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July 2016

FIN1002
LVDS 1-Bit, High-Speed Differential Receiver

Features

- Greater than 400 Mbs Data Rate
- 3.3 V Power Supply Operation
- 0.4 ns Maximum Pulse Skew
- 2.5 ns Maximum Propagation Delay
- Bus Pin ESD (HBM) Protection Exceeds 10 kV
- Power-Off, Over-voltage tolerant Input and Output
- Fail-safe Protection for open-circuit and non-driven, shorted, or terminated Conditions
- High-impedance Output at V_{CC} < 1.5 V
- Meets or exceeds TIA/EIA-644 LVDS Standard
- 5-Lead SOT23 Package saves Space

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 LVTTL 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 FIN1002 can be paired with its companion driver, the FIN1001, or with any other LVDS driver.

Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method	Packing Quantity
FIN1002M5	-40 to +125°C	5-Lead SOT23, JEDEC MO-178, 1.6 mm	Tube	250
FIN1002M5X	-40 to +125°C	5-Lead SOT23, JEDEC MO-178, 1.6 mm	Tape & Reel	3000

Connection Diagram

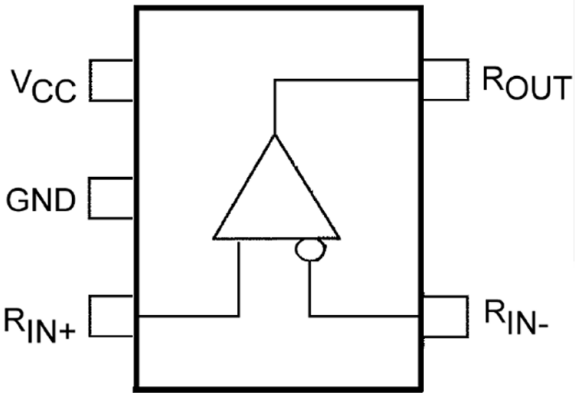


Figure 1. Top View

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Pin Configuration

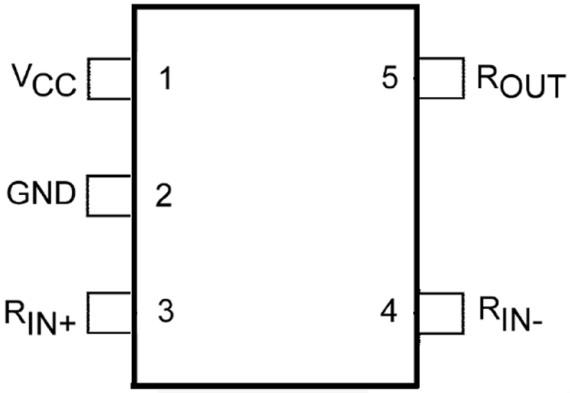


Figure 2. Pin Configuration

Pin Definitions

Pin #	Name	Description
1	V_{CC}	Power Supply
2	GND	Ground for the IC
3	R_{IN+}	Non-inverting Driver Input
4	R_{IN-}	Inverting Driver Input
5	R_{OUT}	LVTTL Data Output

Function Table

Inputs		Outputs
R_{IN+}	R_{IN-}	R_{OUT}
LOW	HIGH	LOW
HIGH	LOW	HIGH
Fail-Safe Condition (Open, Shorted, Terminated)		HIGH

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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
R_{IN+} / R_{IN-}	Input Voltage			-0.5	4.6	V
D_{OUT}	DC Output Voltage			-0.5	6.0	V
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	All Pins		8	kV
			LVDS Pins to GND		10	
		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
V_{ID}	Magnitude of Differential Voltage	100	V_{CC}	mV
V_{IC}	Common-mode Input Voltage	$0 + \|V_{ID}\| /2$	$2.4 - \|V_{ID}\|/2$	V
T_A	Operating Temperature	-40	+125	°C

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DC Electrical Characteristics[1]

All min. and max. values are guaranteed at T_A = -40 to +125°C. 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.	Units
V_{TH}	Differential Input Threshold HIGH	V_{IC} = +0.05 V, 1.2 V, or 2.35 V Figure 3			100	mV
V_{TL}	Differential Input Threshold LOW	V_{IC} = +0.05 V, 1.2 V, or 2.35 V Figure 3	−100			mV
I_{IN}	Input Current	V_{IN} = 0 V or V_{CC}			±20	µA
$I_{I(OFF)}$	Power-OFF Input Current	V_{CC} = 0 V, V_{IN} = 0 V or 3.6 V			±20	µA
V_{OH}	Output HIGH Voltage	I_{OH} = −100 µA	V_{CC} − 0.2	3.3		V
		I_{OH} = −8 mA	2.4	3.1		
V_{OL}	Output LOW Voltage	I_{OH} = 100 µA		0	0.2	V
		I_{OL} = 8 mA		0.16	0.50	
V_{IK}	Input Clamp Voltage	I_{IK} = −18 mA	−1.5	0.8		V
I_{CC}	Power Supply Current	(R_{IN+} = 1 V and R_{IN-}= 1.4 V) or (R_{IN+} = 1.4 V and R_{IN-}= 1 V)		4	7	mA
C_{IN}	Input Capacitance	V_{CC} = 3.3 V		2.3		pF
C_{OUT}	Output Capacitance	V_{CC} = 0 V		2.8		pF

Note:
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.

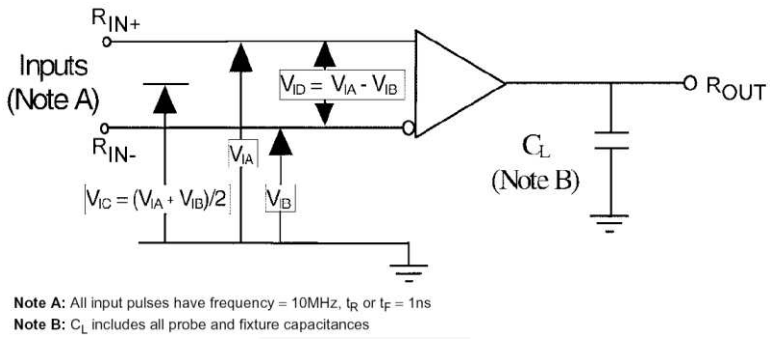
$|V_{ID}|$ = 400 mV, C_L = 10 pF. See Figure 3 and Figure 4.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
t_{PLH}	Propagation Delay	LOW to HIGH	0.9	1.5	2.5	ns
t_{PHL}	Propagation Delay	HIGH to LOW	0.9	1.5	2.5	ns
t_{TLH}	Output Rise Time	20% to 80%		0.6		ns
t_{THL}	Output Fall Time	80% to 20%		0.5		ns
$t_{SK(p)}$	Pulse Skew	$\|t_{PLH} - t_{PHL}\|$		0.02	0.4	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.

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Test Diagrams



Note A: All input pulses have frequency = 10MHz, t_R or t_F = 1ns
Note B: C_L includes all probe and fixture capacitances

Figure 3. Differential Receiver Voltage Definitions and Propagation Delay and Transition Time Test Circuit

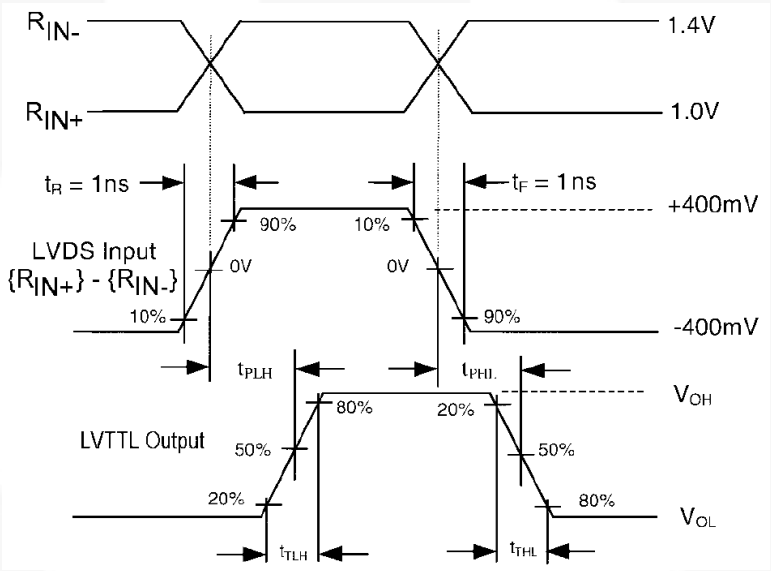


Figure 4. LVDS Input to LVTTL Output AC Waveforms

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Typical Performance Characteristics

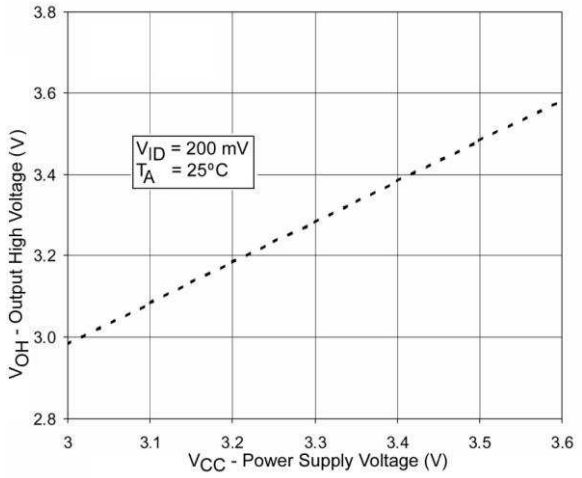


Figure 5. Output High Voltage vs. Power Supply Voltage

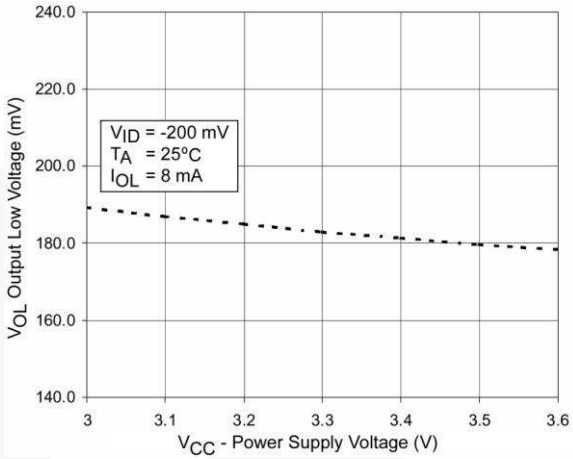


Figure 6. Output Low Voltage vs. Power Supply Voltage

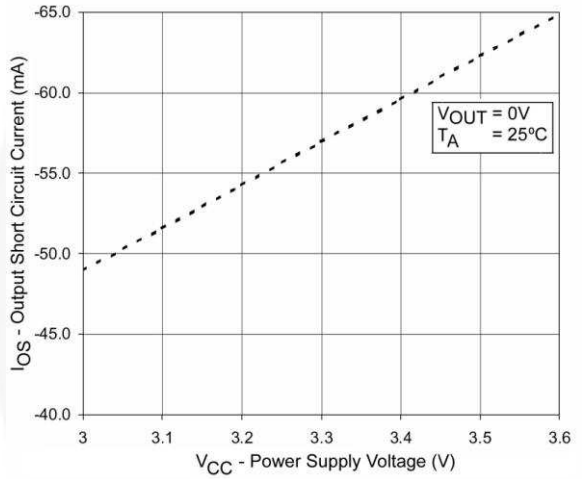


Figure 7. Output Short Circuit Current vs. Power Supply Voltage

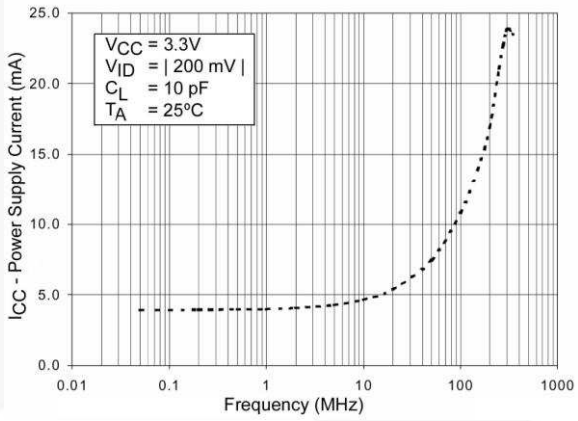


Figure 8. Power Supply Current vs. Frequency

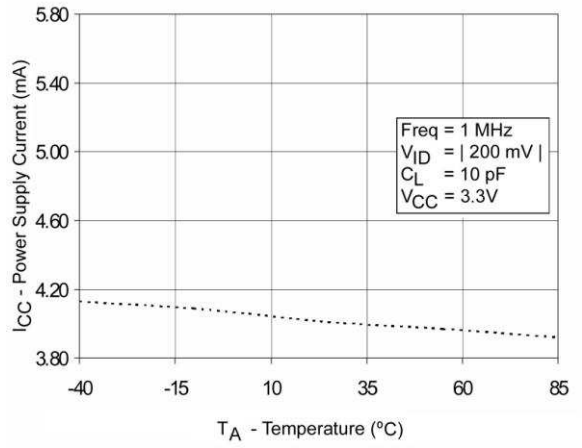


Figure 9. Power Supply Current vs. Ambient Temperature

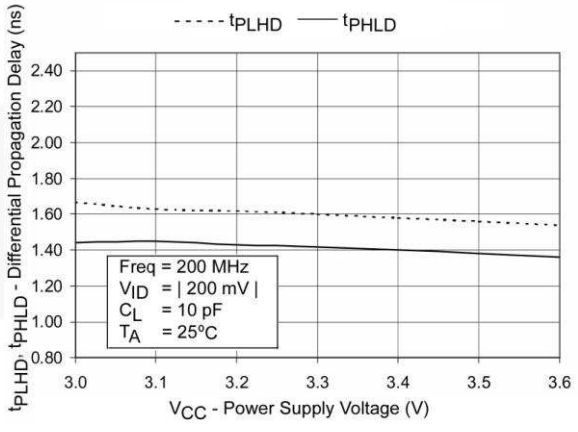


Figure 10. Differential Propagation Delay Power Supply Voltage

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Typical Performance Characteristics (Continued)

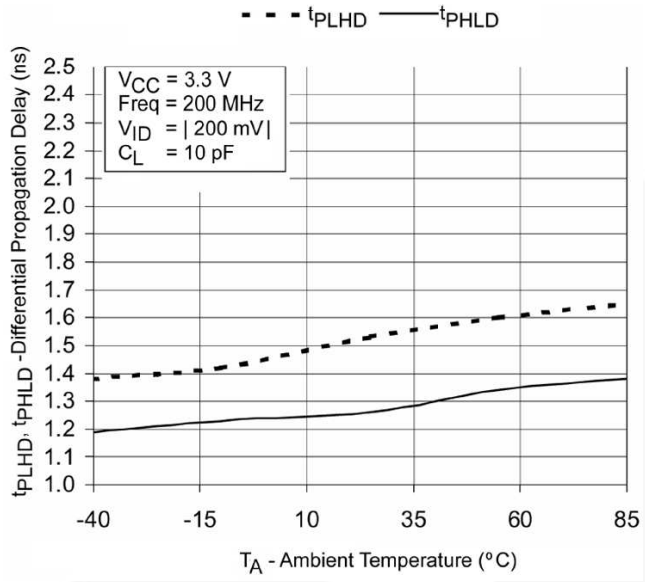


Figure 11. Differential Propagation Delay vs. Ambient Temperature

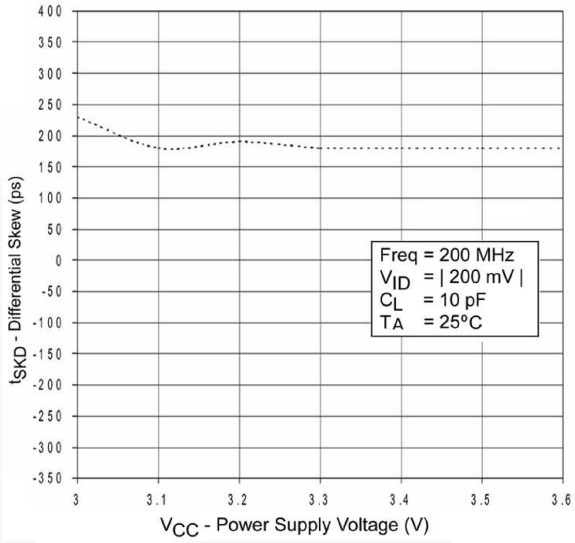


Figure 12. Differential Skew vs. Power Supply Voltage

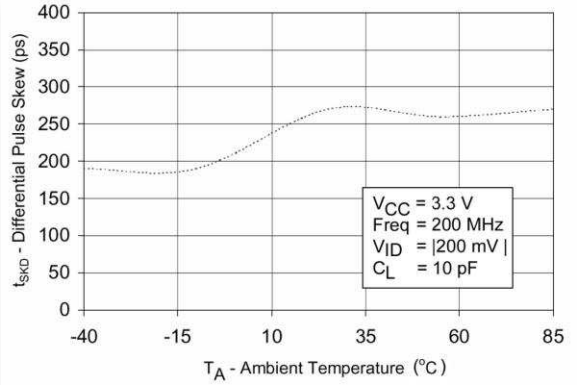


Figure 13. Differential Skew vs. Ambient Temperature

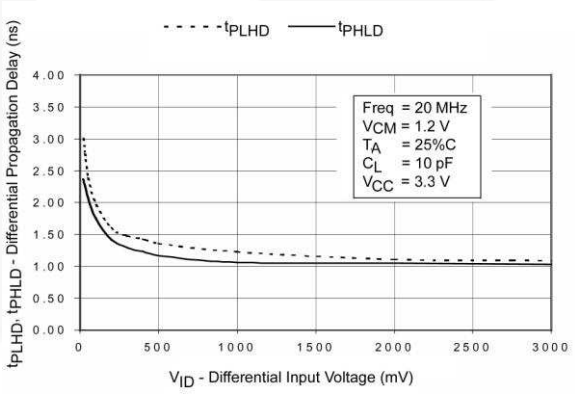


Figure 14. Differential Propagation Delay vs. Differential Input Voltage

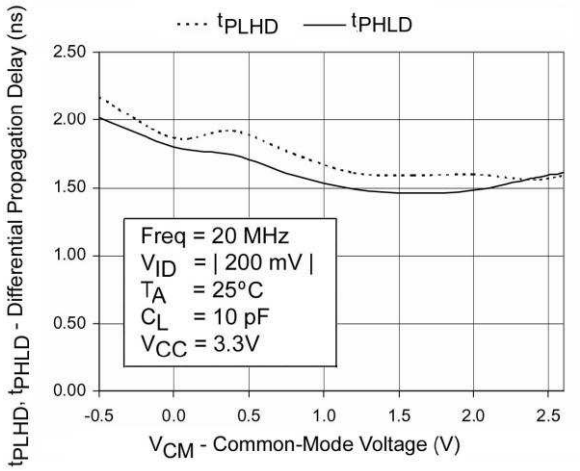


Figure 15. Differential Propagation Delay vs. Common-Mode Voltage

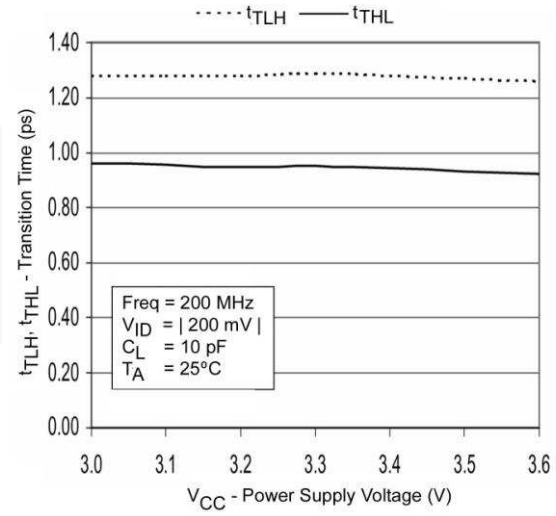


Figure 16. Transition Time vs. Power Supply Voltage

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Typical Performance Characteristics (Continued)

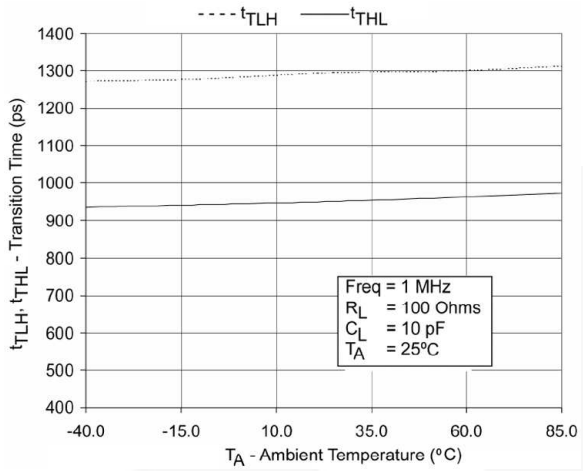


Figure 17. Transition Time vs. Ambient Temperature

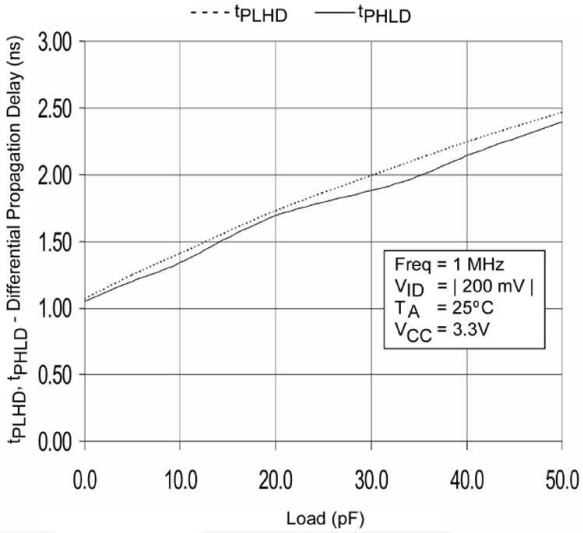


Figure 18. Differential Propagation Delay vs. Load

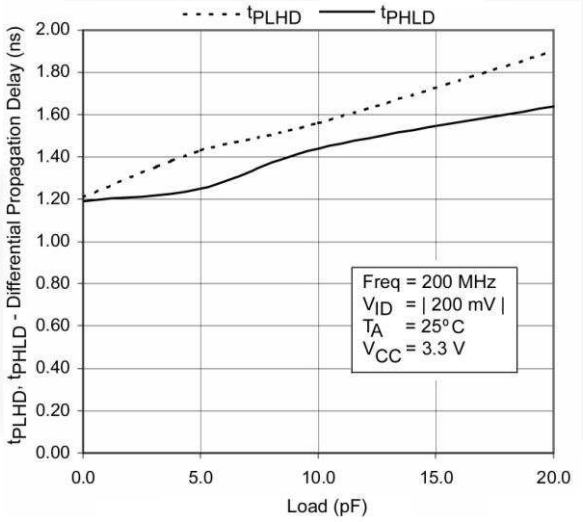


Figure 19. Differential Propagation Delay vs. Load

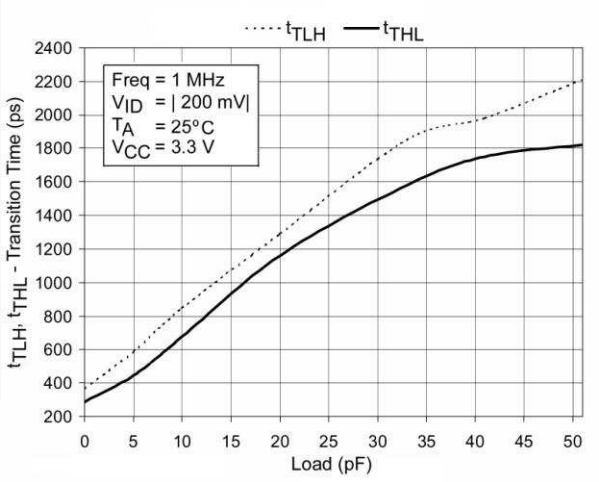


Figure 20. Transition Time vs. Load

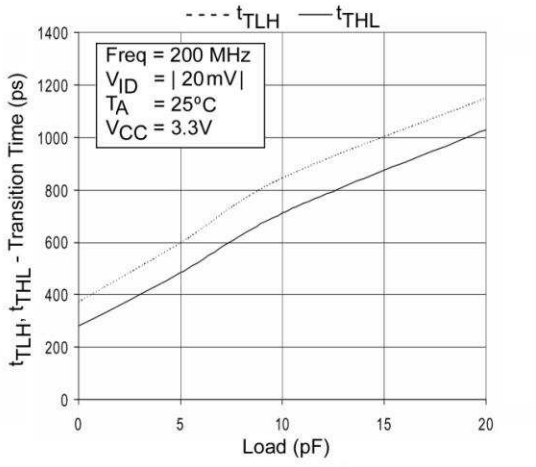


Figure 21. Transition Time vs. Load

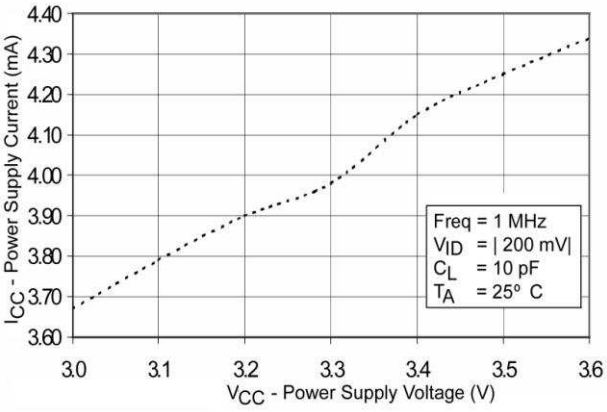
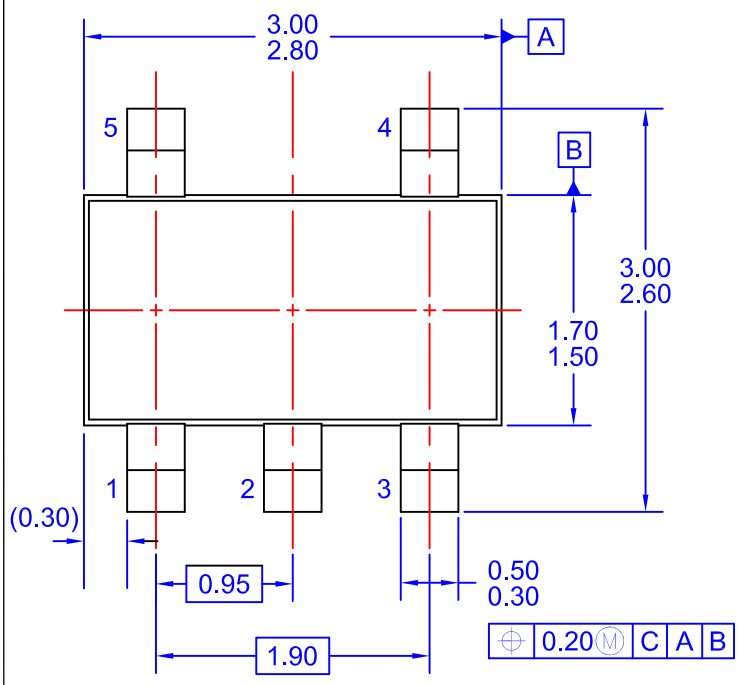
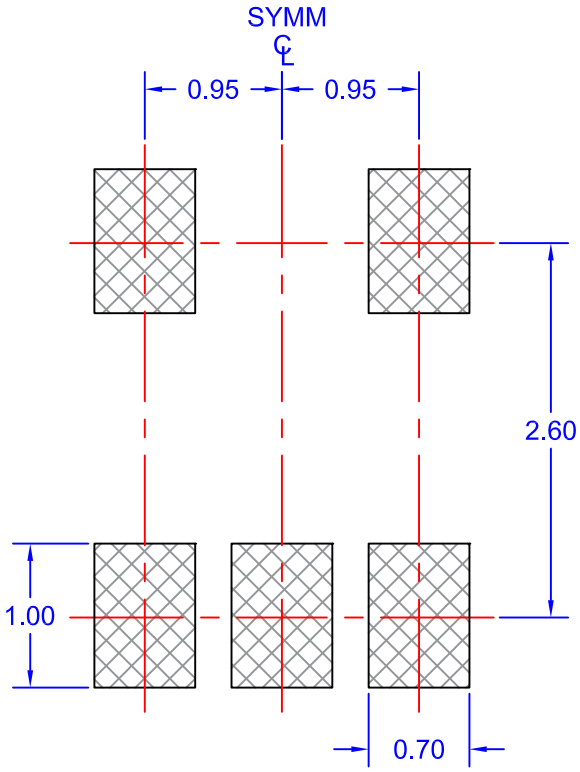


Figure 22. Power Supply Current vs. Power Supply Voltage

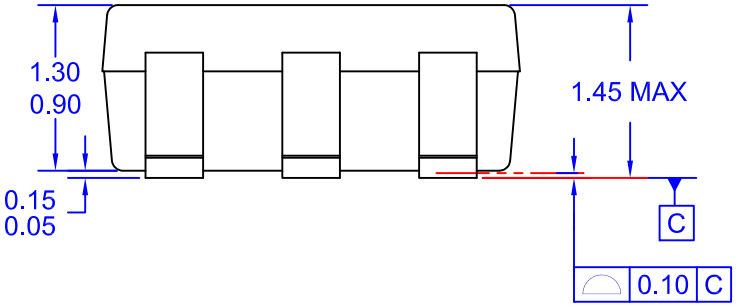
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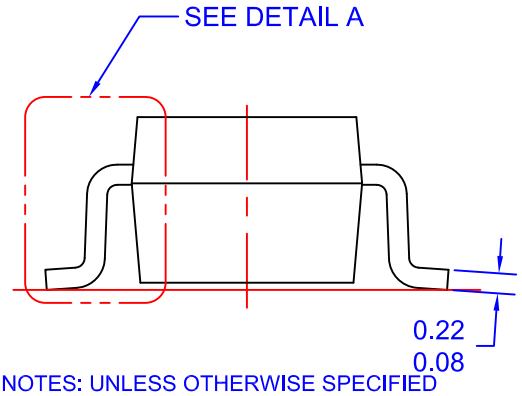


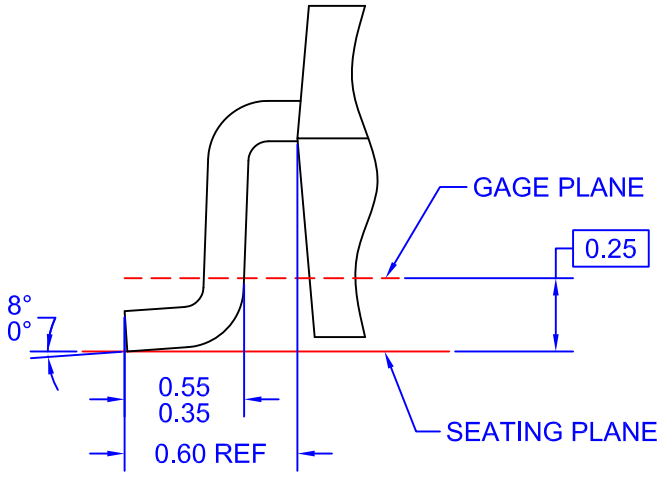
TOP VIEW



LAND PATTERN RECOMMENDATION







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