Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD™

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

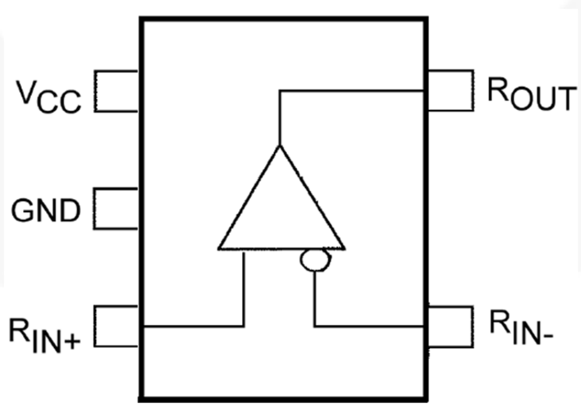


Figure 1. Top View

Pin Configuration

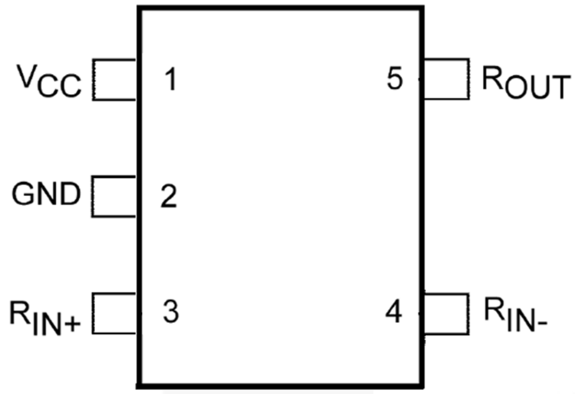


Figure 2. Pin Configuration

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

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.

<table>
<tr><th>Symbol</th><th colspan="3">Parameter</th><th>Min.</th><th>Max.</th><th>Unit</th></tr>
<tr><td>V_{CC}</td><td colspan="3">Supply Voltage</td><td>-0.5</td><td>4.6</td><td>V</td></tr>
<tr><td>R_{IN+} / R_{IN-}</td><td colspan="3">Input Voltage</td><td>-0.5</td><td>4.6</td><td>V</td></tr>
<tr><td>D_{OUT}</td><td colspan="3">DC Output Voltage</td><td>-0.5</td><td>6.0</td><td>V</td></tr>
<tr><td>I_O</td><td colspan="3">Output Current</td><td></td><td>16</td><td>mA</td></tr>
<tr><td>T_{STG}</td><td colspan="3">Storage Temperature Range</td><td>-65</td><td>+150</td><td>°C</td></tr>
<tr><td>T_J</td><td colspan="3">Maximum Junction Temperature</td><td></td><td>+150</td><td>°C</td></tr>
<tr><td>T_L</td><td colspan="3">Lead Temperature, Soldering, 10 Seconds</td><td></td><td>+260</td><td>°C</td></tr>
<tr><td rowspan="3">ESD</td><td rowspan="3">Electrostatic Discharge</td><td rowspan="2">Human Body Model</td><td>All Pins</td><td></td><td>8</td><td rowspan="2">kV</td></tr>
<tr><td>LVDS Pins to GND</td><td></td><td>10</td></tr>
<tr><td colspan="2">Machine Model</td><td></td><td>400</td><td>V</td></tr>
</table>

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

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

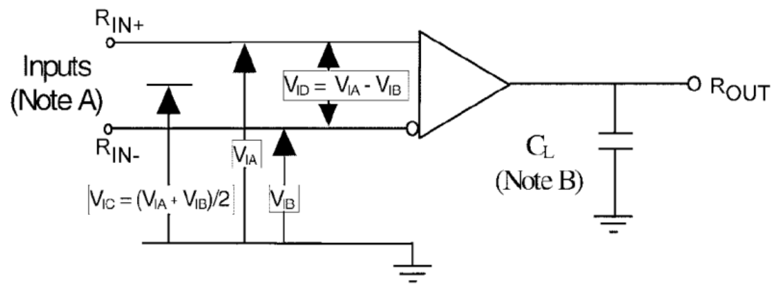
All min. and max. values are guaranteed at T_A = -40 to +85°C. All typical values are at T_A = 25°C and with V_{CC} = 3.3 V, unless otherwise specified.

$|V_{ID}|$ = 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.

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

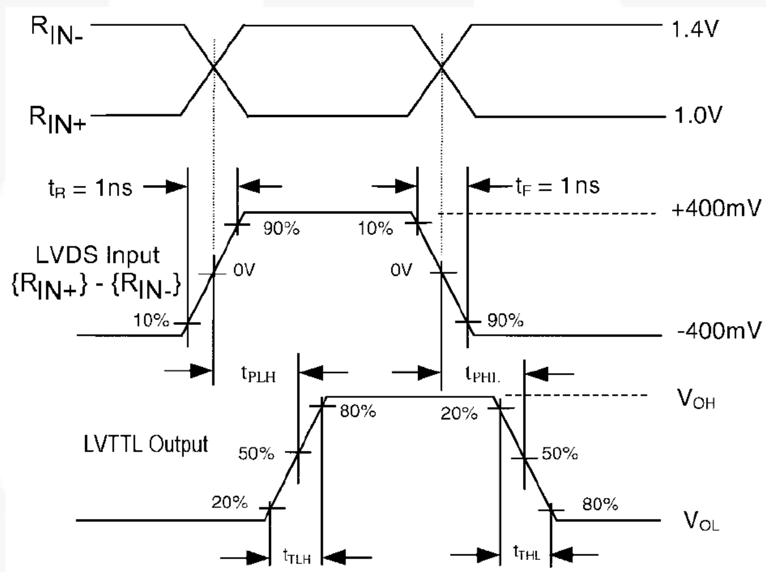


Figure 4. LVDS Input to LVTTL Output AC Waveforms

Typical Performance Characteristics

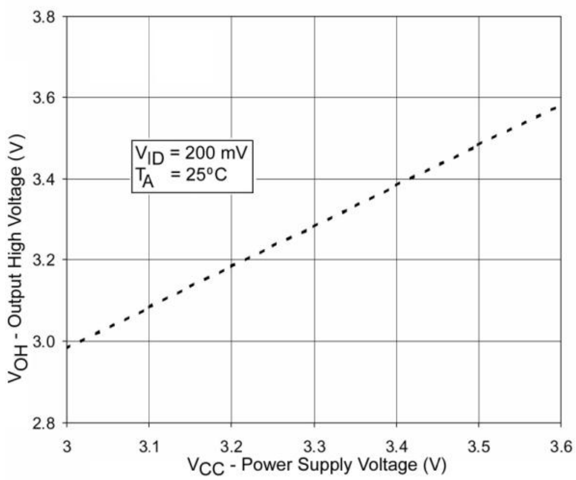


Figure 5. Output High Voltage vs. Power Supply Voltage

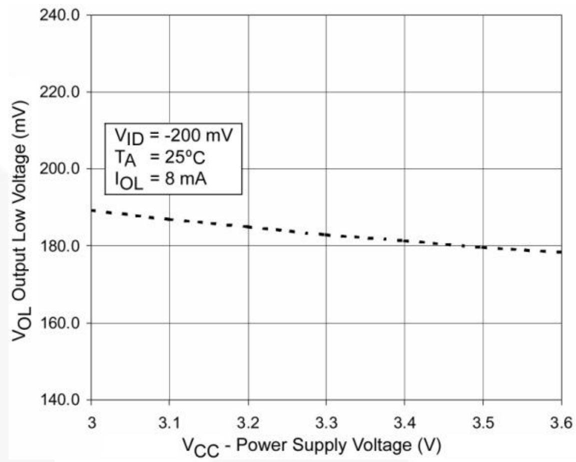


Figure 6. Output Low Voltage vs. Power Supply Voltage

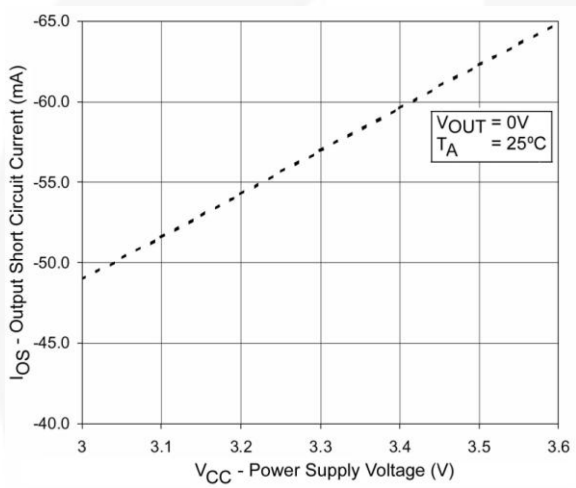


Figure 7. Output Short Circuit Current vs. Power Supply Voltage

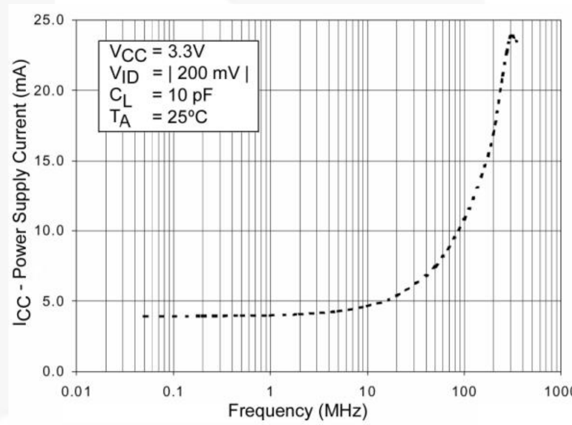


Figure 8. Power Supply Current vs. Frequency

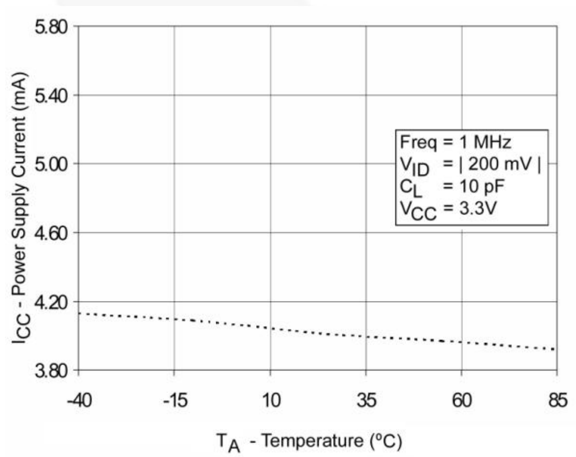


Figure 9. Power Supply Current vs. Ambient Temperature

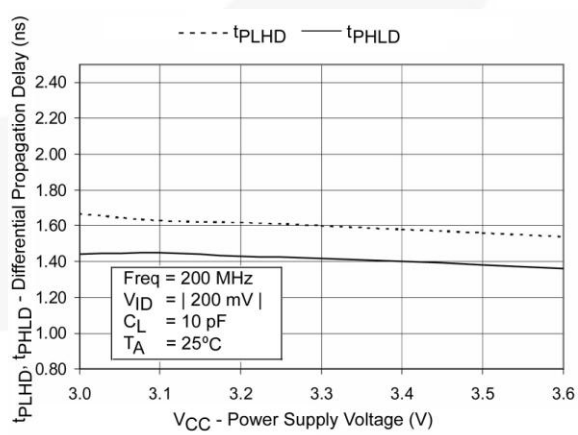


Figure 10. Differential Propagation Delay Power Supply Voltage

Typical Performance Characteristics (Continued)

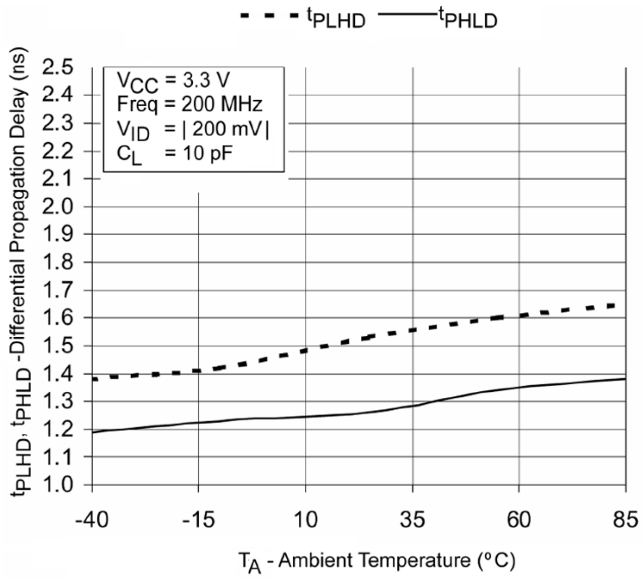


Figure 11. Differential Propagation Delay vs. Ambient Temperature

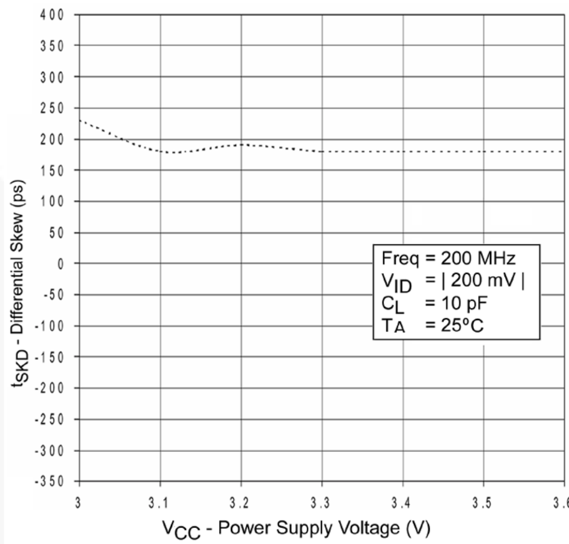


Figure 12. Differential Skew vs. Power Supply Voltage

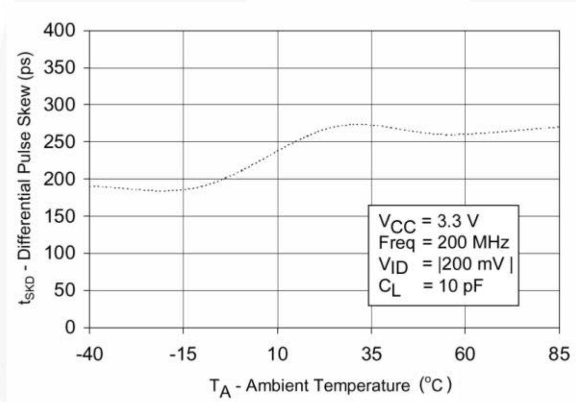


Figure 13. Differential Skew vs. Ambient Temperature

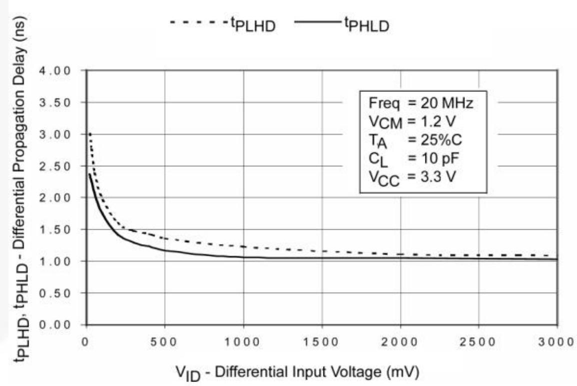


Figure 14. Differential Propagation Delay vs. Differential Input Voltage

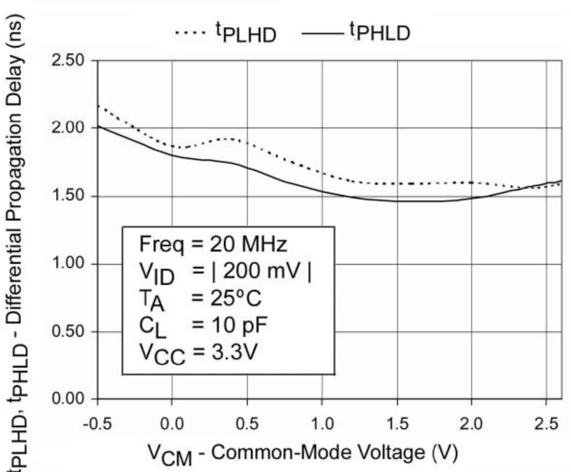


Figure 15. Differential Propagation Delay vs. Common-Mode Voltage

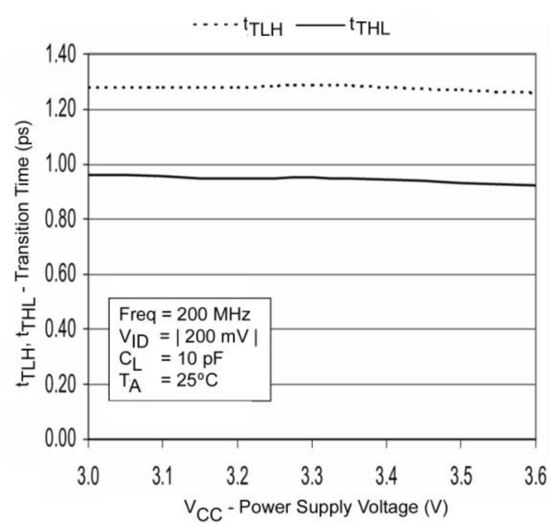


Figure 16. Transition Time vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

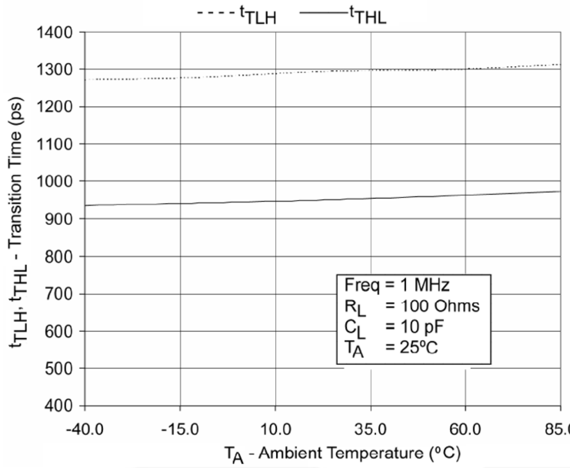


Figure 17. Transition Time vs. Ambient Temperature

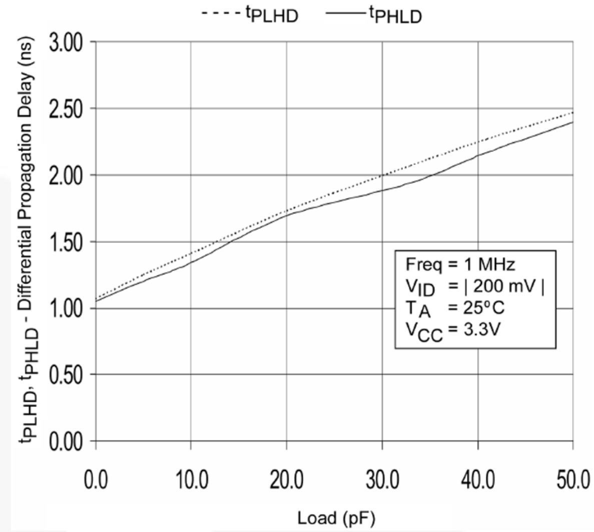


Figure 18. Differential Propagation Delay vs. Load

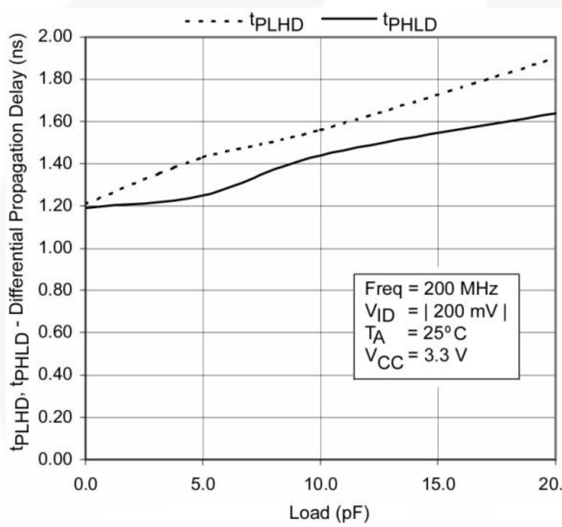


Figure 19. Differential Propagation Delay vs. Load

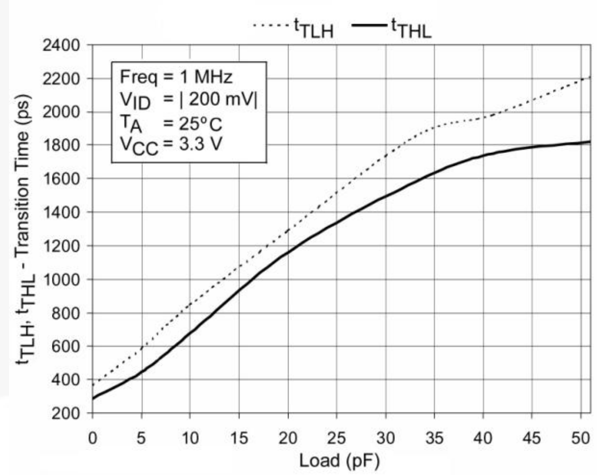


Figure 20. Transition Time vs. Load

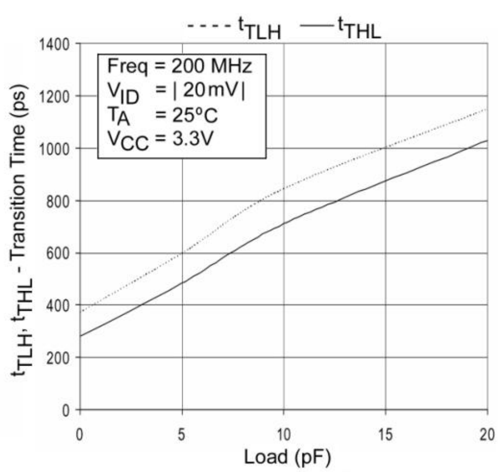


Figure 21. Transition Time vs. Load

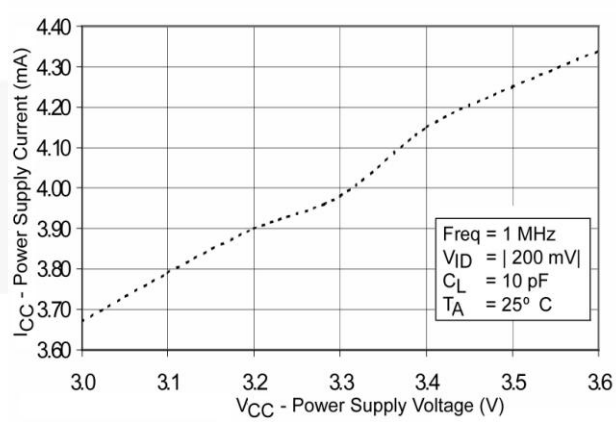
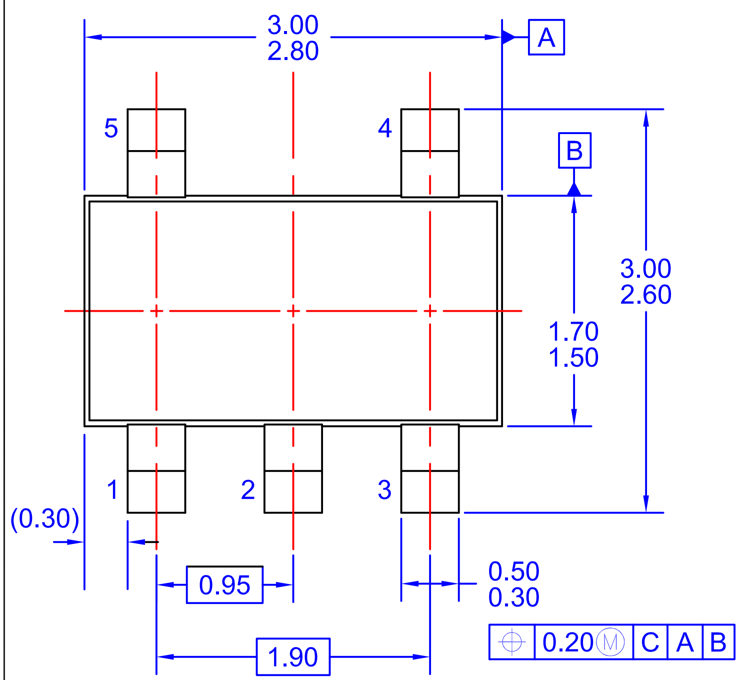
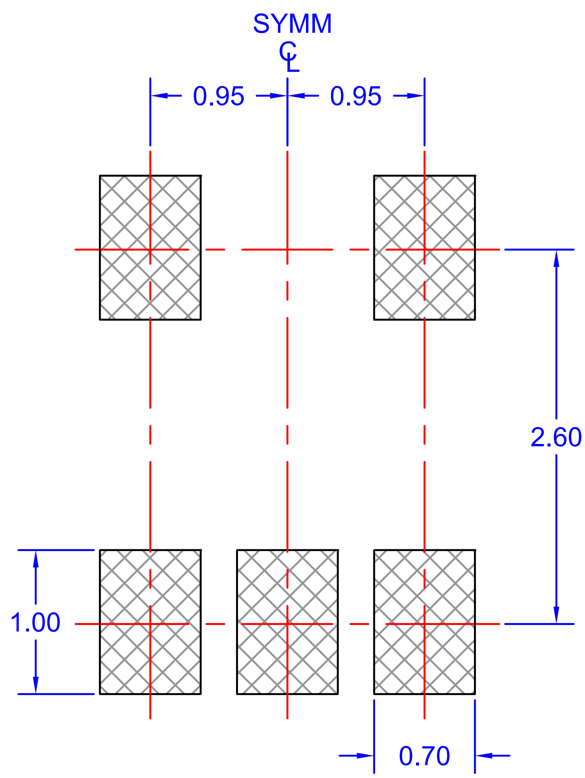


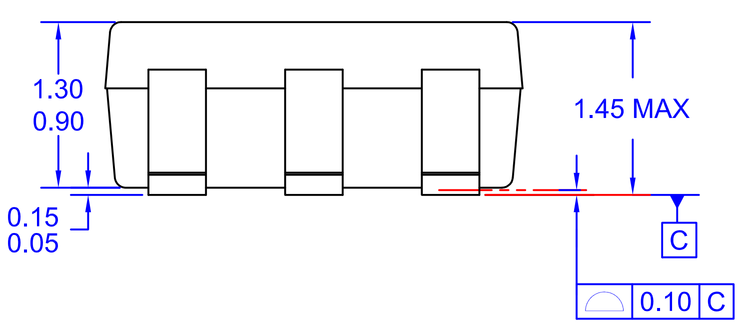
Figure 22. Power Supply Current vs. Power Supply Voltage

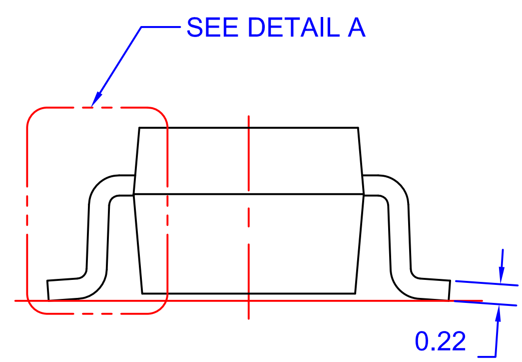


TOP VIEW



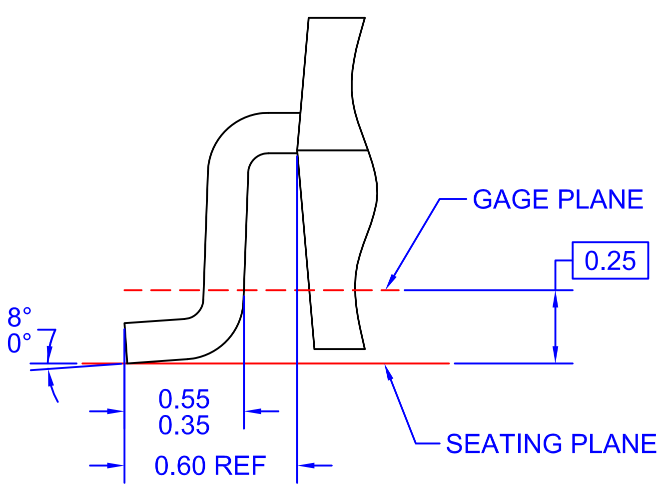
LAND PATTERN RECOMMENDATION





NOTES: UNLESS OTHERWISE SPECIFIED
A) PACKAGE STANDARD REFERENCE: JEDEC REGISTRATION, MO-178, ISSUE B, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
E) DRAWING FILE NAME: MKT-MA05BREV6

FAIRCHILD™



PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative