

HMHAA280, HMHA2801 Series, HMHA281 Half Pitch Mini-Flat Package 4-Pin Optocouplers

Features

- Compact 4-pin package (2.4mm maximum standoff height)
- Half pitch leads for optimum board space savings
- Current Transfer Ratio in selected groups

HMHA2801: 80–600%	HMHA2801A: 80–160%
HMHA2801B: 50–150%	HMHA2801C: 50–100%
HMHA281: 50–600%	HMHAA280: 50–600%
- Available in tape and reel quantities of 2500
- Applicable to Infrared Ray reflow (230°C Max, 30 seconds)
- BSI (File #8611/8612), CSA (File #1201524), UL (File #E90700) and VDE (File #136480) certified

Description

The HMHA281, HMHA2801 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a compact 4-pin mini-flat package. The lead pitch is 1.27mm.

The HMHAA280 series consists of two gallium arsenide infrared emitting diodes, connected in inverse parallel, driving a single silicon phototransistor in a compact 4-pin mini-flat package. The lead pitch is 1.27mm.

Applications

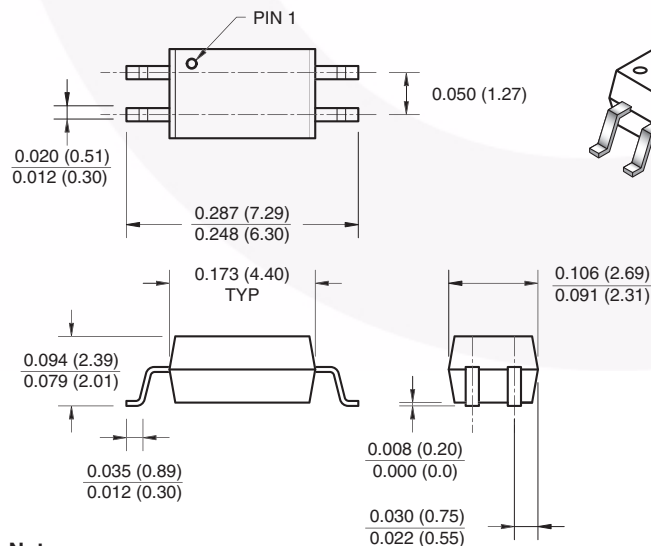
HMHAA280

- AC line monitor
- Unknown polarity DC sensor
- Telephone line receiver

HMHA281, HMHA2801 Series

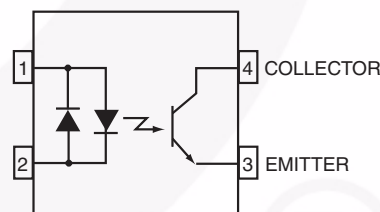
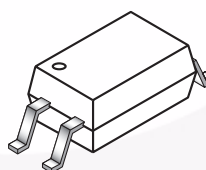
- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

Package Dimensions

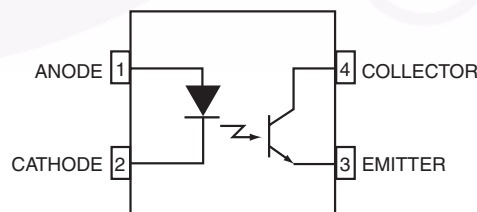


Note:

All dimensions are in inches (millimeters)



Equivalent Circuit
(HMHAA280)



Equivalent Circuit
(HMHA281, HMHA2801)

Absolute Maximum Ratings (T_A = 25°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 PACKAGE			
T _{STG}	Storage Temperature	-55 to +125	°C
T _{OPR}	Operating Temperature	-55 to +100	°C
EMITTER			
I _{F (avg)}	Continuous Forward Current	50	mA
I _{F (pk)}	Peak Forward Current (1μs pulse, 300pps.)	1	A
V _R	Reverse Input Voltage (HMHA)	6	V
P _D	Power Dissipation	60	mW
	Derate linearly (above 25°C)	0.6	mW/°C
DETECTOR			
	Continuous Collector Current	50	mA
P _D	Power Dissipation	150	mW
	Derate linearly (above 25°C)	1.5	mW/°C
V _{CEO}	Collector-Emitter Voltage	80	V
V _{ECO}	Emitter-Collector Voltage	7	V

Electrical Characteristics (T_A = 25°C)

Symbol	Parameter	Test Conditions	Device	Min.	Typ.*	Max.	Unit
INDIVIDUAL COMPONENT CHARACTERISTICS							
Emitter							
V _F	Forward Voltage	I _F = 10mA	HMHA281	1.0		1.3	V
			HMHA2801				
			HMHA2801A	1.0		1.3	
			HMHA2801B				
		I _F = 20mA	HMHA2801C			1.4	
		I _F = ±5mA	HMHA280			1.4	
I _R	Reverse Current	V _R = 5V	All			5	μA
Detector							
BV _{CEO}	Breakdown Voltage Collector to Emitter	I _C = 0.5mA, I _F = 0	All	80			V
BV _{ECO}	Emitter to Collector	I _E = 100μA, I _F = 0	All	7			
I _{CEO}	Collector Dark Current	V _{CE} = 80V, I _F = 0	All			100	nA
C _{CE}	Capacitance	V _{CE} = 0V, f = 1MHz	All		10		pF

Electrical Characteristics ($T_A = 25^\circ\text{C}$) (Continued)

Symbol	Characteristic	Test Conditions	Device	Min.	Typ.*	Max.	Unit
TRANSFER CHARACTERISTICS							
CTR	DC Current Transfer Ratio	I _F = ±5mA, V _{CE} = 5V	HMHAA280	50		600	%
		I _F = 5mA, V _{CE} = 5V	HMHA281	50		600	
			HMHA2801	80		600	
			HMHA2801A	80		160	
			HMHA2801B	50		150	
		I _F = 1mA, V _{CE} = 5V	HMHA2801C	50		100	
	CTR Symmetry	I _F = ± 5mA, V _{CE} = 5V	HMHAA280	0.33		3.0	
V _{CE (SAT)}	Saturation Voltage	I _F = ± 8mA, I _C = 2.4mA	HMHAA280			0.4	V
		I _F = 8mA, I _C = 2.4mA	HMHA281			0.4	
		I _F = 10mA, I _C = 2mA	HMHA2801			0.3	
			HMHA2801A			0.3	
			HMHA2801B				
		I _F = 20mA, I _C = 1mA)	HMHA2801C			0.2	
t _r	Rise Time (Non-Saturated)	I _C = 2mA, V _{CE} = 5V, R _L = 100Ω	All except for HMHA2801C		3		μs
		I _C = 2mA, V _{CE} = 2V, R _L = 1 KΩ	HMHA2801C			9	
t _f	Fall Time (Non-Saturated)	I _C = 2mA, V _{CE} = 5V, R _L = 100Ω	All except for HMHA2801C		3		
		I _C = 2mA, V _{CE} = 2V, R _L = 1KΩ	HMHA2801C			9	
ISOLATION CHARACTERISTICS							
V _{ISO}	Steady State Isolation Voltage	1 Minute	All	2500			VRMS

*All typicals at $T_A = 25^\circ\text{C}$

Typical Performance Characteristics

Fig. 1 Forward Current vs. Forward Voltage

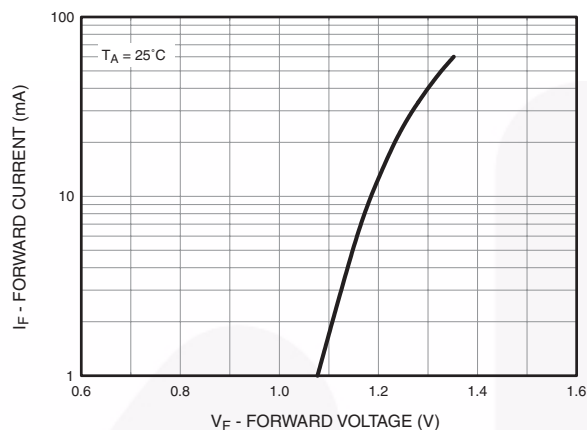


Fig. 2 Collector Current vs. Forward Current

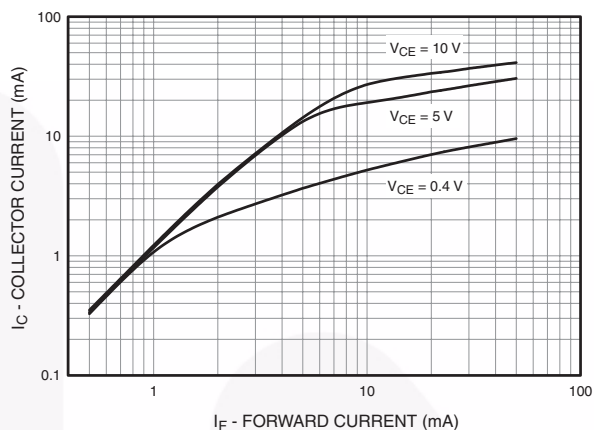


Fig. 3 Current Transfer Ratio vs. Forward Current

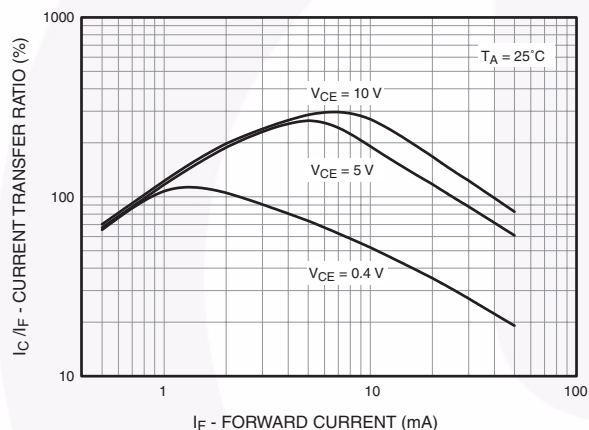


Fig. 4 Normalized CTR vs. Temperature

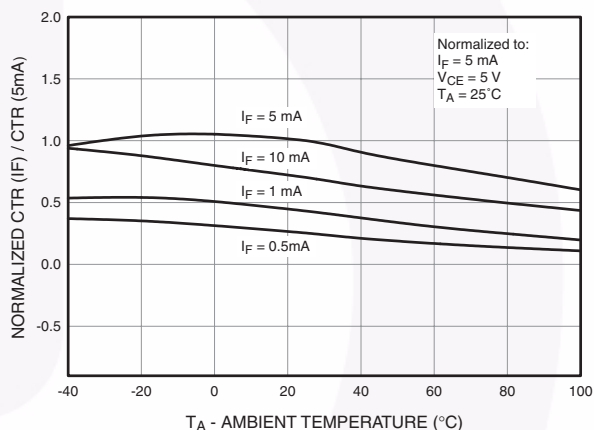
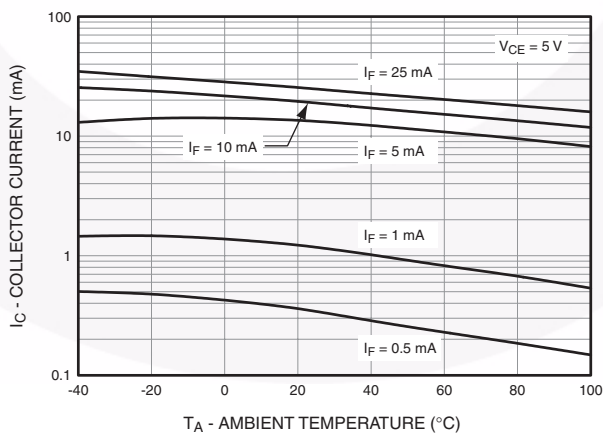


Fig. 5 Collector Current vs. Temperature



Typical Performance Characteristics (Continued)

Fig. 6 Collector Current vs. Collector-Emitter Voltage

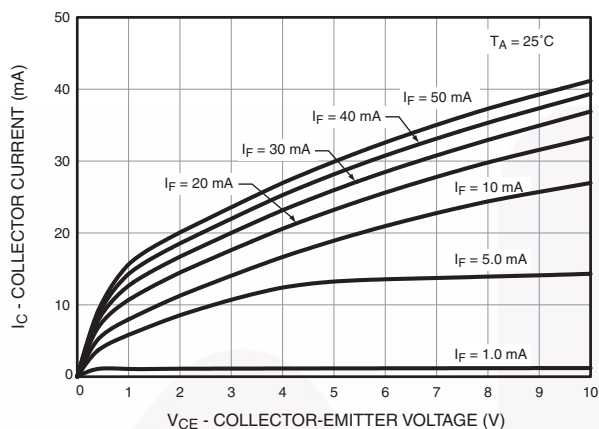


Fig. 7 Collector Current vs. Collector-Emitter Voltage

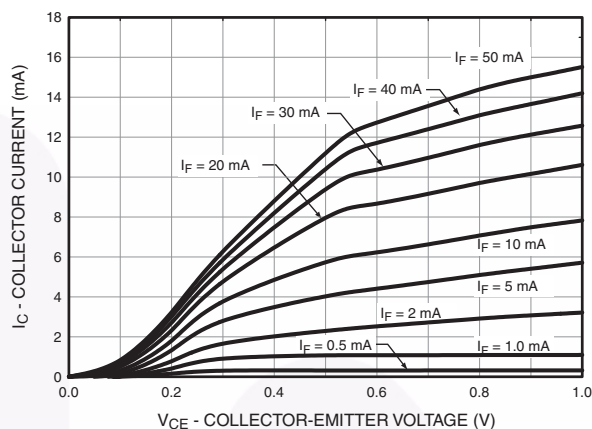


Fig. 8 Collector Dark Current vs. Temperature

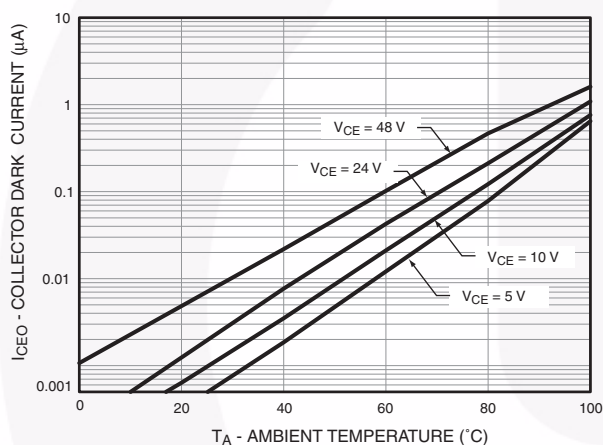


Fig. 9 Switching Time vs. Load Resistance

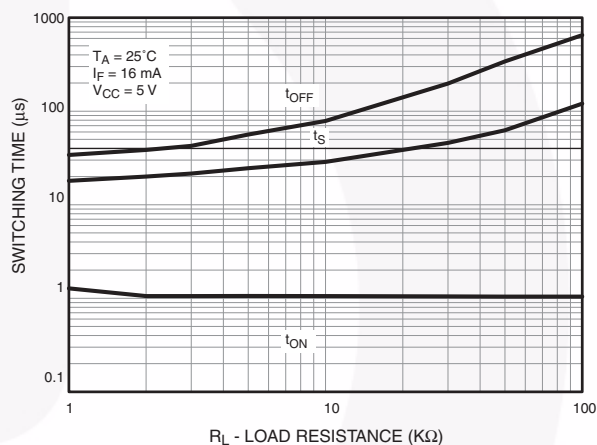
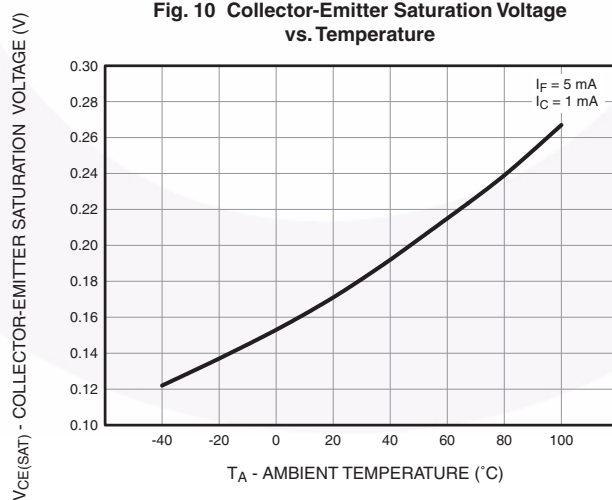


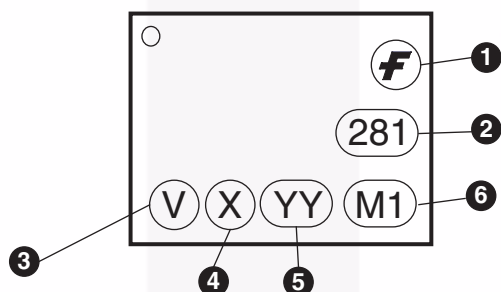
Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature



Ordering Information

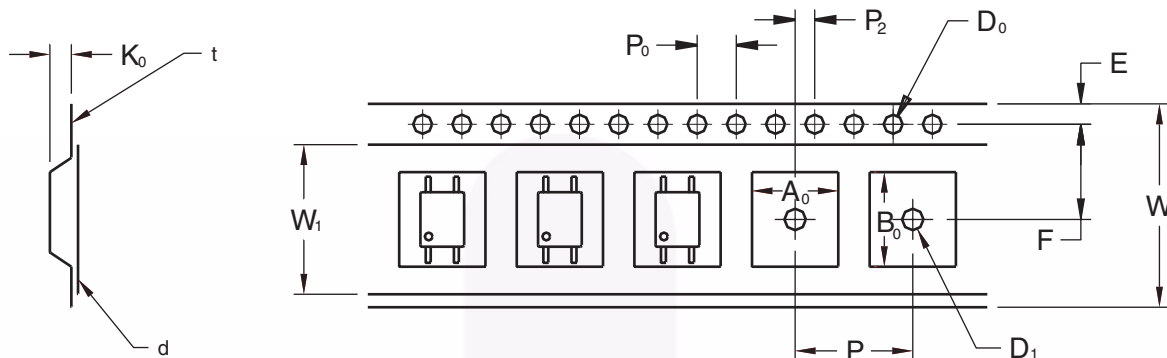
Option	Description
V	VDE Approved
R2	Tape and Reel (2500 units)
R3	Tape and Reel (500 units; unit 180° rotated)
R4	Tape and Reel (2500 units; unit 180° rotated)
R2V	Tape and Reel (2500 units) and VDE Approved
R3V	Tape and Reel (500 units; unit 180° rotated) and VDE Approved
R4V	Tape and Reel (2500 units; unit 180° rotated) and VDE Approved

Marking Information



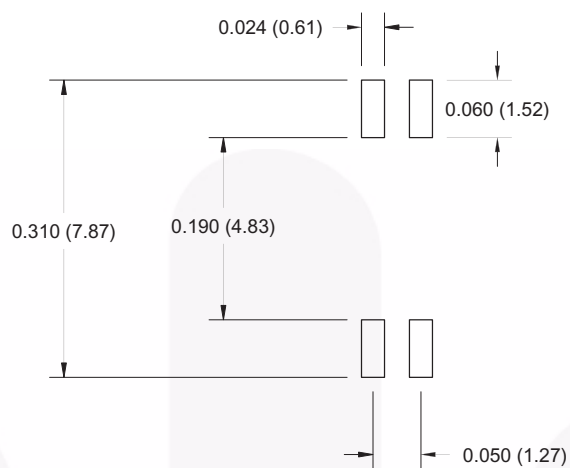
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Tape and Reel Dimensions

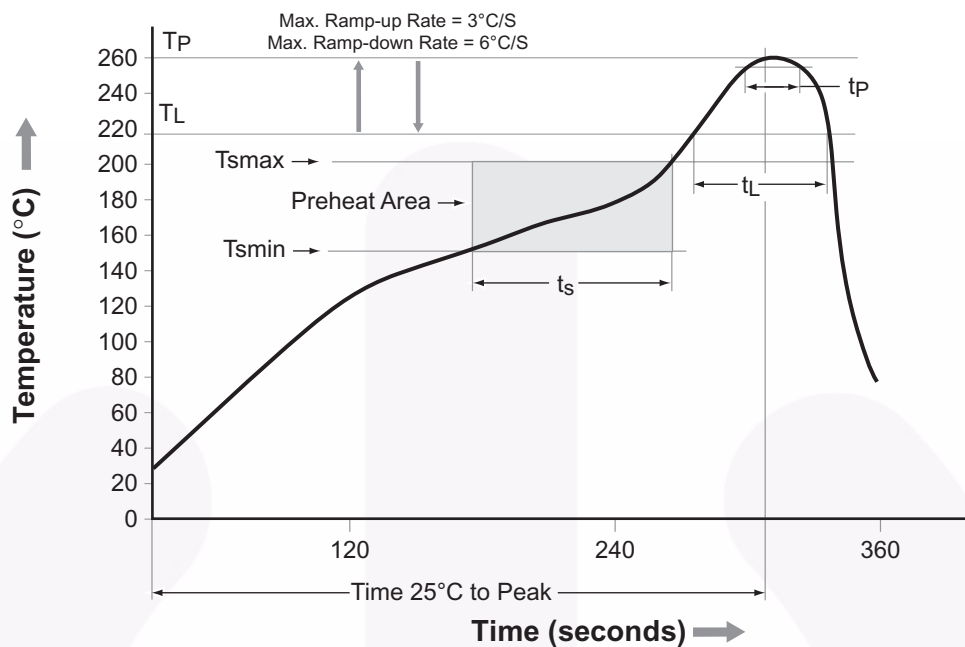


		2.54 Pitch
Description	Symbol	Dimensions
Tape Width	W	12.00±0.4
Tape Thickness	t	0.35±0.02
Sprocket Hole Pitch	P ₀	4.00±0.20
Sprocket Hole Dia.	D ₀	1.55±0.20
Sprocket Hole Location	E	1.75±0.20
Pocket Location	F	5.50±0.20
	P ₂	2.00±0.20
Pocket Pitch	P	8.00±0.20
Pocket Dimension	A ₀	4.75±0.20
	B ₀	7.30±0.20
	K ₀	2.30±0.20
Pocket Hole Dia.	D ₁	1.55±0.20
Cover Tape Width	W ₁	9.20
Cover Tape Thickness	d	0.065±0.02
Max. Component Rotation or Tilt		20° max
Devices Per Reel		2500
Reel Diameter		330 mm (13")

Footprint Drawing for PCB Layout



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60–120 seconds
Ramp-up Rate (tL to tp)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60–150 seconds
Peak Body Package Temperature	260°C +0°C / –5°C
Time (tp) within 5°C of 260°C	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.



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.

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

* 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. 140