



## FOD852

# 4-Pin High Operating Temperature Photodarlington Optocoupler

### Features

- Applicable to Pb-free IR reflow soldering
- Compact 4-pin package
- High current transfer ratio: 1000% minimum
- C-UL, UL, and VDE approved
- High input-output isolation voltage of 5000Vrms
- High operating temperature of 100°C

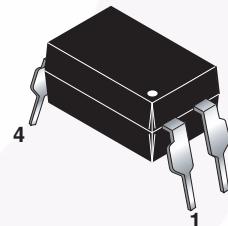
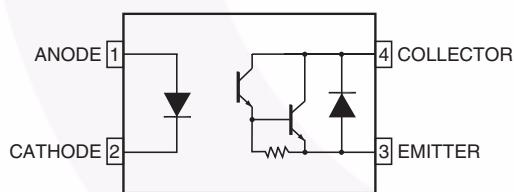
### Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

### Description

The FOD852 consists of gallium arsenide infrared emitting diode driving a silicon photodarlington output (with integral base-emitter resistor) in a 4-pin dual in-line package.

### Functional Block Diagram



**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

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	Value	Units
<b>TOTAL DEVICE</b>			
$T_{STG}$	Storage Temperature	-55 to +125	$^\circ\text{C}$
$T_{OPR}$	Operating Temperature	-30 to +100	$^\circ\text{C}$
$T_{SOL}$	Lead Solder Temperature	260 for 10 sec	$^\circ\text{C}$
$P_{TOT}$	Total Device Power Dissipation	200	mW
<b>INPUT</b>			
$I_F$	Continuous Forward Current	50	mA
$V_R$	Reverse Voltage	6	V
$P_D$	LED Power Dissipation	70	mW
<b>OUTPUT</b>			
$V_{CEO}$	Collector-Emitter Voltage	300	V
$V_{ECO}$	Emitter-Collector Voltage	0.1	V
$I_C$	Continuous Collector Current	150	mA
$P_C$	Collector Power Dissipation	150	mW

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise specified.)**Individual Component Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>INPUT</b>						
$V_F$	Forward Voltage	$I_F = 10\text{mA}$		1.2	1.4	V
$I_R$	Reverse Current	$V_R = 4\text{V}$			10	$\mu\text{A}$
$C_t$	Terminal Capacitance	$V = 0, f = 1\text{kHz}$		30	250	$\text{pF}$
<b>OUTPUT</b>						
$I_{CEO}$	Collector Dark Current	$V_{CE} = 200\text{V}, I_F = 0$			200	nA
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 0.1\text{mA}, I_F = 0$	300			V
$BV_{ECO}$	Emitter-Collector Breakdown Voltage	$I_E = 10\mu\text{A}, I_F = 0$	0.1			V

**Transfer Characteristics**

Symbol	DC Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$I_C$	Collector Current	$I_F = 1\text{mA}, V_{CE} = 2\text{V}$	10	40	1 f0	mA
CTR	Current Transfer Ratio <sup>(1)</sup>		1,000	4,000	15,000	%
$V_{CE(\text{sat})}$	Collector-Emitter Saturation Voltage	$I_F = 20\text{mA}, I_C = 100\text{mA}$			1.2	V
$R_{\text{iso}}$	Isolation Resistance	DC500V 40~60% R.H.	$5 \times 10^{10}$	$1 \times 10^{11}$		$\Omega$
$C_f$	Floating Capacitance	$V = 0, f = 1\text{MHz}$		0.6	1	pF
$f_C$	Cut-Off Frequency	$V_{CE} = 2\text{V}, I_C = 20\text{mA}, R_L = 100\Omega, -3\text{dB}$	1	7		kHz
$t_r$	Response Time (Rise)	$V_{CE} = 2\text{V}, I_C = 20\text{mA}, R_L = 100\Omega$		100	300	$\mu\text{s}$
$t_f$	Response Time (Fall)			20	100	$\mu\text{s}$

**Isolation Characteristics**

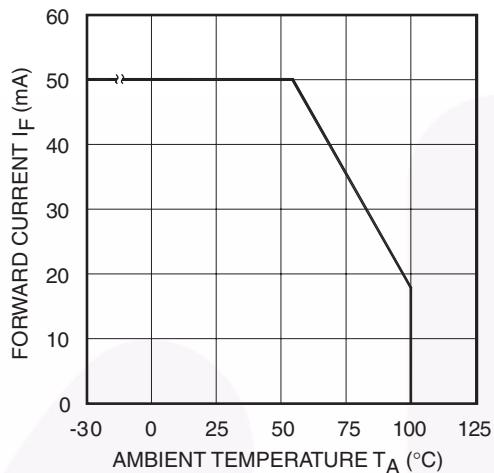
Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
$V_{\text{ISO}}$	Input-Output Isolation Voltage	$f = 60\text{Hz}, t = 1\text{ min}, I_{I-O} \leq 2\mu\text{A}$	5000			Vac(rms)
$R_{\text{ISO}}$	Isolation Resistance	$V_{I-O} = 500\text{ VDC}$	$5 \times 10^{10}$	$10^{11}$	—	$\Omega$
$C_{\text{ISO}}$	Isolation Capacitance	$V_{I-O} = 0, f = 1\text{MHz}$		0.6	1.0	pf

**Note:**

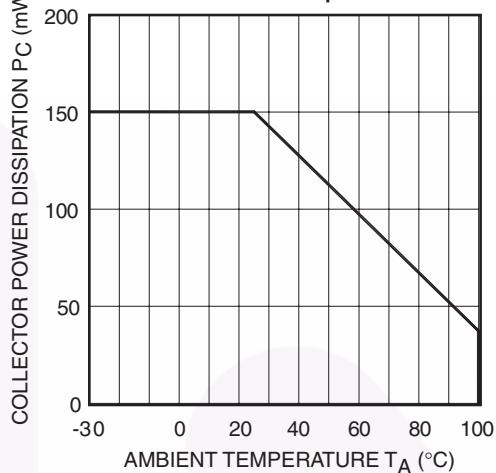
1. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

**Typical Electrical/Optical Characteristic Curves** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

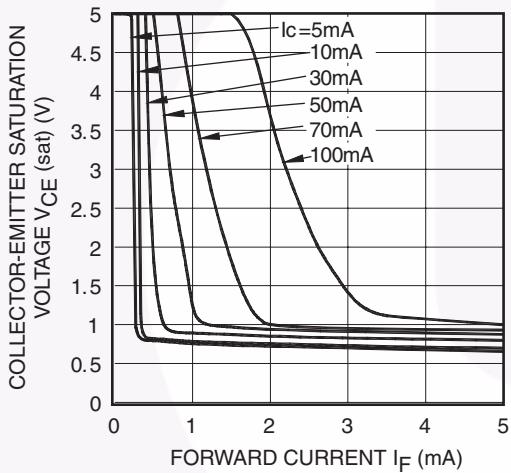
**Fig. 1 Forward Current vs. Ambient Temperature**



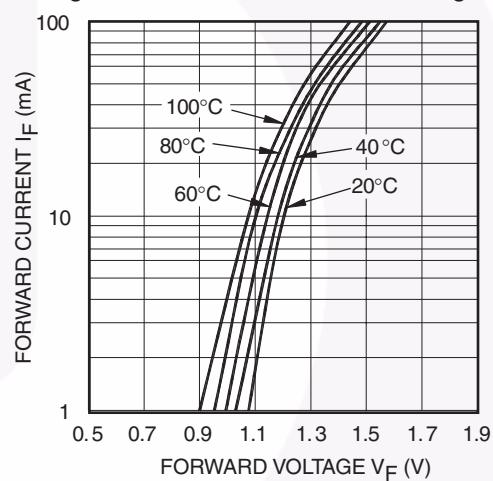
**Fig. 2 Collector Power Dissipation vs. Ambient Temperature**



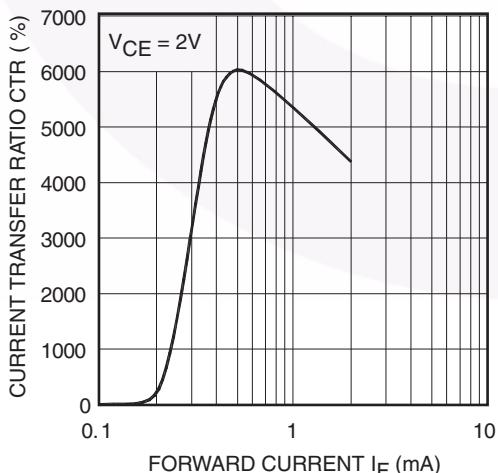
**Fig. 3 Collector-Emitter Saturation Voltage vs. Forward Current**



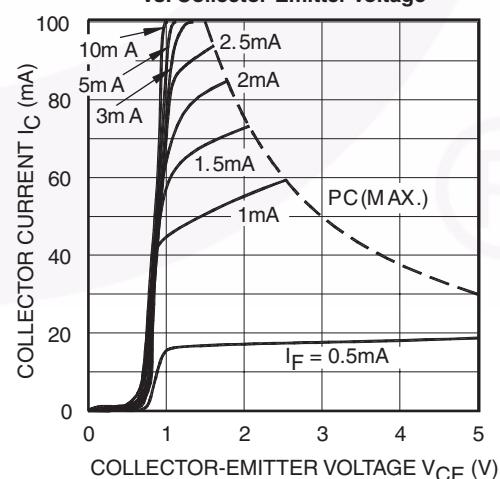
**Fig. 4 Forward Current vs. Forward Voltage**



**Fig. 5 Current Transfer Ratio vs. Forward Current**

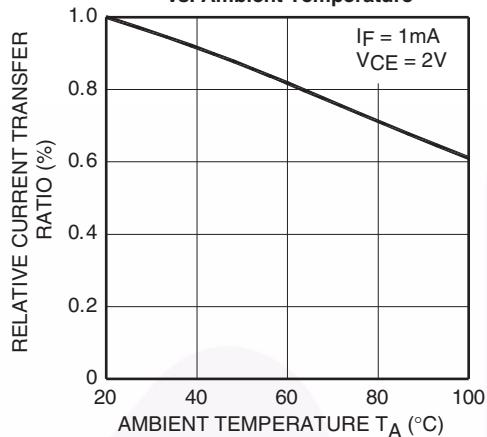


**Fig. 6 Collector Current vs. Collector-Emitter Voltage**

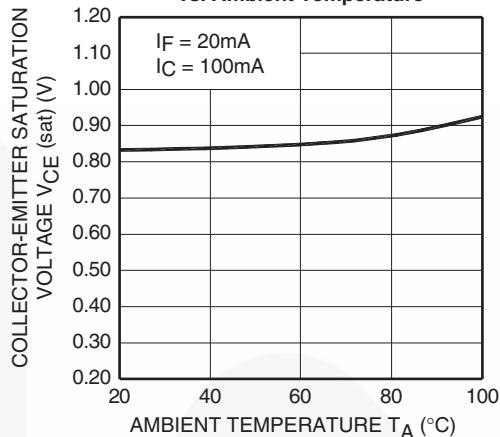


**Typical Electrical/Optical Characteristic Curves** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

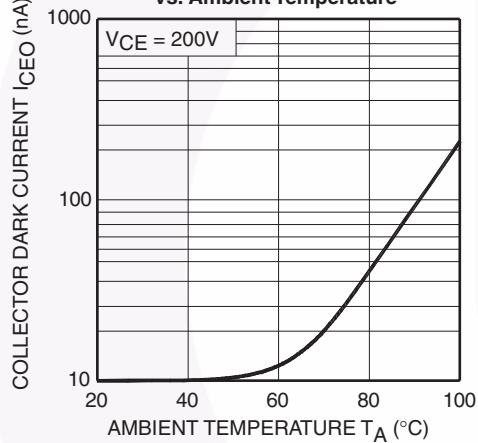
**Fig. 7. Relative Current Transfer Ratio vs. Ambient Temperature**



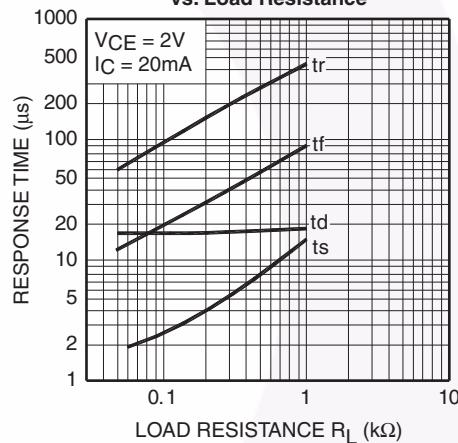
**Fig. 8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



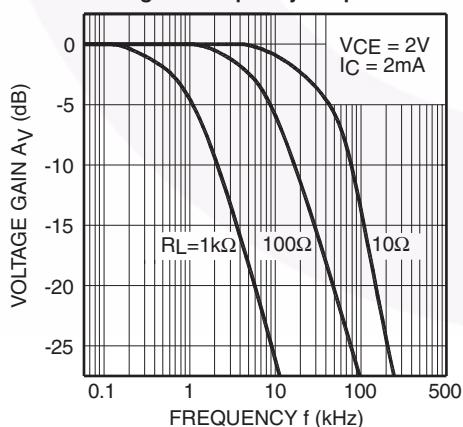
**Fig. 9 Collector Dark Current vs. Ambient Temperature**



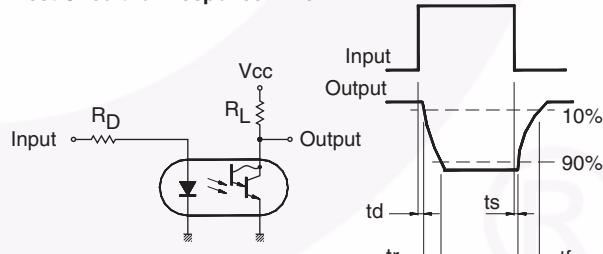
**Fig. 10. Response Time vs. Load Resistance**



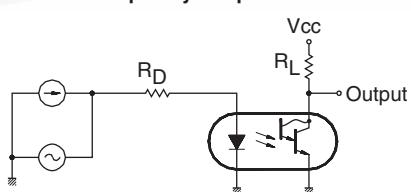
**Fig. 11. Frequency Response**



**Test Circuit for Response Time**

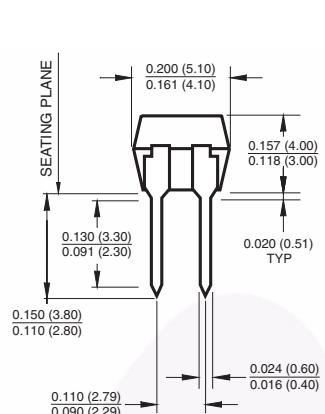


**Test Circuit for Frequency Response**

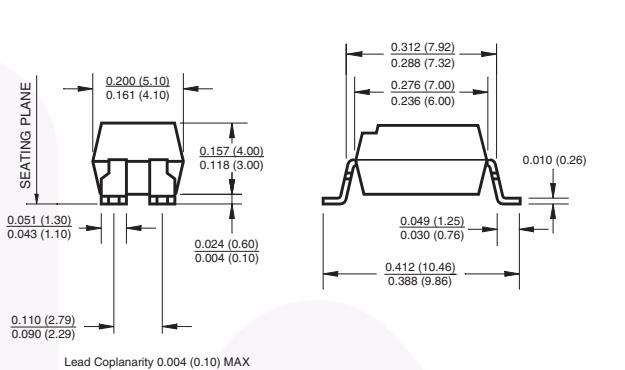


## Package Dimensions

### Through Hole

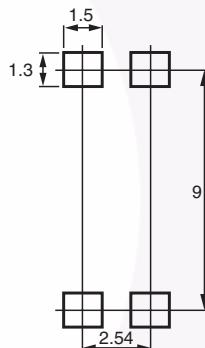
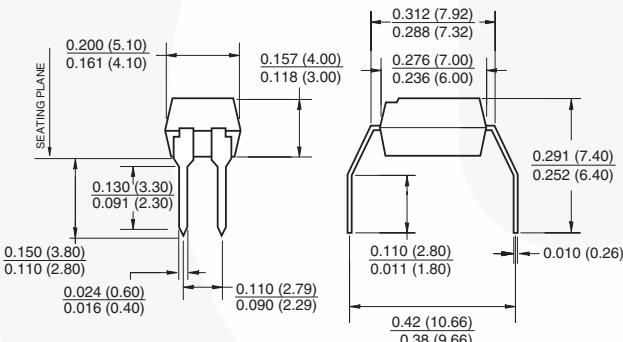


### Surface Mount



### Surface Mount (Footprint Dimensions)

#### 0.4" Lead Spacing



#### Note:

All dimensions are in inches (millimeters)

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.

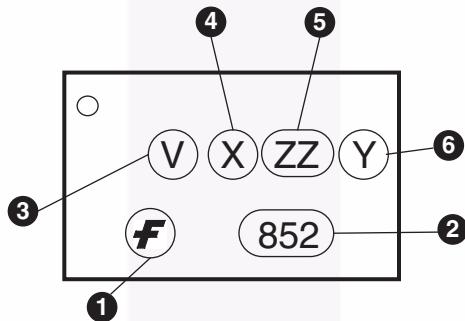
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

<http://www.fairchildsemi.com/packaging/>

## Ordering Information

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE Approved
300W	.300W	VDE Approved, 0.4" Lead Spacing
3S	.3S	VDE Approved, Surface Mount
3SD	.3SD	VDE Approved, Surface Mount, Tape & Reel

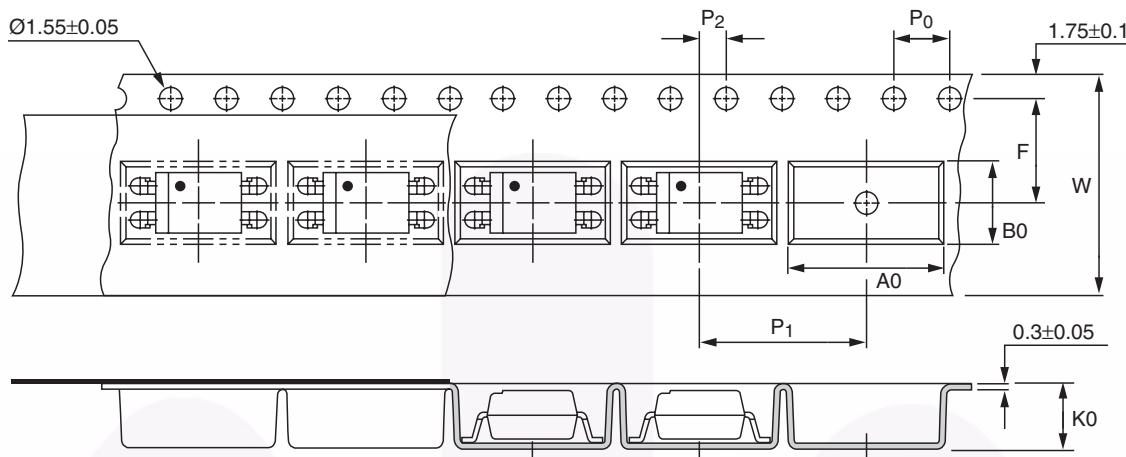
## Marking Information



### Definitions

1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

## Carrier Tape Specifications

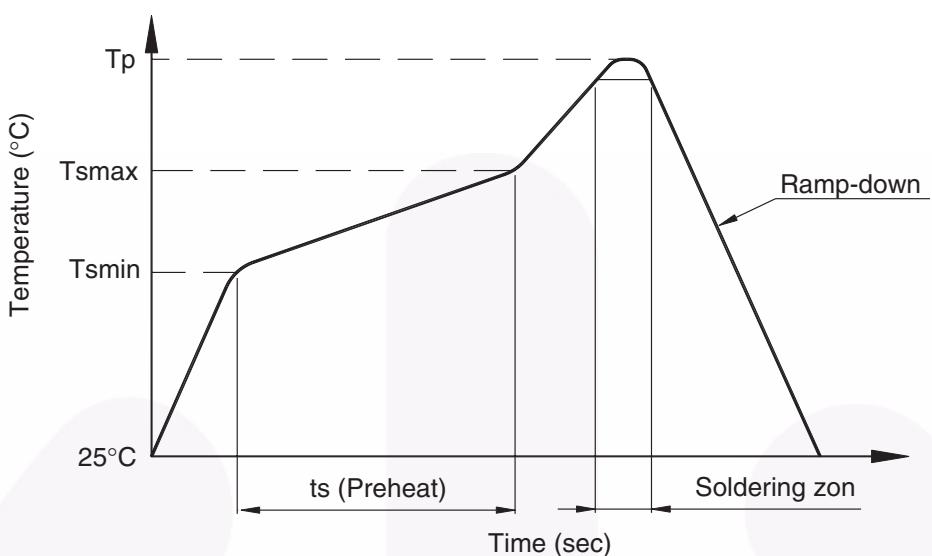


**Note:**

All dimensions are in millimeters.

Symbol	Description	Dimensions in mm (inches)
W	Tape wide	16 ± 0.3 (.63)
P <sub>0</sub>	Pitch of sprocket holes	4 ± 0.1 (.15)
F	Distance of compartment	7.5 ± 0.1 (.295)
P <sub>2</sub>		2 ± 0.1 (.079)
P <sub>1</sub>	Distance of compartment to compartment	12 ± 0.1 (.472)
A <sub>0</sub>	Compartment	10.45 ± 0.1 (.411)
B <sub>0</sub>		5.30 ± 0.1 (.209)
K <sub>0</sub>		4.25 ± 0.1 (.167)

### Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmin-Tsmax / ts)	100°C ~ 150°C 60 ~ 120 sec	150°C ~ 200°C 60 ~ 120 sec
Melt soldering zone	183°C 60 ~ 120 sec	217°C 30 ~ 90 sec
Peak temperature (Tp)	240 +0/-5°C	260 +0/-5°C
Ramp-down rate	6°C/sec max.	6°C/sec max.

### Recommended Wave Soldering condition

Profile Feature	For all solder assembly
Peak temperature (Tp)	Max 260°C for 10 sec



## 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.

Build it Now™  
 CorePLUS™  
 CorePOWER™  
 CROSSVOLT™  
 CTL™  
 Current Transfer Logic™  
 EcoSPARK®  
 EfficientMax™  
 EZSWITCH™ \*  
  
  
 Fairchild®  
 Fairchild Semiconductor®  
 FACT Quiet Series™  
 FACT®  
 FAST®  
 FastvCore™  
 FlashWriter®  
 FPS™  
 F-PFS™

FRFET®  
 Global Power Resource™  
 Green FPS™  
 Green FPS™ e-Series™  
 GTO™  
 IntelliMAX™  
 ISOPLANAR™  
 MegaBuck™  
 MICROCOUPLER™  
 MicroFET™  
 MicroPak™  
 MillerDrive™  
 MotionMax™  
 Motion-SPM™  
 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™  
 SmartMax™  
 SMART START™  
 SPM®  
 STEALTH™  
 SuperFET™  
 SuperSOT™3  
 SuperSOT™6  
 SuperSOT™8  
 SupreMOS™  
 SyncFET™  
  
 The Power Franchise®

the power franchise  
 TinyBoost™  
 TinyBuck™  
 TinyLogic®  
 TINYOPTO™  
 TinyPower™  
 TinyPWM™  
 TinyWire™  
 µUserDes™  
  
 UHC®  
 Ultra FRFET™  
 UnifET™  
 VCX™  
 VisualMax™  
 XST™

\* 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.

## 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](http://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. I37