5.9 | 2.0 | 6.5 | ns | |
| | | 2.0 | 5.0 | 2.0 | 5.1 | | |
| t _{OSHL} , t _{OSLH} | A Port Output to Output Skew ⁽⁸⁾ | | | 1.0 | | 1.0 | ns |
| t _{OSHL} , t _{OSLH} | B Port Output to Output Skew ⁽⁸⁾ | | | 1.0 | | 1.0 | ns |

Note:

8. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t_{OSHL}) or LOW-to-HIGH (t_{OSLH}).

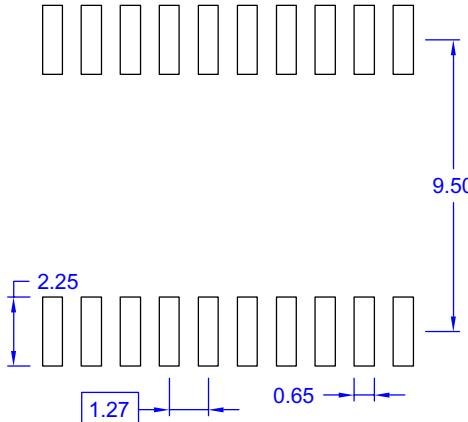
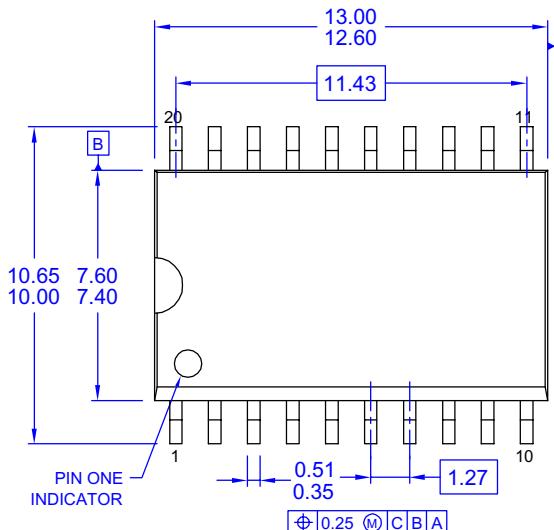
Capacitance⁽⁹⁾

| Symbol | Parameter | Conditions | Typical | Units |
|------------------|--------------------------|----------------------------------------------------------------|---------|-------|
| C _{IN} | Input Capacitance | V _{CC} = 0V, V _I = 0V or V _{CC} | 4 | pF |
| C _{I/O} | Input/Output Capacitance | V _{CC} = 3.0V, V _O = 0V or V _{CC} | 8 | pF |

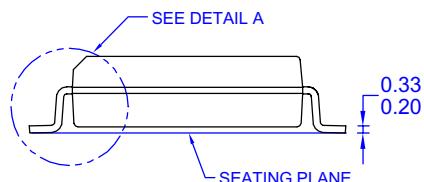
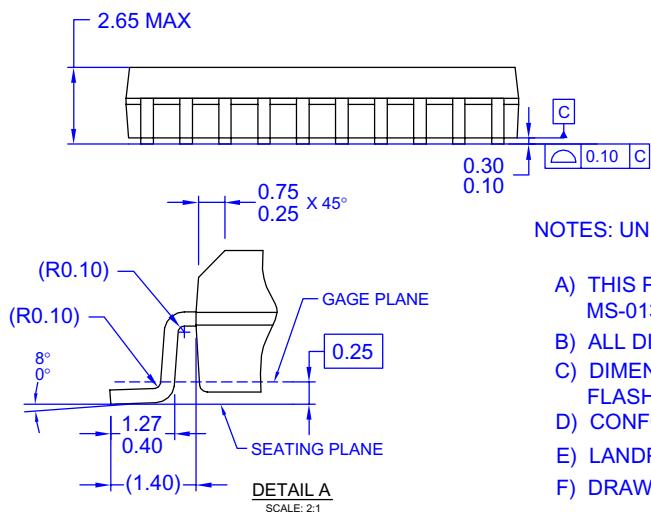
Note:

9. Capacitance is measured at frequency f = 1MHz, per MIL-STD-883, Method 3012.

Physical Dimensions



LAND PATTERN RECOMMENDATION



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MS-013, VARIATION AC, ISSUE E
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) CONFORMS TO ASME Y14.5M-1994
- E) LANDPATTERN STANDARD: SOIC127P1030X265-20L
- F) DRAWING FILENAME: MKT-M20BREV3

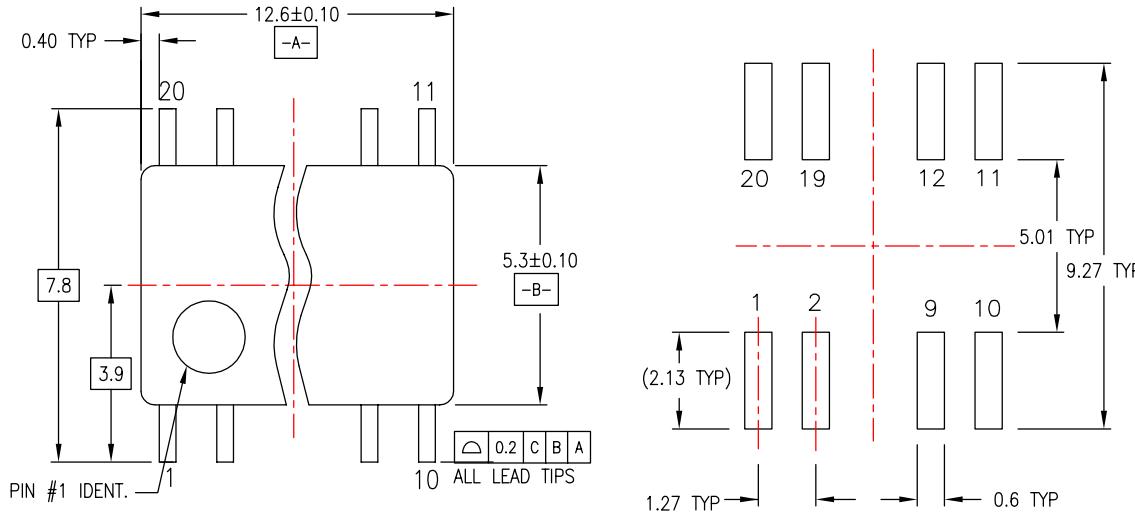
Figure 1. 20-Lead Small Outline Integrated Circuit (SOIC). JEDEC MS-013, 0.300" Wide

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

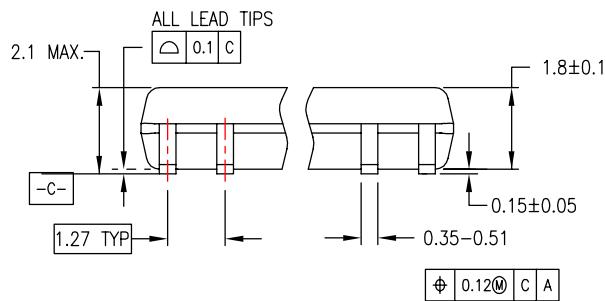
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

<http://www.fairchildsemi.com/packaging/>

Physical Dimensions (Continued)



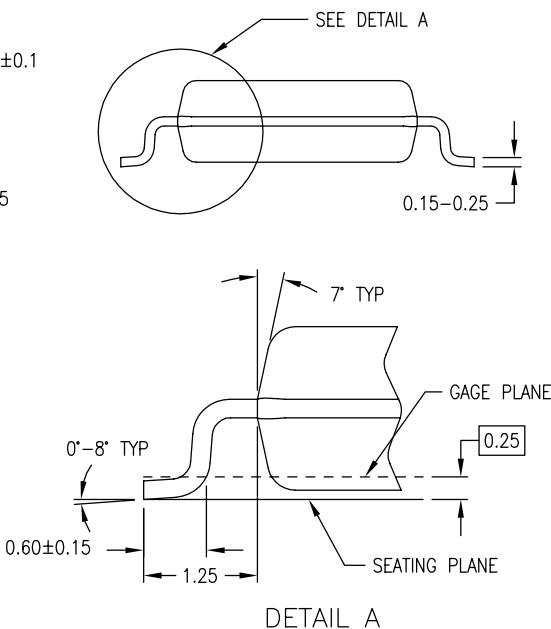
LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS

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.



DETAIL A

M20DREVC

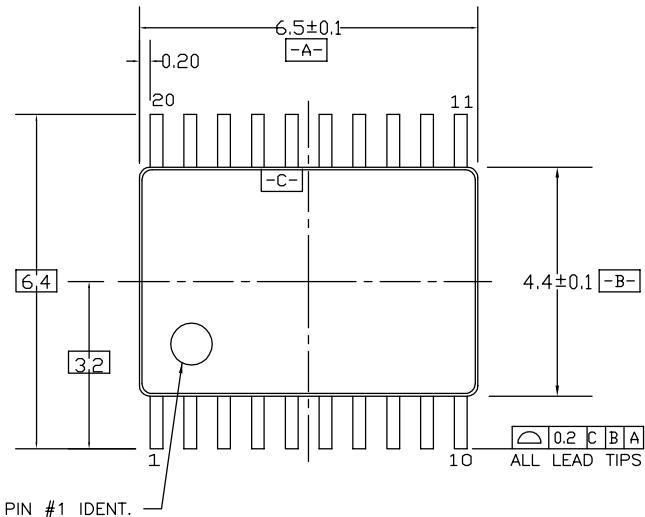
Figure 2. 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

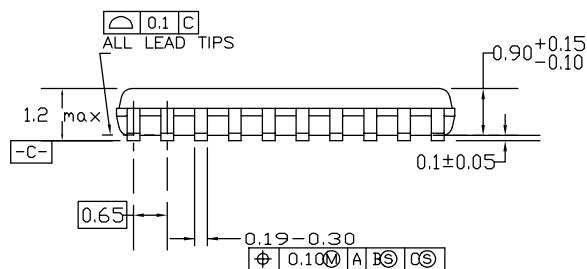
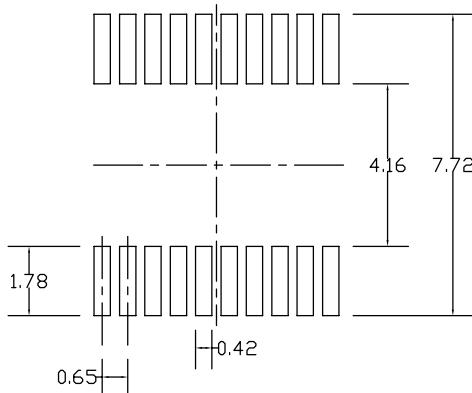
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

<http://www.fairchildsemi.com/packaging/>

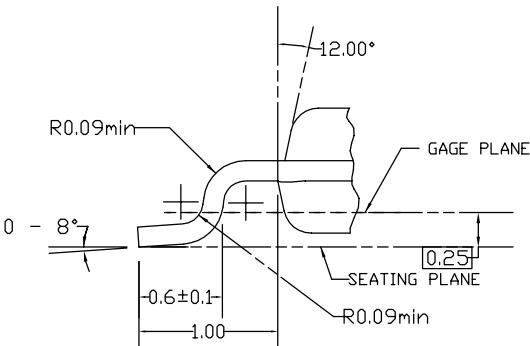
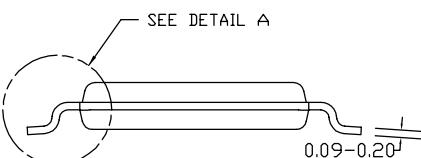
Physical Dimensions (Continued)



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS



DETAIL A

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.

MTC20REV D1

Figure 3. 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

<http://www.fairchildsemi.com/packaging/>



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

| | | | |
|-----------------------------------------------------------------------------------|-------------------------------------|----------------------------|----------------------------------|
| ACE [®] | FPS™ | PDP-SPM™ | SupreMOS™ |
| Build it Now™ | FRFET [®] | Power220 [®] | SyncFET™ |
| CorePLUS™ | Global Power Resource SM | POWEREDGE [®] | SYSTEM [®] |
| CROSSVOLT™ | Green FPS™ | Power-SPM™ | GENERAL |
| CTL™ | Green FPS™ e-Series™ | PowerTrench [®] | The Power Franchise [®] |
| Current Transfer Logic™ | GTO™ | Programmable Active Droop™ | the power franchise |
| EcoSPARK [®] | i-Lo™ | QFET [®] | TinyBoost™ |
| EZSWITCH™ * | IntelliMAX™ | QST™ | TinyBuck™ |
|  | ISOPLANAR™ | QT Optoelectronics™ | TinyLogic [®] |
|  | MegaBuck™ | Quiet Series™ | TINYOPTO™ |
| Fairchild [®] | MICROCOUPLER™ | RapidConfigure™ | TinyPower™ |
| Fairchild Semiconductor [®] | MicroFET™ | SMART START™ | TinyPWM™ |
| FACT Quiet Series™ | MicroPak™ | SPM [®] | TinyWire™ |
| FACT [®] | MillerDrive™ | STEALTH™ | μSerDes™ |
| FAST [®] | Motion-SPM™ | SuperFET™ | UHC [®] |
| FastvCore™ | OPTOLOGIC [®] | SuperSOT™3 | Ultra FRFET™ |
| FlashWriter [®] * | OPTOPLANAR [®] | SuperSOT™6 | UniFET™ |
| | | SuperSOT™8 | VCX™ |

* EZSWITCH™ and FlashWriter[®] are trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

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 FAIRCHILD 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 (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 of the user.
2. 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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

| Datasheet Identification | Product Status | Definition |
|--------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advance Information | Formative or In Design | This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. |
| Preliminary | First Production | This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
| No Identification Needed | Full Production | This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design. |
| Obsolete | Not In Production | This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only. |

Rev. I33

74LVT2245, 74LVTH2245 — Low Voltage Octal Bidirectional Transceiver with 3-STATE Inputs/Outputs and 25Ω Series Resistors
 in the B Port Outputs