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March 2017

FIN1001 3.3 V LVDS 1-Bit, High-Speed Differential Driver

Features

- Greater than 600 Mbs Data Rate
- 3.3 V Power Supply Operation
- 0.5 ns Maximum Pulse Skew
- 1.5 ns Maximum Propagation Delay
- Low Power Dissipation
- Power-Off Protection
- Meets or exceeds TIA/EIA-644 LVDS Standard
- Flow-through pin-out simplifies PCB Layout
- 5-Lead SOT23 package saves Space

Description

This single driver is designed for high-speed interconnects utilizing Low Voltage Differential Signaling (LVDS) technology. The driver translates LVTTTL levels to LVDS levels with a typical differential output swing of 350 mV 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 FIN1001 can be paired with its companion receiver, the FIN1002, or with any other LVDS receiver.

Ordering Information

| Part Number | Operating Temperature Range | Package | Packing Method | Packing Quantity |
|-------------|-----------------------------|------------------------------------|----------------|------------------|
| FIN1001M5X | -40 to +125°C | 5-Lead SOT23, JEDEC MO-178, 1.6 mm | Tape & Reel | 3000 |

Connection Diagram

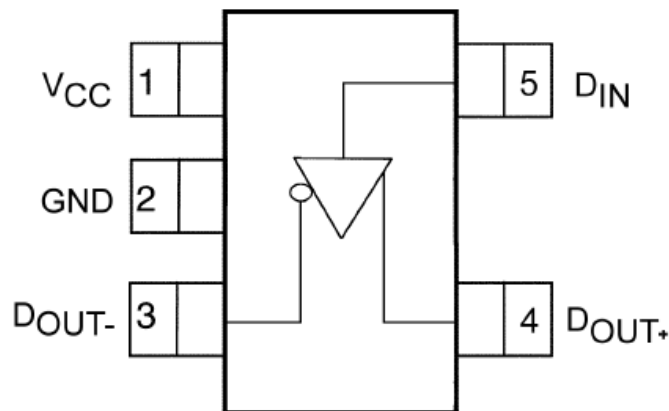


Figure 1. Top View

FIN1001 — 3.3V LVDS 1-Bit, High-Speed Differential Driver

Pin Definitions

| Pin # | Name | Description |
|-------|-------------------|----------------------------------|
| 1 | V _{CC} | Power Supply |
| 2 | GND | Ground |
| 3 | D _{OUT-} | Inverting LVDS Driver Output |
| 4 | D _{OUT+} | Non-inverting LVDS Driver Output |
| 5 | D _{IN} | LVTTTL Data Input |

Function Table

| Input | Outputs | |
|-----------------|-------------------|-------------------|
| D _{IN} | D _{OUT+} | D _{OUT-} |
| LOW | LOW | HIGH |
| HIGH | HIGH | LOW |

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 _{CC} | Supply Voltage | -0.5 | 4.6 | V |
| D _{IN} | DC Input Voltage | -0.5 | 6.0 | V |
| D _{OUT} | DC Output Voltage | -0.5 | 4.6 | V |
| I _{OSD} | Driver Short Circuit Current | Continuous | | |
| I _O | Output Current | | 16 | mA |
| T _{STG} | Storage Temperature Range | -65 | +150 | °C |
| T _J | Maximum Junction Temperature | | +150 | °C |
| T _L | Lead Temperature, Soldering, 10 Seconds | | +260 | °C |
| ESD | Electrostatic Discharge | Human Body Model | 7500 | V |
| | | Machine Model | 400 | V |

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. ON Semiconductor does not recommend exceeding them or designing to Absolute Maximum Ratings.

| Symbol | Parameter | Min. | Max. | Unit |
|----------|-----------------------|------|----------|------|
| V_{CC} | Supply Voltage | 3.0 | 3.6 | V |
| V_{IN} | Input Voltage | 0 | V_{CC} | V |
| T_A | Operating Temperature | -40 | +125 | °C |

DC Electrical Characteristics⁽¹⁾

All min and max values are guaranteed at $T_A = -40^\circ$ to $+125^\circ\text{C}$, unless otherwise specified.

All typical values are at $T_A = 25^\circ\text{C}$ and with $V_{CC} = 3.3\text{ V}$, unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-----------------|---|---|---|---------|----------|---------------|---------------|
| V_{OD} | Output Differential Voltage | $T_A = -40^\circ$ to 85°C | 250 | 350 | 450 | mV | |
| | | $T_A = -40^\circ$ to 125°C | 230 | 350 | 450 | mV | |
| ΔV_{OD} | V_{OD} Magnitude Change from Differential Low-to-High | $R_L = 100\ \Omega$, See Figure 2 | | | 25 | mV | |
| V_{OS} | Offset Voltage | | $T_A = -40^\circ$ to 125°C | 1.125 | 1.25 | 1.375 | V |
| ΔV_{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 V | | | ± 20 | μA |
| I_{OS} | Short Circuit Output Current | $V_{OUT} = 0\text{ V}$ | | -5.5 | -8 | mA | |
| | | $V_{OD} = 0\text{ V}$ | | ± 4 | ± 8 | | |
| $I_{I(OFF)}$ | Power-OFF Input Current | $V_{CC} = 0\text{ V}$, $V_{IN} = 0\text{ V}$ or 3.6 V | | | ± 20 | μA | |
| 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} | | | ± 20 | μA | |
| $I_{I(OFF)}$ | Power-Off Input Current | $V_{CC} = 0\text{V}$, $V_{IN} = 0\text{ V}$ or 3.6 V | | | ± 20 | μA | |
| V_{IK} | Input Clamp Voltage | $I_{IK} = -18\text{ mA}$ | -1.5 | -0.8 | | V | |
| I_{CC} | Power Supply Current | No Load, $V_{IN} = 0\text{ V}$ or V_{CC} | | 4.5 | 8 | mA | |
| | | $R_L = 100\ \Omega$, $V_{IN} = 0\text{ V}$ or V_{CC} | | 6.5 | 10 | | |
| C_{IN} | Input Capacitance | $V_{CC} = 3.3\text{ V}$ | | 3.2 | | pF | |
| C_{OUT} | Output Capacitance | $V_{CC} = 0\text{ V}$ | | 3.3 | | pF | |

Notes:

1. Not production tested across the full temperature range.



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March 2017

AC Electrical Characteristics

All min and max values are guaranteed at $T_A = -40$ to $+85^\circ\text{C}$.

All typical values are at $T_A = 25^\circ\text{C}$ and with $V_{CC} = 3.3\text{ V}$, unless otherwise specified.

$R_L = 100\ \Omega$, $C_L = 5\text{ pF}$. See Figure 3 and Figure 4.

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------|----------------------------------|-----------------------|------|------|------|------|
| t_{PLHD} | Propagation Delay | LOW to HIGH | 0.50 | 0.98 | 1.50 | ns |
| t_{PHLD} | Propagation Delay | HIGH to LOW | 0.50 | 0.93 | 1.50 | ns |
| t_{TLHD} | Differential Output Rise Time | 20% to 80% | 0.4 | 0.5 | 1.0 | ns |
| t_{THLD} | Output Fall Time | 80% to 20% | 0.4 | 0.5 | 1.0 | ns |
| $t_{SK(p)}$ | Pulse Skew | $ t_{PLH} - t_{PHL} $ | | 0.05 | 0.5 | ns |
| $t_{SK(PP)}$ | Part-to-Part Skew ⁽²⁾ | | | | 1.0 | ns |

Note:

- $t_{SK(PP)}$ 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

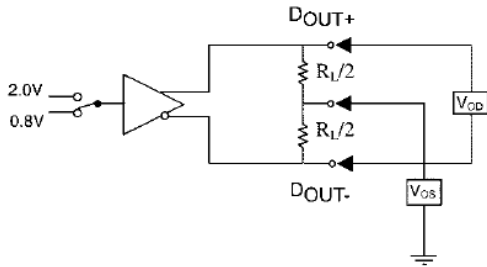
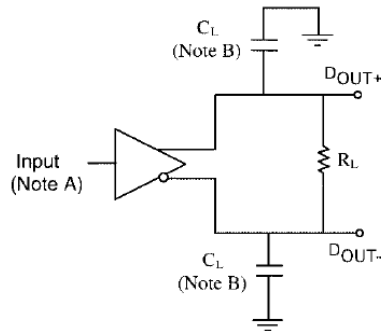


Figure 2. Differential Driver DC Test Circuit



Note A: All input pulses have frequency = 10 MHz, t_R or t_F = 2 ns
Note B: C_L includes all probe and fixture capacitances

Figure 3. Differential Driver Propagation Delay and Transition Time Test Circuit

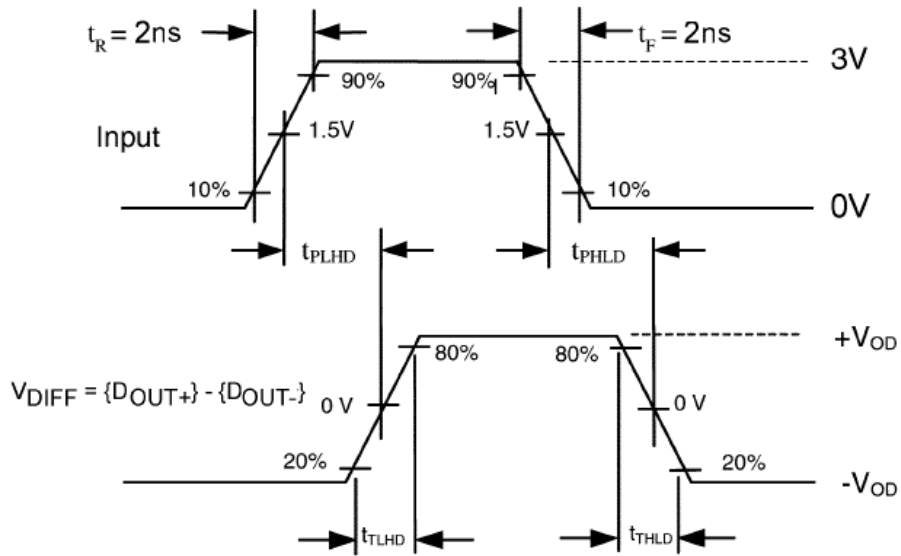


Figure 4. AC Waveforms

Typical Performance Characteristics

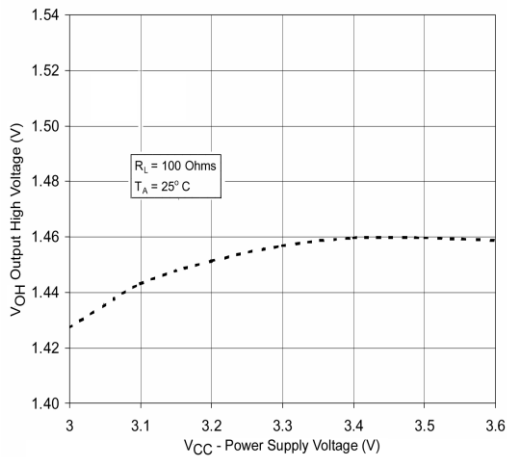


Figure 5. Output High Voltage vs. Power Supply Voltage

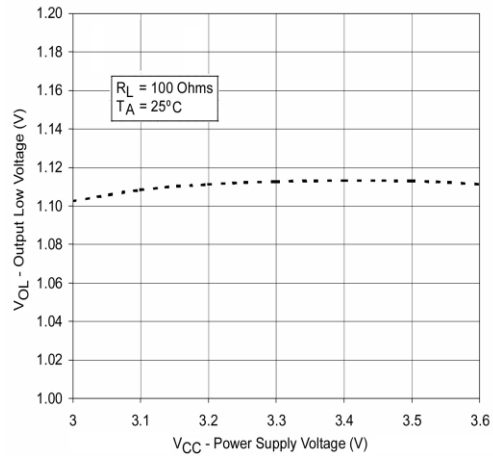


Figure 6. Output Low Voltage vs. Power Supply Voltage

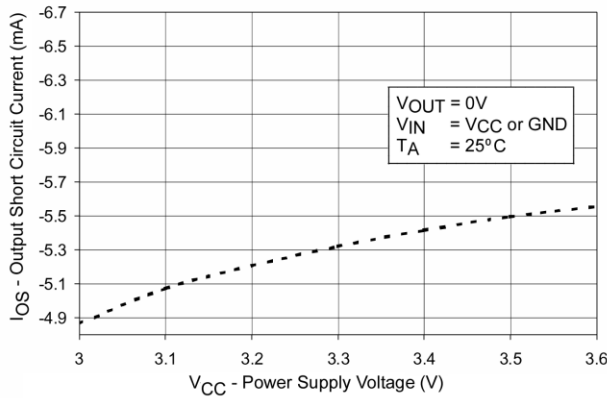


Figure 7. Output Short Circuit Current vs. Power Supply Voltage

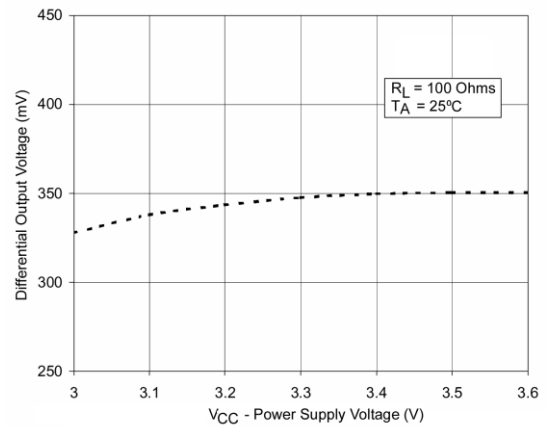


Figure 8. Differential Output Voltage vs. Power Supply Voltage

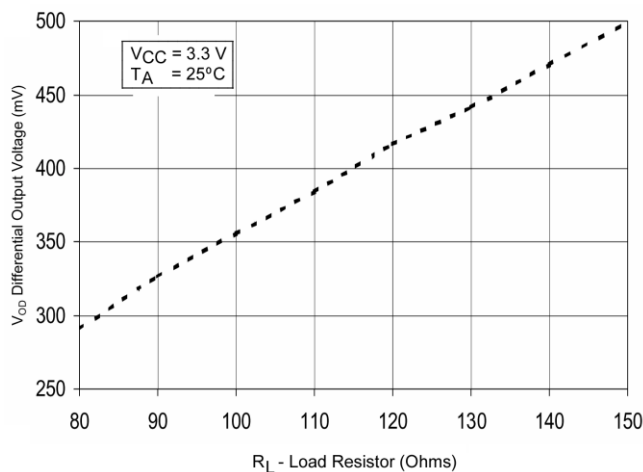


Figure 9. Differential Output Voltage vs. Load Resistor

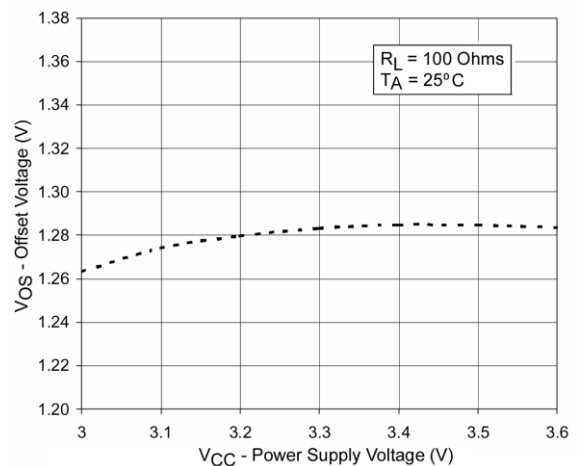


Figure 10. Offset Voltage vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

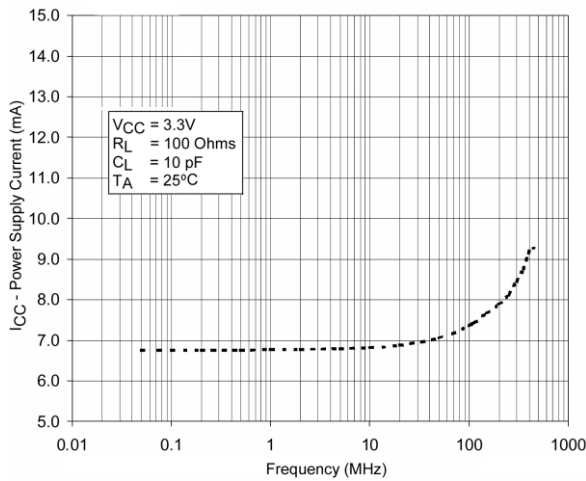


Figure 11. Power Supply Current vs. Frequency

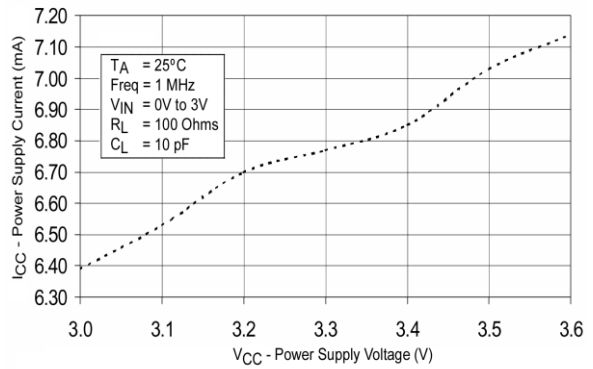


Figure 12. Power Supply Current vs. Power Supply Voltage

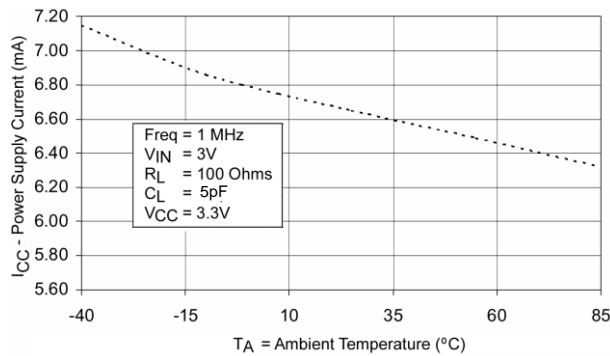


Figure 13. Power Supply Current vs. Ambient Temperature

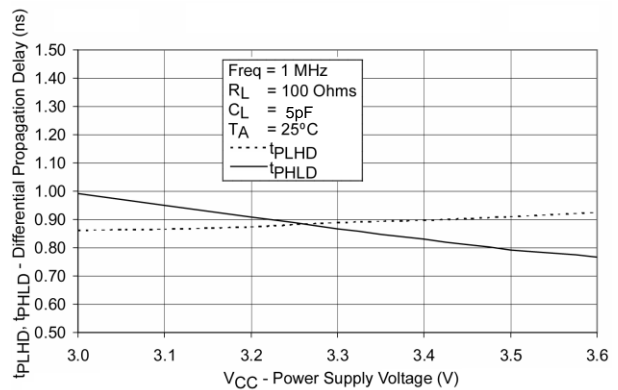


Figure 14. Differential Propagation Delay vs. Power Supply

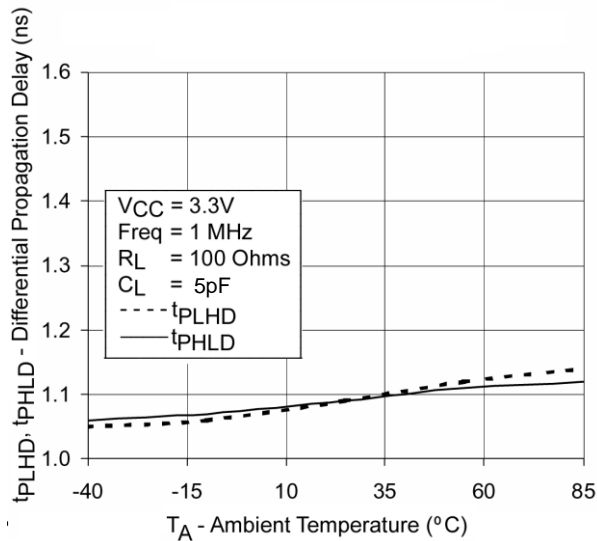


Figure 15. Differential Propagation Delay vs. Ambient Temperature

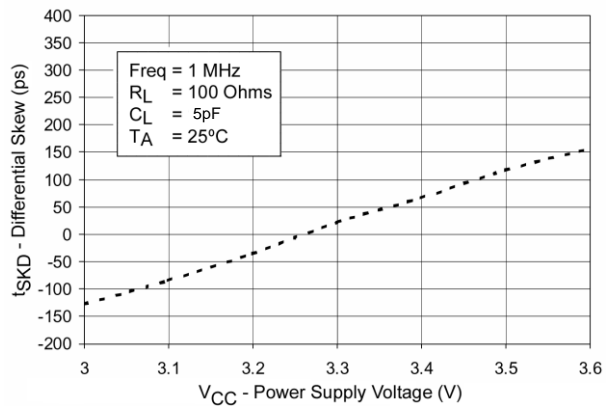


Figure 16. Differential Pulse Skew ($t_{PLH} - t_{PHL}$) vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

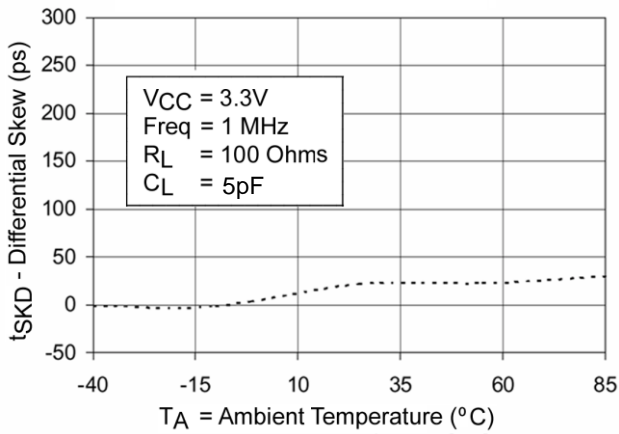


Figure 17. Differential Pulse Skew ($t_{PLH} - t_{PHL}$) vs. Ambient Temperature

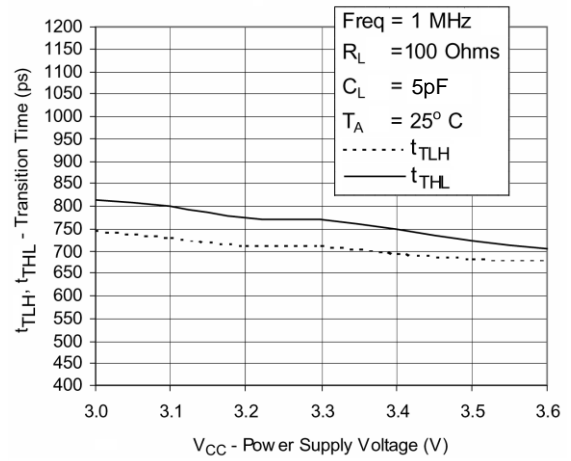


Figure 18. Transition Time vs. Power Supply Voltage

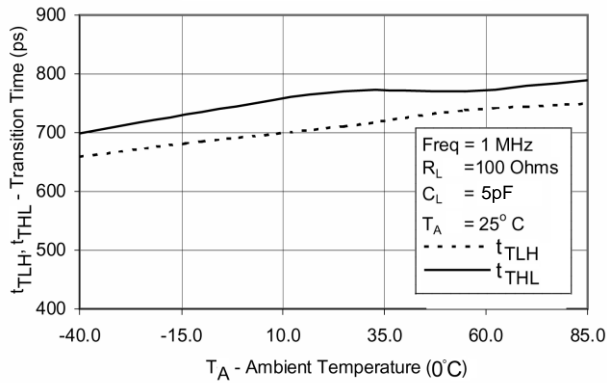
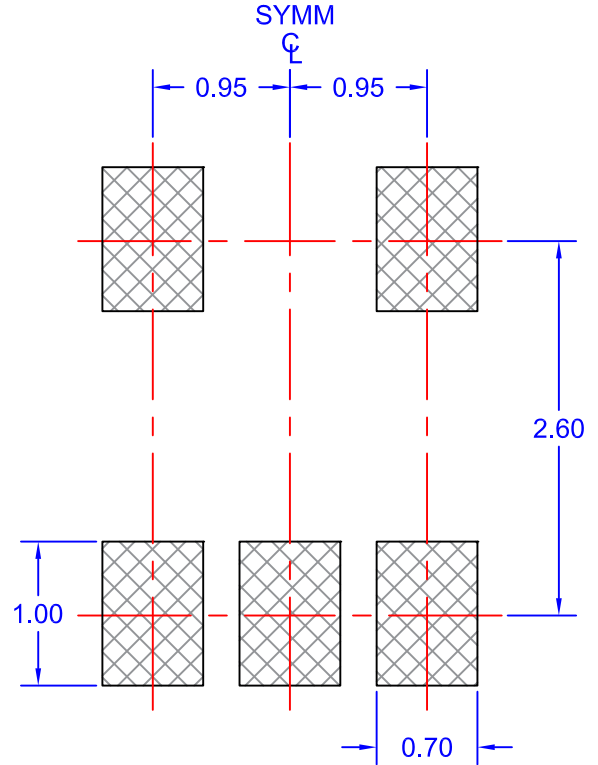


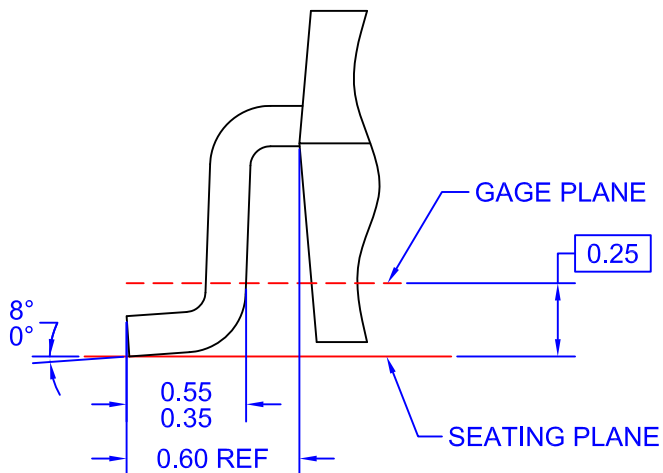
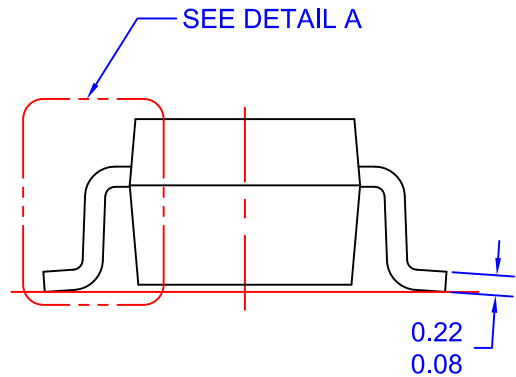
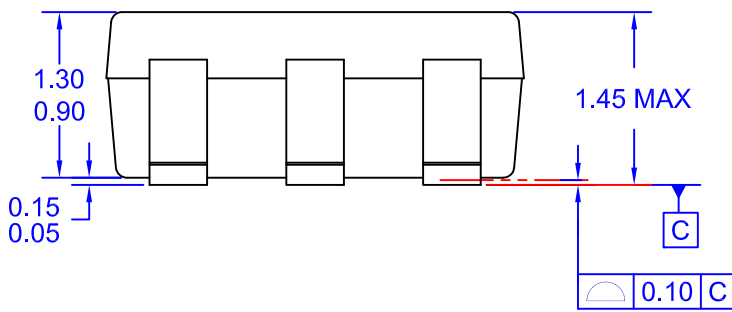
Figure 19. Transition Time vs. Ambient Temperature



TOP VIEW



LAND PATTERN RECOMMENDATION



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