FAIRCHILD
SEMICONDUCTOR™

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FIN1001
3.3V LVDS 1-Bit High Speed Differential Driver

General Description

This single driver is designed for high speed interconnects utilizing Low Voltage Differential Signaling (LVDS) technology. The driver translates LVTTL signal 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.

Features

- Greater than 600Mbs data rate
- 3.3V power supply operation
- 0.5ns maximum differential pulse skew
- 1.5ns maximum propagation delay
- Low power dissipation
- Power-Off protection
- Meets or exceeds the TIA/EIA-644 LVDS standard
- Flow-through pinout simplifies PCB layout
- 5-Lead SOT23 package saves space

Ordering Code:

Order Number	Package Number	Package Description
FIN1001M5	MA05B	5-Lead SOT23, JEDEC MO-178, 1.6mm [250 Units on Tape and Reel]
FIN1001M5X	MA05B	5-Lead SOT23, JEDEC MO-178, 1.6mm [3000 Units on Tape and Reel]

Pin Descriptions

Pin Name	Description
D_{IN}	LVTTL Data Input
D_{OUT+}	Non-inverting LVDS Driver Output
D_{OUT-}	Inverting LVDS Driver Output
V_{CC}	Power Supply
GND	Ground
NC	No Connect

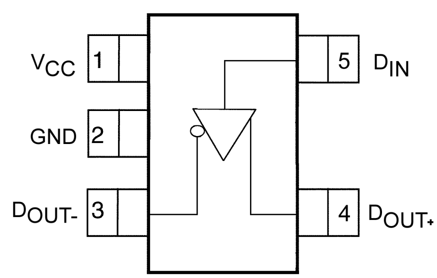
Function Table

Input	Outputs	
D_{IN}	D_{OUT+}	D_{OUT-}
L	L	H
H	H	L

H = HIGH Logic Level L = LOW Logic Level

Connection Diagram

Pin Assignment for SOT23



(Top View)

Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	−0.5V to +4.6V
DC Input Voltage (D_{IN})	−0.5V to +6V
DC Output Voltage (D_{OUT})	−0.5V to +4.6V
Driver Short Circuit Current (I_{OSD})	Continuous
Storage Temperature Range (T_{STG})	−65°C to +150°C
Max Junction Temperature (T_J)	150°C
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C
ESD (Human Body Model)	≥ 7500V
ESD (Machine Model)	≥ 400V

Recommended Operating Conditions

Supply Voltage (V_{CC})	3.0V to 3.6V
Input Voltage (V_{IN})	0 to V_{CC}
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 (Note 2)	Max	Units
V_{OD}	Output Differential Voltage	R_L = 100 Ω, See Figure 1	250	350	450	mV
ΔV_{OD}	V_{OD} Magnitude Change from Differential LOW-to-HIGH				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} = 0V, V_{OUT} = 0V or 3.6V			±20	µA
I_{OS}	Short Circuit Output Current	V_{OUT} = 0V		−5.5	−8	mA
		V_{OD} = 0V		±4	±8	
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} = 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_{IK}	Input Clamp Voltage	I_{IK} = −18 mA	−1.5	−0.8		V
I_{CC}	Power Supply Current	No Load, V_{IN} = 0V or V_{CC}		4.5	8	mA
		R_L = 100 Ω, V_{IN} = 0V or V_{CC}		6.5	10	
C_{IN}	Input Capacitance	V_{CC} = 3.3V		3.2		pF
C_{OUT}	Output Capacitance	V_{CC} = 0V		3.3		pF

Note 2: All typical values are at T_A = 25°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 (Note 3)	Max	Units
t_{PLHD}	Differential Propagation Delay LOW-to-HIGH	R_L = 100 Ω, C_L = 10pF, See Figure 2 and Figure 3	0.5	0.98	1.5	ns
t_{PHLD}	Differential Propagation Delay HIGH-to-LOW		0.5	0.93	1.5	ns
t_{TLHD}	Differential Output Rise Time (20% to 80%)		0.4	0.5	1.0	ns
t_{THLD}	Differential 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 (Note 4)				1.0	ns

Note 3: All typical values are at T_A = 25°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.

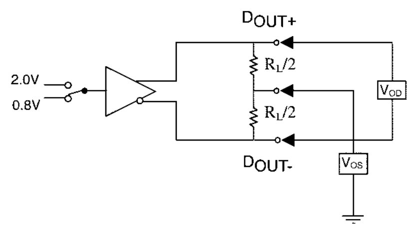
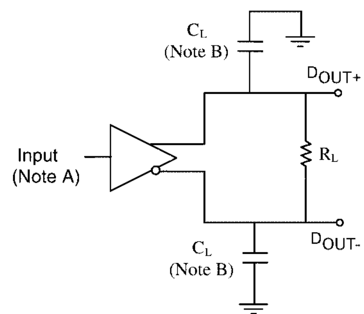


FIGURE 1. Differential Driver DC Test Circuit



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 2. Differential Driver Propagation Delay and Transition Time Test Circuit

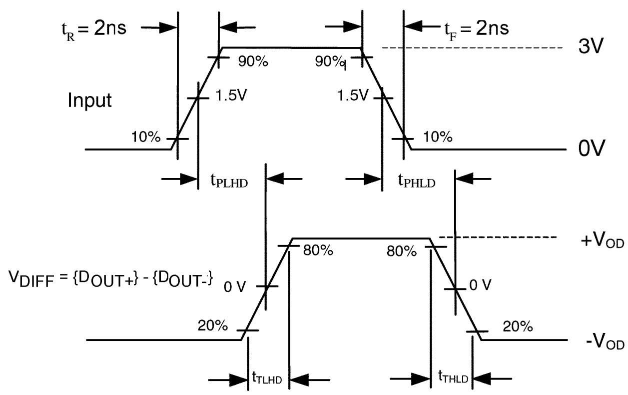


FIGURE 3. AC Waveforms

DC / AC Typical Performance Curves

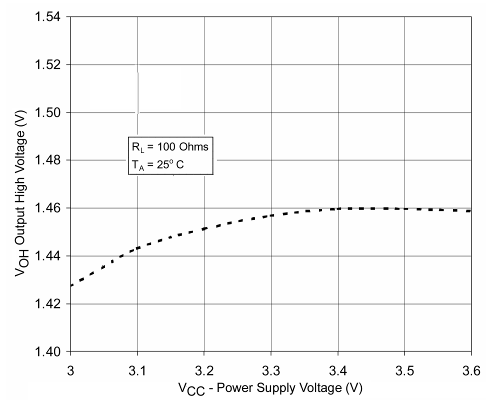


FIGURE 4. Output High Voltage vs. Power Supply Voltage

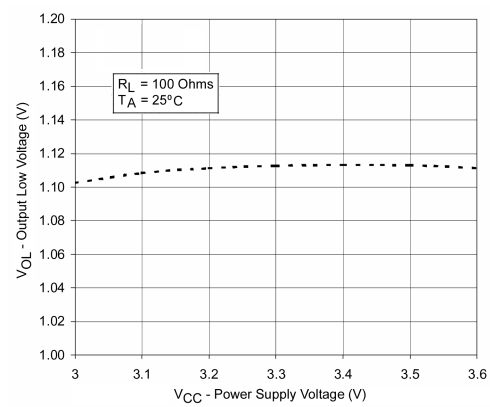


FIGURE 5. Output Low Voltage vs. Power Supply Voltage

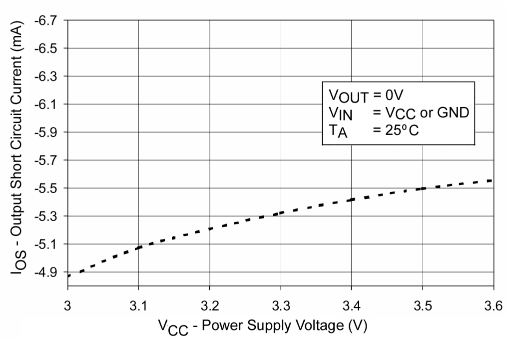


FIGURE 6. Output Short Circuit Current vs. Power Supply Voltage

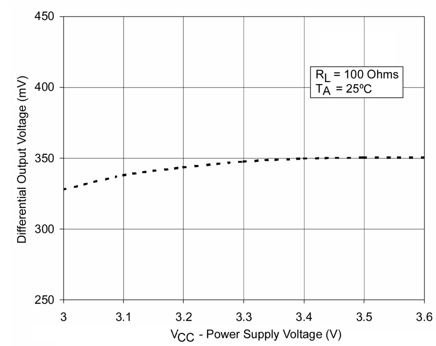


FIGURE 7. Differential Output Voltage vs. Power Supply Voltage

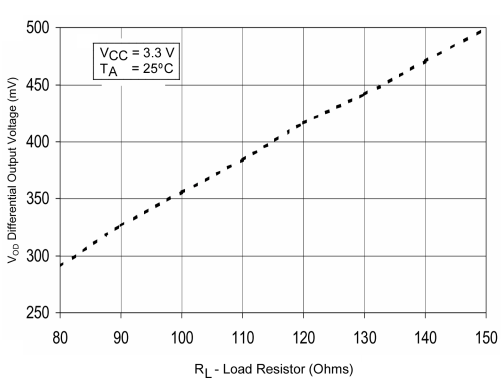


FIGURE 8. Differential Output Voltage vs. Load Resistor

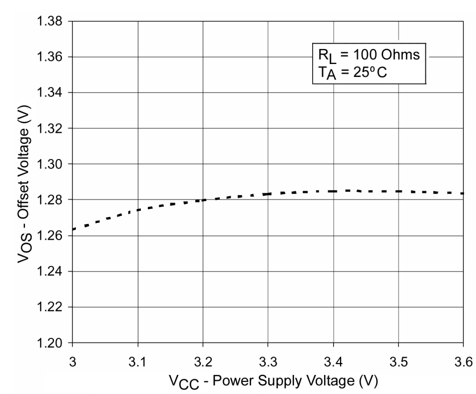


FIGURE 9. Offset Voltage vs. Power Supply Voltage

DC / AC Typical Performance Curves (Continued)

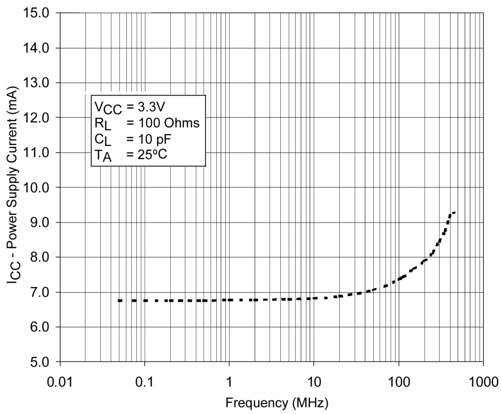


FIGURE 10. Power Supply Current vs. Frequency

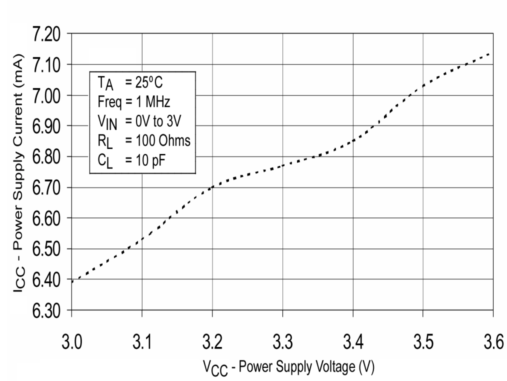


FIGURE 11. Power Supply Current vs. Power Supply Voltage

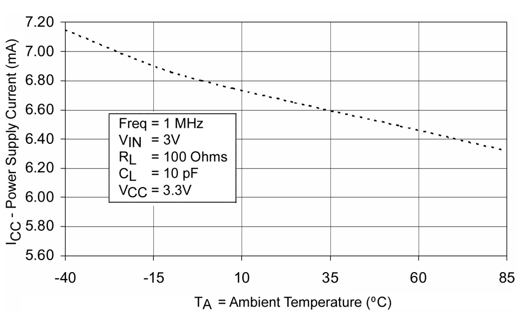


FIGURE 12. Power Supply Current vs. Ambient Temperature

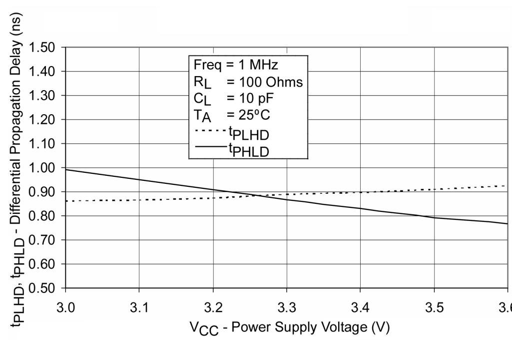


FIGURE 13. Differential Propagation Delay vs. Power Supply

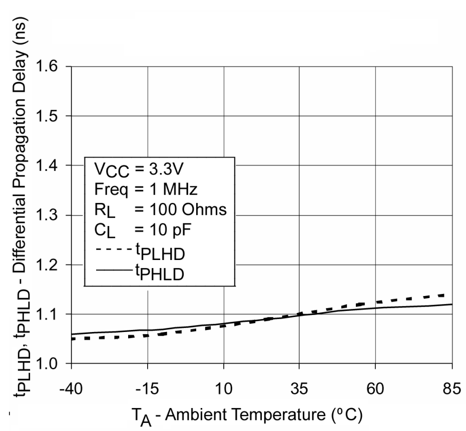


FIGURE 14. Differential Propagation Delay vs. Ambient Temperature

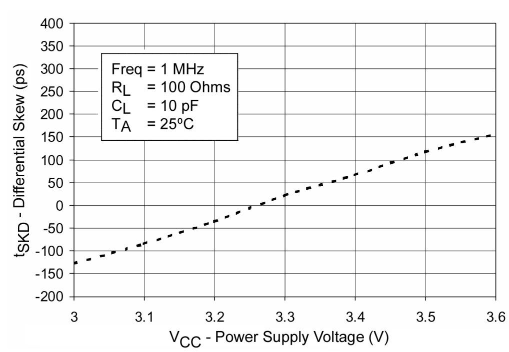


FIGURE 15. Differential Pulse Skew (t_{PLH} - t_{PHL}) vs. Power Supply Voltage

DC / AC Typical Performance Curves (Continued)

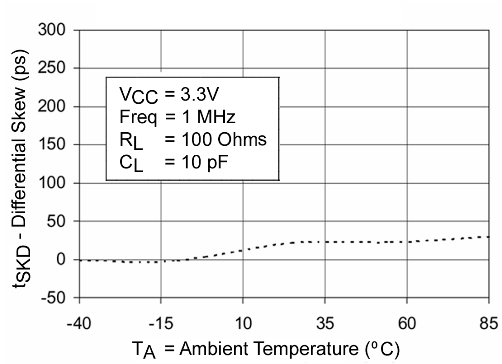


FIGURE 16. Differential Pulse Skew (t_{PLH} - t_{PHL}) vs. Ambient Temperature

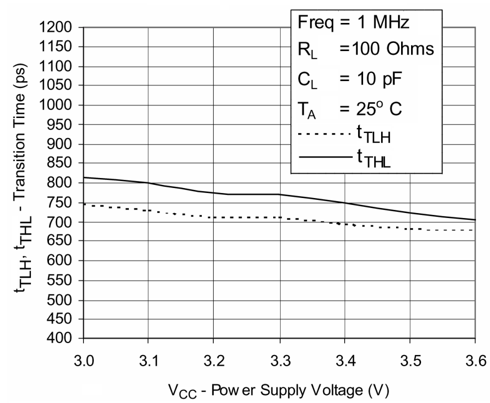


FIGURE 17. Transition Time vs. Power Supply Voltage

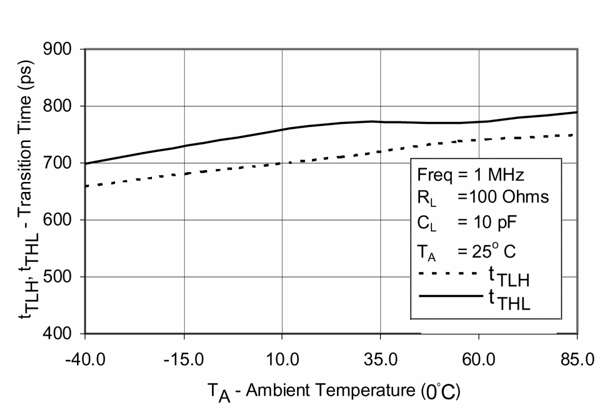
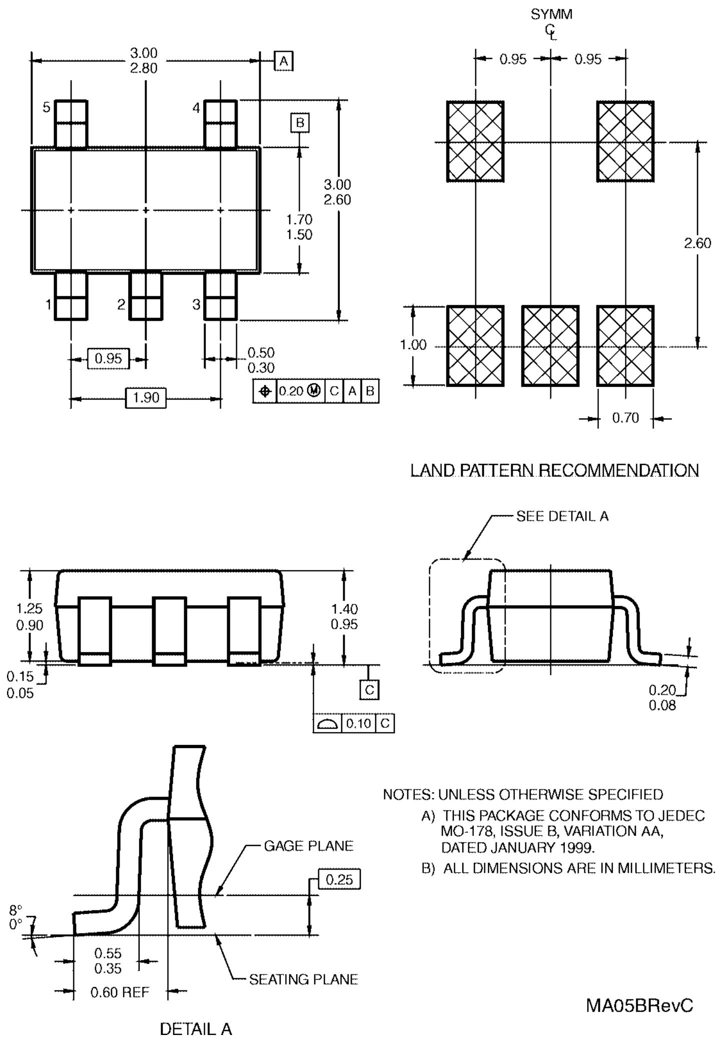


FIGURE 18. Transition Time vs. Ambient Temperature

Physical Dimensions inches (millimeters) unless otherwise noted



5-Lead SOT23, JEDEC MO-178, 1.6mm
Package Number MA05B