

DESCRIPTION

The 4N29, 4N30, 4N31, 4N32, 4N33 have a gallium arsenide infrared emitter optically coupled to a silicon planar photodarlington.

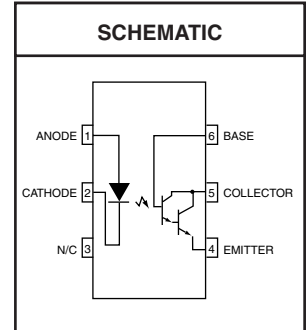
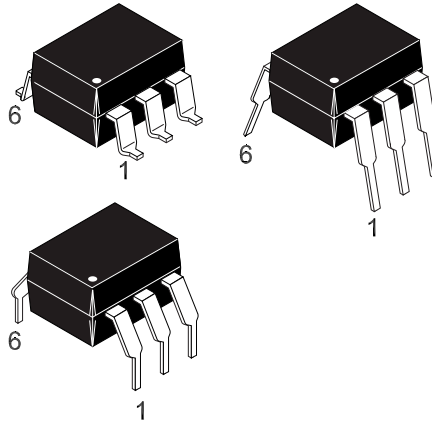
4N29 4N30 4N31 4N32 4N33

FEATURES

- High sensitivity to low input drive current
- Meets or exceeds all JEDEC Registered Specifications
- VDE 0884 approval available as a test option
-add option .300. (e.g., 4N29.300)

APPLICATIONS

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Solid state relays
- Interfacing coupling systems of different potentials and impedances.



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless otherwise specified.)

Parameter	Symbol	Value	Units
TOTAL DEVICE			
Storage Temperature	T _{STG}	-55 to +150	°C
Operating Temperature	T _{OPR}	-55 to +100	°C
Lead Solder Temperature	T _{SOL}	260 for 10 sec	°C
Total Device Power Dissipation @ T _A = 25°C	P _D	250	mW
Derate above 25°C		3.3	mW/°C
EMITTER			
Continuous Forward Current	I _F	80	mA
Reverse Voltage	V _R	3	V
Forward Current - Peak (300 μs, 2% Duty Cycle)	I _{F(pk)}	3.0	A
LED Power Dissipation @ T _A = 25°C	P _D	150	mW
Derate above 25°C		2.0	mW/°C
DETECTOR			
Collector-Emitter Breakdown Voltage	BV _{CEO}	30	V
Collector-Base Breakdown Voltage	BV _{CBO}	30	V
Emitter-Collector Breakdown Voltage	BV _{ECO}	5	V
Detector Power Dissipation @ T _A = 25°C	P _D	150	mW
Derate above 25°C		2.0	mW/°C
Continuous Collector Current	I _C	150	mA

4N29	4N30	4N31	4N32	4N33
------	------	------	------	------

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
EMITTER						
*Input Forward Voltage	(I _F = 10 mA)	V _F		1.2	1.5	V
*Reverse Leakage Current	(V _R = 3.0 V)	I _R		0.001	100	μA
*Capacitance	(V _F = 0 V, f = 1.0 MHz)	C		150		pF
DETECTOR						
*Collector-Emitter Breakdown Voltage	(I _C = 100 μA, I _B = 0)	BV _{CEO}	30	60		
*Collector-Base Breakdown Voltage	(I _C = 100 μA, I _E = 0)	BV _{CBO}	30	100		V
*Emitter-Collector Breakdown Voltage	(I _E = 100 μA, I _B = 0)	BV _{ECO}	5.0	8		V
*Collector-Emitter Dark Current	(V _{CE} = 10 V, Base Open)	I _{CEO}		1	100	nA
DC Current Gain	(V _{CE} = 5.0 V, I _C = 500 μA)	h _{FE}		5000		

TRANSFER CHARACTERISTICS

DC Characteristic	Test Conditions	Symbol	Min	Typ	Max	Units
*Collector Output Current ^(1,2) (4N32, 4N33)	(I _F = 10 mA, V _{CE} = 10 V, I _B = 0)	I _C (CTR)	50 (500)			mA (%)
(4N29, 4N30)			10 (100)			
(4N31)			5 (50)			
*Saturation Voltage ⁽²⁾ (4N29, 4N30, 4N32, 4N33)	(I _F = 8.0 mA, I _C = 2.0 mA)	V _{CE(sat)}			1.0	V
(4N31)					1.2	

TRANSFER CHARACTERISTICS

AC Characteristic	Test Conditions	Symbol	Min	Typ	Max	Units
Turn-on Time ⁽³⁾	(I _F = 200 mA, I _C = 50 mA, V _{CC} = 10 V) (Fig.7)	t _{on}			5.0	μs
Turn-off Time ⁽³⁾ (4N32, 4N33)					100	
(4N29, 4N30, 4N31)			t _{off}			
Bandwidth ^(4,5)		BW		30		KHz

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ	Max	Units
Input-Output Isolation Voltage ⁽⁶⁾ (4N29, 4N30, 4N31, 4N32, 4N33)	(I _{I-O} ≤ 1 μA, V _{rms} , t = 1 min.)	V _{ISO}	5300			Vac(rms)
* (4N32)			VDC	2500		V
* (4N33)			VDC	1500		
Isolation Resistance ⁽⁶⁾	(V _{I-O} = 500 VDC)	R _{ISO}		10 ¹¹		Ω
Isolation Capacitance ⁽⁶⁾	(V _{I-O} = ∅, f = 1 MHz)	C _{ISO}		0.8		pf

4N29 4N30 4N31 4N32 4N33

Fig. 1 Output Current vs. Input Current

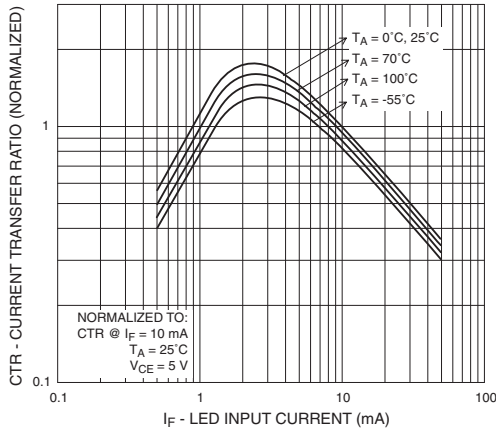


Fig. 2 Current Transfer Ratio vs. Ambient Temperature

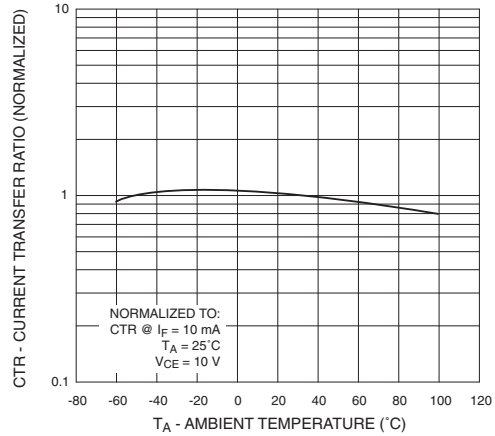


Fig. 3 Collector Current vs. Collector-Emitter Voltage

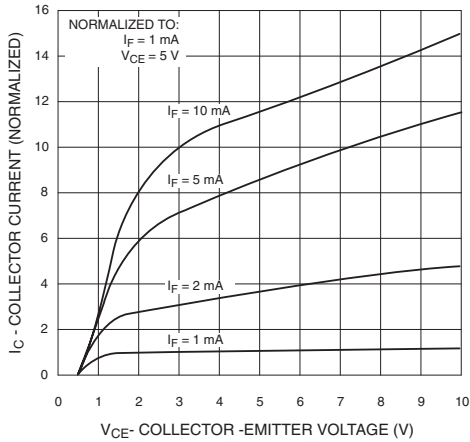


Fig. 4 Dark Current vs. Ambient Temperature

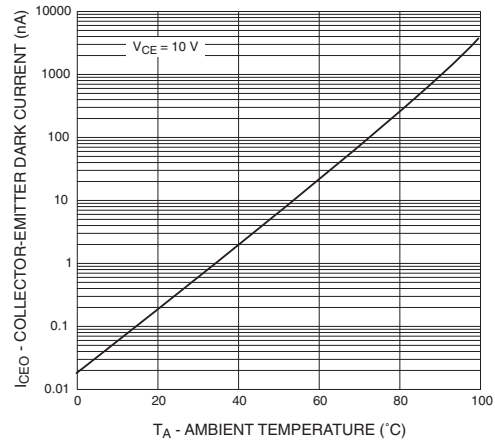


Fig. 5 Turn-On Time vs. Input Current

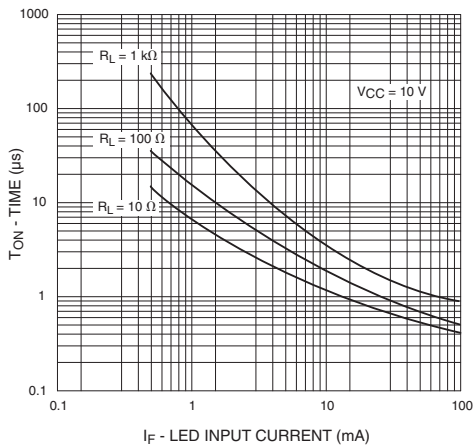
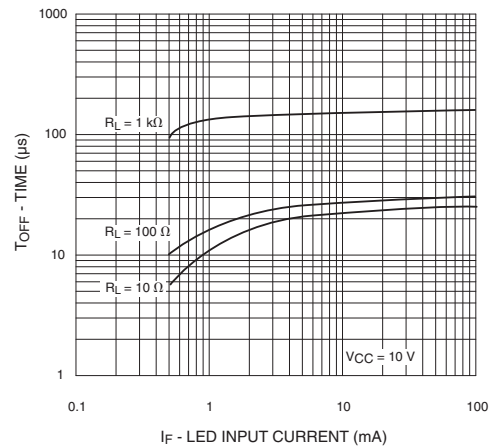


Fig. 6 Turn-Off Time vs. Input Current



4N29 4N30 4N31 4N32 4N33

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free air temperature unless otherwise specified) (Cont.)

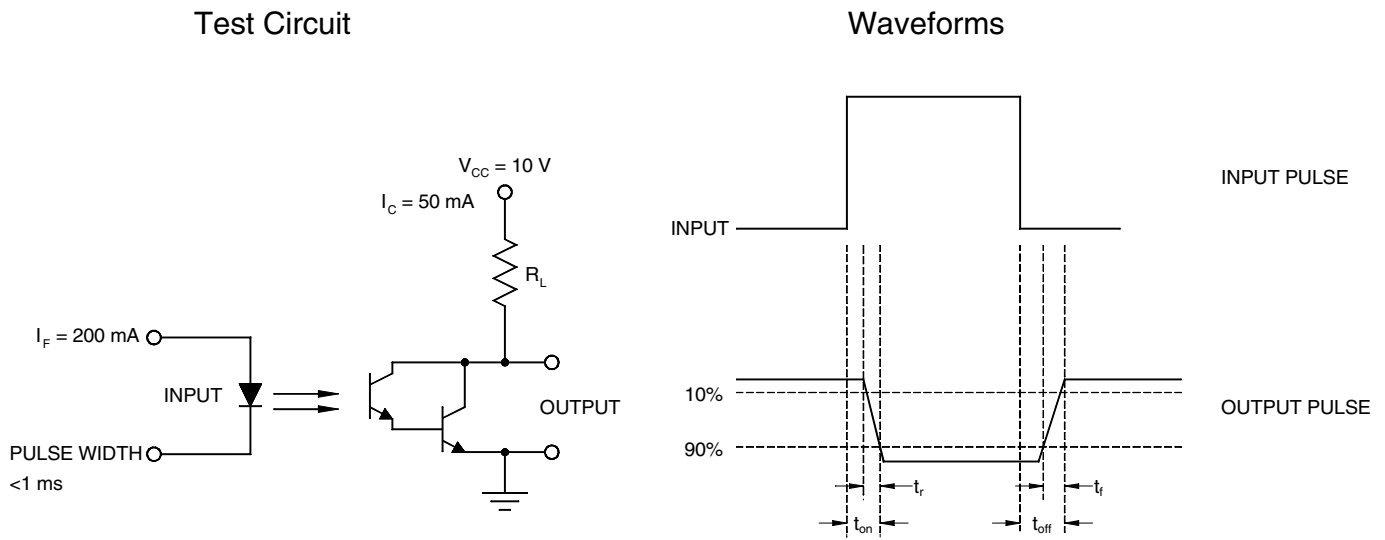


Fig. 7 Switching Time Test Circuit and Waveforms

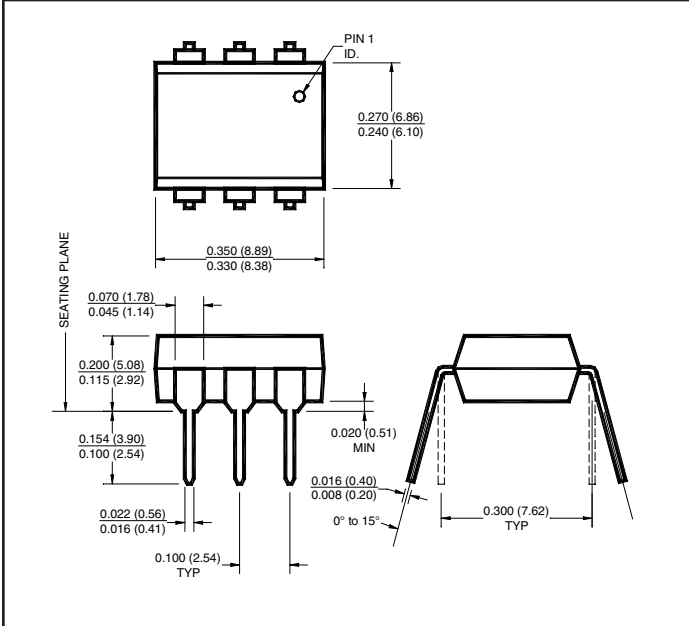
Notes

* Indicates JEDEC registered data.

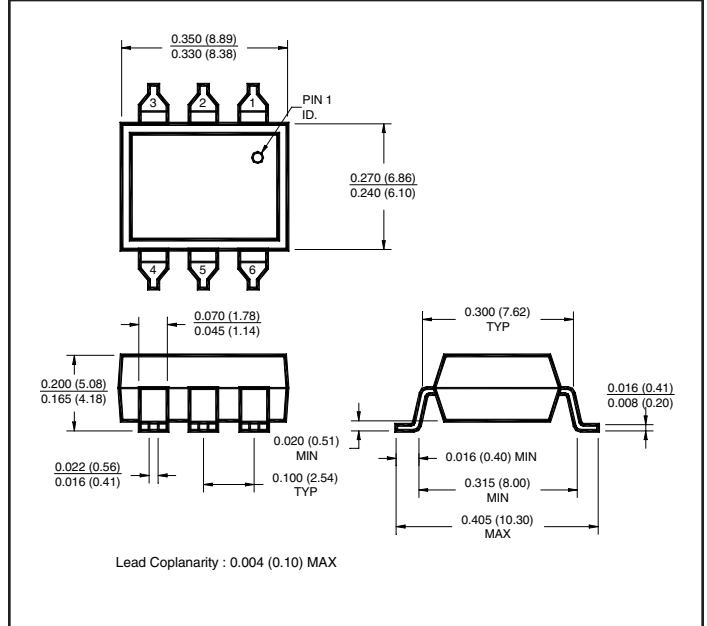
1. The current transfer ratio (I_C/I_F) is the ratio of the detector collector current to the LED input current with $V_{CE} @ 10 \text{ V}$.
2. Pulse test: pulse width = $300 \mu\text{s}$, duty cycle $\leq 2.0\%$.
3. For test circuit setup and waveforms, refer to figure 7..
4. I_F adjusted to $I_C = 2.0 \text{ mA}$ and $I_C = 0.7 \text{ mA rms}$.
5. The frequency at which I_C is 3dB down from the 1 KHz value.
6. For this test, LED pins 1 and 2 are common, and phototransistor pins 4,5 and 6 are common.

4N29 4N30 4N31 4N32 4N33

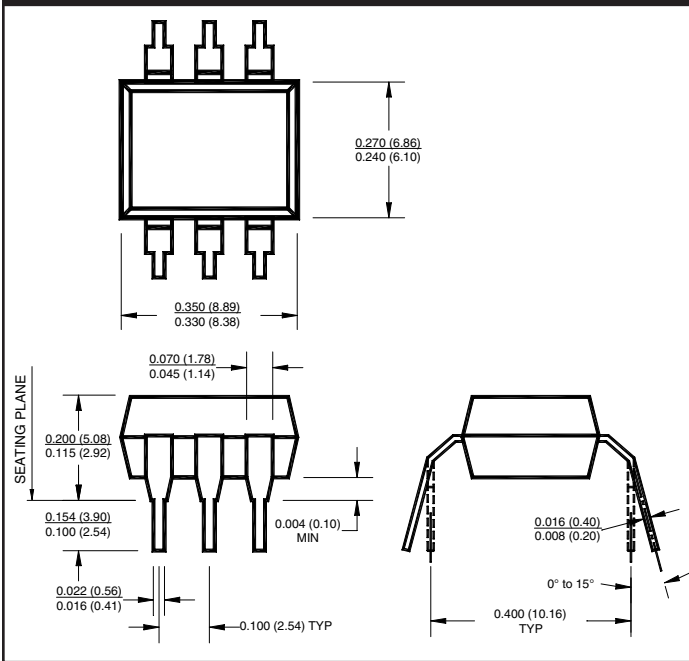
Package Dimensions (Through Hole)



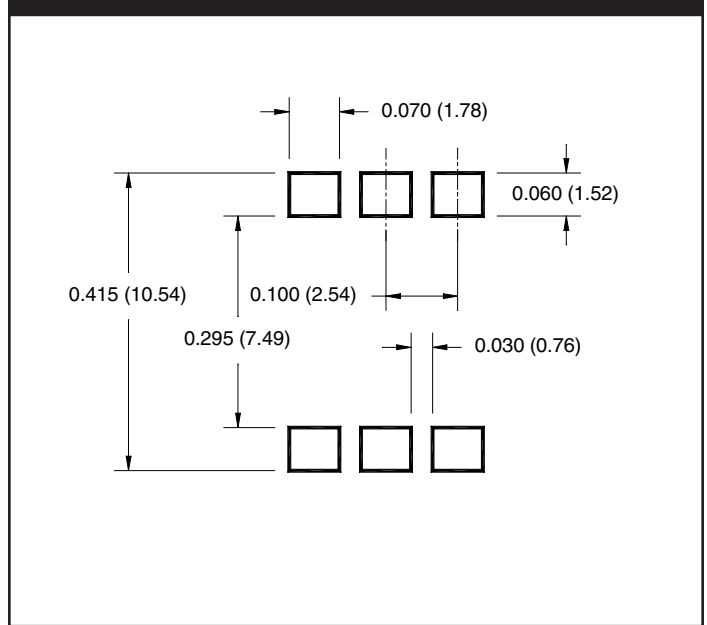
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

All dimensions are in inches (millimeters)

Call QT Optoelectronics for more information or the phone number of your nearest distributor.

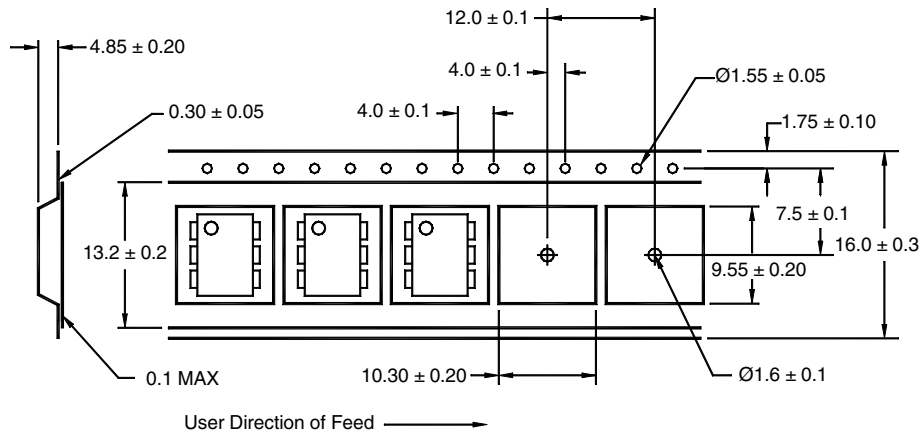
United States 800-533-6786 • France 33 [0] 1.45.18.78.78 • Germany 49 [0] 89/96.30.51 • United Kingdom 44 [0] 1296 394499 • Asia/Pacific 603-7248193

4N29 4N30 4N31 4N32 4N33

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 0884
300W	.300W	VDE 0884, 0.4" Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape & Reel

QT Carrier Tape Specifications ("D" Taping Orientation)



NOTE

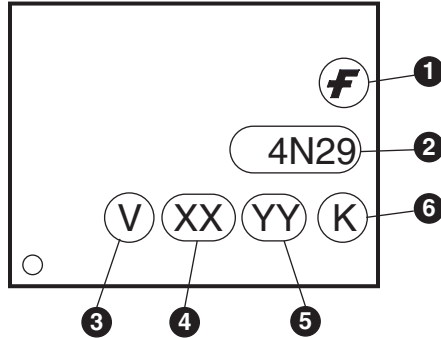
All dimensions are in millimeters

Call QT Optoelectronics for more information or the phone number of your nearest distributor.

United States 800-533-6786 • France 33 [0] 1.45.18.78.78 • Germany 49 [0] 89/96.30.51 • United Kingdom 44 [0] 1296 394499 • Asia/Pacific 603-7248793

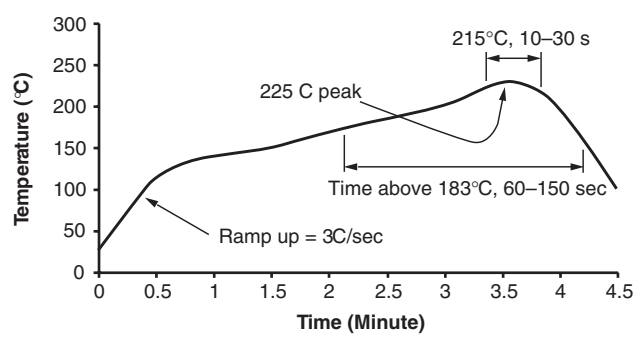
www.qtopto.com

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	Two digit year code, e.g., '03'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Reflow Profile (Black Package, No Suffix)



- Peak reflow temperature: 225°C (package surface temperature)
- Time of temperature higher than 183°C for 60–150 seconds
- 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™	Power247™	Stealth™
ActiveArray™	FASTr™	LittleFET™	PowerEdge™	SuperFET™
Bottomless™	FPST™	MICROCOUPLER™	PowerSaver™	SuperSOT™-3
CoolFET™	FRFET™	MicroFET™	PowerTrench®	SuperSOT™-6
CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QFET®	SuperSOT™-8
DOMET™	GTO™	MICROWIRE™	QS™	SyncFET™
EcoSPARK™	HiSeC™	MSX™	QT Optoelectronics™	TinyLogic®
E ² CMOSTM	ꞑC™	MSXPro™	Quiet Series™	TINYOPTO™
EnSigna™	i-Lo™	OCX™	RapidConfigure™	TruTranslation™
FACT™	ImpliedDisconnect™	OCXPro™	RapidConnect™	UHC™
FACT Quiet Series™		OPTOLOGIC®	µSerDes™	UltraFET®
Across the board. Around the world.™		OPTOPLANAR™	SILENT SWITCHER®	VCX™
The Power Franchise®		PACMAN™	SMART START™	
Programmable Active Droop™		POP™	SPM™	

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.

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, 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.