

# FIN1027 / FIN1027A — 3.3V LVDS, 2-Bit, High-Speed, Differential Driver

## Features

- Greater than 600Mbps Data Rate
- 3V Power Supply Operation
- 5ns Maximum Differential Pulse Skew
- 1.5ns Maximum Propagation Delay
- Low Power Dissipation
- Power-Off Protection
- Meets or Exceeds the TIA/EIA-644 LVDS Standard
- Flow-through Pinout Simplifies PCB Layout

## Description

This dual driver is designed for high-speed interconnects utilizing Low Voltage Differential Signaling (LVDS) technology. The driver translates LVTTTL signal levels to LVDS levels with a typical differential output swing of 350mV, which provides low EMI at ultra-low power dissipation, even at high frequencies. This device is ideal for high-speed transfer of clock or data.

The FIN1027 or FIN1027A can be paired with its companion receiver, the FIN1028, or with any other LVDS receiver.

## Ordering Information

| Part Number | Operating Temperature Range |  Eco Status | Package                                                                | Packing Method |
|-------------|-----------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------|
| FIN1027M    | -40 to +85°C                | Green                                                                                          | 8-Lead Small Outline Package (SOIC)<br>JEDEC MS-012, 0.150 inch Narrow | Trays          |
| FIN1027MX   | -40 to +85°C                | Green                                                                                          | 8-Lead Small Outline Package (SOIC)<br>JEDEC MS-012, 0.150 inch Narrow | Tape and Reel  |
| FIN1027K8X  | -40 to +85°C                | RoHS                                                                                           | 8-Lead US8, JEDEC MO-187,<br>Variation CA 3.1mm Wide                   | Tape and Reel  |
| FIN1027AMX  | -40 to +85°C                | Green                                                                                          | 8-Lead Small Outline Package (SOIC)<br>JEDEC MS-012, 0.150 inch Narrow | Tape and Reel  |

 For Fairchild's definition of Eco Status, please visit: [http://www.fairchildsemi.com/company/green/rohs\\_green.html](http://www.fairchildsemi.com/company/green/rohs_green.html).

## Pin Configuration

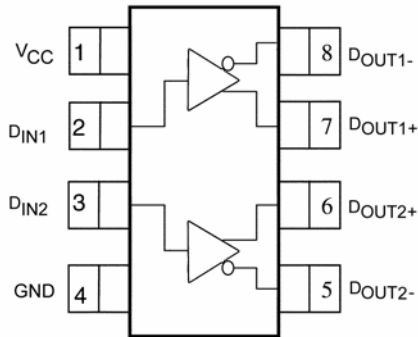


Figure 1. FIN1027 SOIC Pin Assignment (Top View)

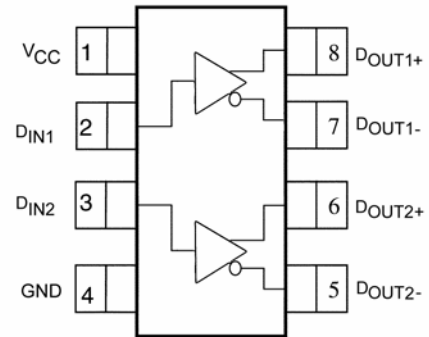


Figure 2. FIN1027A SOIC Pin Assignment (Top View)

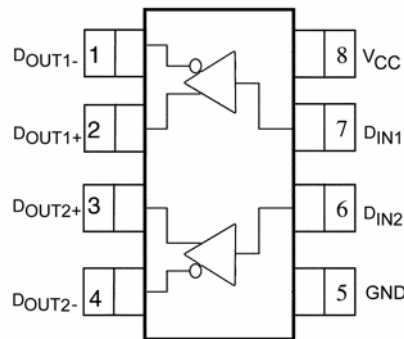


Figure 3. FIN1027 US8 Pin Assignment (Top View)

## Pin Definitions

| Name               | Pin #<br>FIN1027<br>SOIC | Pin #<br>FIN1027A<br>SOIC | Pin #<br>FIN1027<br>US8 | Description                 |
|--------------------|--------------------------|---------------------------|-------------------------|-----------------------------|
| V <sub>CC</sub>    | 1                        | 1                         | 8                       | Power Supply                |
| D <sub>IN1</sub>   | 2                        | 2                         | 7                       | LVTTL Data Input            |
| D <sub>IN2</sub>   | 3                        | 3                         | 6                       | LVTTL Data Input            |
| GND                | 4                        | 4                         | 5                       | Ground                      |
| D <sub>OUT2-</sub> | 5                        | 5                         | 4                       | Inverting Driver Output     |
| D <sub>OUT2+</sub> | 6                        | 6                         | 3                       | Non-Inverting Driver Output |
| D <sub>OUT1+</sub> | 7                        | 8                         | 2                       | Non-Inverting Driver Output |
| D <sub>OUT1-</sub> | 8                        | 7                         | 1                       | Inverting Driver Output     |

## Function Table

| Input           | Outputs           |                   |
|-----------------|-------------------|-------------------|
| D <sub>IN</sub> | D <sub>OUT+</sub> | D <sub>OUT-</sub> |
| LOW             | LOW               | HIGH              |
| HIGH            | HIGH              | LOW               |
| OPEN            | LOW               | HIGH              |

## 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                                  | Min.       | Max.  | Unit |
|------------------|--------------------------------------------|------------|-------|------|
| V <sub>CC</sub>  | Supply Voltage                             | -0.5       | 4.6   | V    |
| D <sub>IN</sub>  | DC Input Voltage                           | -0.5       | 6.0   | V    |
| D <sub>OUT</sub> | DC Output Voltage                          | -0.5       | 4.7   | V    |
| I <sub>OSD</sub> | Driver Short-Circuit Current               | Continuous |       | mA   |
| T <sub>STG</sub> | Storage Temperature Range                  | -65        | +150  | °C   |
| T <sub>J</sub>   | Maximum Junction Temperature               |            | +150  | °C   |
| T <sub>L</sub>   | Lead Temperature,<br>Soldering, 10 Seconds |            | +260  | °C   |
| ESD              | Human Body Model, JESD22-A114              |            | ≥6500 | V    |
|                  | Machine Model, JESD22-A115                 |            | ≥400  |      |

## 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.            | Unit |
|-----------------|-----------------------|------|-----------------|------|
| V <sub>CC</sub> | Supply Voltage        | 3.0  | 3.6             | V    |
| V <sub>IN</sub> | Input Voltage         | 0    | V <sub>CC</sub> | V    |
| T <sub>A</sub>  | Operating Temperature | -40  | +85             | °C   |

## DC Electrical Characteristics

All typical values are at  $T_A = 25^\circ\text{C}$  and  $V_{CC} = 3.3\text{V}$ . Over-supply voltage and operating temperature ranges, unless otherwise noted.

| Symbol          | Parameter                                               | Conditions                                                    | Min.  | Typ.  | Max.     | Units         |
|-----------------|---------------------------------------------------------|---------------------------------------------------------------|-------|-------|----------|---------------|
| $V_{OD}$        | Output Differential Voltage                             | $R_L = 100\Omega$ , Figure 4                                  | 250   | 350   | 450      | mV            |
| $\Delta V_{OD}$ | $V_{OD}$ Magnitude Change from Differential LOW-to-HIGH |                                                               |       |       | 25       | mV            |
| $V_{OS}$        | Offset Voltage                                          |                                                               | 1.125 | 1.250 | 1.375    | V             |
| $\Delta V_{OS}$ | Offset Magnitude Change from Differential LOW-to-HIGH   |                                                               |       |       | 25       | mV            |
| $I_{OFF}$       | Power-Off Output current                                | $V_{CC} = 0\text{V}$ , $V_{OUT} = 0\text{V}$ or $3.6\text{V}$ |       |       | $\pm 20$ | $\mu\text{A}$ |
| $I_{OS}$        | Short-Circuit Output Current                            | $V_{OUT} = 0\text{V}$                                         |       |       | -8       | mA            |
|                 |                                                         | $V_{OD} = 0\text{V}$                                          |       |       | $\pm 8$  |               |
| $V_{IH}$        | Input HIGH Voltage                                      |                                                               | 2.0   |       | $V_{CC}$ | V             |
| $V_{IL}$        | Input LOW Voltage                                       |                                                               | GND   |       | 0.8      | V             |
| $I_{IN}$        | Input Current                                           | $V_{IN} = 0\text{V}$ or $V_{CC}$                              |       |       | $\pm 20$ | $\mu\text{A}$ |
| $I_{I(OFF)}$    | Power-Off Input Current                                 | $V_{CC} = 0\text{V}$ , $V_{IN} = 0\text{V}$ or $3.6\text{V}$  |       |       | $\pm 20$ | $\mu\text{A}$ |
| $V_{IK}$        | Input Clamp Voltage                                     | $I_{IK} = -18\text{mA}$                                       | -1.5  |       |          | V             |
| $I_{CC}$        | Power Supply Current                                    | No Load, $V_{IN} = 0\text{V}$ or $V_{CC}$                     |       |       | 12.5     | mA            |
|                 |                                                         | $R_L = 100\Omega$ , $V_{IN} = 0\text{V}$ or $V_{CC}$          |       |       | 17.0     |               |
| $C_{IN}$        | Input Capacitance                                       |                                                               |       | 4     |          | pF            |
| $C_{OUT}$       | Output Capacitance                                      |                                                               |       | 6     |          | pF            |

## AC Electrical Characteristics

All typical values are at  $T_A = 25^\circ\text{C}$  and  $V_{CC} = 3.3\text{V}$ . Over-supply voltage and operating temperature ranges, unless otherwise noted.

| Symbol                   | Parameter                                   | Conditions                                                         | Min. | Typ. | Max. | Units |
|--------------------------|---------------------------------------------|--------------------------------------------------------------------|------|------|------|-------|
| $t_{PLHD}$               | Differential Propagation Delay, LOW-to-HIGH | $R_L = 100\Omega$ ,<br>$C_L = 10\text{pF}$ ,<br>Figure 5, Figure 6 | 0.5  |      | 1.5  | ns    |
| $t_{PHLD}$               | Differential Propagation Delay, HIGH-to-LOW |                                                                    | 0.5  |      | 1.5  | ns    |
| $t_{TLHD}$               | Differential Output Rise Time (20% to 80%)  |                                                                    | 0.4  |      | 1.0  | ns    |
| $t_{THLD}$               | Differential Output Fall Time (80% to 20%)  |                                                                    | 0.4  |      | 1.0  | ns    |
| $t_{SK(P)}$              | Pulse Skew $ t_{PLH} - t_{PHL} $            |                                                                    |      |      | 0.5  | ns    |
| $t_{SK(LH)}, t_{SK(HL)}$ | Channel-to-Channel Skew <sup>(1)</sup>      |                                                                    |      |      | 0.3  | ns    |
| $t_{SK(PP)}$             | Part-to-Part Skew <sup>(2)</sup>            |                                                                    |      |      | 1.0  | ns    |

### Notes:

- $t_{SK(LH)}, t_{SK(HL)}$  is the skew between specified outputs of a single device when the outputs have identical loads and are switching in the same direction.
- $t_{SK(PP)}$  is the magnitude of the difference in propagation delay times between any specified terminals of two devices switching in the same direction (either LOW-to-HIGH or HIGH-to-LOW) when both devices operate with the same supply voltage, same temperature, and have identical test circuits.

## Test Diagrams

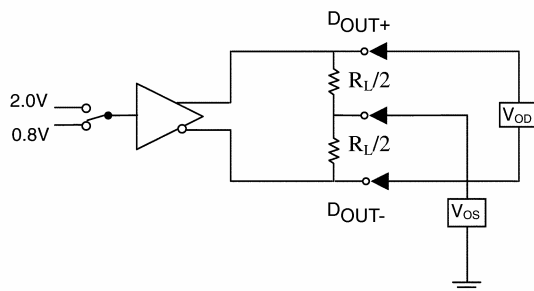
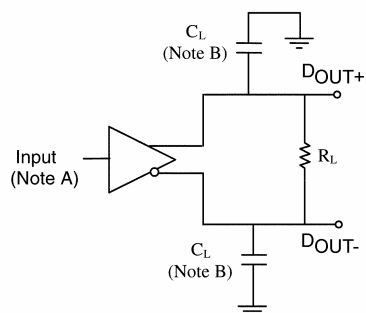


Figure 4. Differential Driver DC Test Circuit



Note A: All input pulses have frequency = 10MHz,  
 $t_R$  or  $t_F = 2\text{ns}$ .

Note B:  $C_L$  includes all probe and fixture capacitances.

Figure 5. Differential Driver Propagation Delay and Transition Time Test Circuit

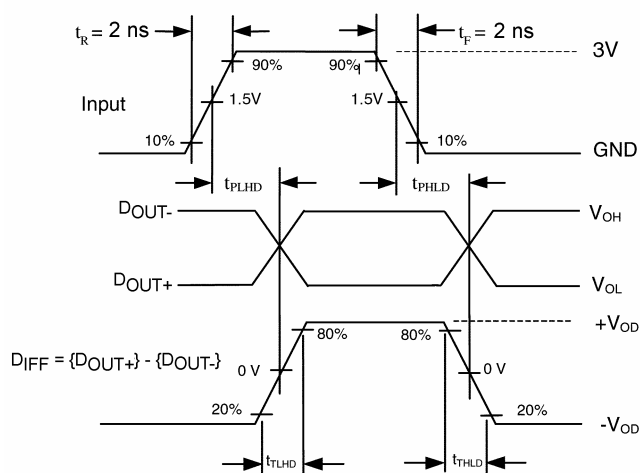


Figure 6. AC Waveforms

## Typical Performance Characteristics

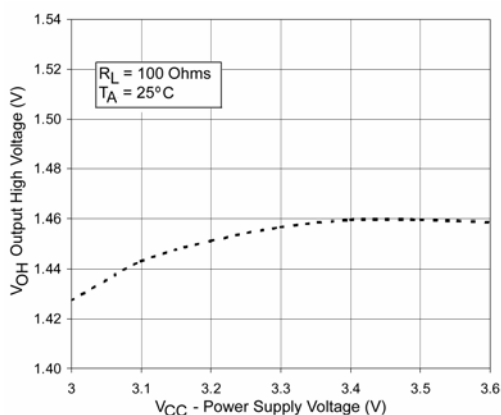


Figure 7. Output High Voltage vs. Power Supply Voltage

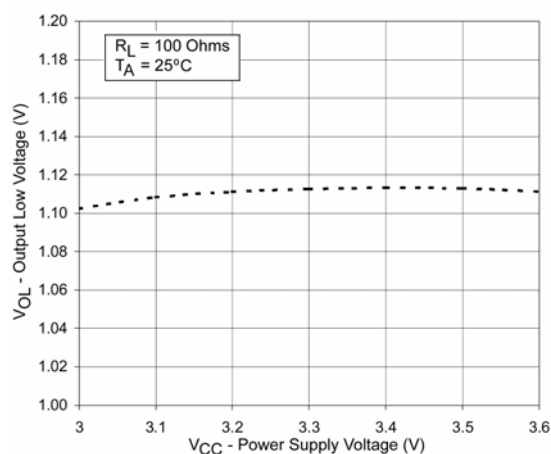


Figure 8. Output Low Voltage vs. Power Supply Voltage

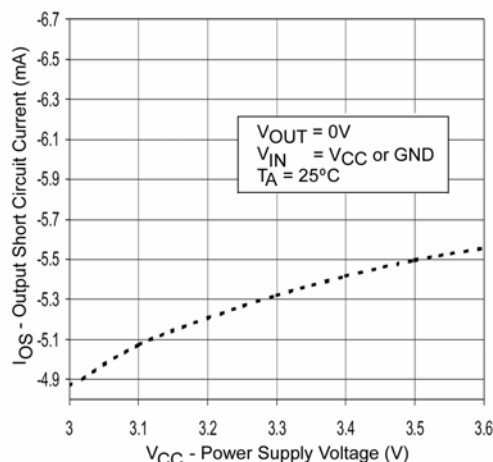


Figure 9. Output Short Circuit Current vs. Power Supply Voltage

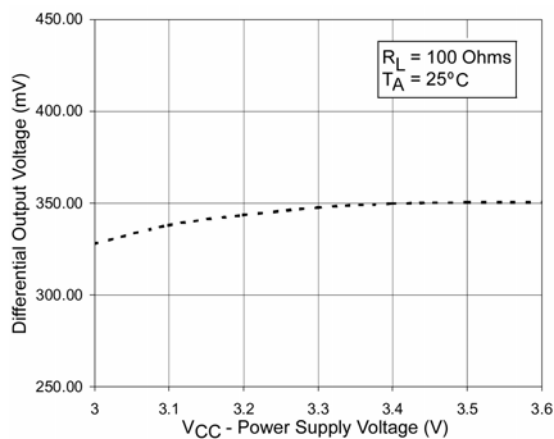


Figure 10. Differential Output Voltage vs. Power Supply Voltage

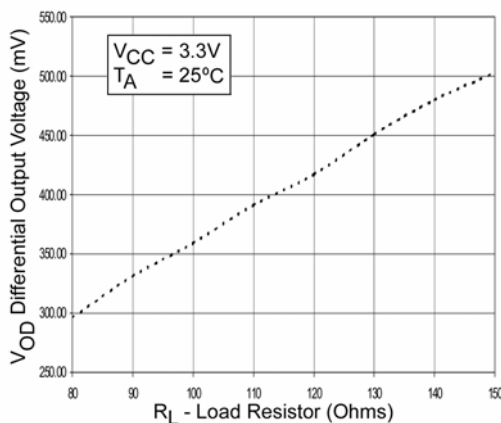


Figure 11. Differential Output Voltage vs. Load Resistor

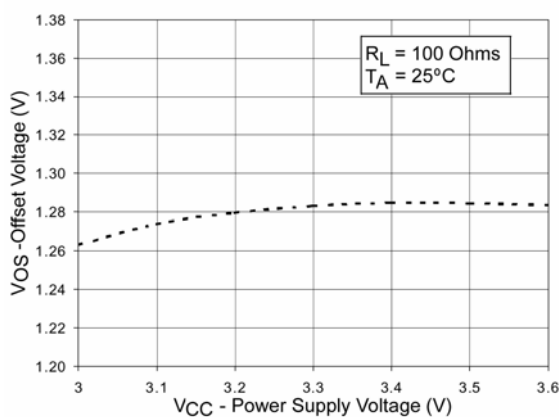


Figure 12. Offset Voltage vs. Power Supply Voltage

## Typical Performance Characteristics (Continued)

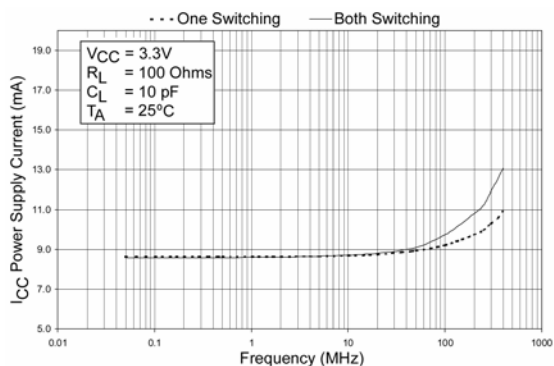


Figure 13. Power Supply Current vs. Frequency

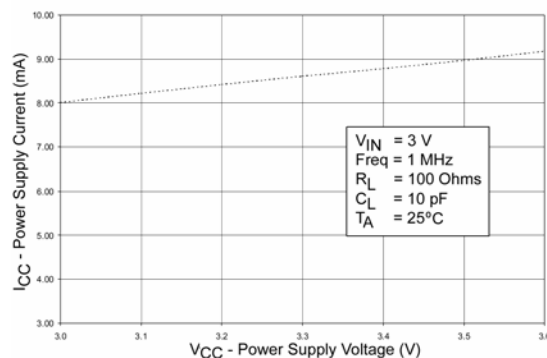


Figure 14. Power Supply Current vs. Power Supply Voltage

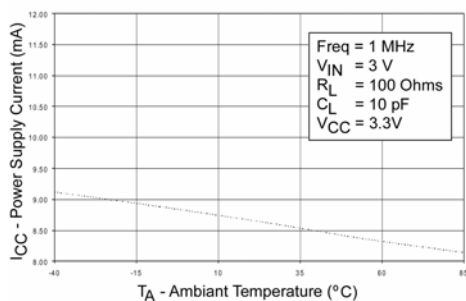


Figure 15. Power Supply Current vs. Ambient Temperature

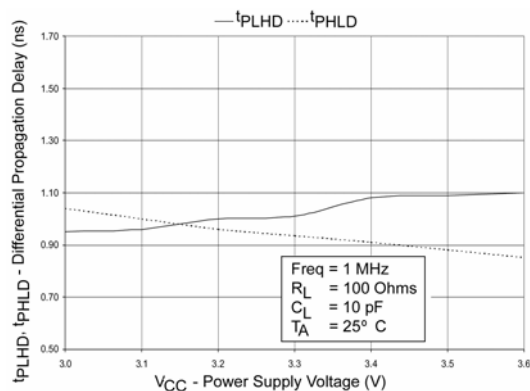


Figure 16. Differential Propagation Delay vs. Power Supply

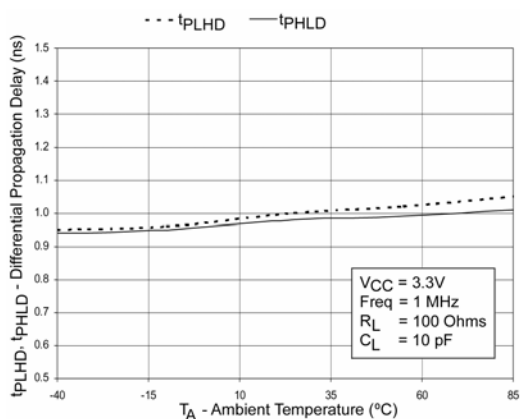
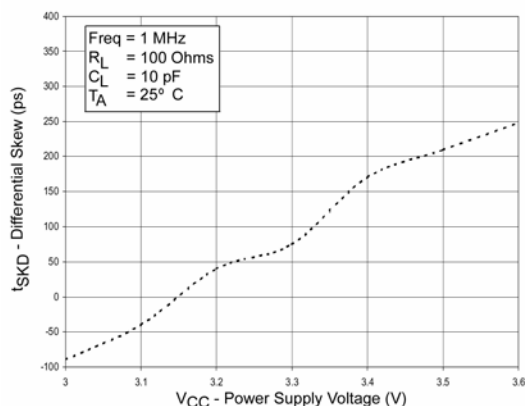


Figure 17. Differential Propagation Delay vs. Ambient Temperature

Figure 18. Differential Skew ( $t_{PLH} - t_{PHL}$ ) vs. Power Supply

# Typical Performance Characteristics (Continued)

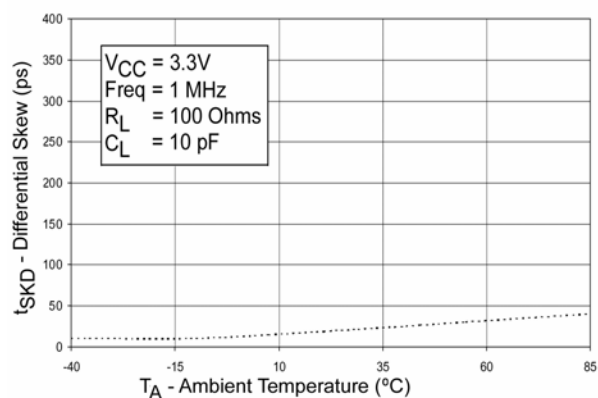


Figure 19. Differential Pulse Skew ( $t_{PLH}$ - $t_{PHL}$ )

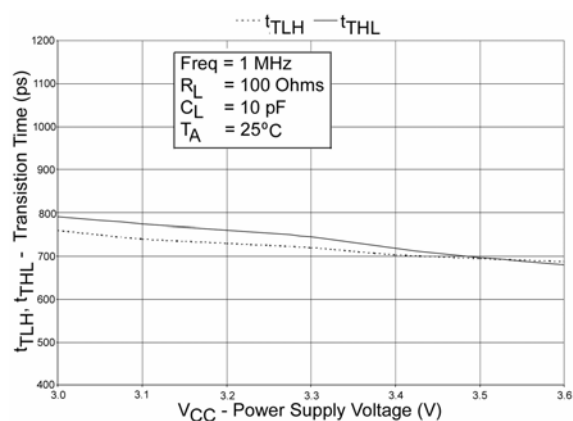


Figure 20. Transition Time vs. Power Supply Voltage

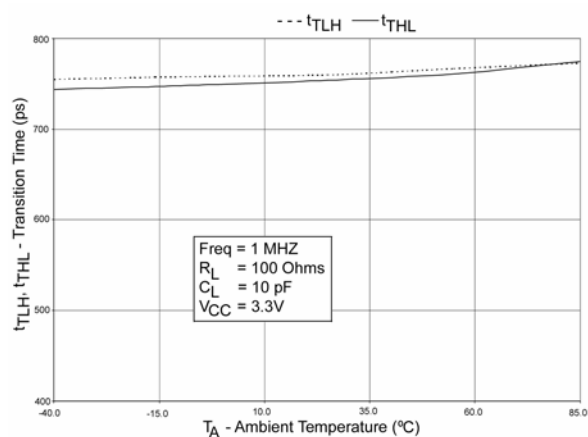


Figure 21. Transition Time vs. Ambient Temperature

## Physical Dimensions

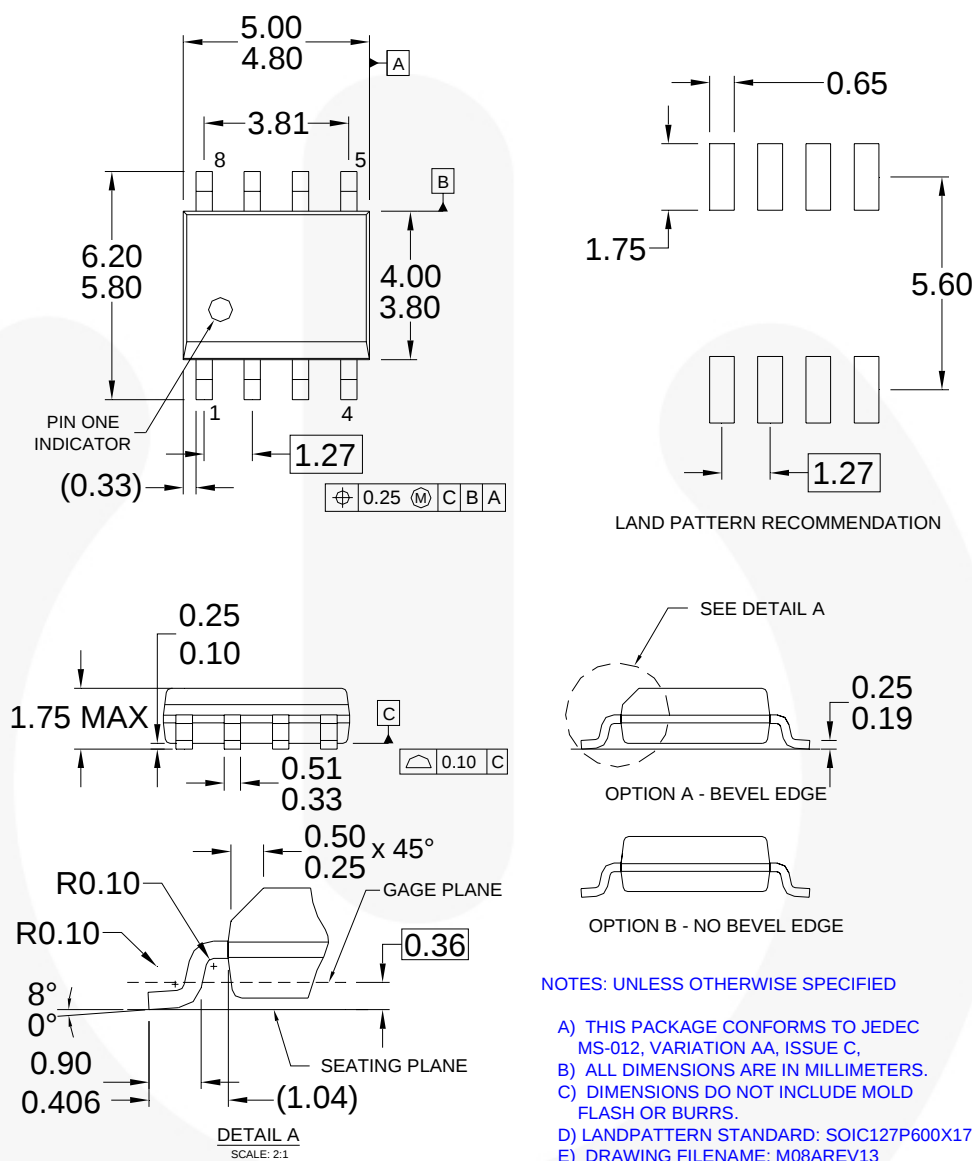


Figure 22. 8-Lead, Small Outline Package (SOIC), JEDEC MS-012, 0.150-inch, Narrow Body

[Click here for tape and reel specifications, available at:](http://www.fairchildsemi.com/products/discrete/pdf/soic8_tr.pdf)

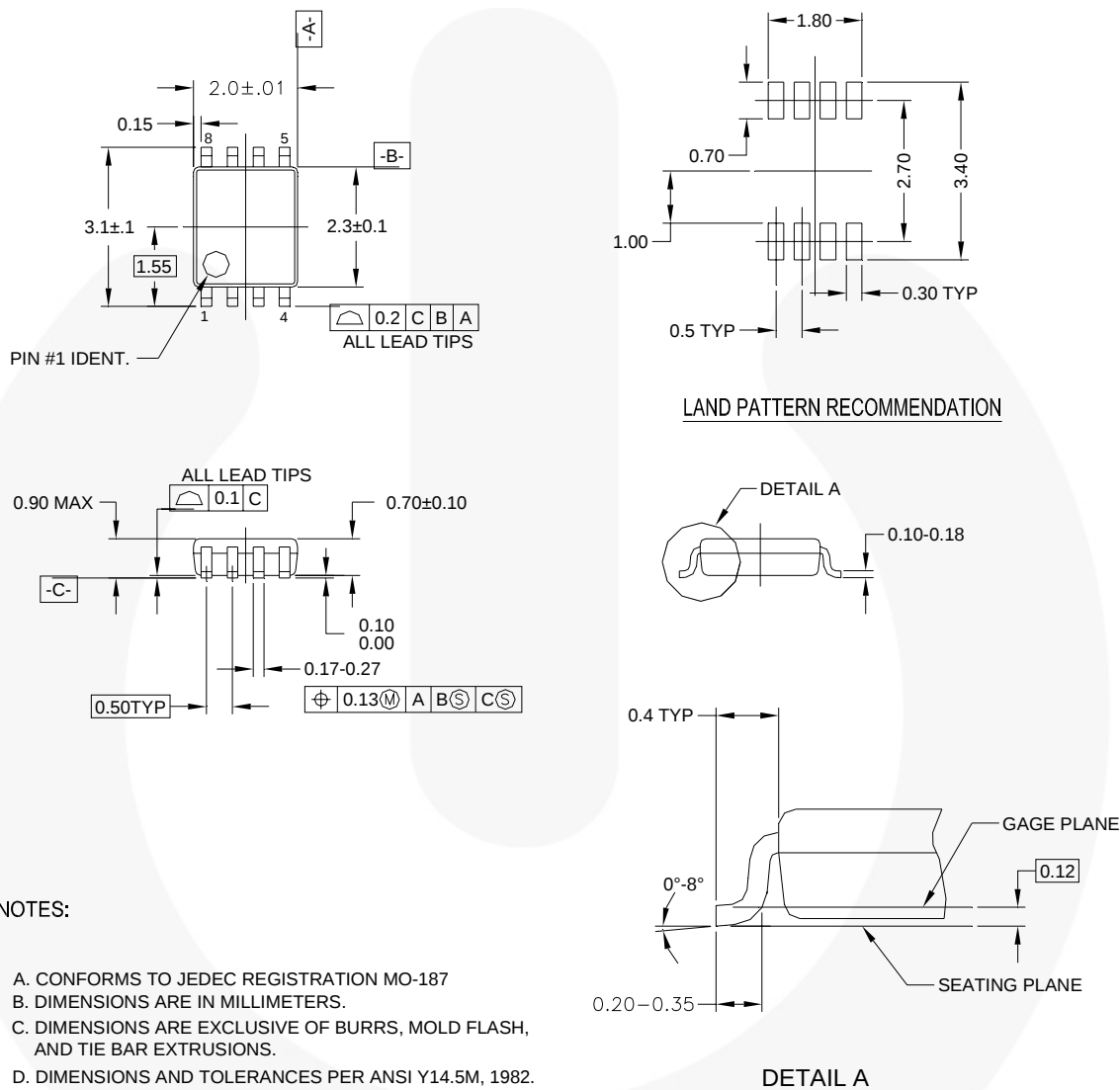
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## Physical Dimensions



MAB08AREVC

**Figure 23. 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide**

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Rev. 140



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