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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.

November 2018

FIN1028 — 3.3V LVDS 2-Bit High-Speed Differential Receiver

Features

- Greater than 400Mbs Data Rate
- Power Supply Operation: 3.3V
- Maximum Differential Pulse Skew: 0.4ns
- Maximum Propagation Delay: 2.5ns
- Low-Power Dissipation
- Power-Off Protection
- Fail-Safe Protection for Open-Circuit, Shorted, and Terminated Conditions
- Meets or Exceeds the TIA/EIA-644 LVDS Standard
- Flow-through Pinout Simplifies PCB Layout

Description

This dual 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 100mV, 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 and data signals.

The FIN1028 can be paired with its companion driver, the FIN1027, or any other LVDS driver.

Ordering Information

Part Number	Operating Temperature Range	Eco Status	Package	Packing Method
FIN1028M	-40 to +85°C	RoHS	8-Lead Small Outline Package (SOIC) JEDEC MS-012, 0.150 inch Narrow	Tube
FIN1028MX	-40 to +85°C	RoHS	8-Lead Small Outline Package (SOIC) JEDEC MS-012, 0.150 inch Narrow	Tape and Reel

For Fairchild's definition of "green" Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs_green.html.

Pin Configuration

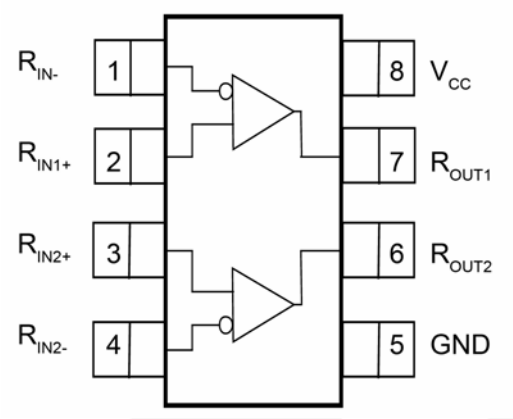

Figure 1. SOIC Pin Assignments (Top View)

Pin Definitions

Pin #	Name	Description
1	R_{IN1-}	Inverting LVDS Input
2	R_{IN1+}	Non-Inverting LVDS Input
3	R_{IN2+}	Non-Inverting LVDS Input
4	R_{IN2-}	Inverting LVDS Input
5	GND	Ground
6	R_{OUT2}	LVTTL Data Output
7	R_{OUT1}	LVTTL Data Output
8	V_{CC}	Power Supply

Function Table

Inputs		Outputs
R_{IN+}	R_{IN-}	R_{OUT}
LOW	HIGH	LOW
HIGH	LOW	HIGH
Fail-Safe Conditions[1]		HIGH

Note:

1. Fail-safe=open, shorted, terminated.

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_{INx+}, R_{INx-}	DC Input Voltage	-0.5	4.7	V
R_{OUTx}	DC Output Voltage	-0.5	6.0	V
I_O	DC 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	Human Body Model, JESD22-A114		≥6500	V
	Machine Model, JESD22-A115		≥300	

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
$\lvert V_{ID} \rvert$	Magnitude of Differential Voltage	100	V_{CC}	mV
V_{IC}	Common-Mode Input Voltage	0.05	2.35	V
T_A	Operating Temperature	-40	+85	°C

DC Electrical Characteristics

Typical values are at T_A=25°C and with V_{CC}=3.3V. Over-supply voltage and operating temperature ranges, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{TH}	Differential Input Threshold HIGH	Figure 2, Table 1			100	mV
V_{TL}	Differential Input Threshold LOW	Figure 2, Table 1	-100			mV
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_{OH}	Output HIGH Voltage	I_{OH}=-100µA	V_{CC}-0.2			V
		I_{OH}=-8mA	2.4			
V_{OL}	Output LOW Voltage	I_{OL}=100µA			0.2	V
		I_{OL}=8mA			0.5	
V_{IK}	Input Clamp Voltage	I_{IK}=-18mA	-1.5			V
I_{CC}	Power Supply Current	R_{IN+}=1V and R_{IN-}=1.4V or R_{IN+}=1.4V and R_{IN-}=1V			9	mA
C_{IN}	Input Capacitance			4		pF
C_{OUT}	Output Capacitance			6		pF

DC Electrical Characteristics

Typical values are at T_A=25°C and with V_{CC}=3.3V. Over-supply voltage and operating temperature ranges, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
t_{PLH}	Differential Propagation Delay, LOW-to-HIGH	$\|V_{ID}\|$=400mV, C_L=10pF Figure 2, Figure 3	0.9		2.5	ns
t_{PHL}	Differential Propagation Delay, HIGH-to-LOW		0.9		2.5	ns
t_{TLH}	Output Rise Time (20% to 80%)			0.5		ns
t_{THL}	Output Fall Time (80% to 20%)			0.5		ns
$t_{SK(P)}$	Pulse Skew $\|t_{PLH} - t_{PHL}\|$				0.4	ns
$t_{SK(LH)}$, $t_{SK(HL)}$	Channel-to-Channel Skew[2]				0.3	ns
$t_{SK(PP)}$	Part-to-Part Skew[3]				1.0	ns

Notes:

2. $t_{SK(LH)}$, $t_{SK(HL)}$ is the skew between specified outputs of a single device when the outputs have identical loads and are switching in the same direction.
3. $t_{SK(PP)}$ 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.

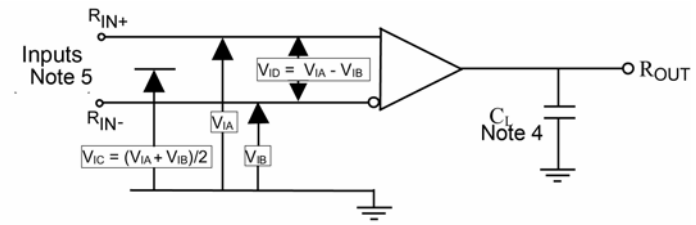

Figure 2. Differential Driver Propagation Delay and Transition Time Test Circuit

Notes:
4. C_L includes all probe and fixture capacitances.
5. All input pulses have frequency = 10MHz, t_R or t_F=1ns.

Table 1. Receiver Minimum and Maximum Input Threshold Test Voltages

Applied Voltages (V)		Resulting Differential Input Voltage (mV)	Resulting Common Mode Input Voltage (V)
V_{IA}	V_{IB}	V_{ID}	V_{IC}
1.25	1.15	100	1.2
1.15	1.25	-100	1.2
2.4	2.3	100	2.35
2.3	2.4	-100	2.35
0.1	0	100	0.05
0	0.1	-100	0.05
1.5	0.9	600	1.2
0.9	1.5	-600	1.2
2.4	1.8	600	2.1
1.8	2.4	-600	2.1
0.6	0	600	0.3
0	0.6	-600	0.3

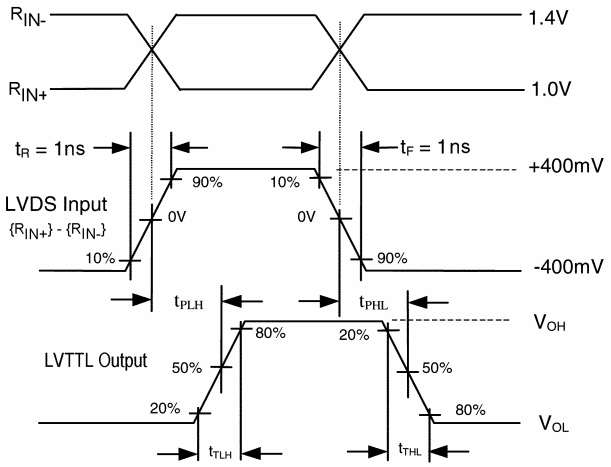

Figure 3. AC Waveforms

Typical Performance Characteristics

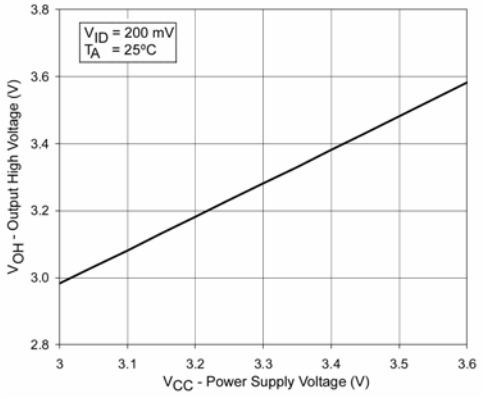

Figure 4. Output High Voltage vs. Power Supply Voltage

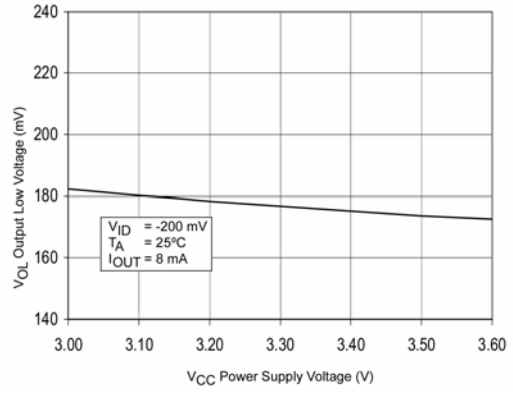

Figure 5. Output Low Voltage vs. Power Supply Voltage

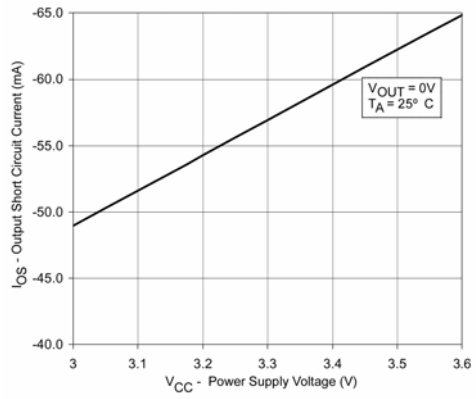

Figure 6. Output Short Circuit Current vs. Power Supply Voltage

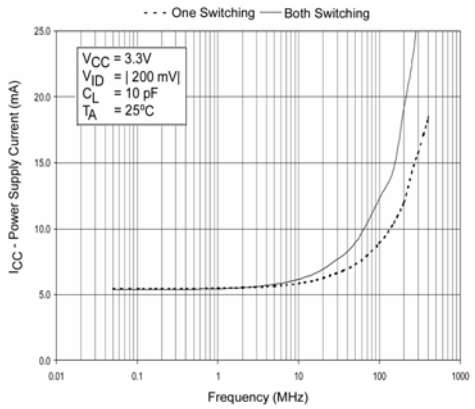

Figure 7. Power Supply Current vs. Frequency

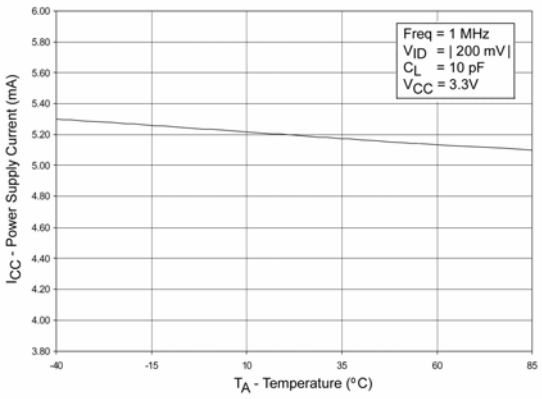

Figure 8. Power Supply Current vs. Ambient Temperature

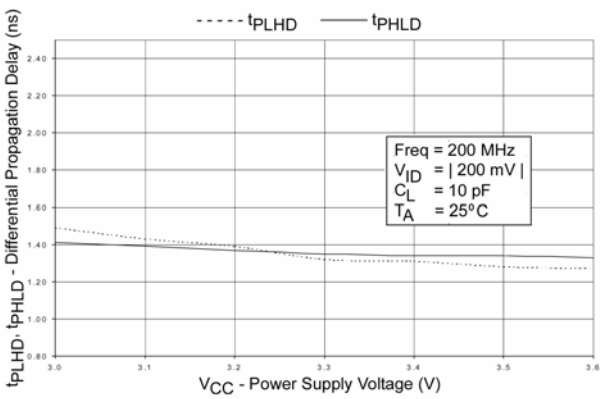

Figure 9. Differential Propagation Delay vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

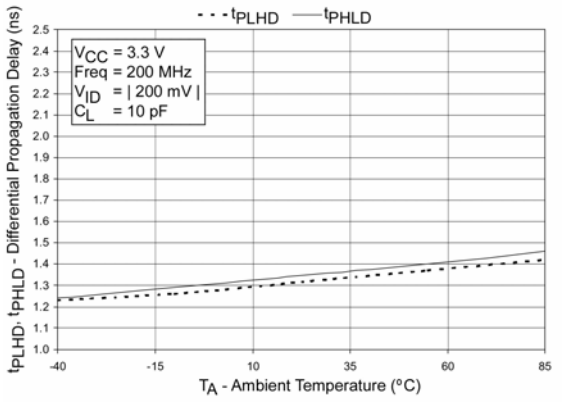

Figure 10. Differential Propagation Delay vs. Ambient Temperature

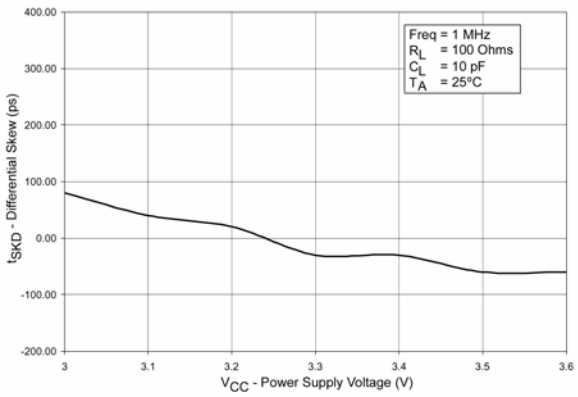

Figure 11. Differential Skew (t_{PLH}-t_{PHL}) vs. Power Supply Voltage

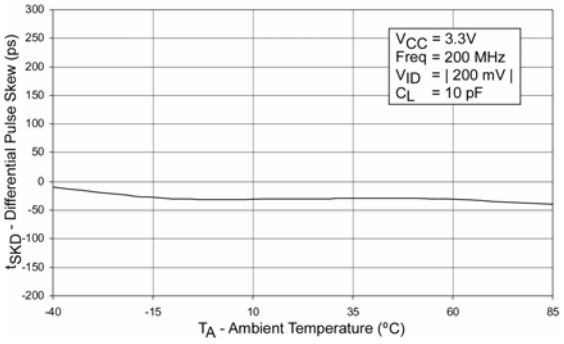

Figure 12. Differential Skew (t_{PHL}-t_{PHL}) vs. Ambient Temperature

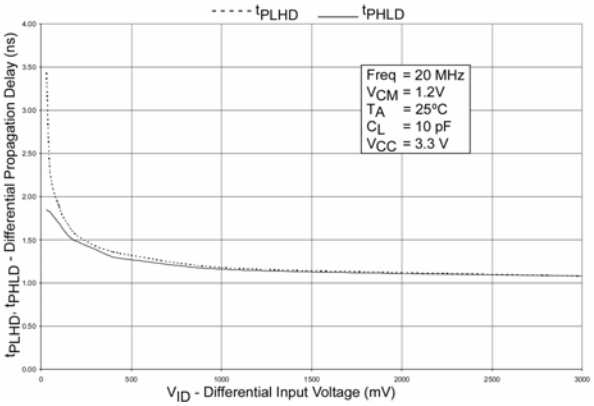

Figure 13. Differential Propagation Delay vs. Differential Input Voltage

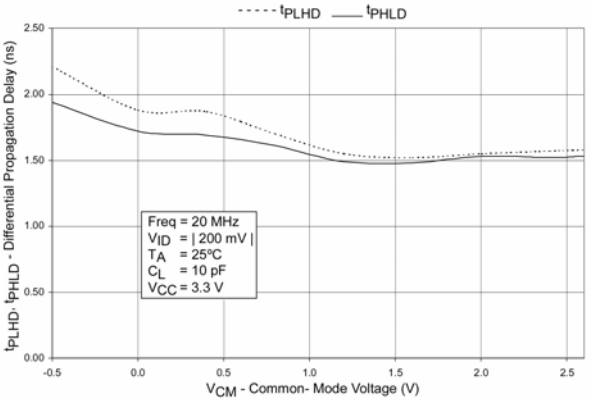

Figure 14. Differential Propagation Delay vs. Common-Mode Voltage

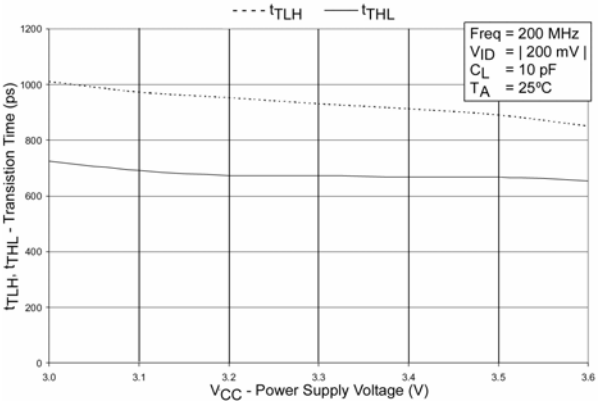

Figure 15. Transition Time vs. Power Supply Voltage

Typical Performance Characteristics (Continued)

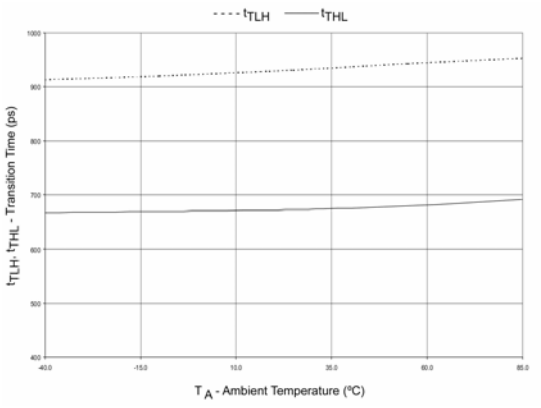

Figure 16. Transition Time vs. Ambient Temperature

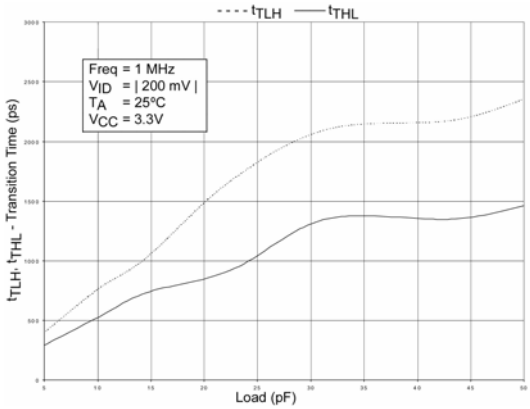

Figure 17. Differential Propagation Delay vs. Load

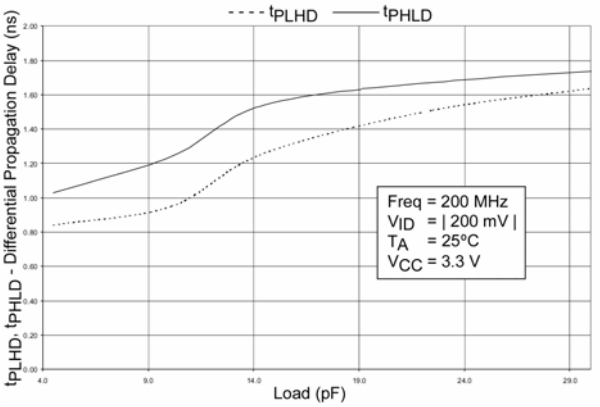

Figure 18. Differential Propagation Delay vs. Load

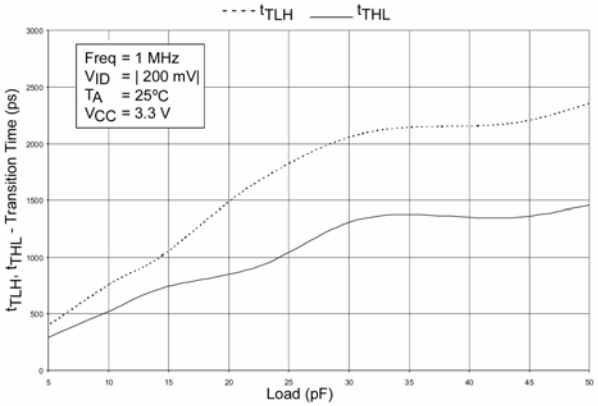

Figure 19. Transition Time vs. Load

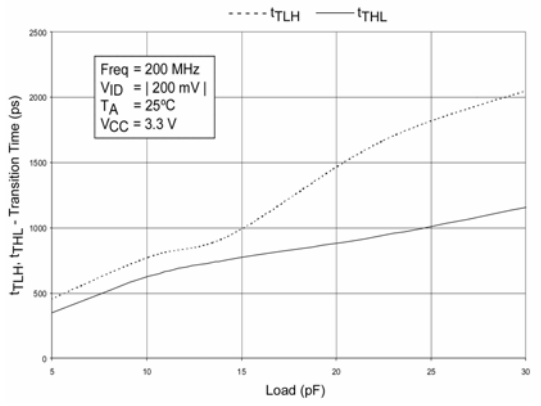

Figure 20. Transition Time vs. Load

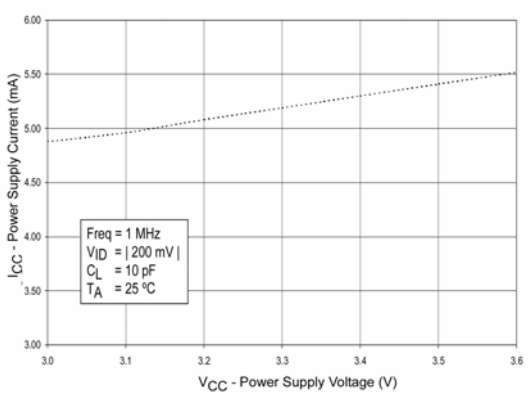

Figure 21. Power Supply Current vs. Power Supply Voltage

Physical Dimensions

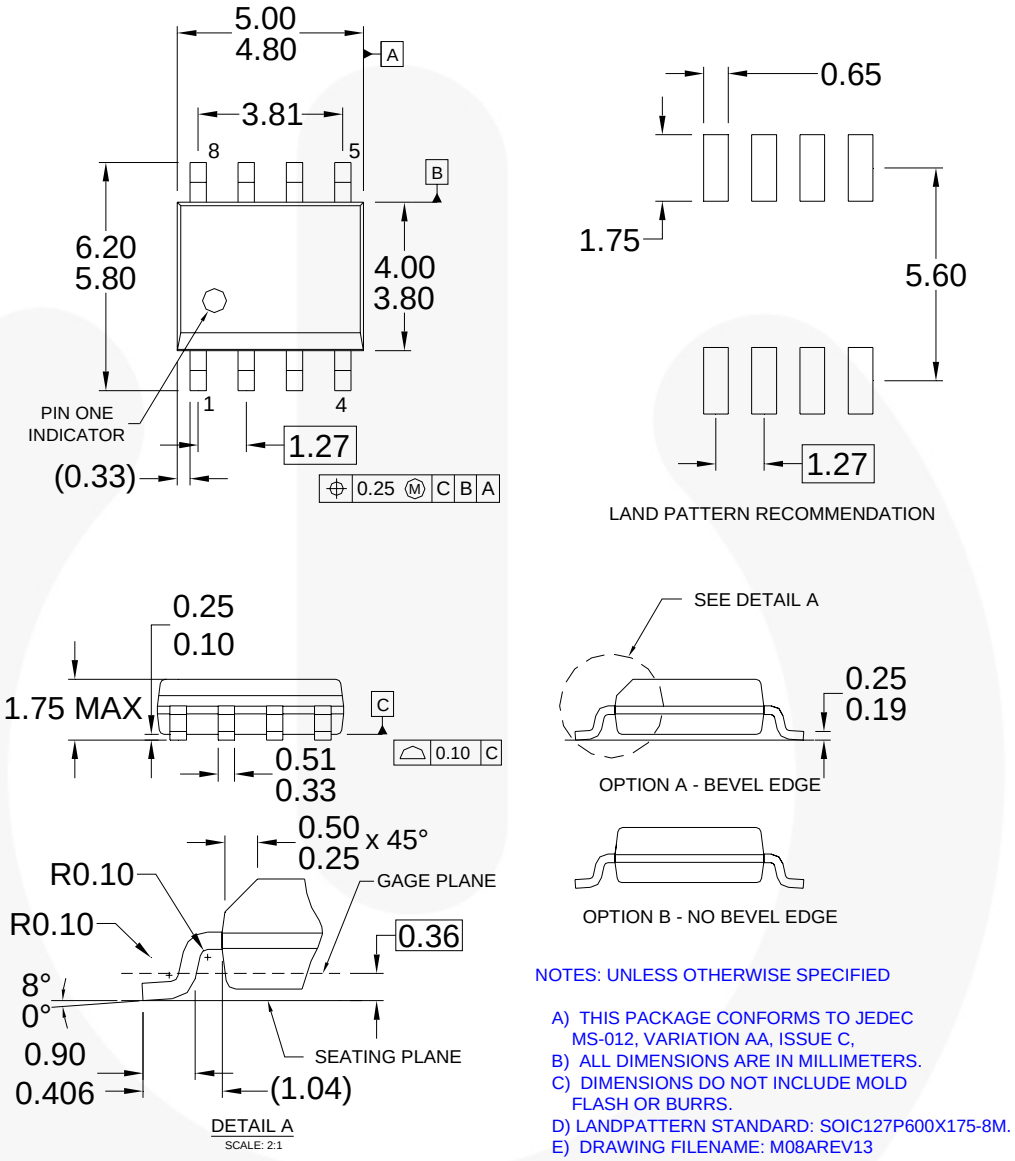

Figure 22. 8-Lead, Small Outline Package (SOIC), JEDEC MS-012, 0.150-inch, Narrow Body

Click here for tape and reel specifications, available at:

http://www.fairchildsemi.com/products/discrete/pdf/soic8_tr.pdf

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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I35