

## FIN1018

### 3.3V LVDS 1-Bit High Speed Differential Receiver

#### General Description

This single receiver is designed for high speed interconnects utilizing Low Voltage Differential Signaling (LVDS) technology. The receiver translates LVDS levels, with a typical differential input threshold of 100 mV, to LVTTTL signal levels. LVDS 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 FIN1018 can be paired with its companion driver, the FIN1017, or with any other LVDS driver.

#### Features

- Greater than 400Mbps data rate
- 3.3V power supply operation
- 0.4ns maximum pulse skew
- 2.5ns maximum propagation delay
- Low power dissipation
- Power-Off protection
- Fail safe protection for open-circuit, shorted and terminated conditions
- Meets or exceeds the TIA/EIA-644 LVDS standard
- Flow-through pinout simplifies PCB layout
- 8-Lead SOIC and US-8 packages save space

#### Ordering Code:

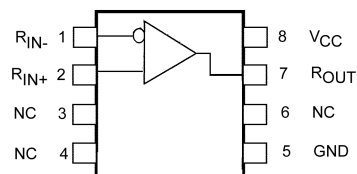
| Order Number | Package Number | Package Description                                                                         |
|--------------|----------------|---------------------------------------------------------------------------------------------|
| FIN1018M     | M08A           | 8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow [TUBE]          |
| FIN1018MX    | M08A           | 8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow [TAPE and REEL] |
| FIN1018K8X   | MAB08A         | 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide [TAPE and REEL]                           |

#### Pin Descriptions

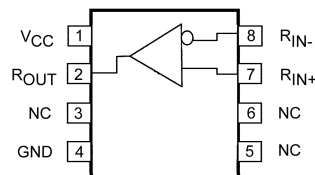
| Pin Name         | Description                |
|------------------|----------------------------|
| R <sub>OUT</sub> | LVTTTL Data Output         |
| R <sub>IN+</sub> | Non-inverting Driver Input |
| R <sub>IN-</sub> | Inverting Driver Input     |
| V <sub>CC</sub>  | Power Supply               |
| GND              | Ground                     |
| NC               | No Connect                 |

#### Connection Diagrams

8-Lead SOIC



Pin Assignment for US-8 Package



TOP VIEW

#### Function Table

| Input               |                  | Outputs          |
|---------------------|------------------|------------------|
| R <sub>IN+</sub>    | R <sub>IN-</sub> | R <sub>OUT</sub> |
| L                   | H                | L                |
| H                   | L                | H                |
| Fail Safe Condition |                  | H                |

H = HIGH Logic Level

L = LOW Logic Level

Fail Safe = Open, Shorted, Terminated

**Absolute Maximum Ratings**(Note 1)

|                                                       |                 |
|-------------------------------------------------------|-----------------|
| Supply Voltage ( $V_{CC}$ )                           | -0.5V to +4.6V  |
| DC Input Voltage ( $R_{IN+}$ , $R_{IN-}$ )            | -0.5V to +4.7V  |
| DC Output Voltage ( $D_{OUT}$ )                       | -0.5V to +6V    |
| DC Output Current ( $I_O$ )                           | 16 mA           |
| Storage Temperature Range ( $T_{STG}$ )               | -65°C to +150°C |
| Max Junction Temperature ( $T_J$ )                    | 150°C           |
| Lead Temperature ( $T_L$ )<br>(Soldering, 10 seconds) | 260°C           |
| ESD (Human Body Model)                                | ≥ 6500V         |
| ESD (Bus Pins $R_{IN-}/R_{IN+}$ to GND)               | ≥ 9500V         |
| ESD (Machine Model)                                   | ≥ 300V          |

**Recommended Operating Conditions**

|                                                     |                   |
|-----------------------------------------------------|-------------------|
| Supply Voltage ( $V_{CC}$ )                         | 3.0V to 3.6V      |
| Input Voltage ( $V_{IN}$ )                          | 0 to $V_{CC}$     |
| Magnitude of Differential Voltage<br>( $ V_{ID} $ ) | 100mV to $V_{CC}$ |
| Common-mode Input Voltage ( $V_{IC}$ )              | 0.05V to 2.35V    |
| Operating Temperature ( $T_A$ )                     | -40°C to +85°C    |

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature and output/input loading variables. Fairchild does not recommend operation of circuits outside databook specification.

**DC Electrical Characteristics**

Over supply voltage and operating temperature ranges, unless otherwise specified

| Symbol       | Parameter                         | Test Conditions                                                                                     | Min            | Typ<br>(Note 2) | Max | Units |
|--------------|-----------------------------------|-----------------------------------------------------------------------------------------------------|----------------|-----------------|-----|-------|
| $V_{TH}$     | Differential Input Threshold HIGH | See Figure 1 and Table 1                                                                            |                |                 | 100 | mV    |
| $V_{TL}$     | Differential Input Threshold LOW  | See Figure 1 and Table 1                                                                            | -100           |                 |     | mV    |
| $I_{IN}$     | Input Current                     | $V_{IN} = 0V$ or $V_{CC}$                                                                           |                |                 | ±20 | μA    |
| $I_{I(OFF)}$ | Power-OFF Input Current           | $V_{CC} = 0V$ , $V_{IN} = 0V$ or 3.6V                                                               |                |                 | ±20 | μA    |
| $V_{OH}$     | Output HIGH Voltage               | $I_{OH} = -100 \mu A$                                                                               | $V_{CC} - 0.2$ |                 |     | V     |
|              |                                   | $I_{OH} = -8 \text{ mA}$                                                                            | 2.4            |                 |     | V     |
| $V_{OL}$     | Output LOW Voltage                | $I_{OH} = 100 \mu A$                                                                                |                |                 | 0.2 | V     |
|              |                                   | $I_{OL} = 8 \text{ mA}$                                                                             |                |                 | 0.5 | V     |
| $V_{IK}$     | Input Clamp Voltage               | $I_{IK} = -18 \text{ mA}$                                                                           | -1.5           |                 |     | V     |
| $I_{CC}$     | Power Supply Current              | Inputs Open, ( $R_{IN+} = 1V$ and $R_{IN-} = 1.4V$ ),<br>or ( $R_{IN+} = 1.4V$ and $R_{IN-} = 1V$ ) |                |                 | 7   | mA    |
| $C_{IN}$     | Input Capacitance                 |                                                                                                     |                | 4               |     | pF    |
| $C_{OUT}$    | Output Capacitance                |                                                                                                     |                | 6               |     | pF    |

**Note 2:** All typical values are at  $T_A = 25^\circ\text{C}$  and with  $V_{CC} = 3.3V$ .

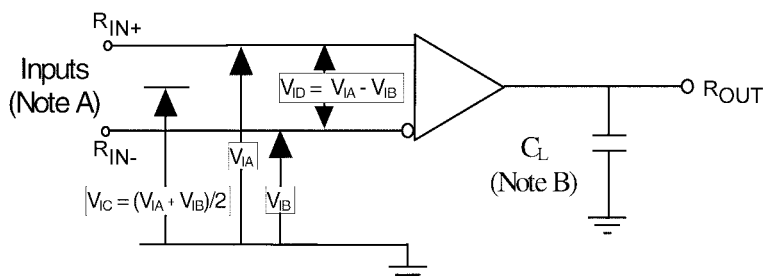
**AC Electrical Characteristics**

Over supply voltage and operating temperature ranges, unless otherwise specified

| Symbol       | Parameter                          | Test Conditions                                                                  | Min | Typ<br>(Note 3) | Max | Units |
|--------------|------------------------------------|----------------------------------------------------------------------------------|-----|-----------------|-----|-------|
| $t_{PLH}$    | Propagation Delay LOW-to-HIGH      | $ V_{ID}  = 400 \text{ mV}$ , $C_L = 10 \text{ pF}$<br>See Figure 1 and Figure 2 | 0.9 |                 | 2.5 | ns    |
| $t_{PHL}$    | Propagation Delay HIGH-to-LOW      |                                                                                  | 0.9 |                 | 2.5 | ns    |
| $t_{TLH}$    | Output Rise Time (20% to 80%)      |                                                                                  |     | 0.5             |     | ns    |
| $t_{THL}$    | Output Fall Time (80% to 20%)      |                                                                                  |     | 0.5             |     | ns    |
| $t_{SK(P)}$  | Pulse Skew [ $t_{PLH} - t_{PHL}$ ] |                                                                                  |     |                 | 0.4 | ns    |
| $t_{SK(PP)}$ | Part-to-Part Skew (Note 4)         |                                                                                  |     |                 | 1.0 | ns    |

**Note 3:** All typical values are at  $T_A = 25^\circ\text{C}$  and with  $V_{CC} = 3.3V$ .

**Note 4:**  $t_{SK(PP)}$  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.



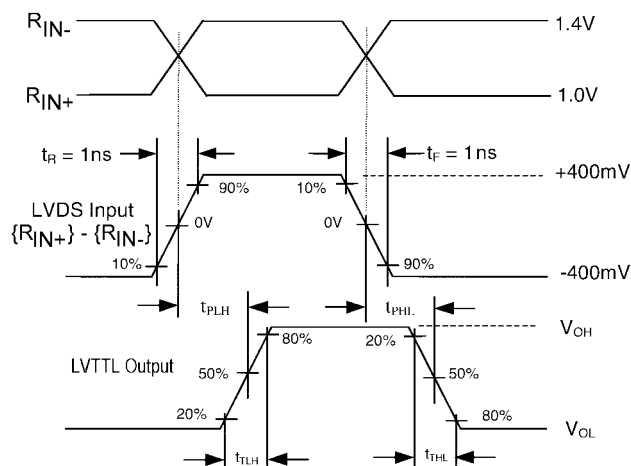
**Note A:** All input pulses have frequency = 10MHz,  $t_p$  or  $t_F = 1ns$

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

**FIGURE 1. Differential Receiver Voltage Definitions and Propagation Delay and Transition Time Test Circuit**

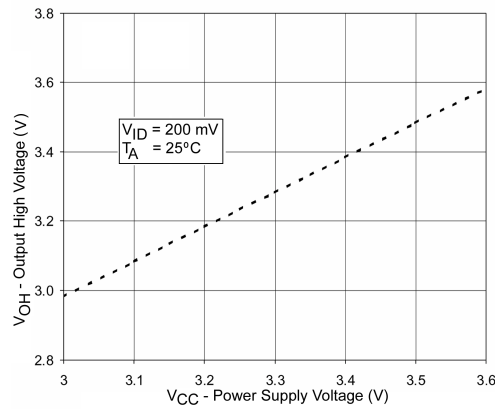
**TABLE 1. Receiver Minimum and Maximum Input Threshold Test Voltages**

| Applied Voltages (V) |          | Resulting Differential Input Voltage (mV) | Resulting Common Mode Input Voltage (V) |
|----------------------|----------|-------------------------------------------|-----------------------------------------|
| $V_{IA}$             | $V_{IB}$ | $V_{ID}$                                  | $V_{IC}$                                |
| 1.25                 | 1.15     | 100                                       | 1.2                                     |
| 1.15                 | 1.25     | -100                                      | 1.2                                     |
| 2.4                  | 2.3      | 100                                       | 2.35                                    |
| 2.3                  | 2.4      | -100                                      | 2.35                                    |
| 0.1                  | 0        | 100                                       | 0.05                                    |
| 0                    | 0.1      | -100                                      | 0.05                                    |
| 1.5                  | 0.9      | 600                                       | 1.2                                     |
| 0.9                  | 1.5      | -600                                      | 1.2                                     |
| 2.4                  | 1.8      | 600                                       | 2.1                                     |
| 1.8                  | 2.4      | -600                                      | 2.1                                     |
| 0.6                  | 0        | 600                                       | 0.3                                     |
| 0                    | 0.6      | -600                                      | 0.3                                     |

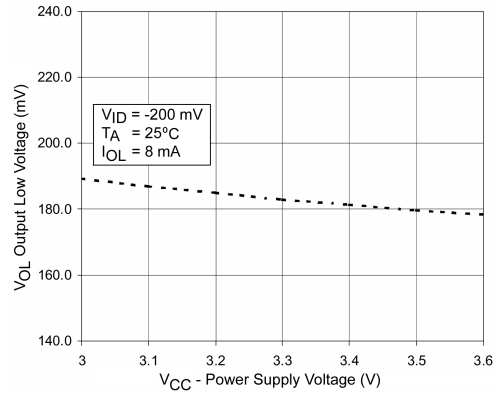


**FIGURE 2. LVDS Input to LVTTTL Output AC Waveforms**

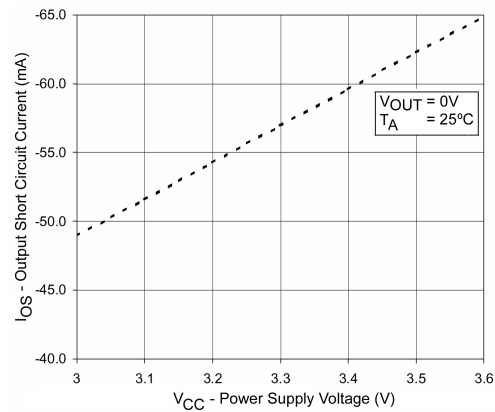
# DC / AC Typical Performance Curves



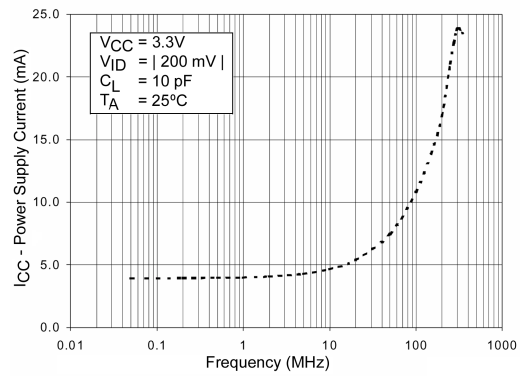
**FIGURE 3. Output High Voltage vs. Power Supply Voltage**



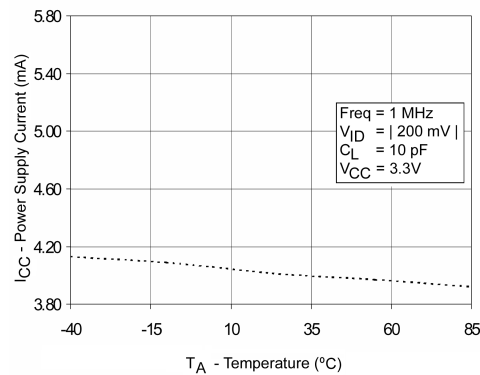
**FIGURE 4. Output Low Voltage vs. Power Supply Voltage**



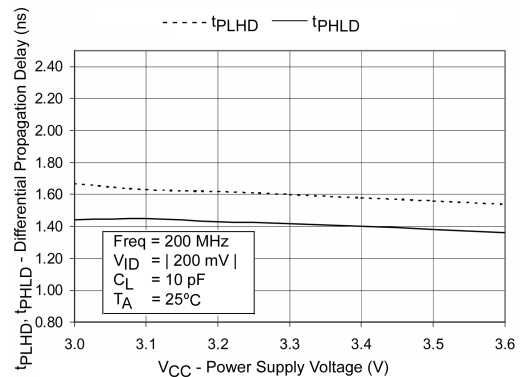
**FIGURE 5. Output Short Circuit Current vs. Power Supply Voltage**



**FIGURE 6. Power Supply Current vs. Frequency**



**FIGURE 7. Power Supply Current vs. Ambient Temperature**



**FIGURE 8. Differential Propagation Delay vs. Power Supply Voltage**

## DC / AC Typical Performance Curves (Continued)

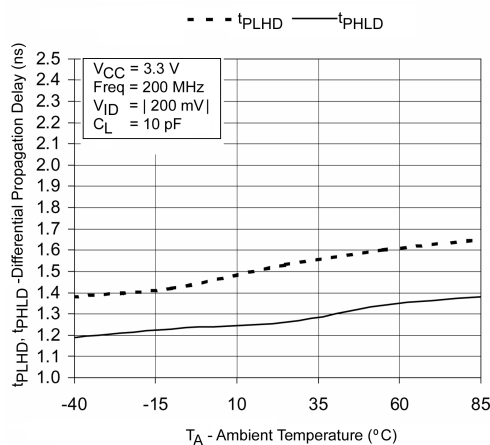


FIGURE 9. Differential Propagation Delay vs. Ambient Temperature

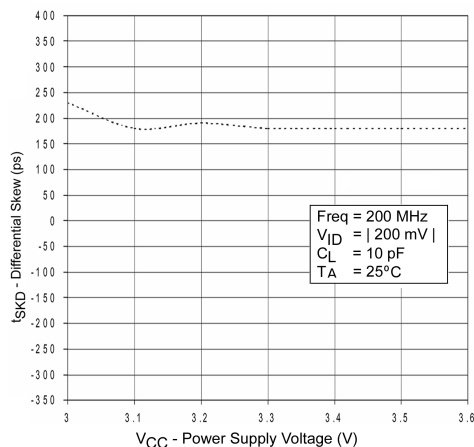


FIGURE 10. Differential Skew vs. Power Supply Voltage

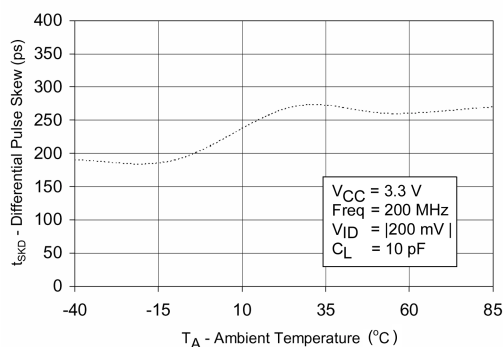


FIGURE 11. Differential Skew vs. Ambient Temperature

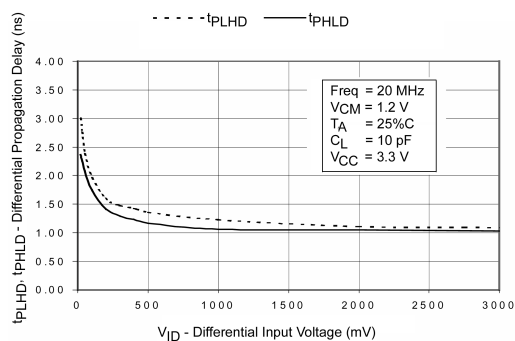


FIGURE 12. Differential Propagation Delay vs. Differential Input Voltage

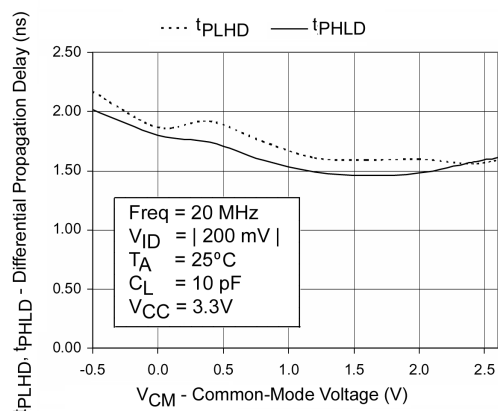


FIGURE 13. Differential Propagation Delay vs. Common-Mode Voltage

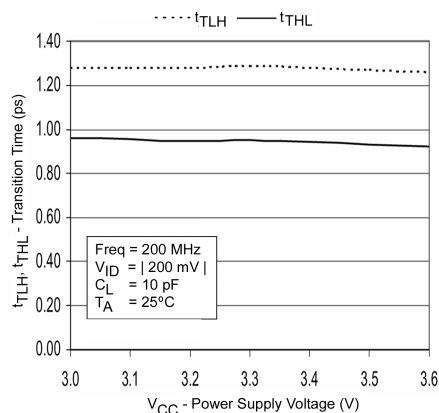


FIGURE 14. Transition Time vs. Power Supply Voltage

## DC / AC Typical Performance Curves (Continued)

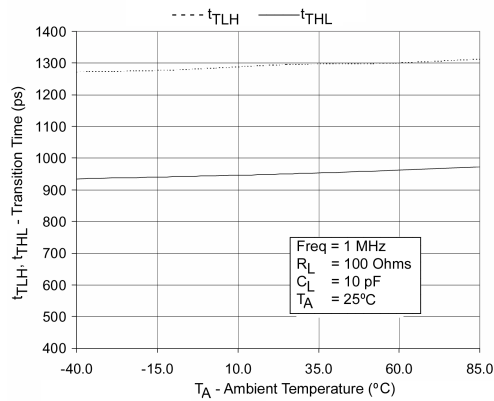


FIGURE 15. Transition Time vs. Ambient Temperature

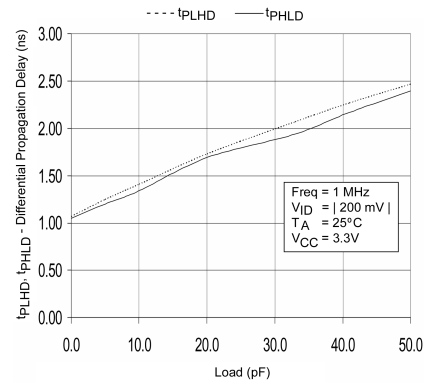


FIGURE 16. Differential Propagation Delay vs. Load

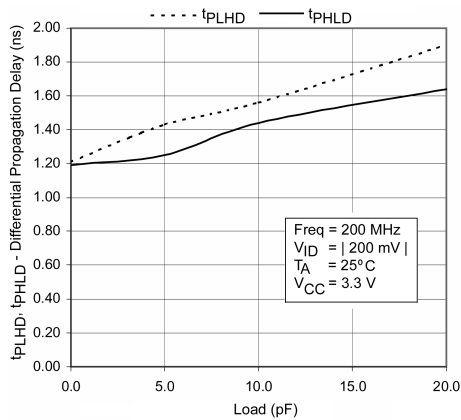


FIGURE 17. Differential Propagation Delay vs. Load

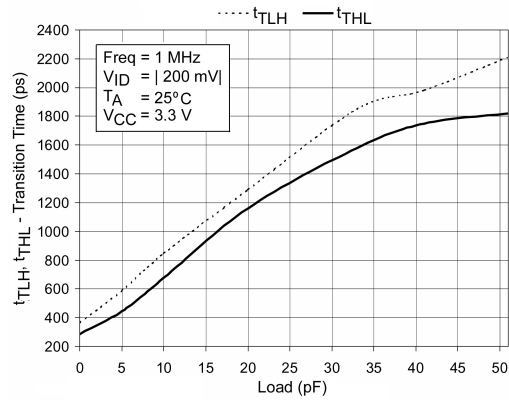


FIGURE 18. Transition Time vs. Load

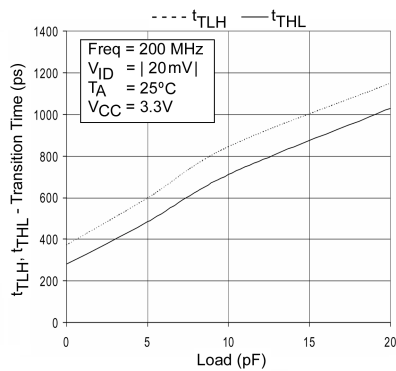


FIGURE 19. Transition Time vs. Load

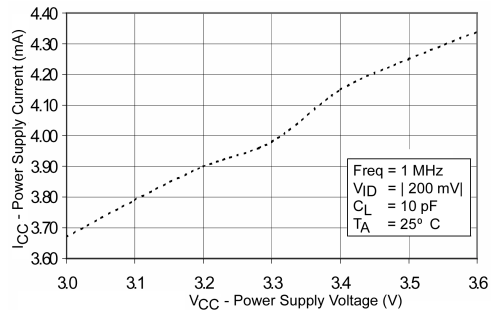
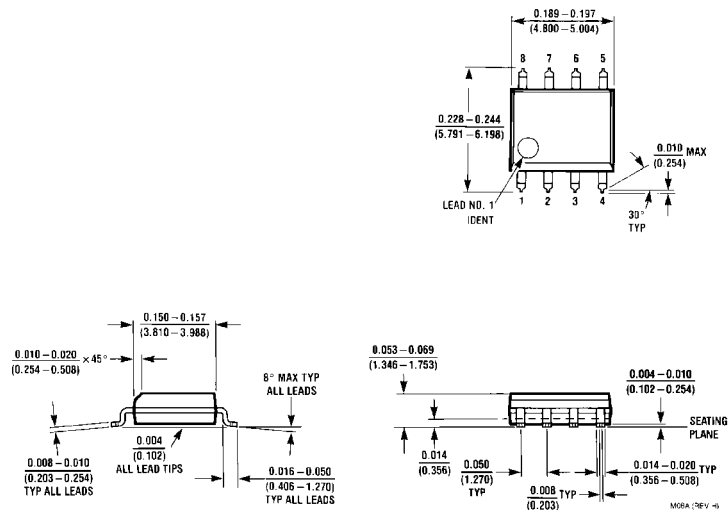


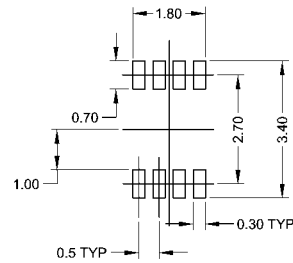
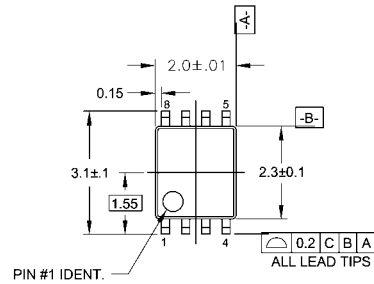
FIGURE 20. Power Supply Current vs. Power Supply Voltage

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

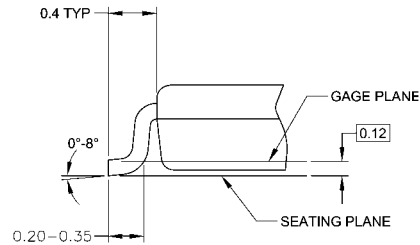
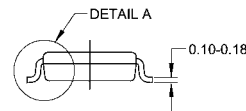
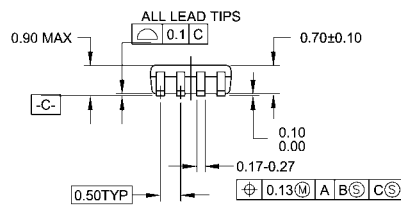


**8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow  
Package Number M08A**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



### LAND PATTERN RECOMMENDATION



### DETAIL A

#### NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-187
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MAB08AREVC

8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide  
Package Number MAB08A

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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.

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