

FST3125 — 4-Bit Bus Switch

Features

- 4Ω Switch Connection between Two Ports
- Minimal Propagation Delay through the Switch
- Low I_{CC}
- Zero Bounce in Flow-through Mode
- Control Inputs Compatible with TTL Level


Description

Fairchild switch FST3125 provides four high-speed CMOS TTL-compatible bus switches. The low on resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

The device is organized as four one-bit switches with separate /OE inputs. When /OE is LOW, the switch is ON and port A is connected to port B. When /OE is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
FST3125M	-40 to 85°C	14-Lead, Small Outline Integrated Circuit (SOIC) 0.150 inch Narrow	Tube
FST3125MX	-40 to 85°C	14-Lead, Small Outline Integrated Circuit (SOIC) 0.150 inch Narrow	Tape and Reel
FST3125QSC	-40 to 85°C	16-Lead, Quarter Size Outline Package (QSOP) MO-137 0.150 inch Wide	Tube
FST3125QSCX	-40 to 85°C	16-Lead, Quarter Size Outline Package (QSOP) MO-137 0.150 inch Wide	Tape and Reel
FST3125MTC	-40 to 85°C	14-Lead, Thin Shrink Small Outline Package (TSSOP) MO-153, 4mm Wide	Tube
FST3125MTCX	-40 to 85°C	14-Lead, Thin Shrink Small Outline Package (TSSOP) MO-153, 4mm Wide	Tape and Reel

 All packages are lead free per JEDEC: J-STD-020B standard.

The Fairchild switch family derives from and embodies Fairchild's proven switch technology used for several years in its 74LVX3L384 (FST3384) bus switch product.

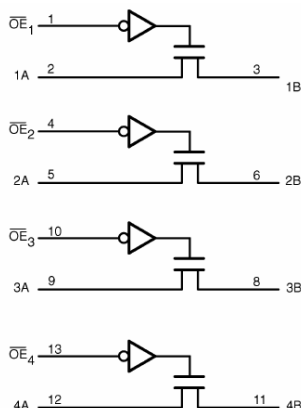


Figure 1. Logic Diagram

Pin Configurations

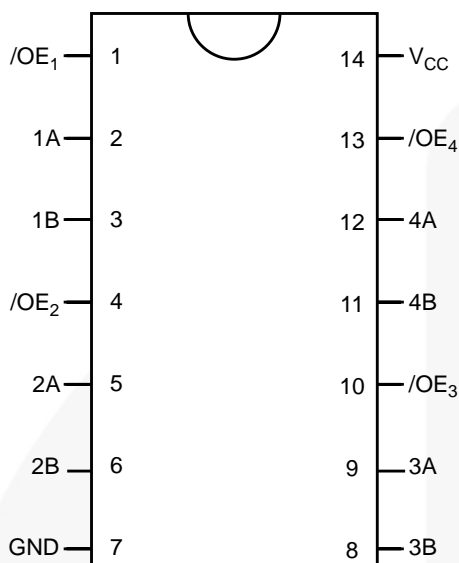


Figure 2. SOIC and TSSOP Pin Assignments

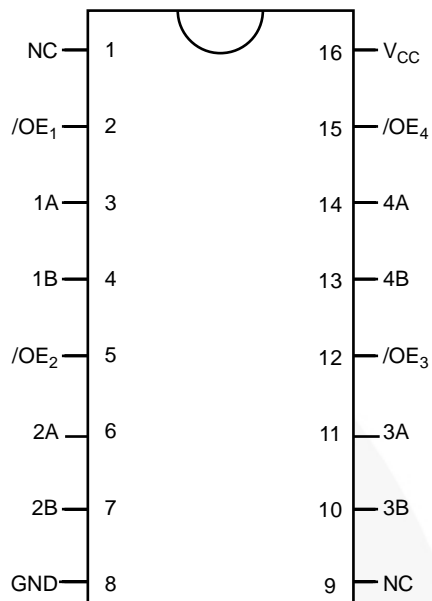


Figure 3. QSOP Pin Assignments

Pin Descriptions

Pin Names	Description
/OE ₁ , /OE ₂ , /OE ₃ , /OE ₄	Bus Switch Enables
1A, 2A, 3A, 4A	Bus A
1B, 2B, 3B, 4B	Bus B
NC	Not Connected
V _{CC}	Supply Voltage
GND	Ground

Truth Table

Inputs	Inputs/Outputs
/OE	A, B
LOW	A = B
HIGH	High Impedance

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	7.0	V
V_S	DC Switch Voltage	-0.5	7.0	V
V_{IN}	DC Input Voltage ⁽¹⁾	-0.5	7.0	V
I_{IK}	DC Input Current		-50	mA
I_{OUT}	DC Output Sink Current		128	mA
I_{CC} / I_{GND}	DC V_{CC} / GND Current		±100	mA
T_{STG}	Storage Temperature Range	-65	+150	°C

Note:

- The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

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}	Power Supply Operating		4.0	5.5	V
V_{IN}	Input Voltage		0	5.5	V
V_{OUT}	Output Voltage		0	5.5	V
t_r, t_f	Input Rise and Fall Time	Switch Control Input ⁽²⁾	0	5	ns/V
		Switch I/O	0	DC	
T_A	Operating Temperature, Free Air		-40	+85	°C

Note:

- Unused control inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Typical values are at $V_{CC} = 5.0V$ and $T_A = 25^\circ C$.

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = -40$ to $+85^\circ C$			Units
				Min.	Typ.	Max.	
V_{IK}	Clamp Diode Voltage	$I_{IN} = -18mA$	4.5			-1.2	V
V_{IH}	High-Level Input Voltage		4.0 to 5.5	2.0			V
V_{IL}	Low-Level Input Voltage		4.0 to 5.5			0.8	V
I_{IN}	Input Leakage Current	$0 \leq V_{IN} \leq 5.5$	5.5			± 1.0	μA
I_{OZ}	Off-state Leakage Current	$0 \leq A, B \leq V_{CC}$	5.5			± 1.0	μA
R_{ON}	Switch On Resistance ⁽³⁾	$V_{IN} = 0V, I_{IN} = 64mA$	4.5		4	7	Ω
		$V_{IN} = 0V, I_{IN} = 30mA$	4.5		4	7	
		$V_{IN} = 2.4V, I_{IN} = 15mA$	4.5		8	15	
		$V_{IN} = 2.4V, I_{IN} = 15mA$	4.0		11	20	
I_{CC}	Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$	5.5			3	μA
ΔI_{CC}	Increase in I_{CC} per Input	One Input at 3.4V, Other Inputs at V_{CC} or GND	5.5			2.5	mA

Note:

3. Measured by the voltage drop between A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the A or B pins.

AC Electrical Characteristics

$T_A = -40$ to $+85^\circ C$, $C_L = 50pF$, and $R_U = R_D = 500\Omega$.

Symbol	Parameter	Conditions	$V_{CC} = 4.5 - 5.5V$		$V_{CC} = 4.0V$		Units	Figure
			Min.	Max.	Min.	Max.		
t_{PHL}, t_{PLH}	Propagation Delay Bus-to-Bus ⁽⁴⁾	$V_{IN} = \text{Open}$		0.25		0.25	ns	Figure 4 Figure 5
t_{PZH}, t_{PZL}	Output Enable Time	$V_{IN} = 7V$ for t_{PZL} $V_{IN} = \text{Open}$ for t_{PZH}	1.0	5.0		5.5	ns	Figure 4 Figure 5
t_{PHZ}, t_{PLZ}	Output Disable Time	$V_{IN} = 7V$ for t_{PLZ} $V_{IN} = \text{Open}$ for t_{PHZ}	1.5	5.3		5.6	ns	Figure 4 Figure 5

Note:

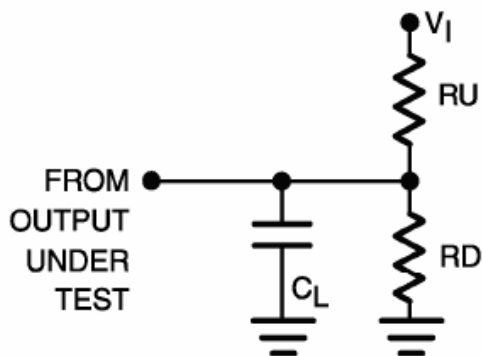
4. This parameter is guaranteed by design, but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical on resistance of the switch and the 50pF load capacitance when driven by an ideal voltage source (zero output impedance).

Capacitance

$T_A = +25^\circ C$, $f = 1MHz$. Capacitance is characterized, but not tested.

Symbol	Parameter	Conditions	Typ.	Units
C_{IN}	Control Pin Input Capacitance	$V_{CC} = 5.0V$	3	pF
$C_{I/O}$	Input/Output Capacitance	$V_{CC}, /OE = 5.0V$	2	pF

AC Loadings and Waveforms



Notes: Input driven by 50Ω source terminated in 50Ω .
 C_L includes load and stray capacitance.
 Input PRR = 1.0MHz, $t_w = 500\text{ns}$.

Figure 4. AC Test Circuit

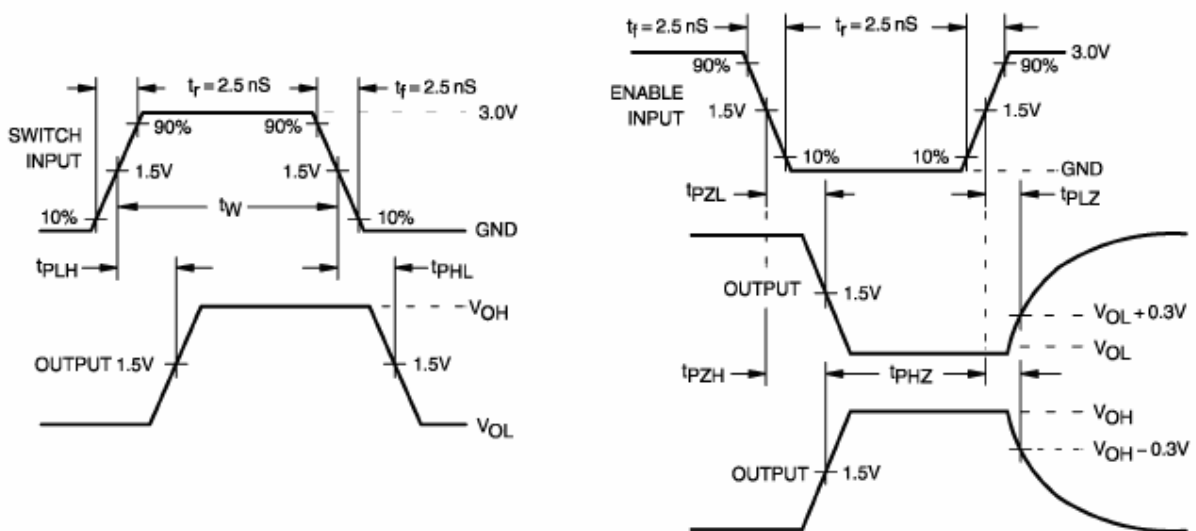


Figure 5. AC Waveforms

Physical Dimensions

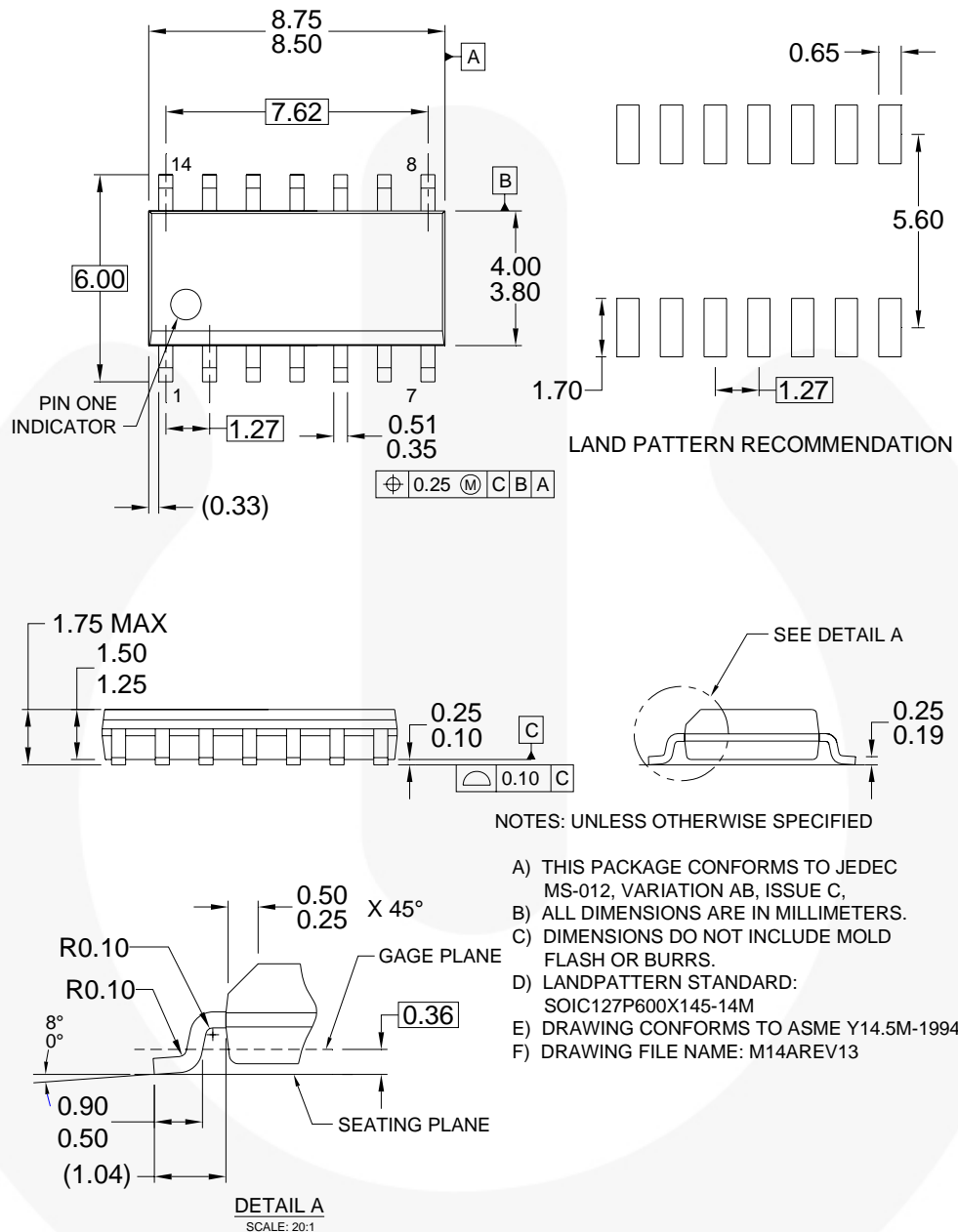
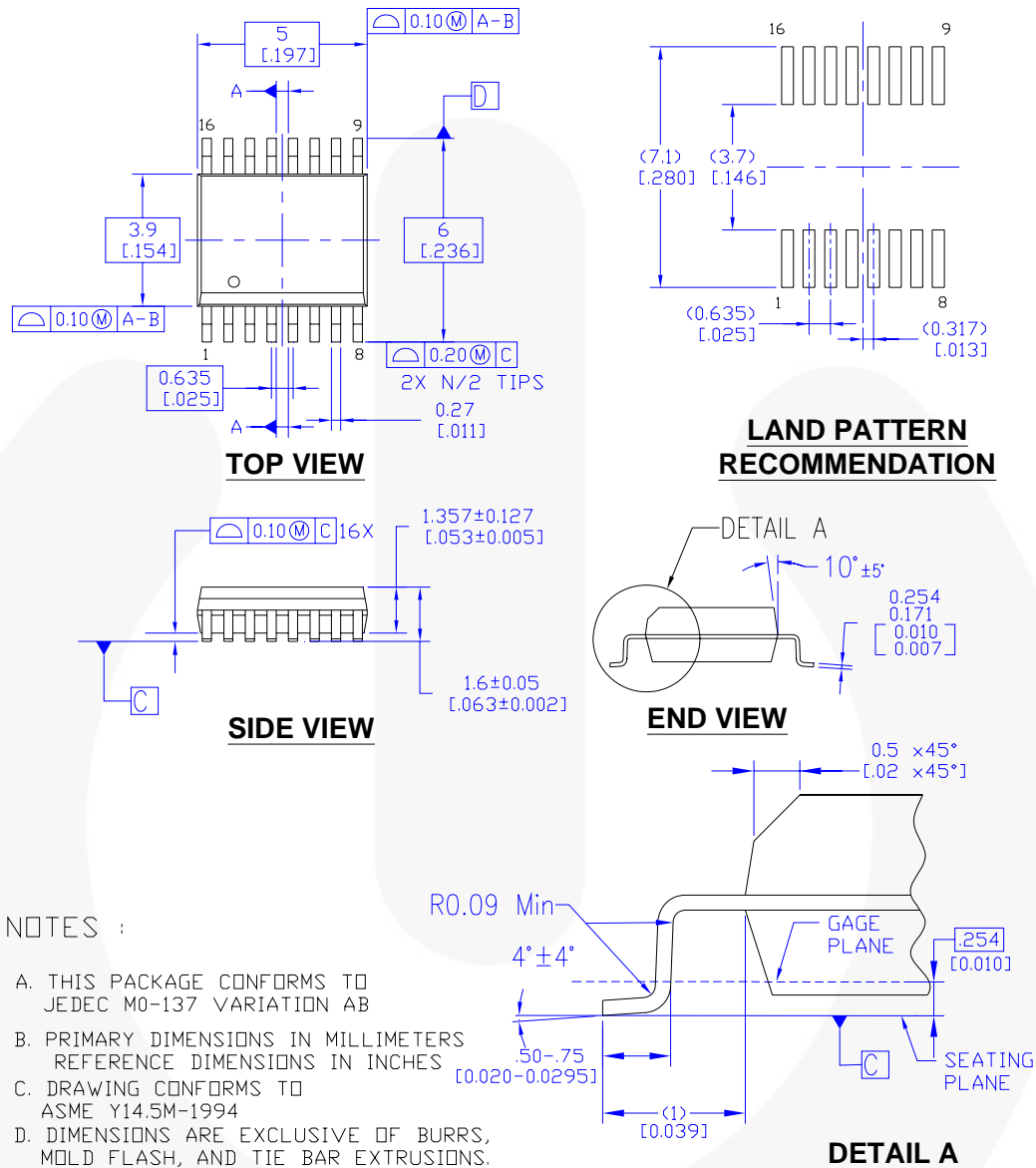


Figure 6. 14-Lead, Small-Outline Integrated Circuit (SOIC) 0.150-inch Narrow

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



MQA16AREVB

Figure 7. 16-Lead, Quarter-Size Outline Package (QSOP), MO-1370.150-inch 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/>



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.

- | | | | |
|---|---|---|---|
| ACEx [®] | FPST [™] | PDP SPM [™] | The Power Franchise [®] |
| Build it Now [™] | F-PFS [™] | Power-SPM [™] |  |
| CorePLUS [™] | FRFET [®] | PowerTrench [®] | TinyBoost [™] |
| CorePOWER [™] | Global Power Resource SM | Programmable Active Droop [™] | TinyBuck [™] |
| CROSSVOLT [™] | Green FPST [™] | QFET [®] | TinyLogic [®] |
| CTL [™] | Green FPST [™] e-Series [™] | QST [™] | TINYOPTO [™] |
| Current Transfer Logic [™] | GTO [™] | Quiet Series [™] | TinyPower [™] |
| EcoSPARK [®] | IntelliMAX [™] | RapidConfigure [™] | TinyPWM [™] |
| EfficientMax [™] | ISOPLANAR [™] | Saving our world, 1mW at a time [™] | TinyWire [™] |
| EZSWITCH [™] * | MegaBuck [™] | SmartMax [™] | μSerDes [™] |
|  | MICROCOUPLER [™] | SMART START [™] |  |
|  | MicroFET [™] | SPM [®] | UHC [®] |
| Fairchild [®] | MicroPak [™] | STEALTH [™] | Ultra FRFET [™] |
| Fairchild Semiconductor [®] | MillerDrive [™] | SuperFET [™] | UniFET [™] |
| FACT Quiet Series [™] | MotionMax [™] | SuperSOT [™] -3 | VCX [™] |
| FACT [®] | Motion-SPM [™] | SuperSOT [™] -6 | VisualMax [™] |
| FAST [®] | OPTOLOGIC [®] | SuperSOT [™] -8 | |
| FAST [®] | OPTOPLANAR [®] | SupreMOS [™] | |
| FastvCore [™] | | SyncFET [™] | |
| FlashWriter [®] * | |  | |

* EZSWITCH[™] and FlashWriter[®] are 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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This 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	This 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	This datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I34