April 2006

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 500 and 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

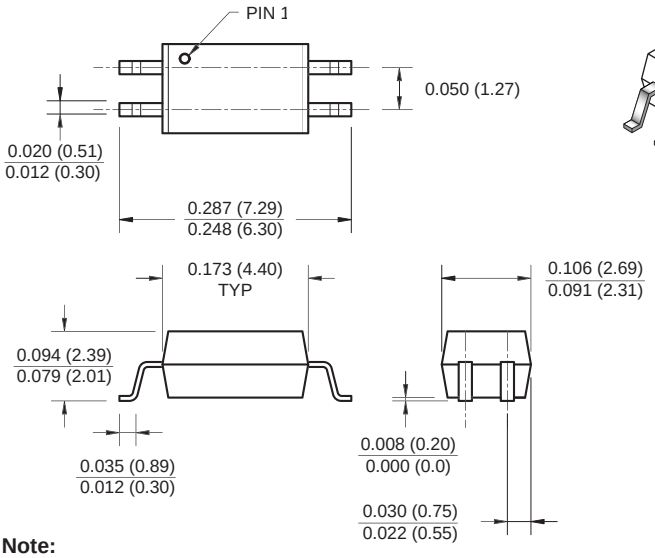
HMHAA280

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

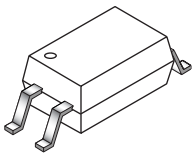
HMHA281, HMHA2801 Series

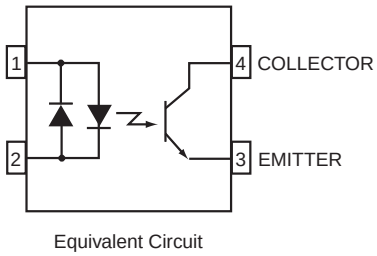
- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

Package Dimensions

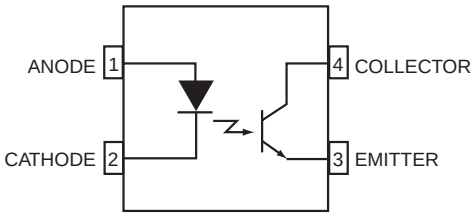


Note:
All dimensions are in inches (millimeters)





Equivalent Circuit
(HMHAA280)



Equivalent Circuit
(HMHA281, HMHA2801)

©2006 Fairchild Semiconductor Corporation

Absolute Maximum Ratings (T_A = 25°C unless otherwise specified)

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	HMHAA280			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°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°C

Typical Performance Characteristics

Fig. 1 Forward Current vs. Forward Voltage

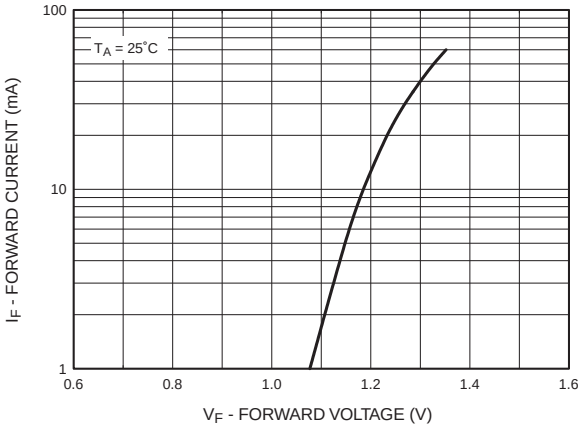


Fig. 2 Collector Current vs. Forward Current

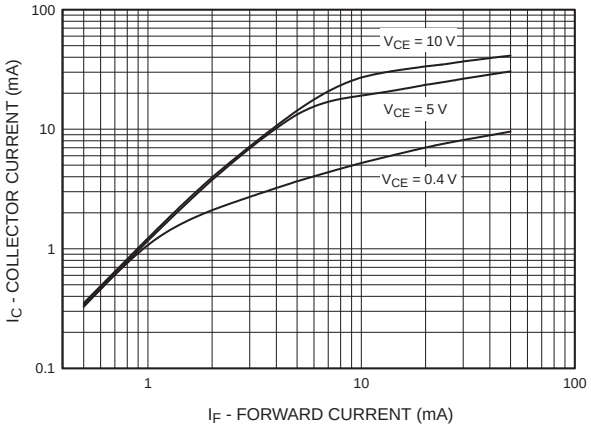


Fig. 3 Current Transfer Ratio vs. Forward Current

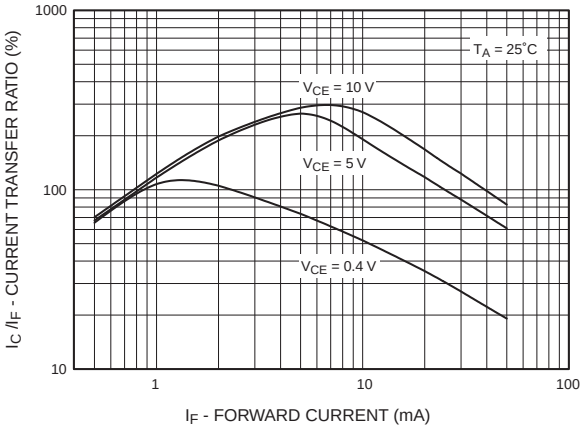


Fig. 4 Normalized CTR vs. Temperature

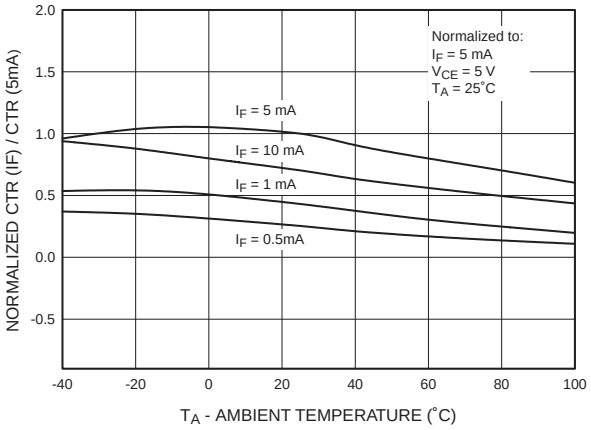
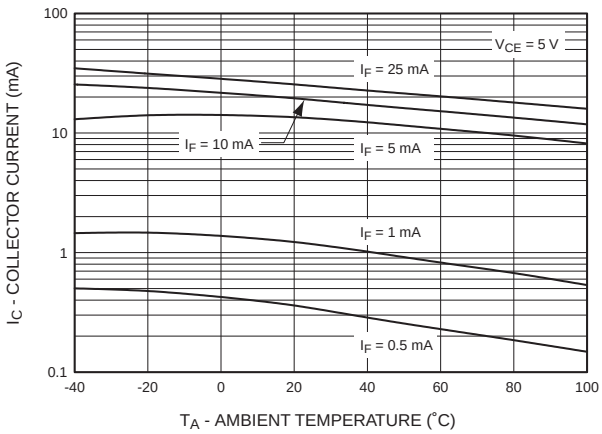


Fig. 5 Collector Current vs. Temperature



Typical Performance Characteristics (Continued)

Fig. 6 Collector Current vs. Collector-Emitter Voltage

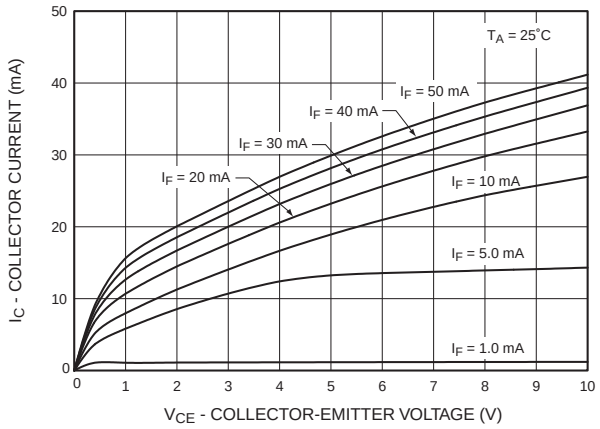


Fig. 7 Collector Current vs. Collector-Emitter Voltage

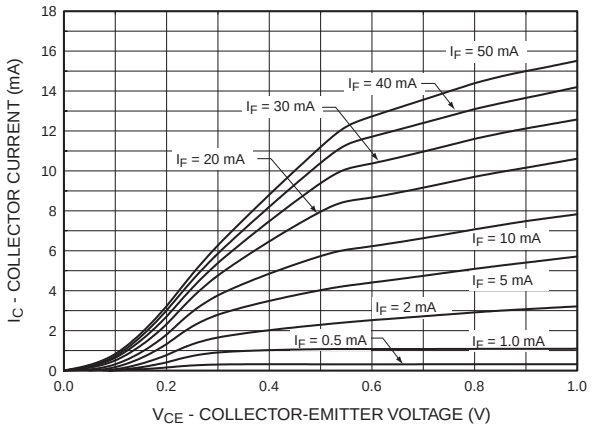


Fig. 8 Collector Dark Current vs. Temperature

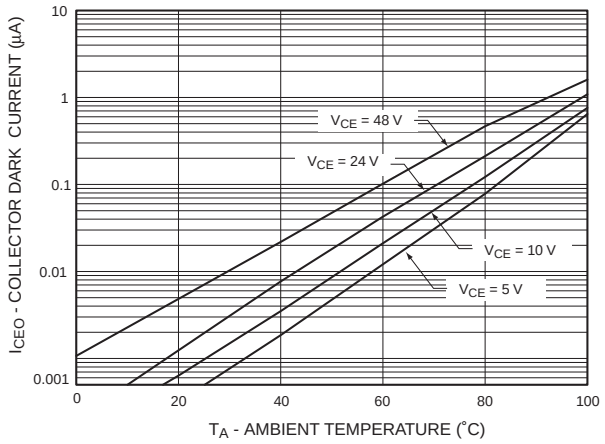


Fig. 9 Switching Time vs. Load Resistance

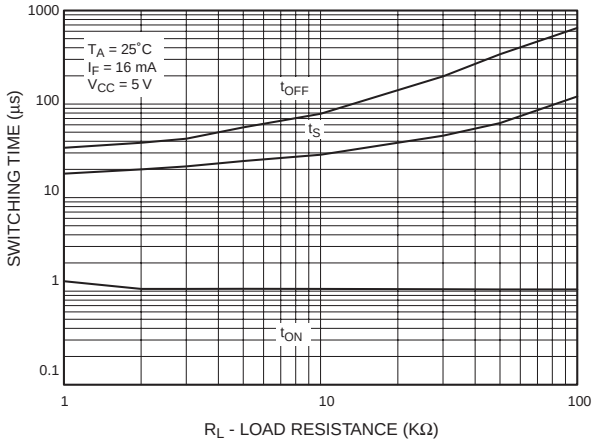
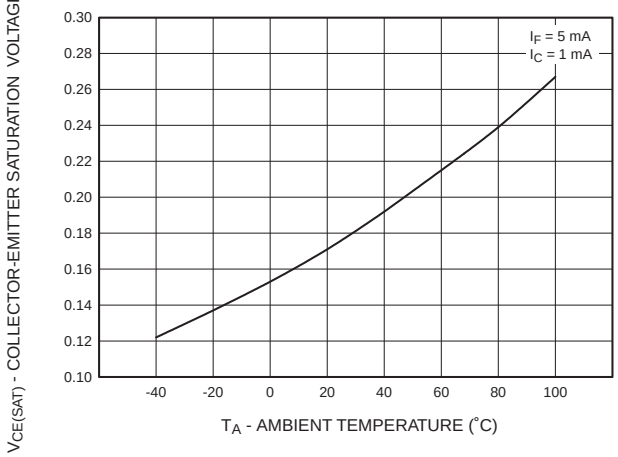


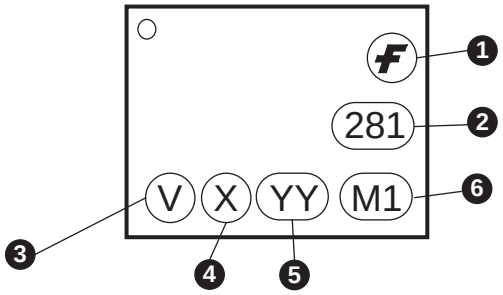
Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature



Ordering Information

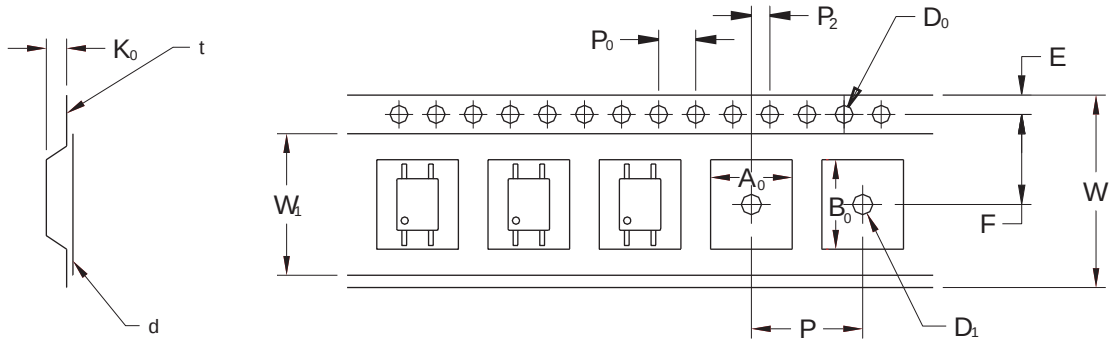
Option	Description
V	VDE Approved
R1	Tape and Reel (500 units)
R2	Tape and Reel (2500 units)
R3	Tape and Reel (500 units; unit 180° rotated)
R4	Tape and Reel (2500 units; unit 180° rotated)
R1V	Tape and Reel (500 units) and VDE Approved
R2V	Tape and Reel (2500 units) and VDE Approved
R3V	Tape and Reel (500 units; unit 180° rotated) and VDE Approved
R4V	Tape and Reel (2500 units; unit 180° rotated) and VDE Approved

Marking Information



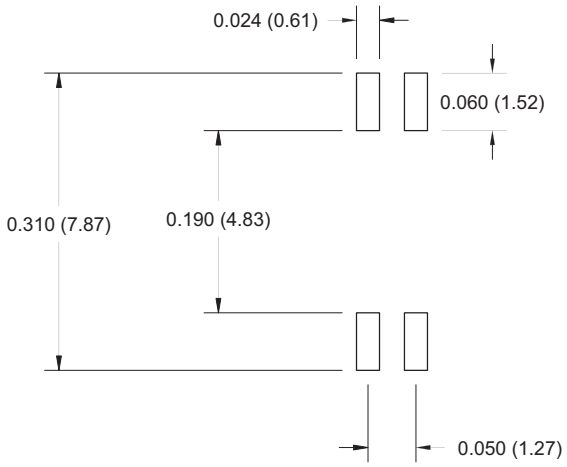
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

Tape and Reel Dimensions

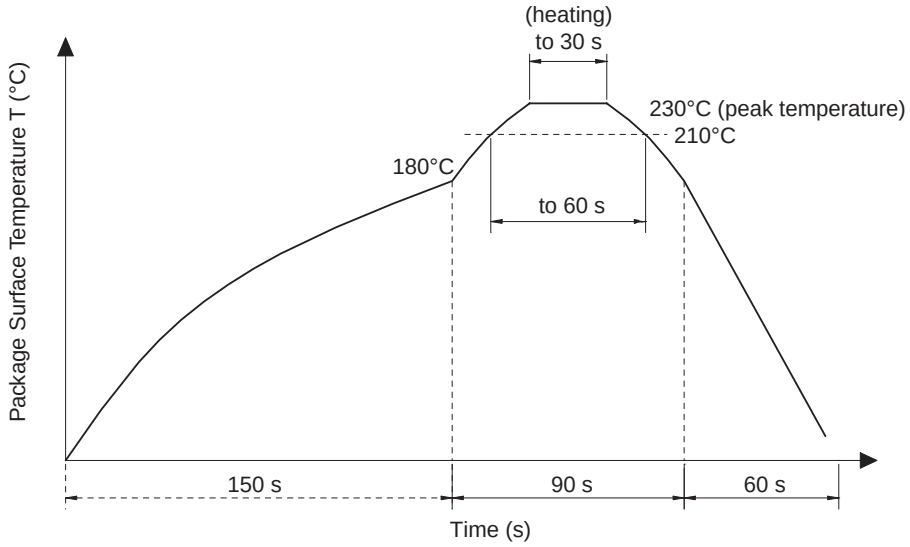


Description		Symbol	1.27 Pitch Dimensions (mm)
Tape Width		W	12.00±0.4
Tape Thickness		t	0.30±0.20
Sprocket Hole Pitch		P_0	4.00±0.20
Sprocket Hole Dia.		D_0	1.55±0.20
Sprocket Hole Location		E	1.75±0.20
Pocket Location		F	5.50±0.20
		P_2	2.00±0.20
Pocket Pitch		P	8.00±0.20
Pocket Dimension		A_0	4.40±0.20
		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	R1		500
	R2		2500
Reel Diameter	R1		178 mm (7")
	R2		330 mm (13")

Footprint Drawing for PCB Layout



Recommended Infrared Reflow Soldering Profile



- Peak reflow temperature: 230°C (package surface temperature) for 30 seconds
- Time of temperature higher than 210°C: 60 seconds or less
- One time soldering reflow is recommended

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FAST®	ISOPLANAR™	PowerEdge™	SuperFET™
ActiveArray™	FASTr™	LittleFET™	PowerSaver™	SuperSOT™-3
Bottomless™	FPS™	MICROCOUPLER™	PowerTrench®	SuperSOT™-6
Build it Now™	FRFET™	MicroFET™	QFET®	SuperSOT™-8
CoolFET™	GlobalOptoisolator™	MicroPak™	QS™	SyncFET™
CROSSVOLT™	GTO™	MICROWIRE™	QT Optoelectronics™	TCM™
DOME™	HiSeC™	MSX™	Quiet Series™	TinyLogic®
EcoSPARK™	I^2C™	MSXPro™	RapidConfigure™	TINYOPTO™
E^2CMOS™	*i-Lo*™	OCX™	RapidConnect™	TruTranslation™
EnSigna™	ImpliedDisconnect™	OCXPro™	µSerDes™	UHC™
FACT™	IntelliMAX™	OPTOLOGIC®	ScalarPump™	UniFET™
FACT Quiet Series™		OPTOPLANAR™	SILENT SWITCHER®	UltraFET®
Across the board. Around the world.™		PACMAN™	SMART START™	VCX™
The Power Franchise®		POP™	SPM™	Wire™
Programmable Active Droop™		Power247™	Stealth™	

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 FAIRCHILDíS WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILDíS 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, or (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 significant injury to the user.

2. A critical component is 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 or 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, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order 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 in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Rev. I19