

FGH30N60LSD

Features

- Low saturation voltage: $V_{CE(sat)} = 1.1V @ I_C = 30A$
- High Input Impedance
- Low Conduction Loss

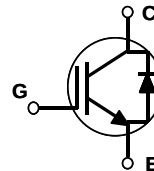
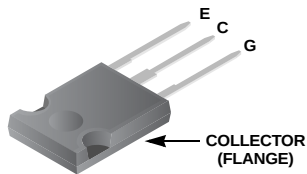
Applications

- Solar Inverters
- UPS, Welder



General Description

The FGH30N60LSD is a MOS gated high voltage switching device combining the best features of MOSFETs and bipolar transistors. This device has the high input impedance of a MOSFET and the low on-state conduction loss of a bipolar transistor.



Absolute Maximum Ratings

Symbol	Description	FGH30N60LSD	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C = 25^\circ C$	60	A
	Collector Current @ $T_C = 100^\circ C$	30	A
$I_{CM} (1)$	Pulsed Collector Current	90	A
I_{FSM}	Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave	150	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ C$	480	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	192	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ C$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

Notes :

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC} (IGBT)$	Thermal Resistance, Junction-to-Case	--	0.26	$^\circ C/W$
$R_{\theta JC} (Diode)$	Thermal Resistance, Junction-to-Case	--	0.92	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ C/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGH30N60LSD	FGH30N60LSDTU	TO-247	Tube	30ea	-

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 250uA	600	--	--	V
ΔB _{V_{CES}} /ΔT _J	Temperature Coefficient of Breakdown Voltage	V _{GE} = 0V, I _C = 250uA	--	0.6	--	V/°C
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0V	--	--	250	uA
I _{GES}	G-E Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0V	--	--	±250	nA
On Characteristics						
V _{GE(th)}	G-E Threshold Voltage	I _C = 250uA, V _{CE} = V _{GE}	4.0	5.5	7.0	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 30A, V _{GE} = 15V	--	1.1	1.4	V
		I _C = 30A, V _{GE} = 15V, T _C = 125°C	--	1.0	--	V
		I _C = 60 A, V _{GE} = 15V	--	1.3	--	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 30V, V _{GE} = 0V, f = 1MHz	--	3550	--	pF
C _{oes}	Output Capacitance		--	245	--	pF
C _{res}	Reverse Transfer Capacitance		--	90	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{CC} = 400 V, I _C = 30A, R _G = 6.8Ω, V _{GE} = 15V, Inductive Load, T _C = 25°C	--	18	--	ns
t _r	Rise Time		--	46	--	ns
t _{d(off)}	Turn-Off Delay Time		--	250	--	ns
t _f	Fall Time		--	1.3	2.0	us
E _{on}	Turn-On Switching Loss		--	1.1	--	mJ
E _{off}	Turn-Off Switching Loss	V _{CC} = 400 V, I _C = 30A, R _G =6.8Ω, V _{GE} = 15V, Inductive Load, T _C = 125°C	--	21	--	mJ
t _{d(on)}	Turn-On Delay Time		--	17	--	ns
t _r	Rise Time		--	45	--	ns
t _{d(off)}	Turn-Off Delay Time		--	270	--	ns
t _f	Fall Time		--	2.6	--	us
E _{on}	Turn-On Switching Loss	V _{CE} = 300 V, I _C = 30A, V _{GE} = 15V	--	1.1	--	mJ
E _{off}	Turn-Off Switching Loss		--	36	--	mJ
Q _g	Total Gate Charge		--	225	--	nC
Q _{ge}	Gate-Emitter Charge	V _{CE} = 300 V, I _C = 30A, V _{GE} = 15V	--	30	--	nC
Q _{gc}	Gate-Collector Charge		--	105	--	nC
L _e	Internal Emitter Inductance	Measured 5mm from PKG	--	7	--	nH

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

Parameter	Conditions		Min.	Typ.	Max	Units
V_{FM}	$I_F = 15\text{A}$	$T_C = 25^\circ\text{C}$	-	1.8	2.2	V
	$I_F = 15\text{A}$	$T_C = 125^\circ\text{C}$	-	1.6	-	V
I_{RM}	$V_R = 600\text{V}$	$T_C = 25^\circ\text{C}$	-	-	100	μA
t_{rr}	$I_F = 1\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 30\text{V}$	$T_C = 25^\circ\text{C}$	-	-	35	ns
	$I_F = 15\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	-	40	ns
t_a	$I_F = 15\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	18	-	ns
t_b		$T_C = 25^\circ\text{C}$	-	13	-	ns
Q_{rr}		$T_C = 25^\circ\text{C}$	-	27.5	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

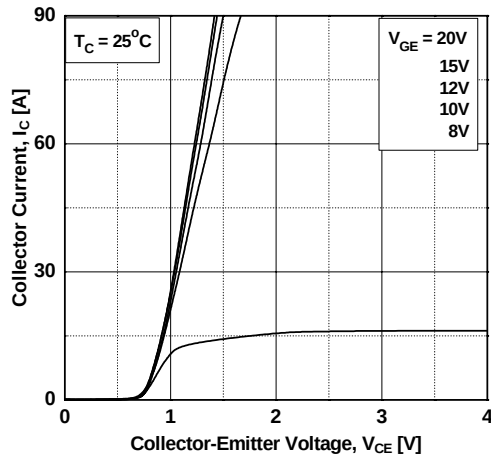


Figure 3. Typical Saturation Voltage Characteristics

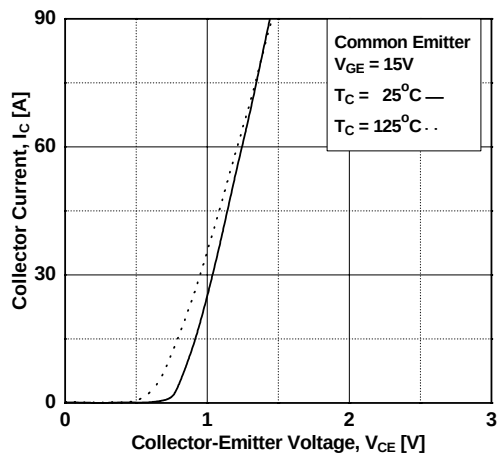


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

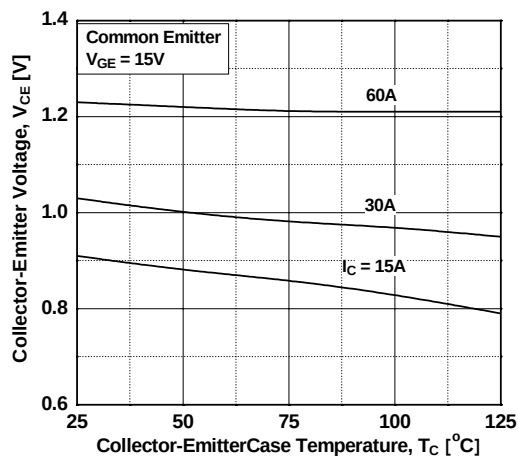


Figure 2. Typical Saturation Voltage Characteristics

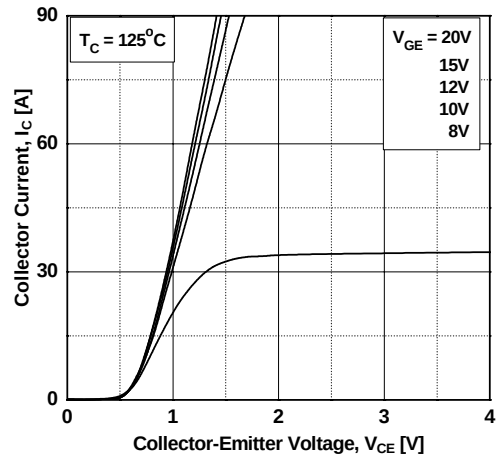


Figure 4. Transfer characteristics

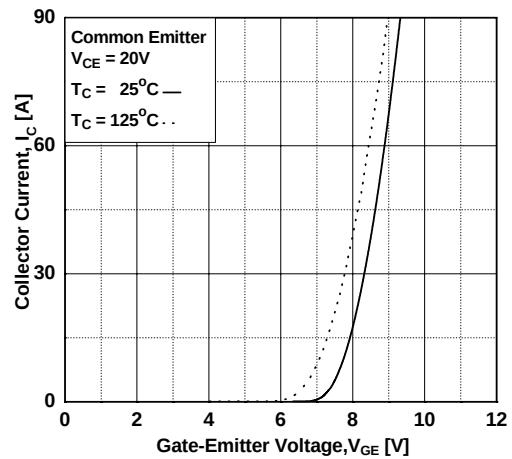
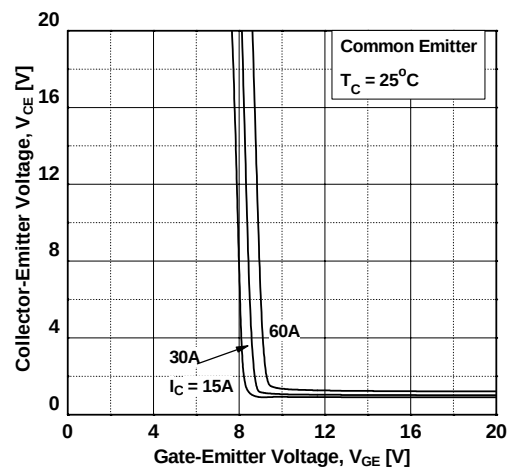


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

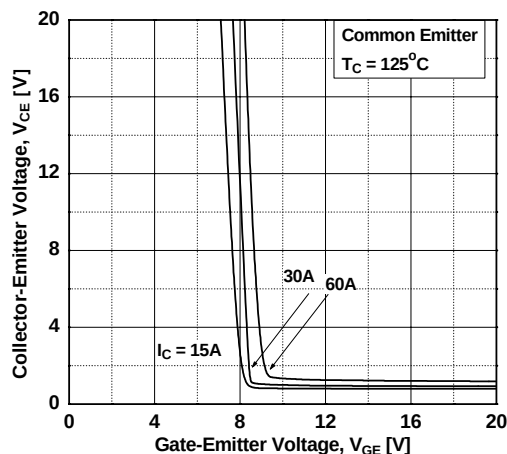


Figure 8. Capacitance characteristics

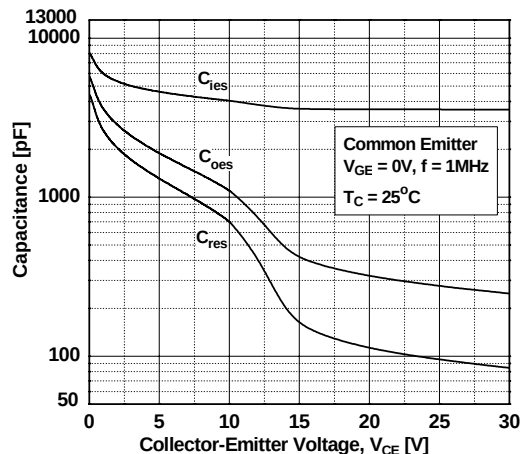


Figure 9. Gate Charge Characteristics

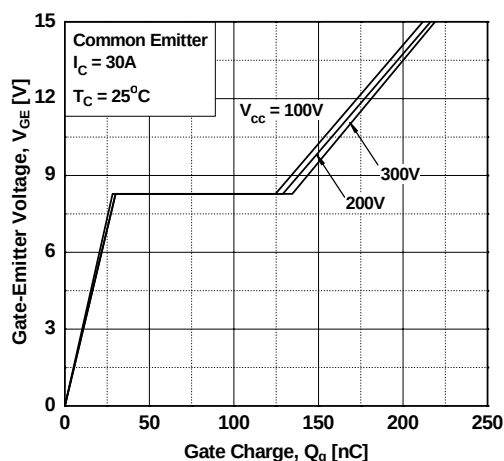


Figure 10. SOA Characteristics

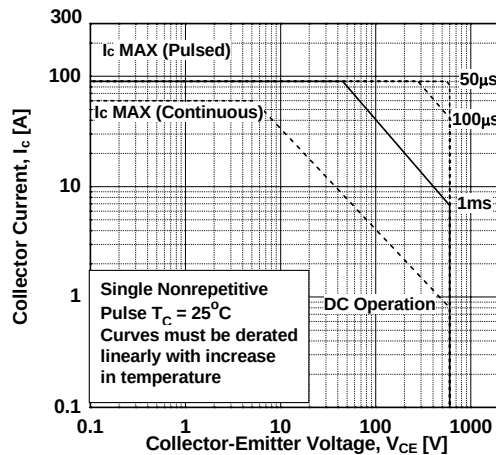


Figure 11. Load Current Vs. Frequency

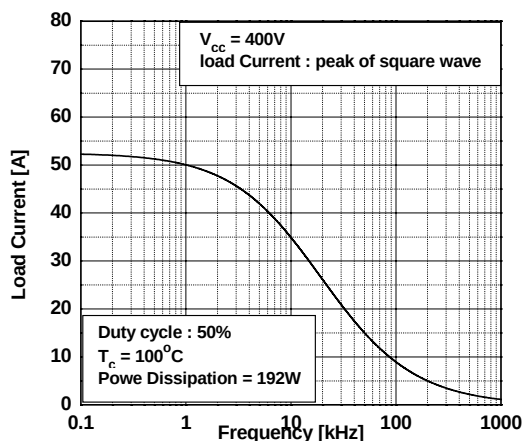
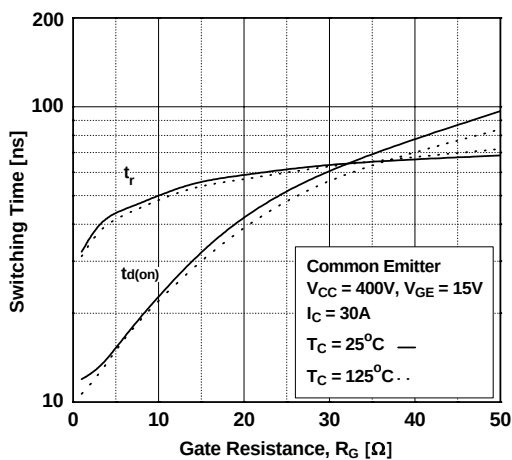


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

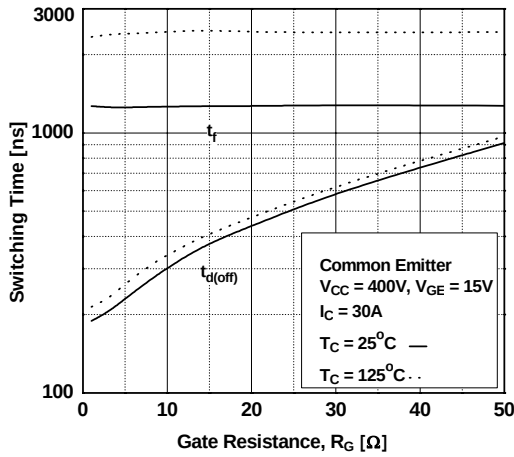


Figure 15. Turn-Off Characteristics vs. Collector Current

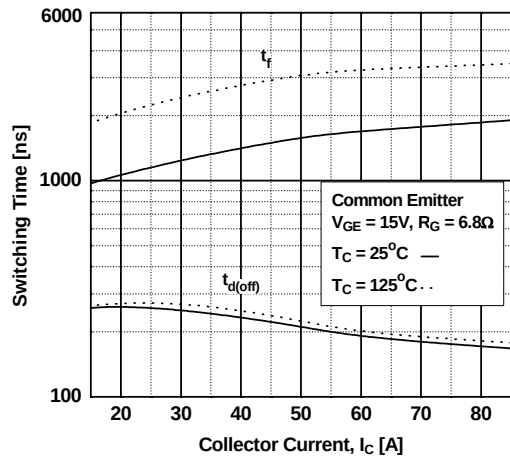


Figure 17. Switching Loss vs Collector Current

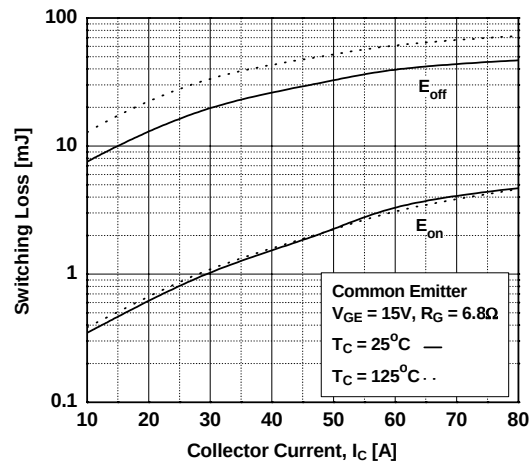


Figure 14. Turn-On Characteristics vs. Collector Current

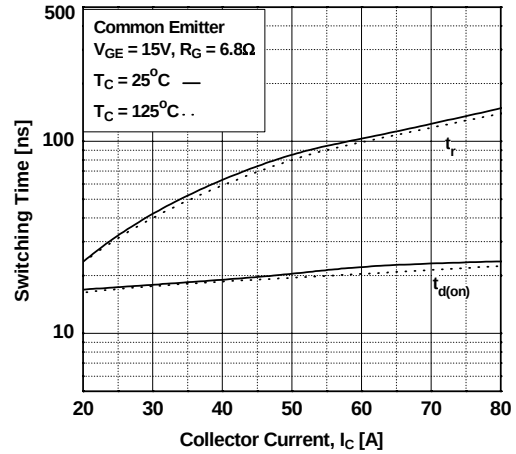


Figure 16. Switching Loss vs Gate Resistance

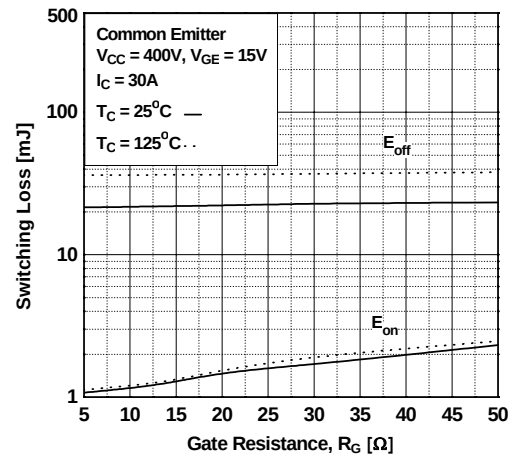


Figure 18. Turn-Off Switching SOA Characteristics

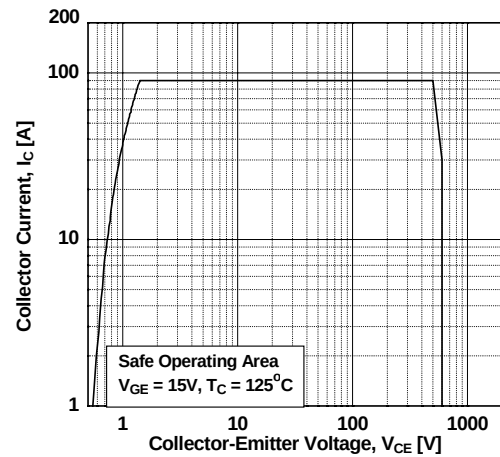


Figure 19. Transient Thermal Impedance of IGBT

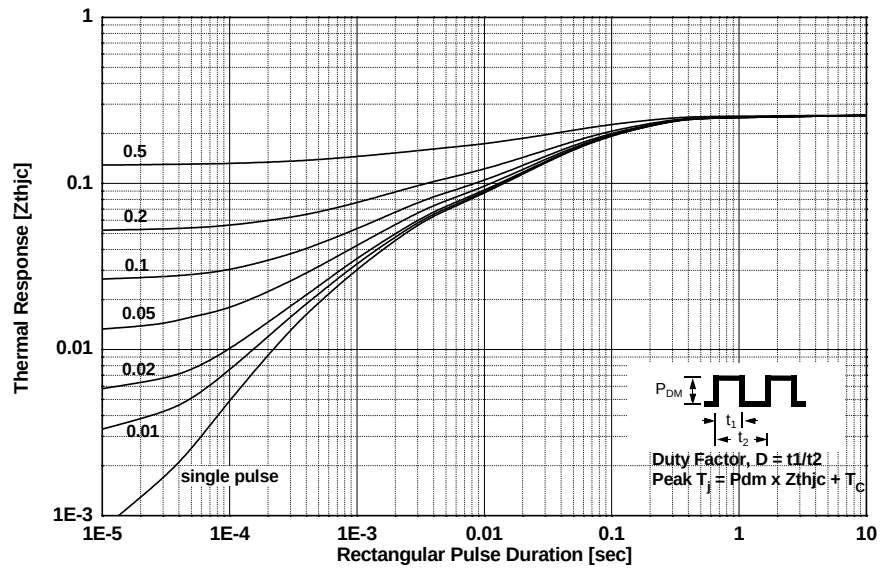


Figure 20. Typical Forward Voltage Drop

Figure 21. Typical Reverse Current

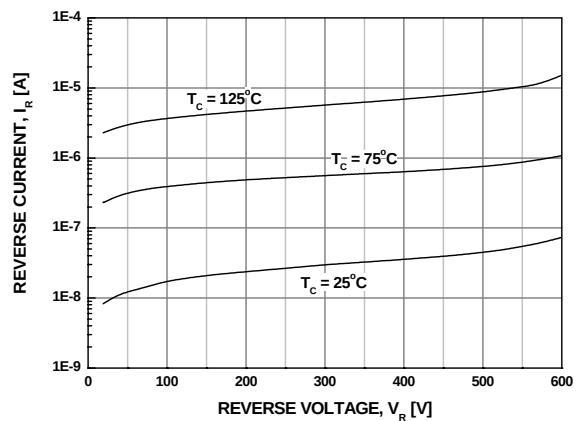
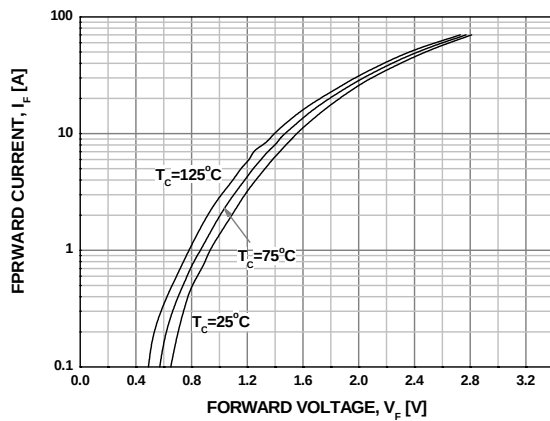
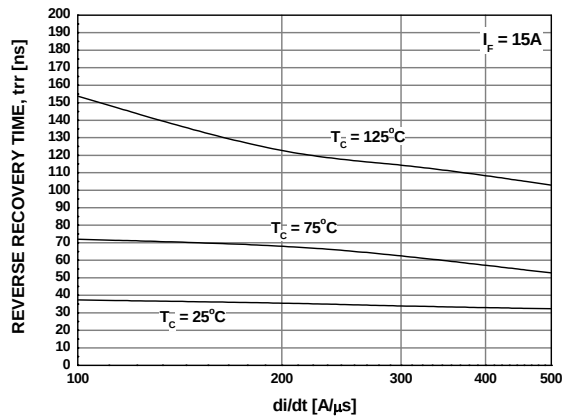


Figure 22. Typical Reverse Recovery Time



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.

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

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, 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. 120