

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

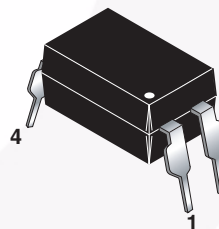
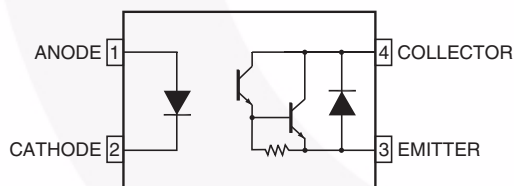
Applications

- 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
TOTAL DEVICE			
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
INPUT			
I_F	Continuous Forward Current	50	mA
V_R	Reverse Voltage	6	V
P_D	LED Power Dissipation	70	mW
OUTPUT			
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
INPUT						
V_F	Forward Voltage	$I_F = 10\text{mA}$		1.2	1.4	V
I_R	Reverse Current	$V_R = 4\text{V}$			10	μA
C_t	Terminal Capacitance	$V = 0, f = 1\text{kHz}$		30	250	pF
OUTPUT						
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 ⁽¹⁾		1,000	4,000	15,000	%
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_F = 20\text{mA}, I_C = 100\text{mA}$			1.2	V
R_{iso}	Isolation Resistance	DC500V 40~60% R.H.	5×10^{10}	1×10^{11}		Ω
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	μs
t_f	Response Time (Fall)			20	100	μs

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
V_{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_{ISO}	Isolation Resistance	$V_{I-O} = 500\text{VDC}$	5×10^{10}	10^{11}	—	Ω
C_{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

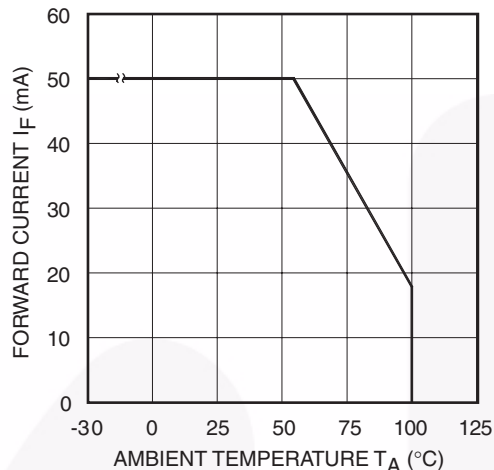


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

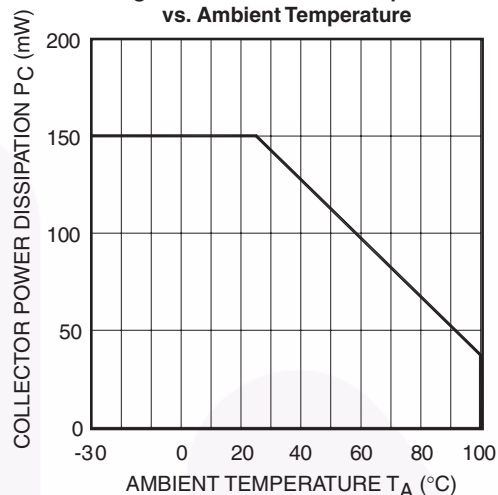


Fig. 3 Collector-Emitter Saturation Voltage vs. Forward Current

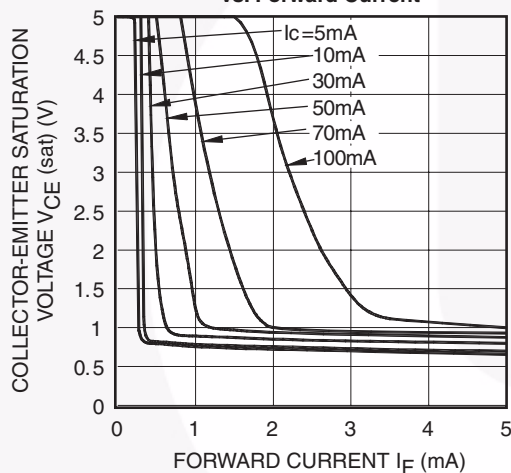


Fig. 4 Forward Current vs. Forward Voltage

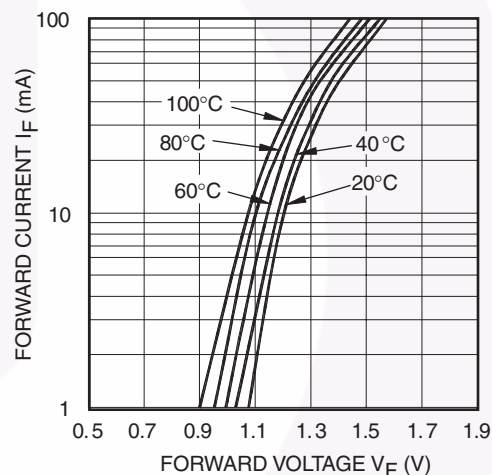


Fig. 5 Current Transfer Ratio vs. Forward Current

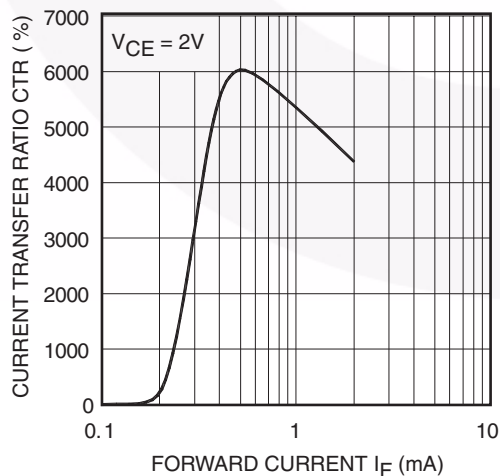
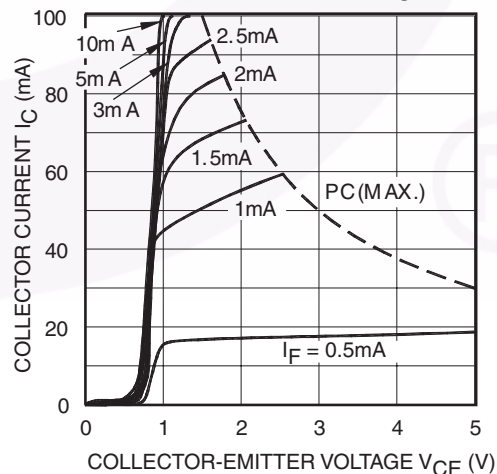
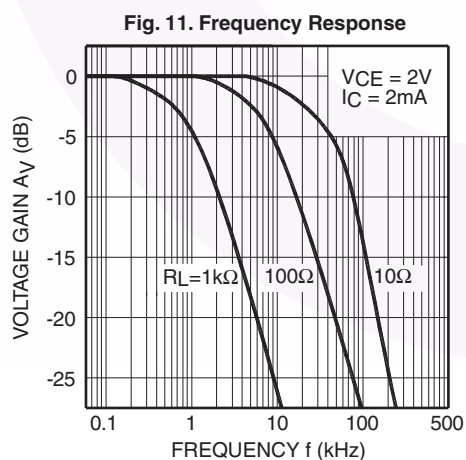
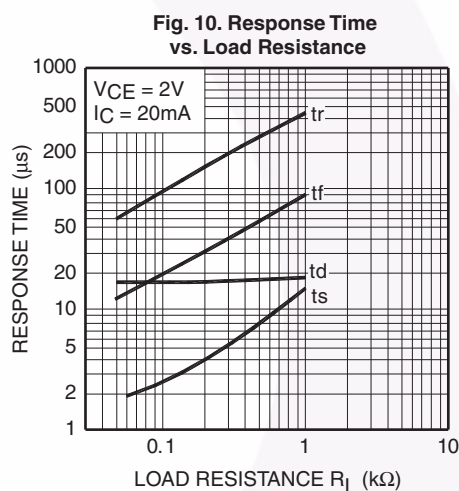
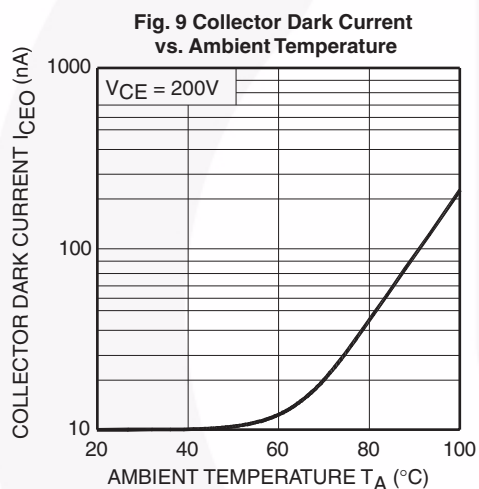
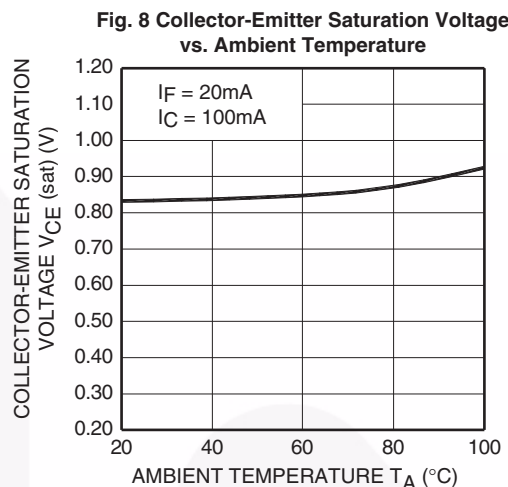
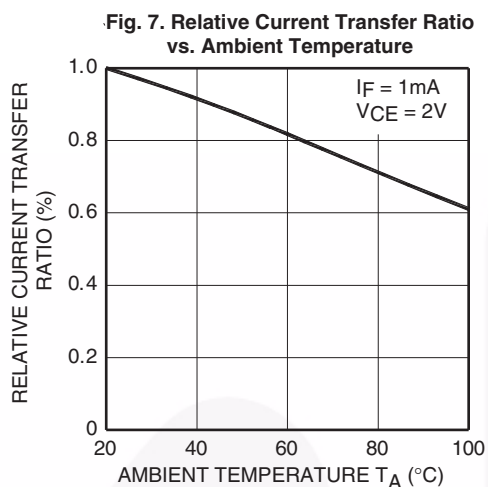


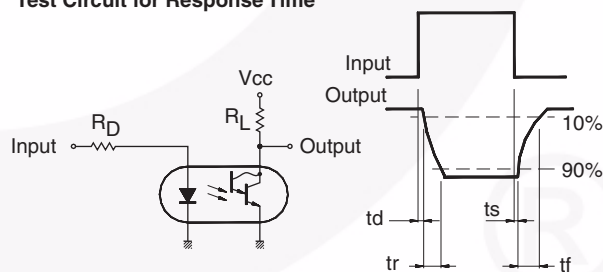
Fig. 6 Collector Current vs. Collector-Emitter Voltage



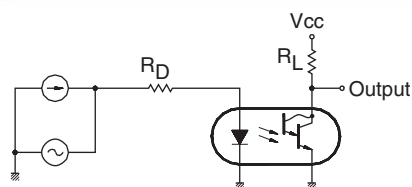
Typical Electrical/Optical Characteristic Curves ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)



Test Circuit for Response Time

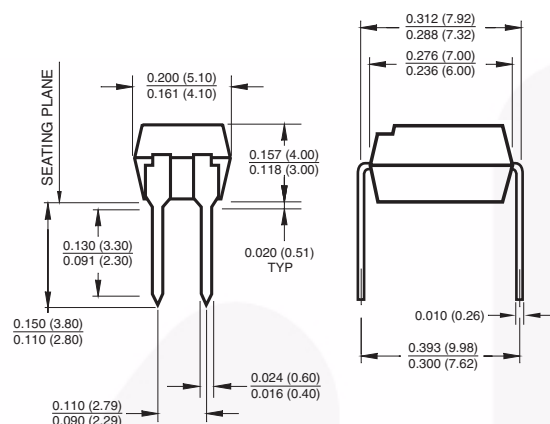


Test Circuit for Frequency Response

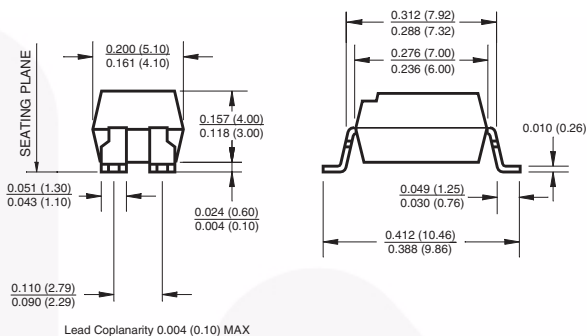


Package Dimensions

Through Hole

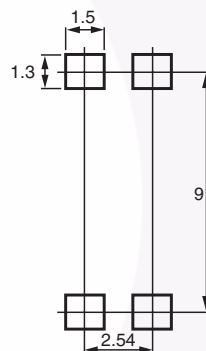
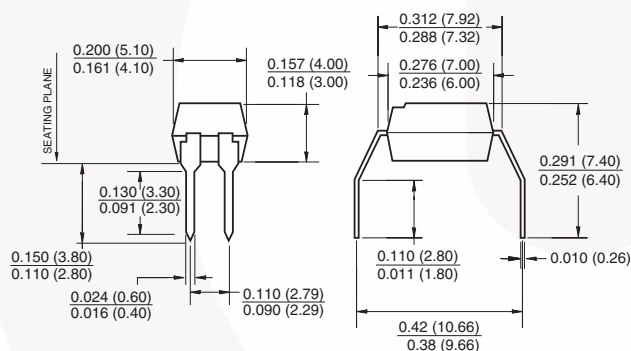


Surface Mount



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.

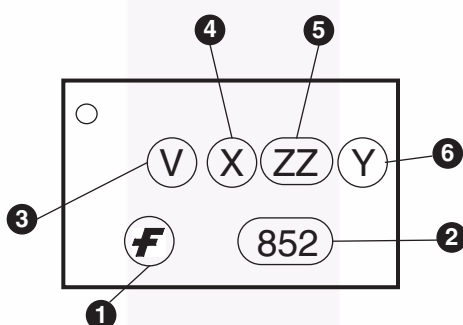
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

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

Ordering Information

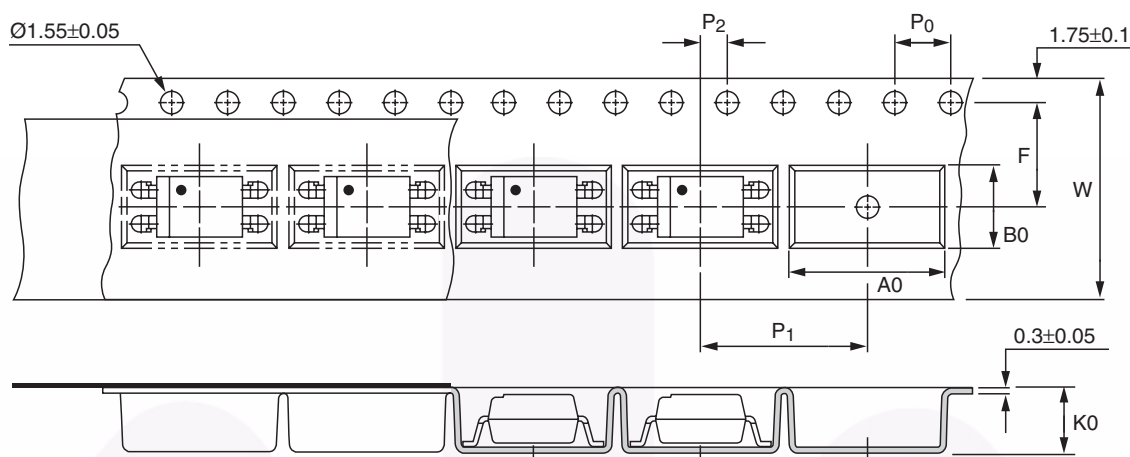
Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE Approved
300W	.300W	VDE Approved, 0.4" Lead Spacing
3S	.3S	VDE Approved, Surface Mount
3SD	.3SD	VDE Approved, Surface Mount, Tape & Reel

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

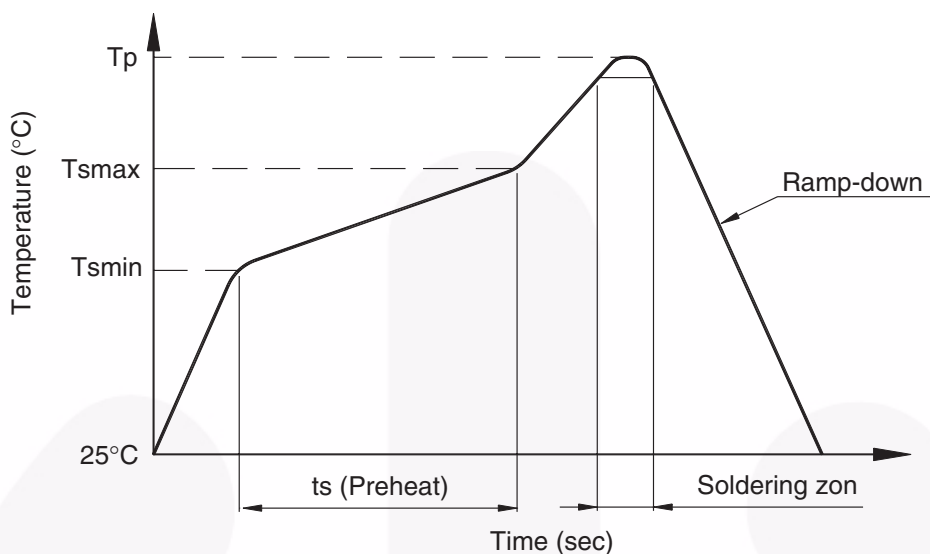


Note:

All dimensions are in millimeters.

Symbol	Description	Dimensions in mm (inches)
W	Tape wide	16 ± 0.3 (.63)
P_0	Pitch of sprocket holes	4 ± 0.1 (.15)
F	Distance of compartment	7.5 ± 0.1 (.295)
P_2		2 ± 0.1 (.079)
P_1	Distance of compartment to compartment	12 ± 0.1 (.472)
A0	Compartment	10.45 ± 0.1 (.411)
B0		5.30 ± 0.1 (.209)
K0		4.25 ± 0.1 (.167)

Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmmin-Tsmmax / 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.

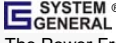
Recommended Wave Soldering condition

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

* 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, 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. 137