

FGA50N100BNTD

1000 V NPT Trench IGBT

General Description

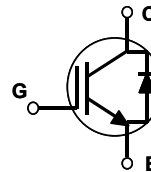
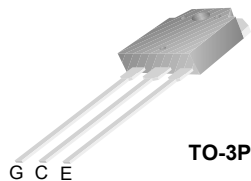
Using Fairchild®'s proprietary trench design and advanced NPT technology, the 1000V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device offers the optimum performance for hard switching application such as UPS, welder applications.

Features

- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)} = 2.5 \text{ V @ } I_C = 60 \text{ A}$
- High Input Impedance
- Built-in Fast Recovery Diode

Application

UPS, Welder, Induction Heating, Microwave Oven



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Description	FGA50N100BNTD	Unit
V_{CES}	Collector-Emitter Voltage	1000	V
V_{GES}	Gate-Emitter Voltage	± 25	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	50	A
	Collector Current @ $T_C = 100^\circ\text{C}$	35	A
$I_{CM(1)}$	Pulsed Collector Current	100	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	15	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	156	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	63	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Notes :

(1) Repetitive rating : Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.8	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	2.4	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	25	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA50N100BNTD	FGA50N100BNTDTU	TO-3P	Rail / Tube	30ea	-

Electrical Characteristics of IGBT T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
--------	-----------	-----------------	------	------	------	------

Off Characteristics

BV _{CES}	Collector Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 1mA	1000	--	--	V
I _{CES}	Collector Cut-Off Current	V _{CE} = 1000V, V _{GE} = 0V	--	--	1.0	mA
I _{GES}	G-E Leakage Current	V _{GE} = ± 25, V _{CE} = 0V	--	--	± 500	nA

On Characteristics

V _{GE(th)}	G-E Threshold Voltage	I _C = 60mA, V _{CE} = V _{GE}	4.0	5.0	7.0	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 10A, V _{GE} = 15V	--	1.5	1.8	V
		I _C = 60A, V _{GE} = 15V	--	2.5	2.9	V

Dynamic Characteristics

C _{ies}	Input Capacitance	V _{CE} =10V, V _{GE} = 0V, f = 1MHz	--	6000	--	pF
C _{oes}	Output Capacitance		--	260	--	pF
C _{res}	Reverse Transfer Capacitance		--	200	--	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{CC} = 600 V, I _C = 60A, R _G = 51Ω, V _{GE} =15V, Resistive Load, T _C = 25°C	--	140	--	ns
t _r	Rise Time		--	320	--	ns
t _{d(off)}	Turn-Off Delay Time		--	630	--	ns
t _f	Fall Time		--	130	250	ns
Q _g	Total Gate Charge	V _{CE} = 600 V, I _C = 60A, V _{GE} = 15V, T _C = 25°C	--	275	350	nC
Q _{ge}	Gate-Emitter Charge		--	45	--	nC
Q _{gc}	Gate-Collector Charge		--	95	--	nC

Electrical Characteristics of DIODE T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{FM}	Diode Forward Voltage	I _F = 15A	--	1.2	1.7	V
		I _F = 60A	--	1.8	2.1	V
t _{rr}	Diode Reverse Recovery Time	I _F = 60A di/dt = 20 A/us	--	1.2	1.5	us
I _R	Instantaneous Reverse Current	V _{RRM} = 1000V	--	0.05	2	uA

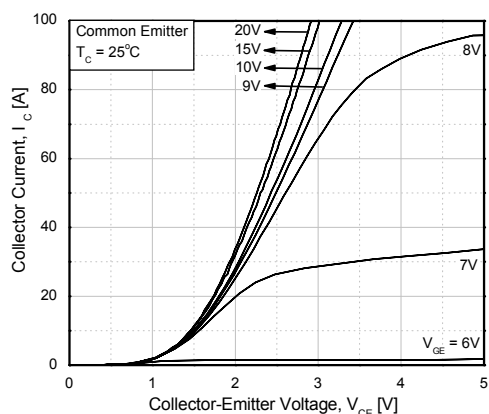


Fig 1. Typical Output Characteristics

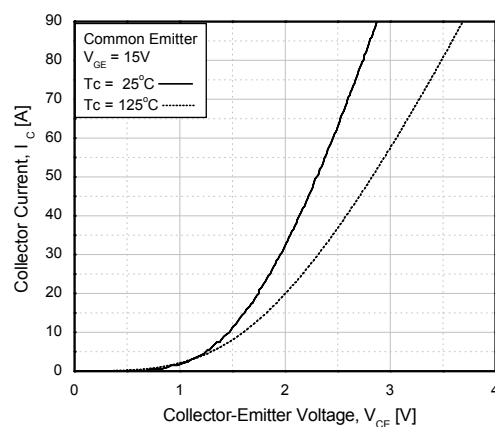


Fig 2. Typical Saturation Voltage Characteristics

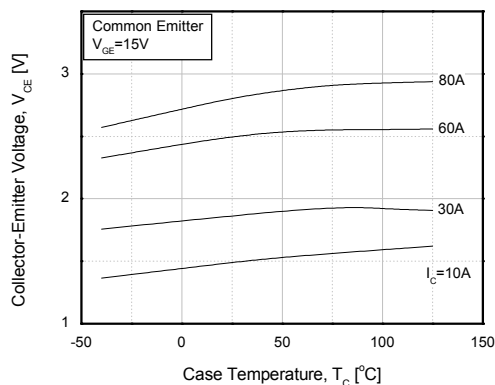


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

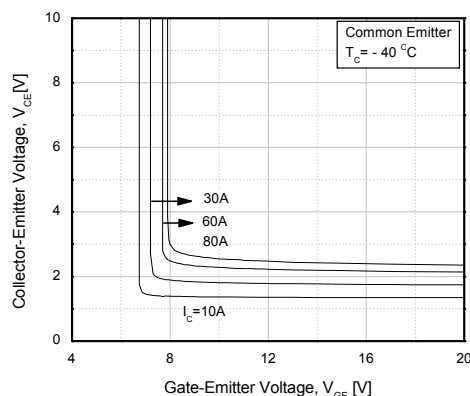


Fig 4. Saturation Voltage vs. V_{GE}

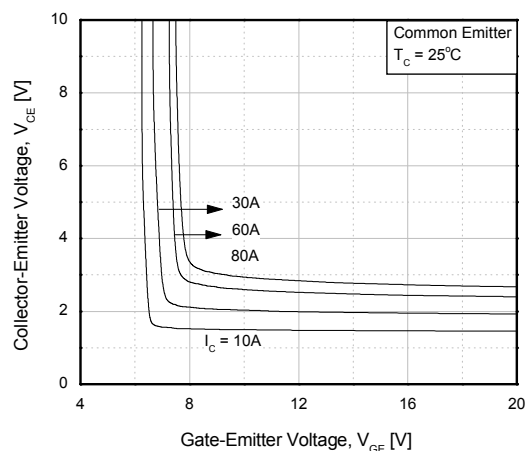


Fig 5. Saturation Voltage vs. V_{GE}

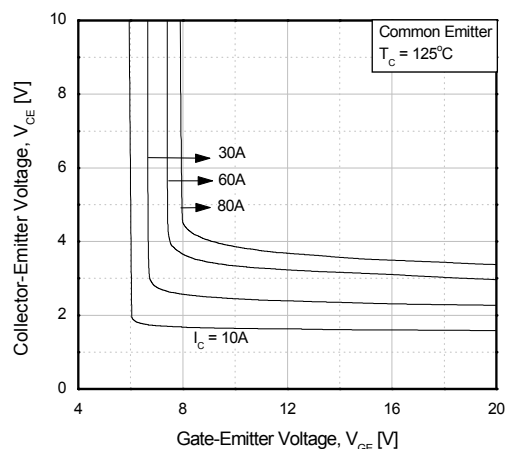


Fig 6. Saturation Voltage vs. V_{GE}

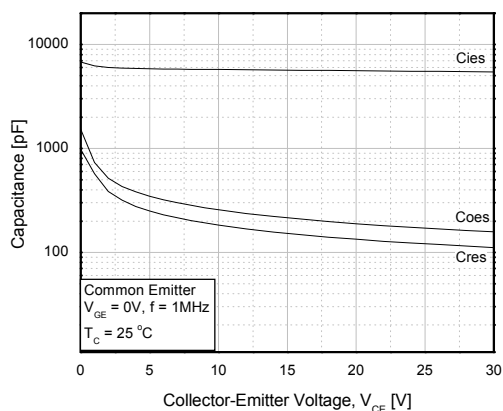


Fig 7. Capacitance Characteristics

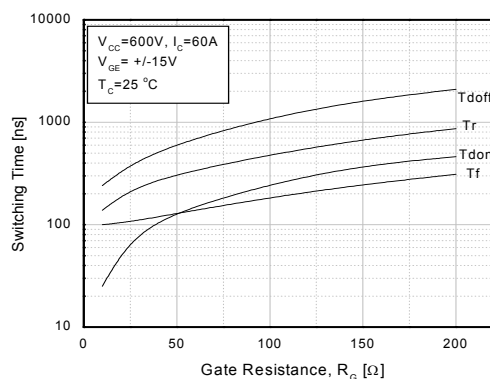


Fig 8. Switching Characteristics vs. Gate Resistance

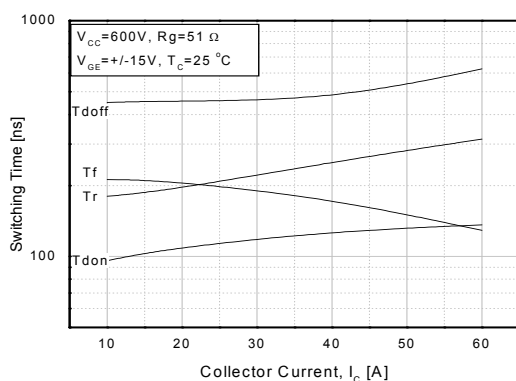


Fig 9. Switching Characteristics vs. Collector Current

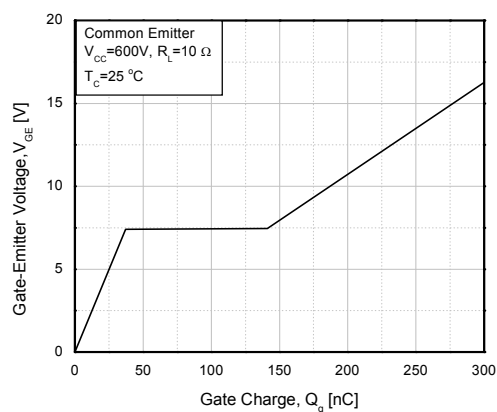


Fig 10. Gate Charge Characteristics

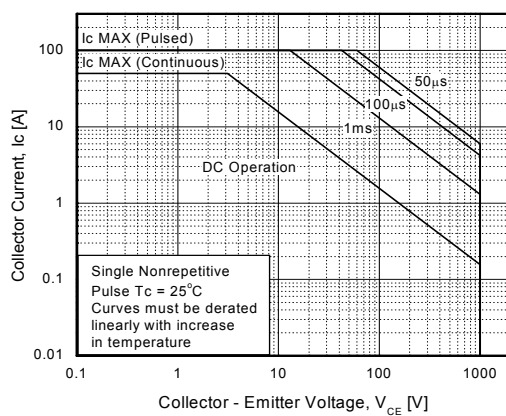


Fig 11. SOA Characteristics

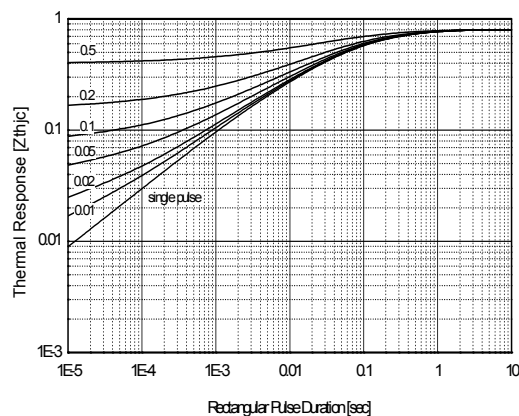


Fig 12. Transient Thermal Impedance of IGBT

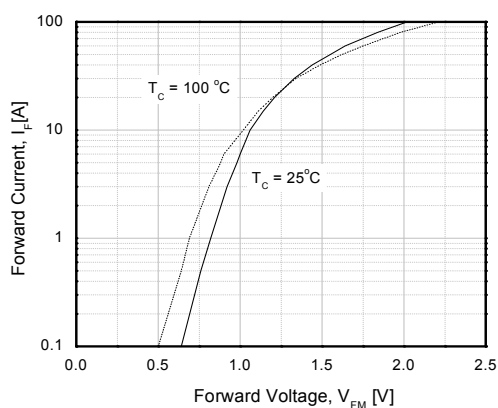


Fig 13. Forward Characteristics

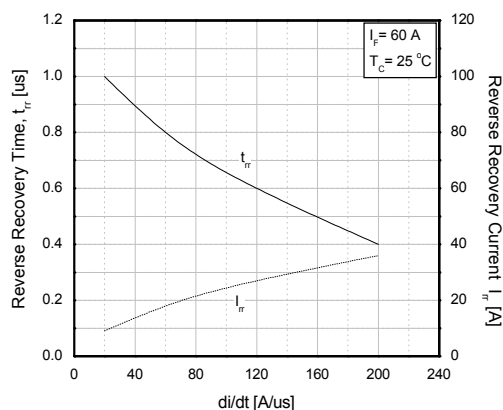


Fig 14. Reverse Recovery Characteristics vs. di/dt

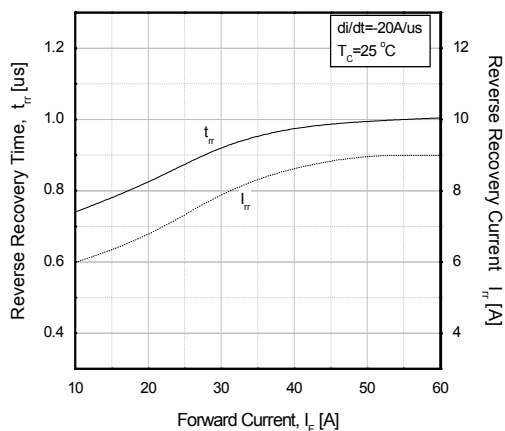


Fig 15. Reverse Recovery Characteristics vs. Forward Current

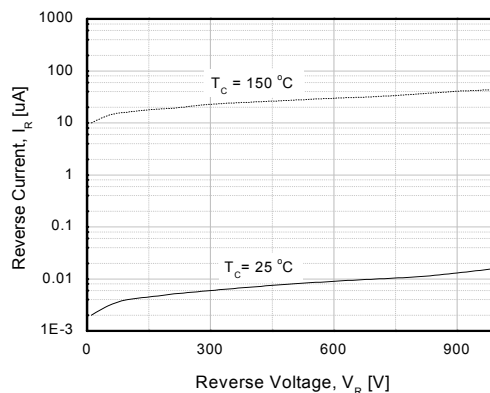


Fig 16. Reverse Current vs. Reverse Voltage

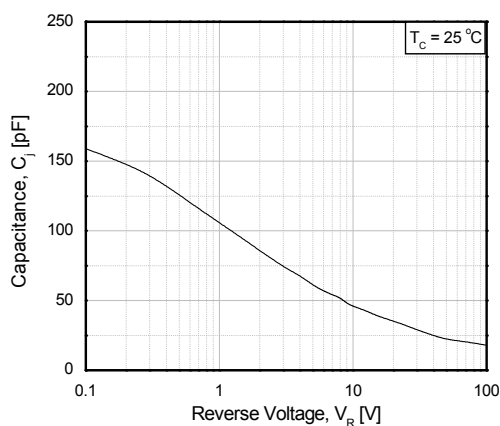
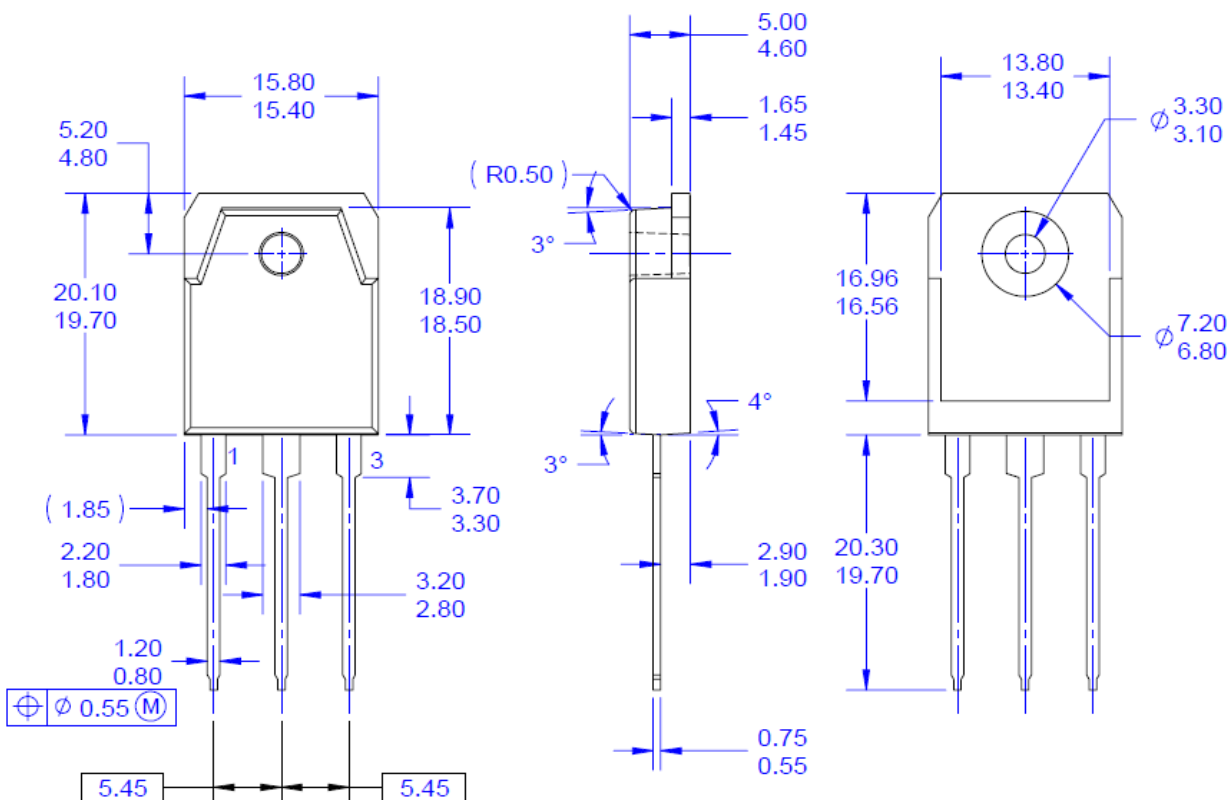


Fig 17. Junction capacitance

Mechanical Dimensions

TO-3PN



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSION AND TOLERANCING PER ASME14.5
- D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- E) THIS PACKAGE IS INTENDED ONLY FOR TO3PN.
- F) DRAWING FILE NAME: TO3P03AREV4.

Dimensions in Millimeters

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.

2Cool™	FPS™	PowerTrench®	Sync-Lock™
AccuPower™	F-PFS™	PowerXS™	SYSTEM GENERAL®*
AX-CAP®*	FRFET®	Programmable Active Droop™	TinyBoost™
BitSiC™	Global Power ResourceSM	QFET®	TinyBuck™
Build it Now™	Green Bridge™	QS™	TinyCalc™
CorePLUS™	Green FPS™	Quiet Series™	TinyLogic®
CorePOWER™	Green FPS™ e-Series™	RapidConfigure™	TINYOPTO™
CROSSVOL™	Gmax™	GTO™	TinyPower™
CTL™	IntelliMAX™	STEALTH™	TinyPWM™
Current Transfer Logic™	ISOPLANAR™	Saving our world, 1mW/W/kW at a time™	TinyWire™
DEUXPEED®	Marking Small Speakers Sound Louder and Better™	SignalWise™	TranSiC®
Dual Cool™	MegaBuck™	SmartMax™	TriFault Detect™
EcoSPARK®	MICROCOUPLER™	SMART START™	TRUECURRENT®*
EfficientMax™	MicroFET™	Solutions for Your Success™	μSerDes™
ESBC™	MicroPak™	SPM®	SerDes™
F®	MicroPak2™	STEALTH™	UHC®
Fairchild®	MillerDrive™	SuperFET®	Ultra FRFET™
Fairchild Semiconductor®	MotionMax™	SuperSOT™-3	UniFET™
FACT Quiet Series™	mWSaver™	SuperSOT™-6	VCX™
FACT®	OptoHiT™	SuperSOT™-8	VisualMax™
FAST®	OPTOLOGIC®	SupreMOS®	VoltagePlus™
FastvCore™	OPTOPLANAR®	SyncFET™	XS™
FETBench™			

*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 here in:

- 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.
- 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 manufactures 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 application, 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 and 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. I64



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.