FAIRCHILD SEMICONDUCTOR®

May 2010

FIN1017
3.3V LVDS, 1-Bit, High-Speed Differential Driver

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
- 8-Lead SOIC and US8 Packages Save Space

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 350mV, 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 FIN1017 can be paired with its companion receiver, the FIN1018, or with any other LVDS receiver.

Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
FIN1017MX	-40 to +85°C	8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150inch Narrow	Tape and Reel
FIN1017K8X	-40 to +85°C	8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide	Tape and Reel

Pin Configuration

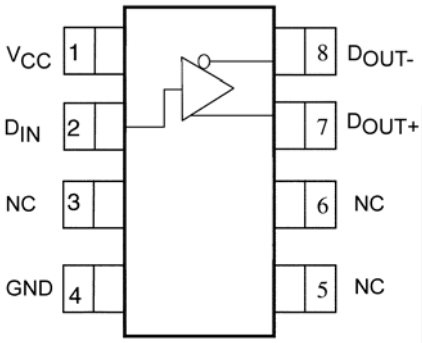


Figure 1. SOIC

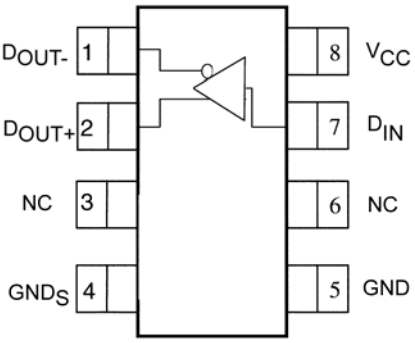


Figure 2. US-8 (Top View)(1)

Note:
1. Ground pins 4 and 5 for optimum performance.

Pin Definitions

Pin# US-8	Pin# SOIC	Name	Description
7	2	D_{IN}	LVTTL Data Input
2	7	D_{OUT+}	Non-inverting Driver Output
1	8	D_{OUT-}	Inverting Driver Output
8	1	V_{CC}	Power Supply
4, 5	4	GND / GND_S	Ground
3, 6	3, 5, 6	NC	No Connect

Function Table

Input	Outputs	
D_{IN}	**D_{OUT+}**	**D_{OUT-}**
LOW	LOW	HIGH
HIGH	HIGH	LOW
OPEN	LOW	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.

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	+4.7	V
I_{OSD}	Driver Short-Circuit Current, Continuous		10	mA
T_{STG}	Storage Temperature Range	-65	+150	°C
T_J	Max Junction Temperature		+150	°C
T_L	Lead Temperature (Soldering, 10 Seconds)		+260	°C
ESD	Human Body Model, JESD22-A114		6500	V
	Bus Pins D_{OUT+}/D_{OUT-} to GND		10500	
	Machine Model, JESD22-A115		350	

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	+85	°C

DC Electrical Characteristics

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{OD}	Output Differential Voltage	R_L = 100 Ω, See Figure 3	250	350	450	mV
ΔV_{OD}	V_{OD} Magnitude Change from Differential LOW-to-HIGH				25	mV
V_{OS}	Offset Voltage		1.125	1.250	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	mA
I_{OS}	Short-Circuit Output Current	V_{OUT} = 0V			-8	mA
		V_{OD} = 0V			±8	
V_{IH}	Input HIGH Voltage		2		V_{CC}	V
V_{IL}	Input LOW Voltage		GND		0.8	V
I_{IN}	Input Current	V_{IN} = 0V or V_{CC}			±20	mA
$I_{I(OFF)}$	Power-Off Input Current	V_{CC} = 0V, V_{IN} = 0V or 3.6V			±20	mA
V_{IK}	Input Clamp Voltage	I_{IK} = -18mA	-1.5			V
I_{CC}	Power Supply Current	No Load, V_{IN} = 0V or V_{CC}			8	mA
		R_L = 100Ω, V_{IN} = 0V or V_{CC}			10	mA
C_{IN}	Input Capacitance			4		pF
C_{OUT}	Output Capacitance			6		pF

AC Electrical Characteristics

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

Symbol	Parameter	Test Conditions	Min.	Max.	Units
t_{PLHD}	Differential Propagation Delay, LOW-to-HIGH	R_L = 100Ω, C_L = 10pF, see Figure 4 and Figure 5	0.5	1.5	ns
t_{PHLD}	Differential Propagation Delay, HIGH-to-LOW		0.5	1.5	ns
t_{TLHD}	Differential Output Rise Time (20% to 80%)		0.4	1.0	ns
t_{THLD}	Differential Output Fall Time (80% to 20%)		0.4	1.0	ns
$t_{SK(P)}$	Pulse Skew $\|t_{PLH} - t_{PHL}\|$			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

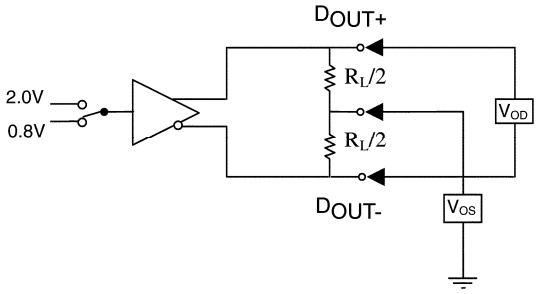


Figure 3. Differential Driver DC Test Circuit

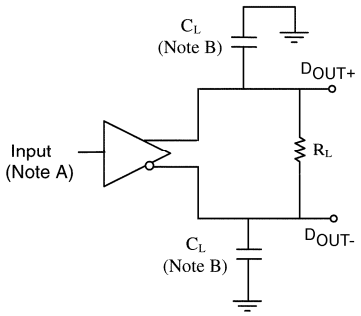


Figure 4. Differential Driver Propagation Delay and Transition Time Test Circuit

Notes:

Note A: All input pulses have frequency = 10MHz, t_R or t_F = 2ns.

Note B: C_L includes all probe and fixture capacitances.

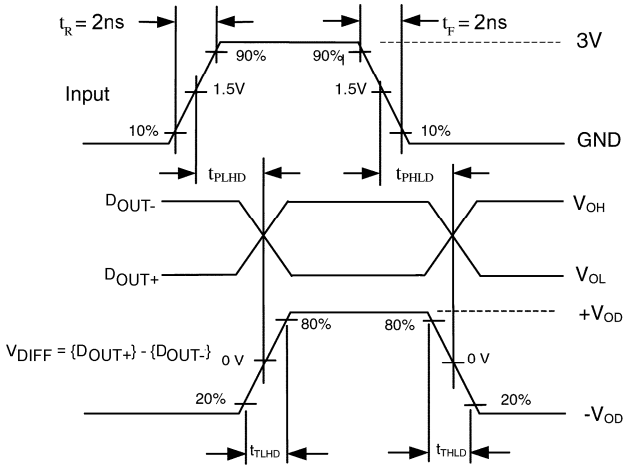


Figure 5. AC Waveforms

Typical Performance Characteristics

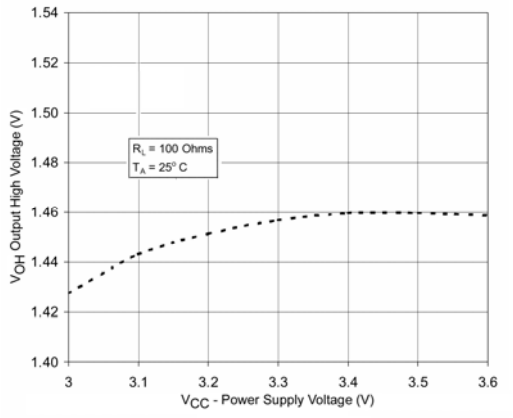


Figure 6. Output High Voltage vs. Power Supply Voltage

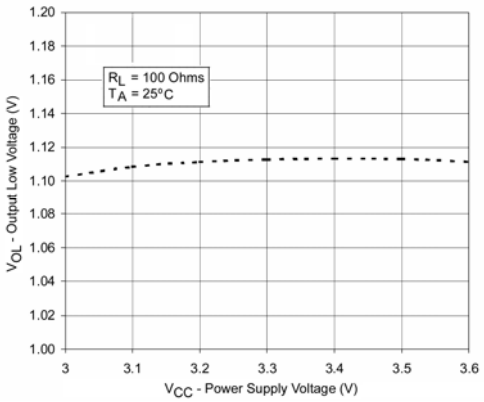


Figure 7. Output Low Voltage vs. Power Supply Voltage

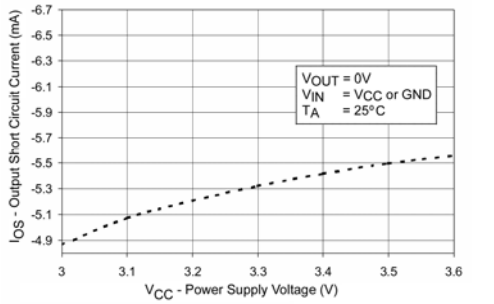


Figure 8. Output Short Circuit Current vs. Power Supply Voltage

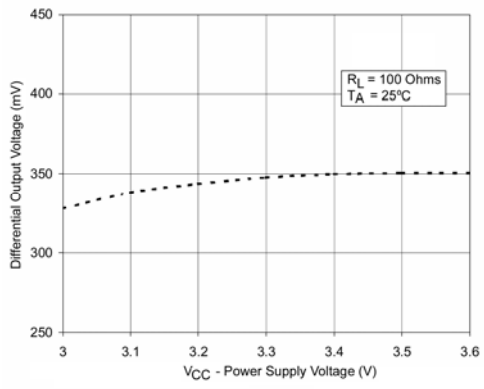


Figure 9. Differential Output Voltage vs. Power Supply Voltage

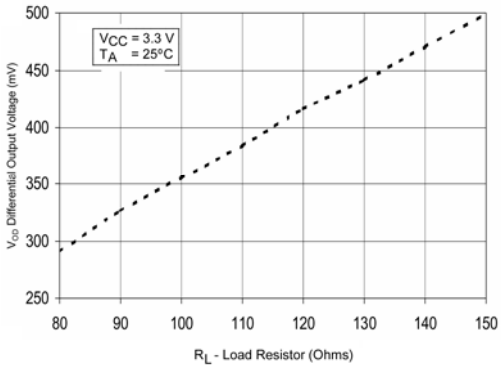


Figure 10. Differential Output Voltage vs. Load Resistor

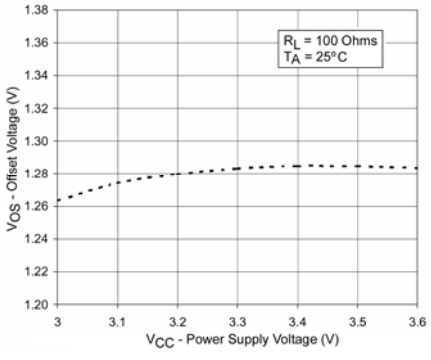


Figure 11. Offset Voltage vs. Power Supply Voltage

Typical Performance Characteristics

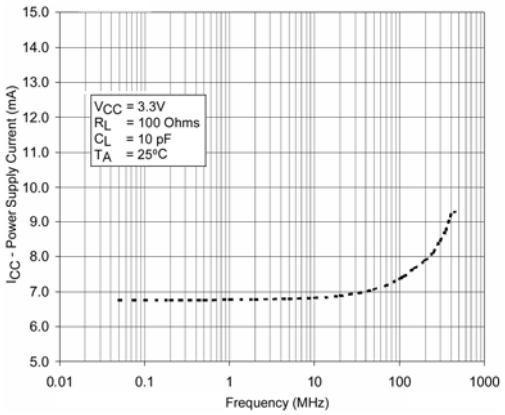


Figure 12. Power Supply Current vs. Frequency

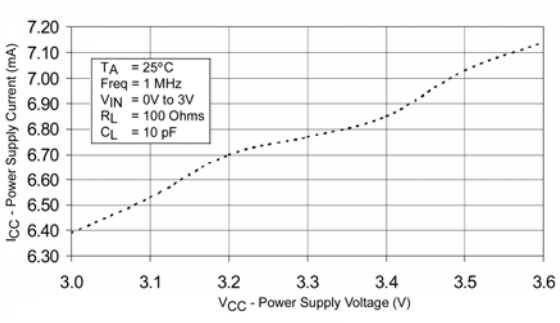


Figure 13. Power Supply Current vs. Power Supply Voltage

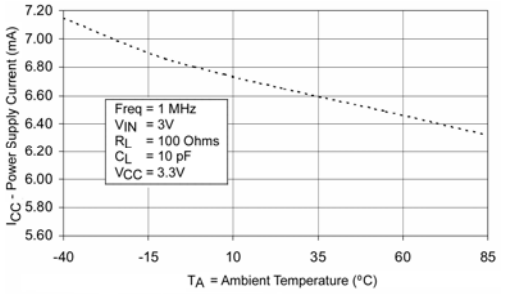


Figure 14. Power Supply Current vs. Ambient Temperature

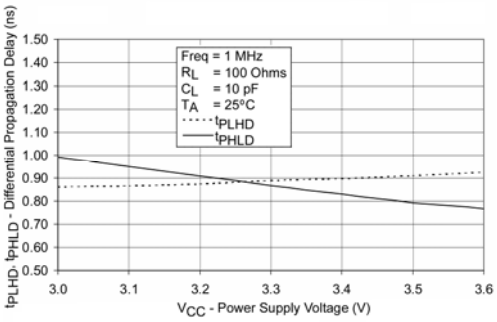


Figure 15. Differential Propagation Delay vs. Power Supply

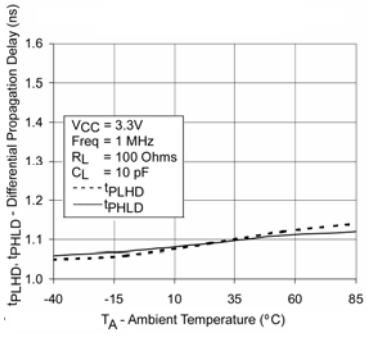


Figure 16. Differential Propagation Delay vs. Ambient Temperature

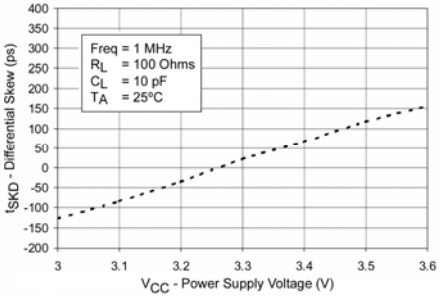


Figure 17. Differential Pulse Skew (t_{PLH} - t_{PHL}) vs. Power Supply Voltage

Typical Performance Characteristics

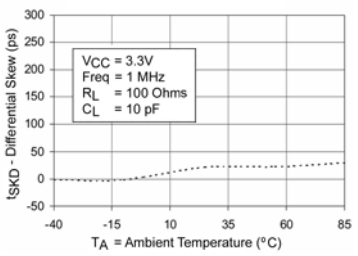


Figure 18. Differential Pulse Skew (t_{PLH} - t_{PHL}) vs. Ambient Temperature

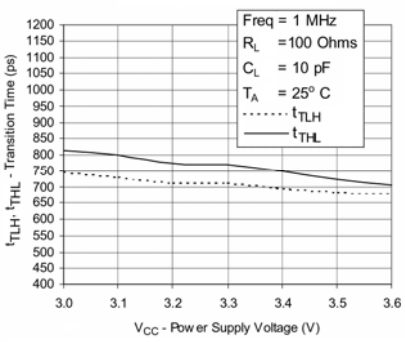


Figure 19. Transition Time vs. Power Supply Voltage

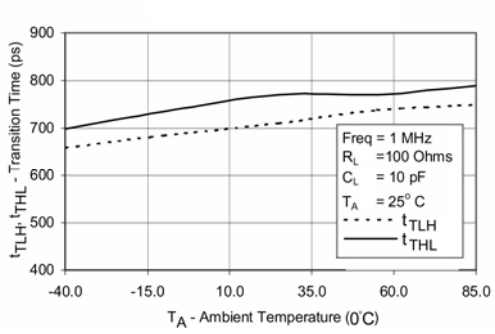


Figure 20. Transition Time vs. Ambient Temperature

Physical Dimensions

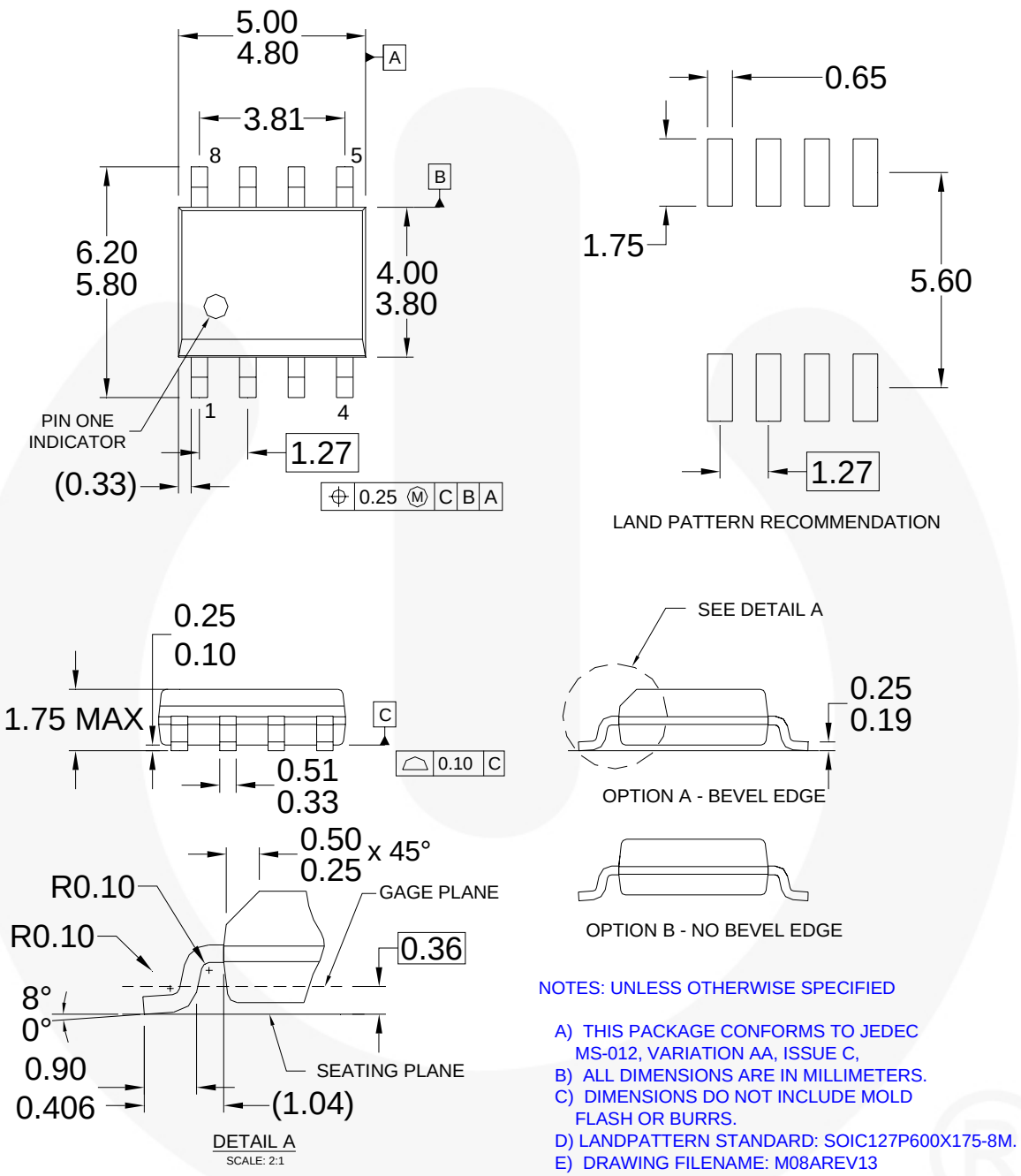
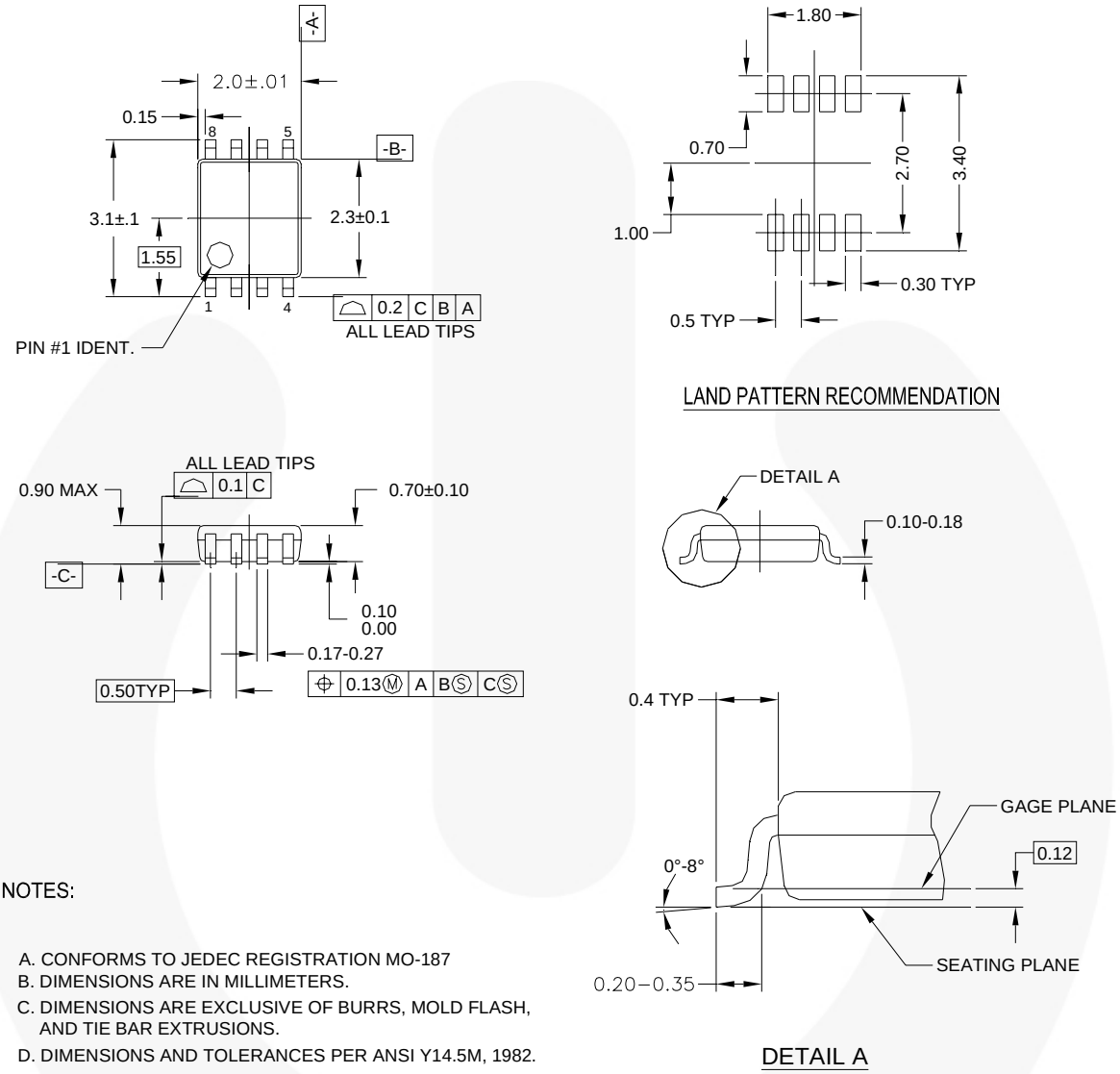


Figure 21. 8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150inch Narrow

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/packaging/.

Physical Dimensions



NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-187
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MAB08AREVC

Figure 22. 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/packaging/.

FAIRCHILD SEMICONDUCTOR®

TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™
Auto-SPM™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficientMax™
ESBC™
F®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™
FlashWriter®*
FPS™
F-PFS™
FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
G*max*™
GTO™
IntelliMAX™
ISOPLANAR™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
Motion-SPM™
OptoHiT™
OPTOLOGIC®
OPTOPLANAR®
PDP SPM™
Power-SPM™
PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
™
Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™
Sync-Lock™
SYSTEM GENERAL®*
The Power Franchise®
the power franchise
TinyBoost™
TinyBuck™
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TriFault Detect™
TRUECURRENT™*
µSerDes™
SerDes
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
XS™

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

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. I49