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FAIRCHILD

July 2016

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 LVTTL 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

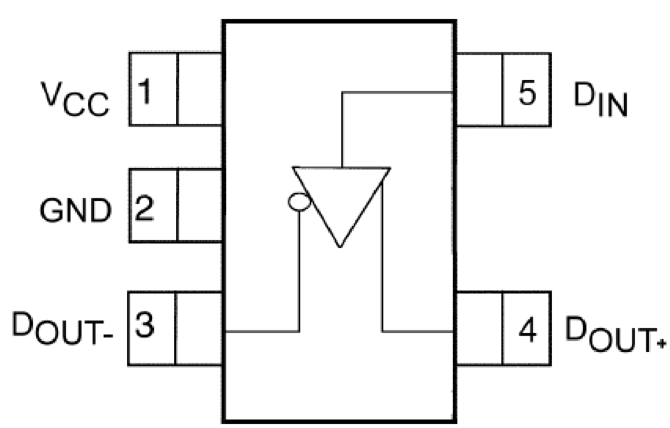


Figure 1. Top View

Pin Definitions

Pin #	Name	Description
1	V_{CC}	Power Supply
2	GND	Ground
3	D_{OUT+}	Non-inverting LVDS Driver Output
4	D_{OUT-}	Inverting LVDS Driver Output
5	D_{IN}	LVTTL 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. Fairchild 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° to +125°C, unless otherwise specified.
All typical values are at T_A = 25°C and with V_{CC} = 3.3 V, unless otherwise specified.

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

Notes:
1. Not production tested across the full temperature range.

AC Electrical Characteristics

All min and max values are guaranteed at T_A = -40 to +85°C.
All typical values are at T_A = 25°C and with V_{CC} = 3.3 V, unless otherwise specified.
R_L = 100 Ω, C_L = 5 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	$\lvert t_{PLH} - t_{PHL} \rvert$		0.05	0.5	ns
$t_{SK(PP)}$	Part-to-Part Skew[2]				1.0	ns

Note:
2. $t_{SK(PP)}$ 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

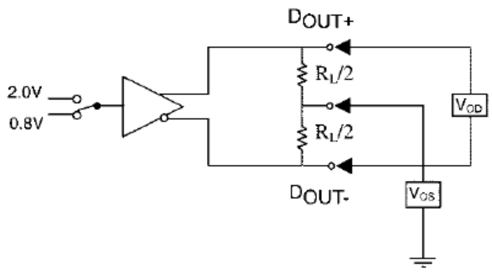


Figure 2. Differential Driver DC Test Circuit

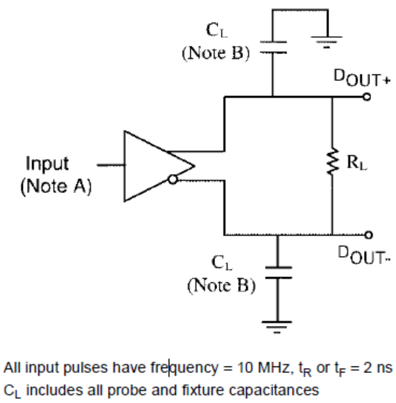


Figure 3. Differential Driver Propagation Delay and Transition Time Test Circuit

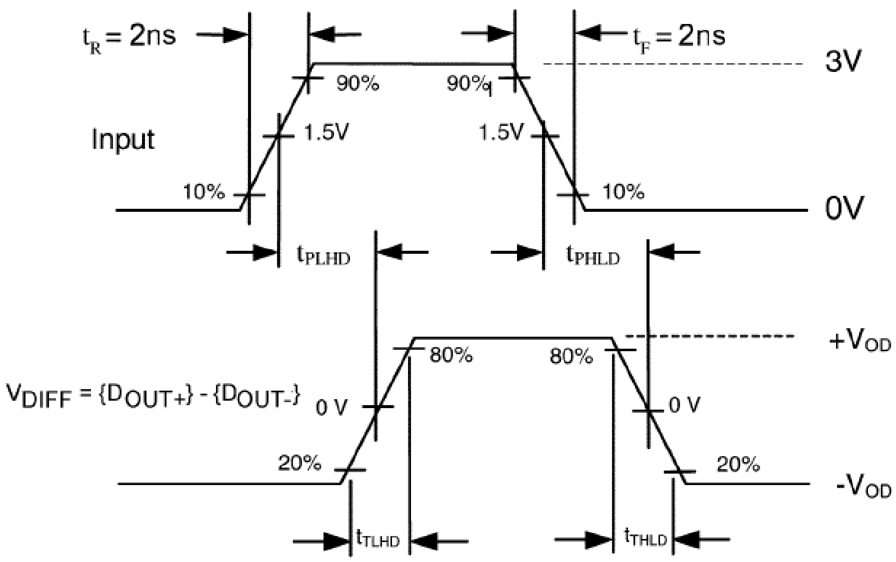


Figure 4. AC Waveforms

Typical Performance Characteristics

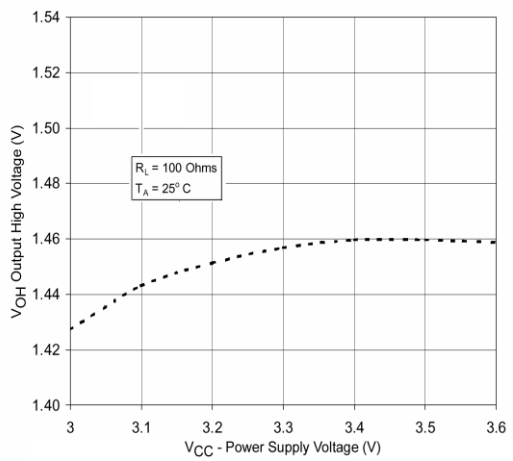


Figure 5. Output High Voltage vs. Power Supply Voltage

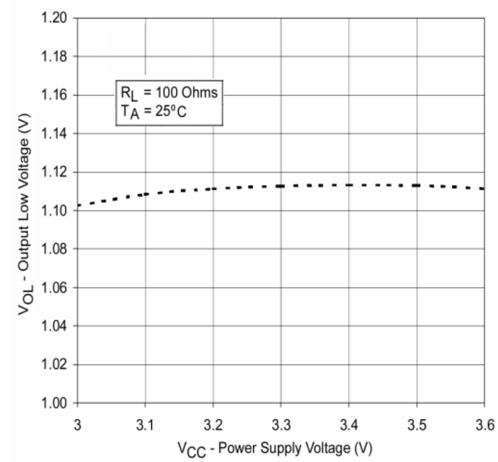


Figure 6. Output Low Voltage vs. Power Supply Voltage

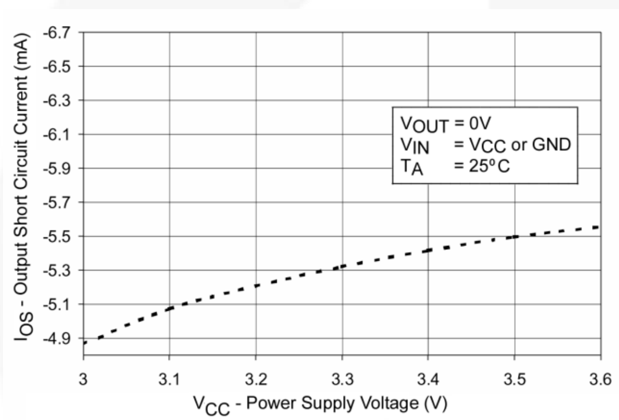


Figure 7. Output Short Circuit Current vs. Power Supply Voltage

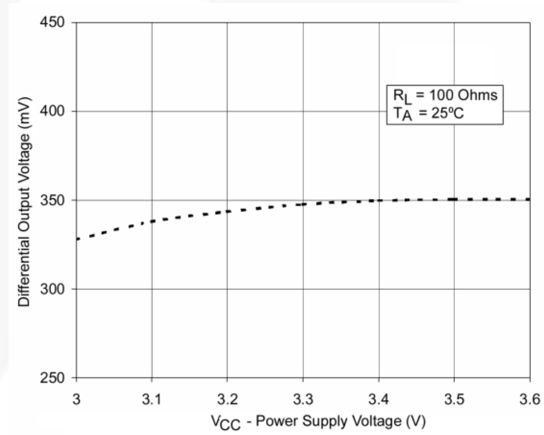


Figure 8. Differential Output Voltage vs. Power Supply Voltage

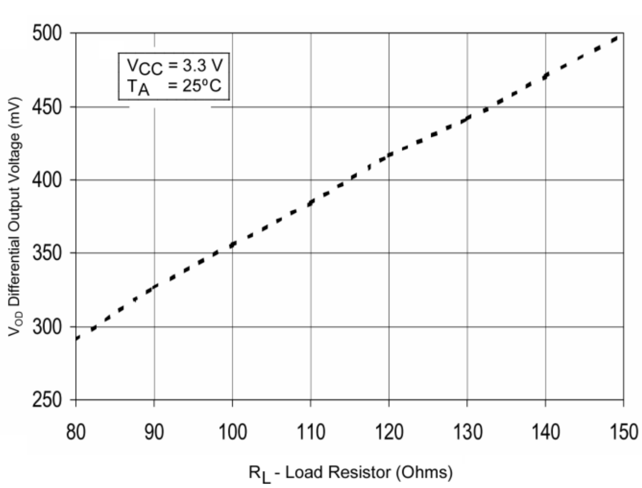


Figure 9. Differential Output Voltage vs. Load Resistor

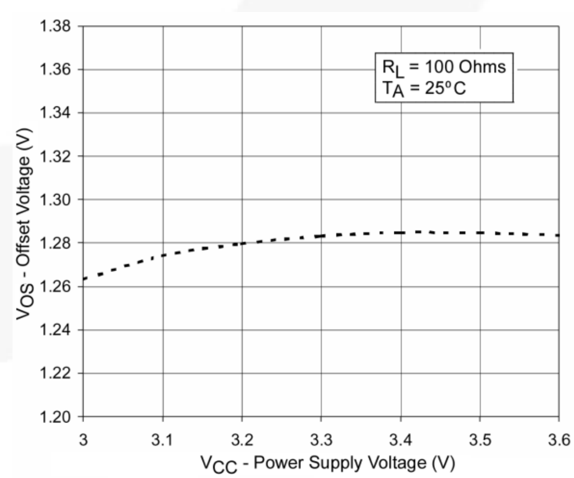


Figure 10. Offset Voltage vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

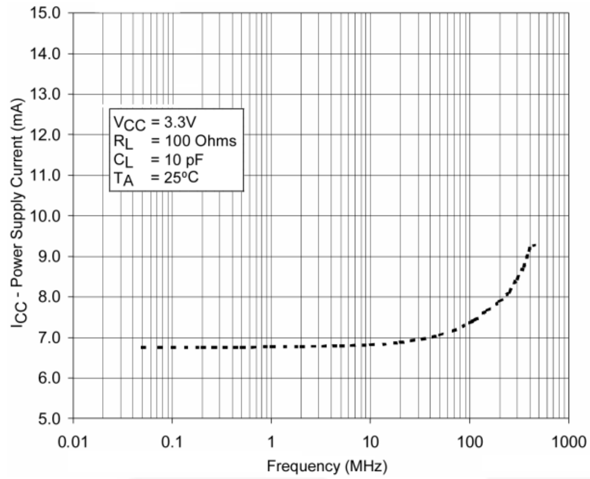


Figure 11. Power Supply Current vs. Frequency

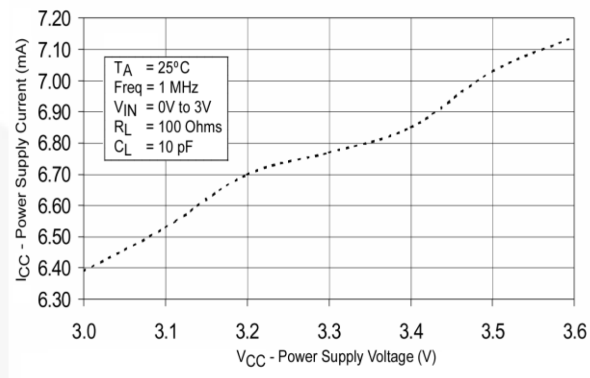


Figure 12. Power Supply Current vs. Power Supply Voltage

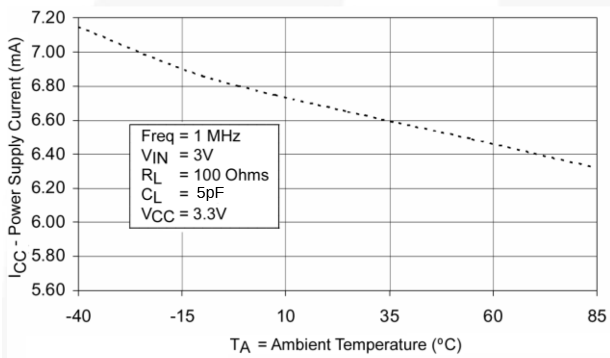


Figure 13. Power Supply Current vs. Ambient Temperature

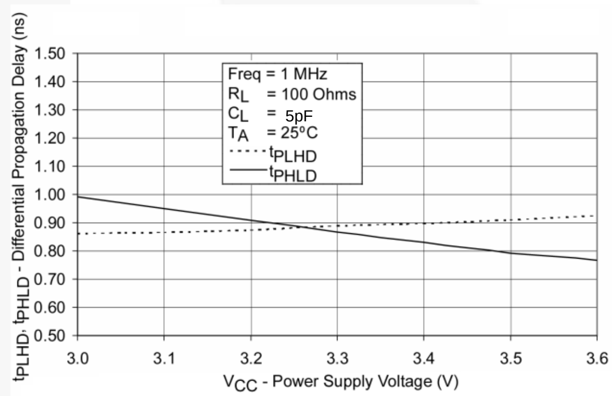


Figure 14. Differential Propagation Delay vs. Power Supply

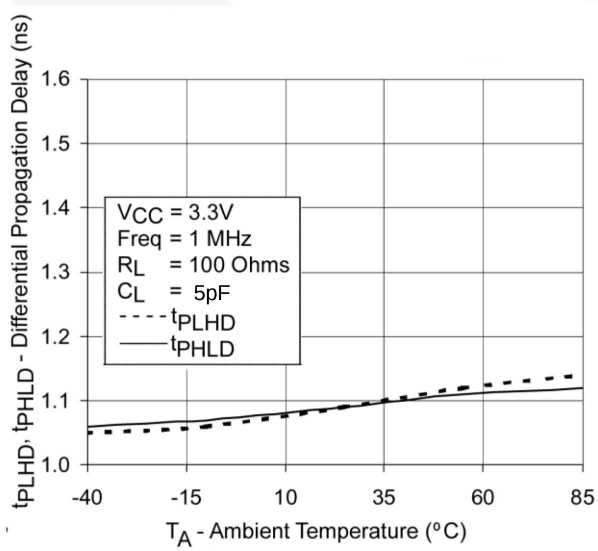


Figure 15. Differential Propagation Delay vs. Ambient Temperature

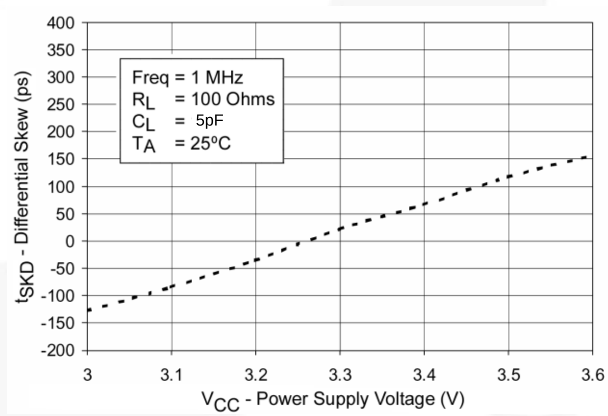


Figure 16. Differential Pulse Skew (t_{PLH} - t_{PHL}) vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

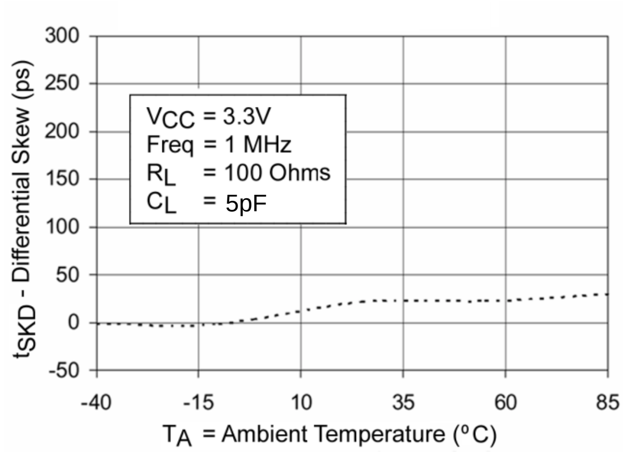


Figure 17. Differential Pulse Skew (t_{PLH} - t_{PHL}) vs. Ambient Temperature

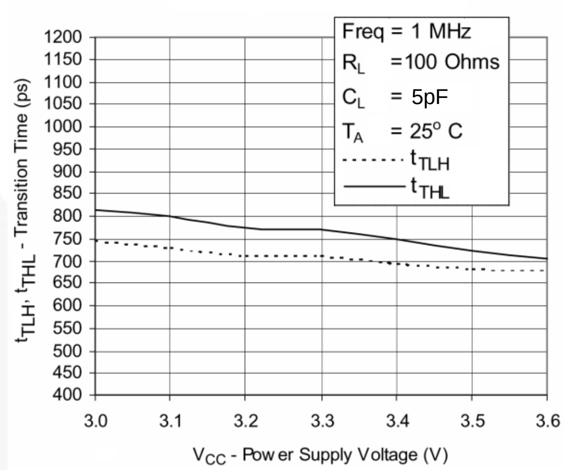


Figure 18. Transition Time vs. Power Supply Voltage

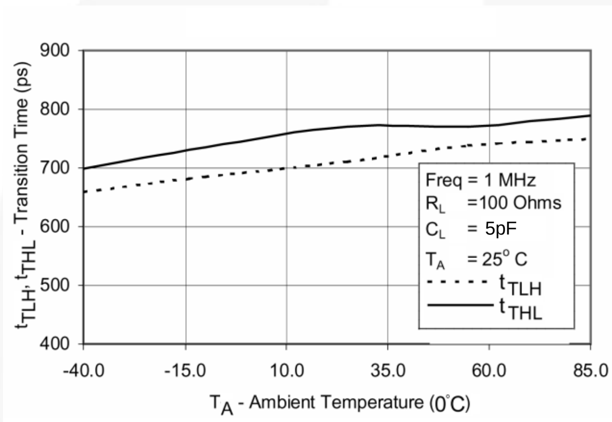
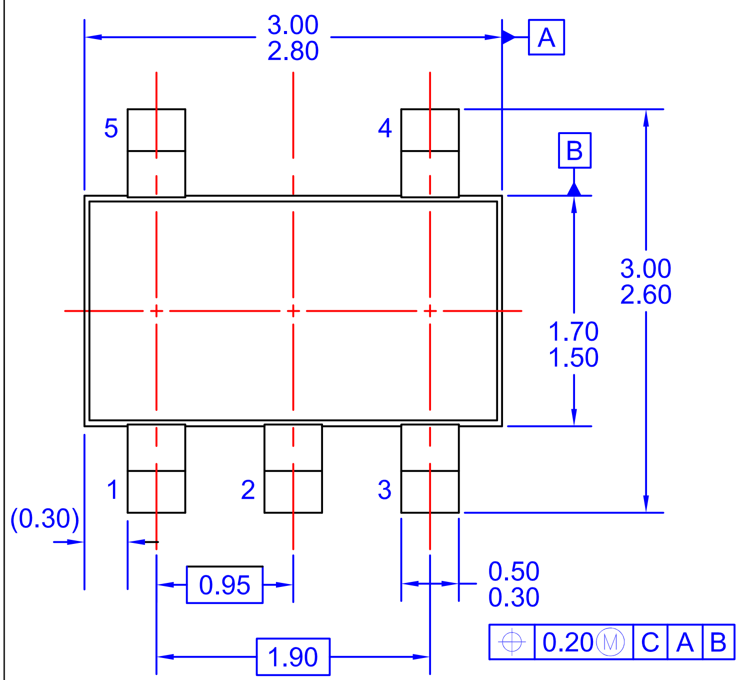
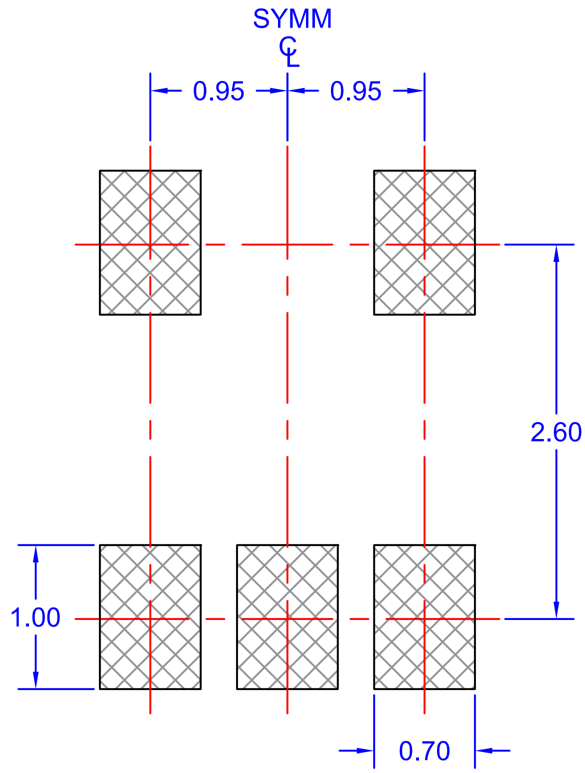


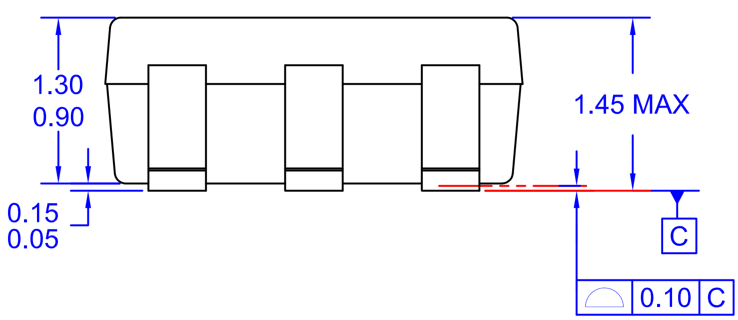
Figure 19. Transition Time vs. Ambient Temperature

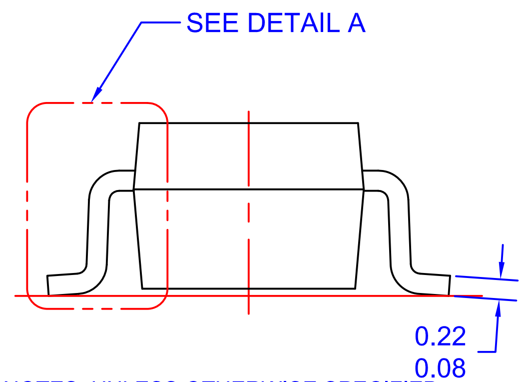


TOP VIEW



LAND PATTERN RECOMMENDATION





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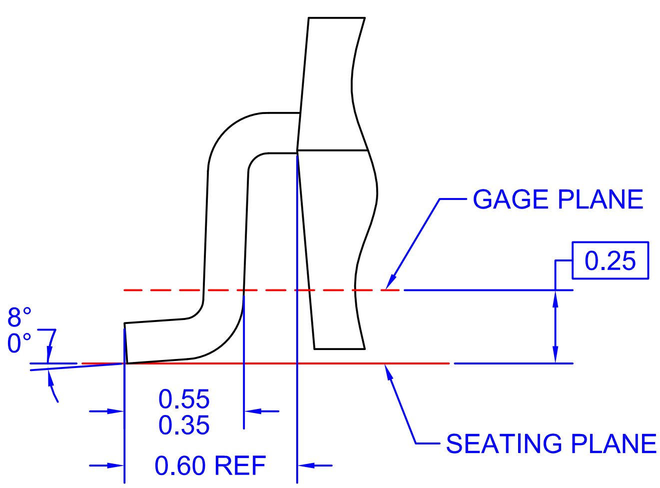

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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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