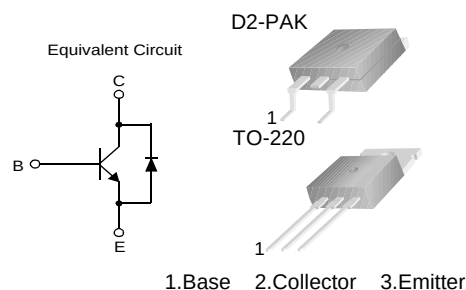


KSC5338D/KSC5338DW

High Voltage Power Switch Switching Application

- Wide Safe Operating Area
- Built-in Free-Wheeling Diode
- Suitable for Electronic Ballast Application
- Small Variance in Storage Time
- Two Package Choices : TO-220 or D2-PAK



NPN Triple Diffused Planar Silicon Transistor

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

Symbol	Parameter	Value	Units
V_{CBO}	Collector-Base Voltage	1000	V
V_{CEO}	Collector-Emitter Voltage	450	V
V_{EBO}	Emitter-Base Voltage	12	V
I_C	Collector Current (DC)	5	A
I_{CP}	*Collector Current (Pulse)	10	A
I_B	Base Current (DC)	2	A
I_{BP}	*Base Current (Pulse)	4	A
P_C	Power Dissipation($T_C=25^\circ\text{C}$)	75	W
T_J	Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature	- 55 ~ 150	$^\circ\text{C}$

* Pulse Test : Pulse Width = 5ms, Duty Cycle $\leq$ 10%

Thermal Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Characteristics		Rating	Unit
$R_{\theta jc}$	Thermal Resistance	Junction to Case	1.65	$^\circ\text{C/W}$
$R_{\theta ja}$		Junction to Ambient	62.5	
T_L	Maximum Lead Temperature for Soldering		270	$^\circ\text{C}$

Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C=1\text{mA}, I_E=0$	1000			V
BV_{CEO}	Collector-Emitter Breakdown Voltage	$I_C=5\text{mA}, I_B=0$	450			V
BV_{EBO}	Emitter-Base Breakdown Voltage	$I_E=1\text{mA}, I_C=0$	12			V
I_{CBO}	Collector Cut-off Current	$V_{CB}=800\text{V}, I_E=0$			10	μA
I_{CES}	Collector Cut-off Current	$V_{CES}=1000\text{V}, I_{EB}=0$	$T_C=25^\circ\text{C}$		100	μA
			$T_C=125^\circ\text{C}$		500	μA
I_{CEO}	Collector Cut-off Current	$V_{CE}=450\text{V}, I_B=0$	$T_C=25^\circ\text{C}$		100	μA
			$T_C=125^\circ\text{C}$		500	μA
I_{EBO}	Emitter Cut-off Current	$V_{EB}=10\text{V}, I_C=0$			10	μA
h_{FE}	DC Current Gain	$V_{CE}=1\text{V}, I_C=0.8\text{A}$	$T_C=25^\circ\text{C}$	15	25	
			$T_C=125^\circ\text{C}$	10	14	
		$V_{CE}=1\text{V}, I_C=2\text{A}$	$T_C=25^\circ\text{C}$	6	9	
			$T_C=125^\circ\text{C}$	4	6	
		$V_{CE}=2.5\text{V}, I_C=1\text{A}$	$T_C=25^\circ\text{C}$	18	25	
			$T_C=125^\circ\text{C}$	14	18	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=0.8\text{A}, I_B=0.08\text{A}$	$T_C=25^\circ\text{C}$	0.35	0.5	V
			$T_C=125^\circ\text{C}$	0.55	0.75	V
		$I_C=2\text{A}, I_B=0.4\text{A}$	$T_C=25^\circ\text{C}$	0.47	0.75	V
			$T_C=125^\circ\text{C}$	0.9	1.1	V
		$I_C=0.8\text{A}, I_B=0.04\text{A}$	$T_C=25^\circ\text{C}$	0.9	1.5	V
			$T_C=125^\circ\text{C}$	1.8	2.5	V
		$I_C=1\text{A}, I_B=0.2\text{A}$	$T_C=25^\circ\text{C}$	0.22	0.5	V
			$T_C=125^\circ\text{C}$	0.3	0.6	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_{CS}=0.8\text{A}, I_B=0.08\text{A}$	$T_C=25^\circ\text{C}$	0.8	1.0	V
			$T_C=125^\circ\text{C}$	0.65	0.9	V
		$I_C=2\text{A}, I_B=0.4\text{A}$	$T_C=25^\circ\text{C}$	0.9	1.0	V
			$T_C=125^\circ\text{C}$	0.8	0.9	V
C_{ib}	Input Capacitance	$V_{EB}=10\text{V}, I_C=0.5\text{A}, f=1\text{MHz}$		550	750	pF
C_{ob}	Output Capacitance	$V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$		60	100	pF
f_T	Current Gain Bandwidth Product	$I_C=0.5\text{A}, V_{CE}=10\text{V}$		11		MHz
V_F	Diode Forward Voltage	$I_F=1\text{A}, I_C=1\text{mA}, I_E=0$	$T_C=25^\circ\text{C}$	0.86	1.3	V
			$T_C=125^\circ\text{C}$	0.79		V
		$I_F=2\text{A}$	$T_C=25^\circ\text{C}$	0.95	1.5	V
			$T_C=125^\circ\text{C}$	0.88		V
t_{fr}	Diode Forward Recovery Time ($di/dt=10\text{A}/\mu\text{s}$)	$I_F=0.4\text{A}$		460		ns
		$I_F=1\text{A}$		360		ns
		$I_F=2\text{A}$		325		ns
$V_{CE(DSAT)}$	Dynamic Saturation Voltage	$I_C=1\text{A}, I_{B1}=100\text{mA}, V_{CC}=300\text{V}$ at 1 μs	$T_C=25^\circ\text{C}$	8		V
			$T_C=125^\circ\text{C}$	15		V
		$I_C=1\text{A}, I_{B1}=100\text{mA}, V_{CC}=300\text{V}$ at 3 μs	$T_C=25^\circ\text{C}$	2.9		V
			$T_C=125^\circ\text{C}$	8		V
		$I_C=2\text{A}, I_{B1}=400\text{mA}, V_{CC}=300\text{V}$ at 1 μs	$T_C=25^\circ\text{C}$	9		V
			$T_C=125^\circ\text{C}$	17		V
		$I_C=2\text{A}, I_{B1}=400\text{mA}, V_{CC}=300\text{V}$ at 3 μs	$T_C=25^\circ\text{C}$	1.9		V
			$T_C=125^\circ\text{C}$	8.5		V

Electrical Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition		Min	Typ.	Max.	Units
RESISTIVE LOAD SWITCHING (D.C ≤ 10%, Pulse Width=40μs)							
t _{ON}	Turn ON Time	I _C =2.5A, I _{B1} =500mA I _{B2} =1A, V _{CC} =250V, R _L = 100Ω			500	750	ns
t _{STG}	Storage Time			1.2		1.5	μs
t _F	Fall Time				100	200	ns
t _{ON}	Turn ON Time	I _C =2A, I _{B1} =400mA I _{B2} =1A, V _{CC} =300V R _L = 150Ω	T _C =25°C		100	150	ns
t _{STG}	Storage Time		T _C =125°C		150		ns
			T _C =25°C	1.4	2.2	μs	
			T _C =125°C	1.7		μs	
t _F	Fall Time		T _C =25°C		90	150	ns
			T _C =125°C		150		ns
t _{ON}	Turn ON Time	I _C =2.5A, I _{B1} =500mA I _{B2} =5mA, V _{CC} =300V R _L = 120Ω	T _C =25°C		120	150	ns
t _{STG}	Storage Time		T _C =125°C		150		ns
			T _C =25°C	1.8		2.1	μs
			T _C =125°C		2.6		μs
t _F	Fall Time		T _C =25°C		110	150	ns
			T _C =125°C		160		ns
INDUCTIVE LOAD SWITCHING (V _{CC} =15V)							
t _{STG}	Storage Time	I _C =2.5A, I _{B1} =500mA I _{B2} =0.5A, V _Z =350V L _C =300μH	T _C =25°C		1.9	2.2	μs
			T _C =125°C		2.4		μs
t _F	Fall Time		T _C =25°C		160	200	ns
			T _C =125°C		330		ns
t _C	Cross-over Time		T _C =25°C		350	500	ns
			T _C =125°C		750		ns
t _{STG}	Storage Time	I _C =2A, I _{B1} =400mA I _{B2} =0.4A, V _Z =300V L _C =200μH	T _C =25°C	1.95		2.25	μs
			T _C =125°C		2.9		μs
t _F	Fall Time		T _C =25°C		120	150	ns
			T _C =125°C		270		ns
t _C	Cross-over Time		T _C =25°C		300	450	ns
			T _C =125°C		700		ns
t _{STG}	Storage Time	I _C =1A, I _{B1} =100mA I _{B2} =0.5A, V _Z =300V L _C =200μH	T _C =25°C		0.6	0.8	μs
			T _C =125°C		1.0		μs
t _F	Fall Time		T _C =25°C		70		ns
			T _C =125°C		110		ns
t _C	Cross-over Time		T _C =25°C		80	130	ns
			T _C =125°C		170		ns

Typical Characteristics

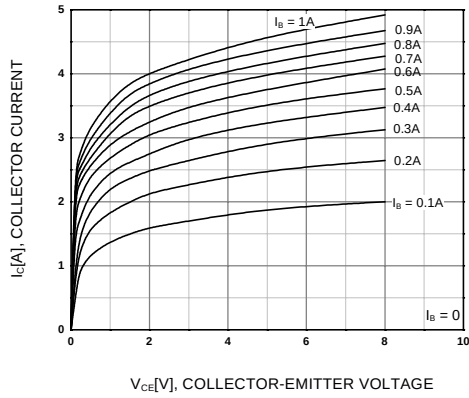


Figure 1. Static Characteristic

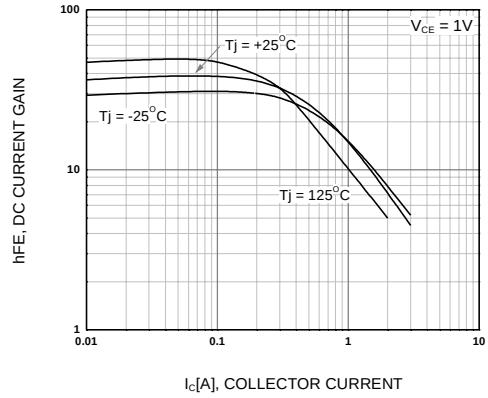


Figure 2. DC current Gain

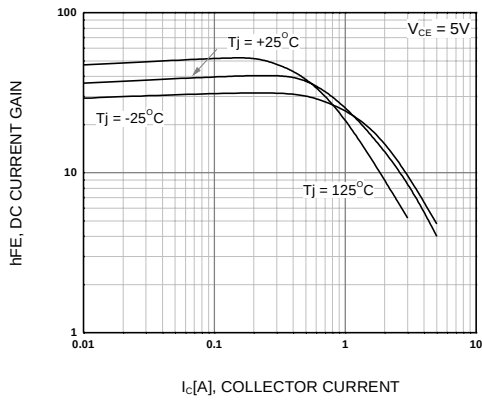


Figure 3. DC current Gain

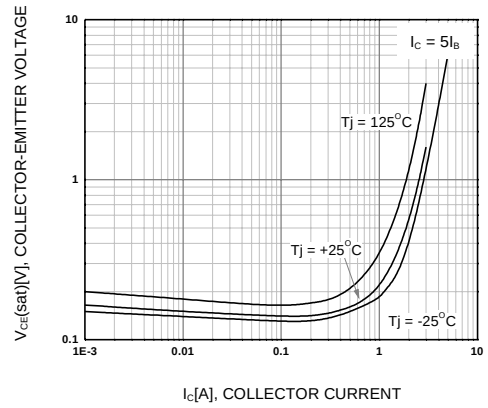


Figure 4. Collector-Emitter Saturation Voltage

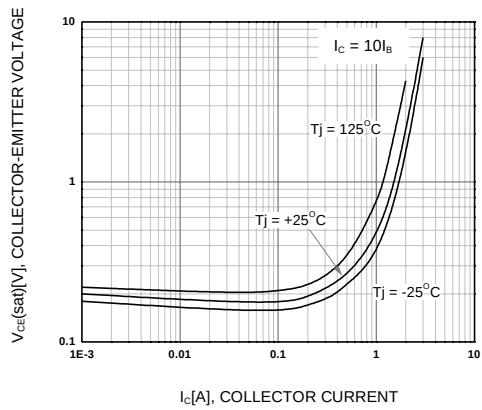


Figure 5. Collector-Emitter Saturation Voltage

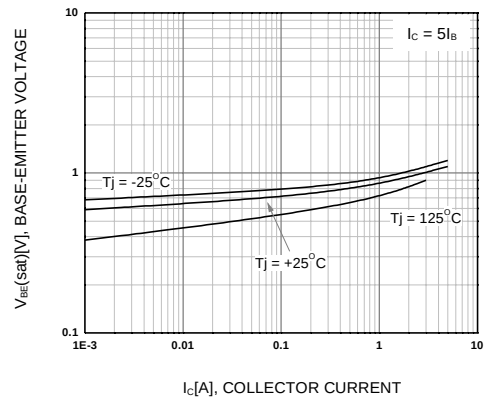


Figure 6. Base-Emitter Saturation Voltage

Typical Characteristics (Continued)

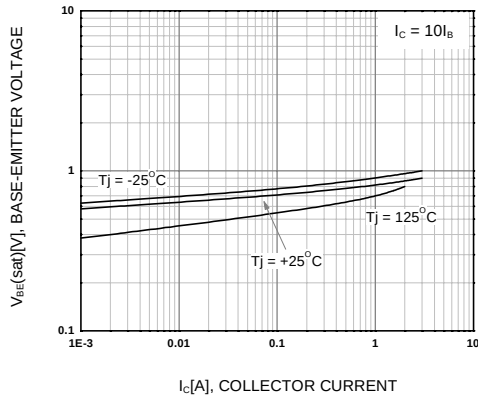


Figure 7. Base-Emitter Saturation Voltage

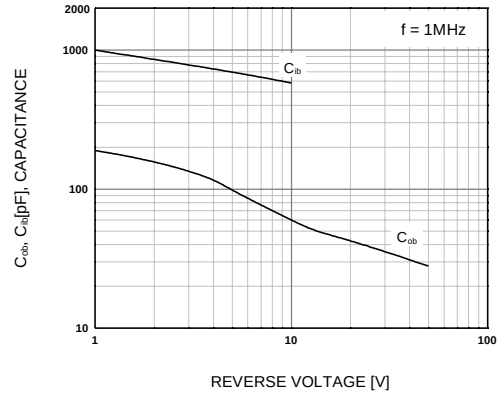


Figure 8. Collector Output Capacitance

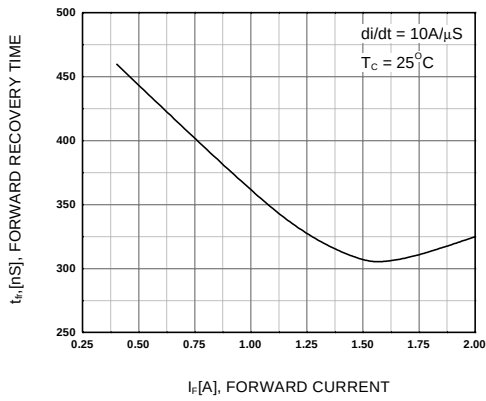


Figure 9. Forward Recovery Time

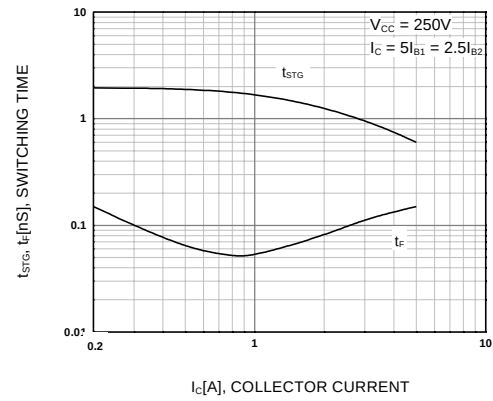


Figure 10. Switching Time

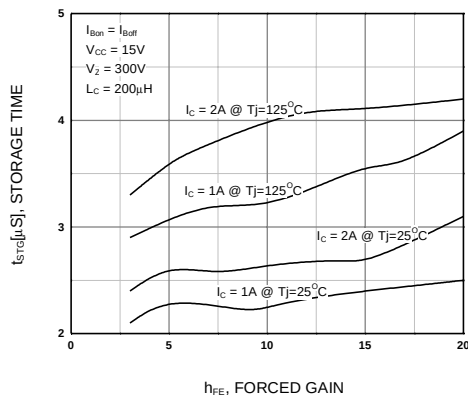


Figure 11. Induction Storage Time

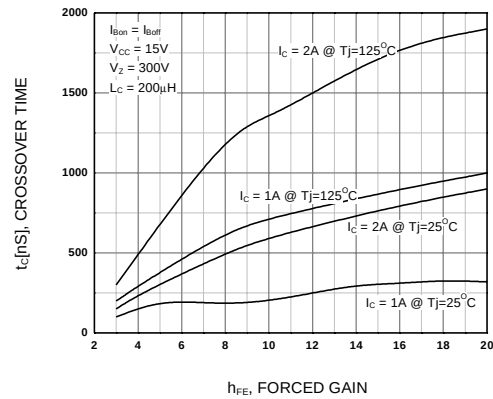


Figure 12. Inductive Crossover Time

Typical Characteristics (Continued)

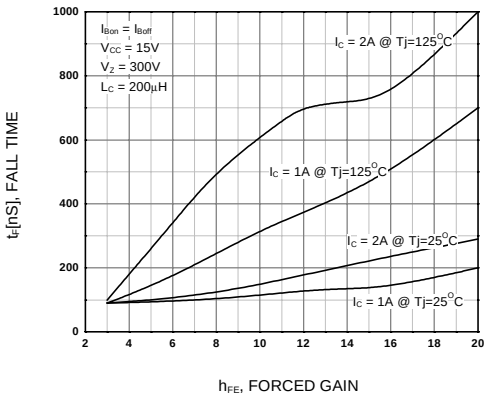


Figure 13. Inductive Fall Time

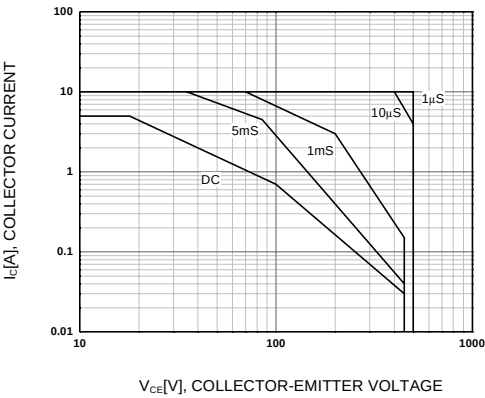


Figure 14. Safe Operating Area

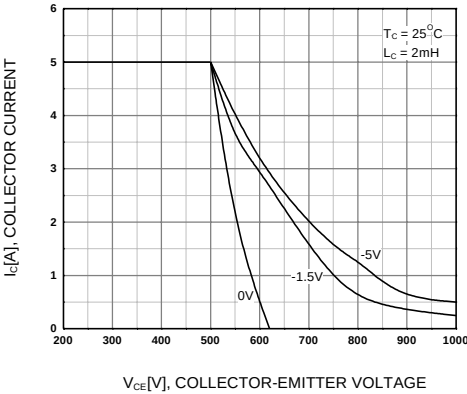


Figure 15. Reverse Bias Safe Operating

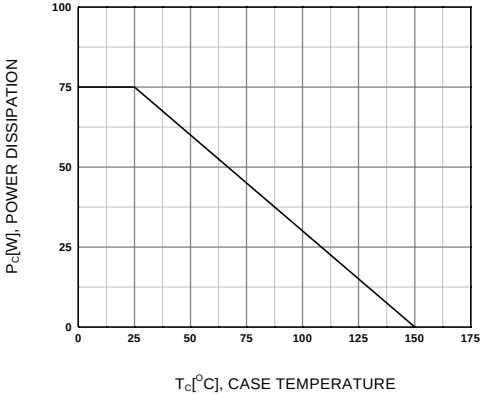
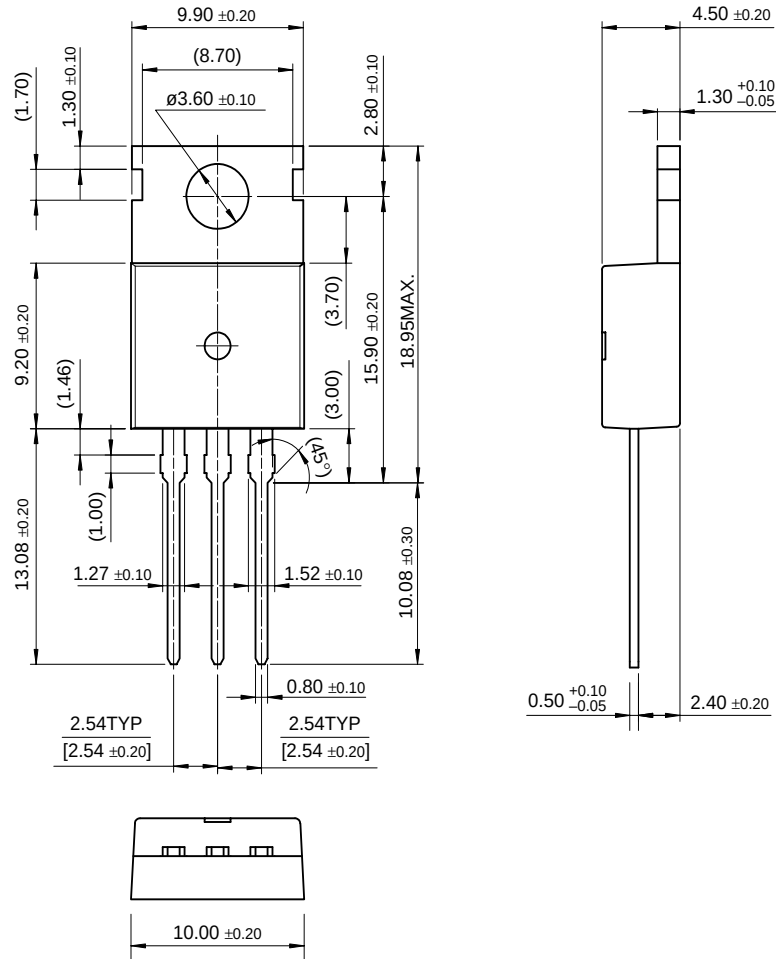


Figure 16. Power Derating

Package Dimensions

TO-220



Dimensions in Millimeters

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™
Bottomless™
CoolFET™
CROSSVOLT™
E²CMOS™
FACT™
FACT Quiet Series™
FAST®
FASTr™
GTO™

HiSeC™
ISOPLANAR™
MICROWIRE™
POP™
PowerTrench®
QFET™
QS™
Quiet Series™
SuperSOT™-3
SuperSOT™-6

SuperSOT™-8
SyncFET™
TinyLogic™
UHC™
VCX™

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 INTERNATIONAL.

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.