

SGL160N60UFD

Ultrafast IGBT

General Description

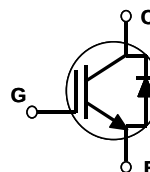
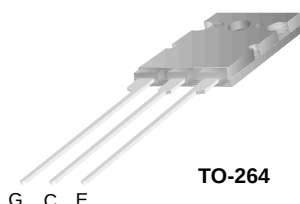
Fairchild's UFD series of Insulated Gate Bipolar Transistors (IGBTs) provides low conduction and switching losses. The UFD series is designed for applications such as motor control and general inverters where high speed switching is a required feature.

Features

- High speed switching
- Low saturation voltage : $V_{CE(sat)} = 2.1 \text{ V @ } I_C = 80 \text{ A}$
- High input impedance
- CO-PAK, IGBT with FRD: $t_{rr} = 75 \text{ ns (typ.)}$

Applications

AC & DC motor controls, general purpose inverters, robotics, servo controls, and power supplies.



Absolute Maximum Ratings

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

Symbol	Description	SGL160N60UFD	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	160	A
	Collector Current @ $T_C = 100^\circ\text{C}$	80	A
$I_{CM(1)}$	Pulsed Collector Current	300	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	25	A
I_{FM}	Diode Maximum Forward Current	280	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	250	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	100	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.	Units
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.5	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	0.83	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	25	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	600	--	--	V
$\Delta BV_{CES} / \Delta T_J$	Temperature Coefficient of Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	--	0.6	--	V/ $^\circ\text{C}$
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	250	μA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	± 100	nA

On Characteristics

$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 80mA, V_{CE} = V_{GE}$	3.5	4.5	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 80A, V_{GE} = 15V$	--	2.1	2.6	V
		$I_C = 160A, V_{GE} = 15V$	--	2.6	--	V

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V,$ $f = 1MHz$	--	5000	--	pF
C_{oes}	Output Capacitance		--	600	--	pF
C_{res}	Reverse Transfer Capacitance		--	200	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 300V, I_C = 80A,$ $R_G = 3.9\Omega, V_{GE} = 15V$ Inductive Load, $T_C = 25^\circ\text{C}$	--	40	--	ns
t_r	Rise Time		--	101	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	90	130	ns
t_f	Fall Time		--	75	150	ns
E_{on}	Turn-On Switching Loss		--	2500	--	μJ
E_{off}	Turn-Off Switching Loss	$V_{CC} = 300V, I_C = 80A,$ $R_G = 3.9\Omega, V_{GE} = 15V$ Inductive Load, $T_C = 125^\circ\text{C}$	--	1760	--	μJ
E_{ts}	Total Switching Loss		--	4260	5000	μJ
$t_{d(on)}$	Turn-On Delay Time		--	45	--	ns
t_r	Rise Time		--	105	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	140	200	ns
t_f	Fall Time	$V_{CE} = 300V, I_C = 80A,$ $V_{GE} = 15V$	--	122	250	ns
E_{on}	Turn-On Switching Loss		--	2785	--	μJ
E_{off}	Turn-Off Switching Loss		--	3100	--	μJ
E_{ts}	Total Switching Loss		--	5885	--	μJ
Q_g	Total Gate Charge		--	345	520	nC
Q_{ge}	Gate-Emitter Charge	Measured 5mm from PKG	--	60	100	nC
Q_{gc}	Gate-Collector Charge		--	95	150	nC
L_e	Internal Emitter Inductance		--	18	--	nH

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _{FM}	Diode Forward Voltage	I _F = 25A	T _C = 25°C	--	1.4	1.7	V
			T _C = 100°C	--	1.3	--	
t _{rr}	Diode Reverse Recovery Time	I _F = 25A, di/ dt = 200 A/us	T _C = 25°C	--	50	95	ns
			T _C = 100°C	--	105	--	
I _{rr}	Diode Peak Reverse Recovery Current		T _C = 25°C	--	4.5	10	A
			T _C = 100°C	--	8.5	--	
Q _{rr}	Diode Reverse Recovery Charge		T _C = 25°C	--	112	375	nC
			T _C = 100°C	--	420	--	

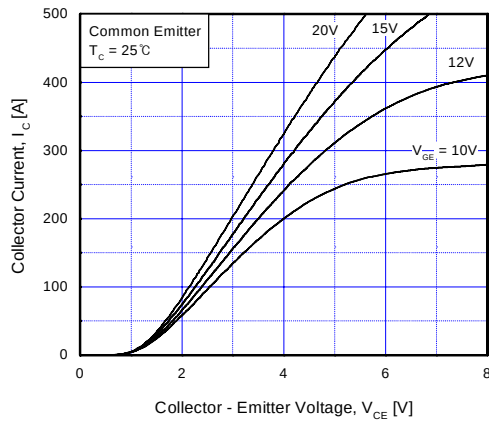


Fig 1. Typical Output Characteristics

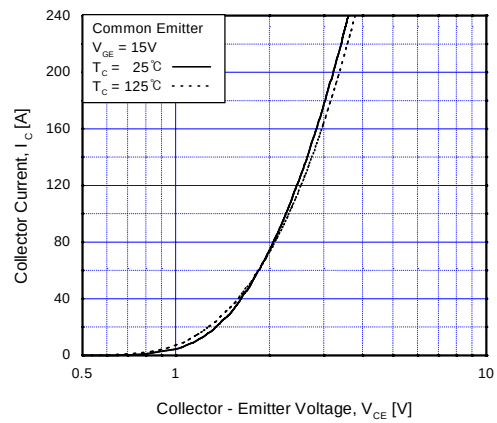


Fig 2. Typical Saturation Voltage Characteristics

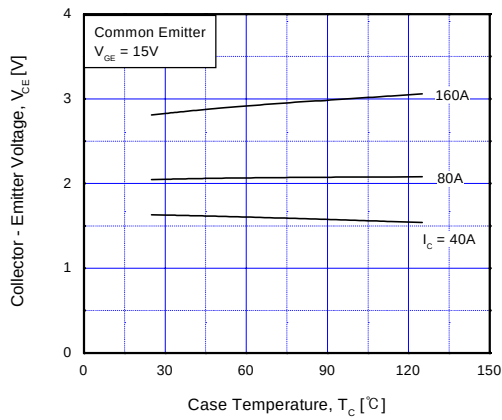


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

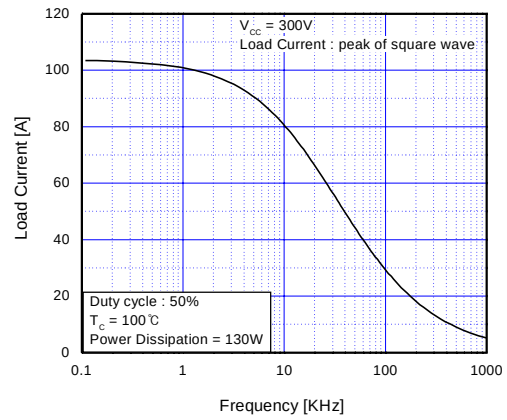


Fig 4. Load Current vs. Frequency

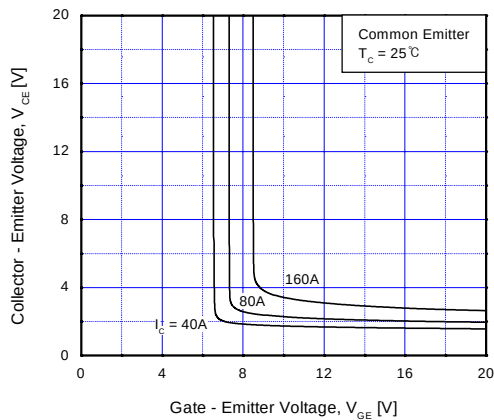


Fig 6. Saturation Voltage vs. V_{GE}

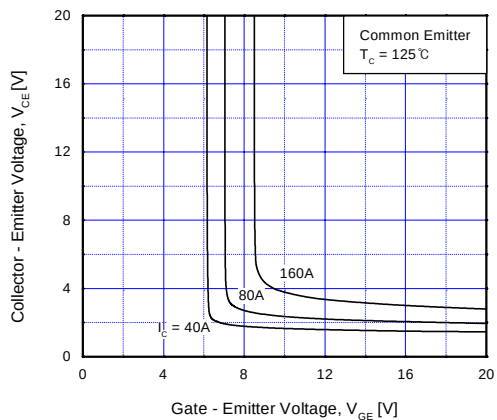


Fig 7. Saturation Voltage vs. V_{GE}

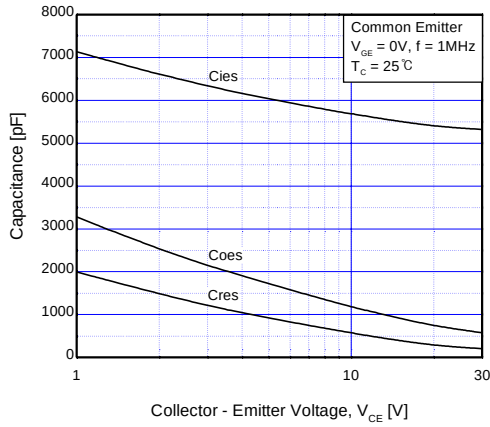


Fig 7. Capacitance Characteristics

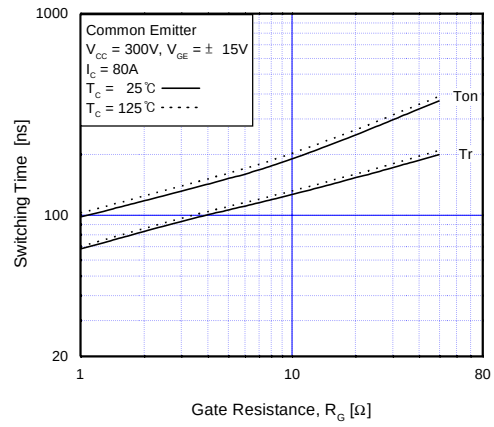


Fig 8. Turn-On Characteristics vs. Gate Resistance

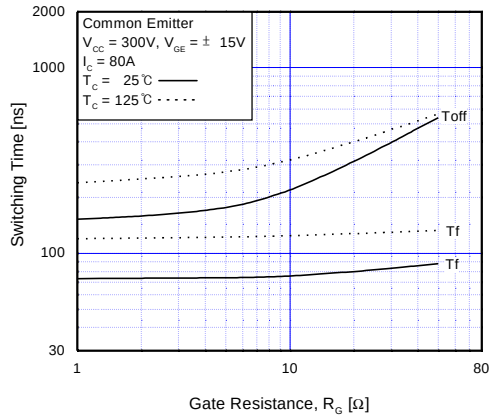


Fig 9. Turn-Off Characteristics vs. Gate Resistance

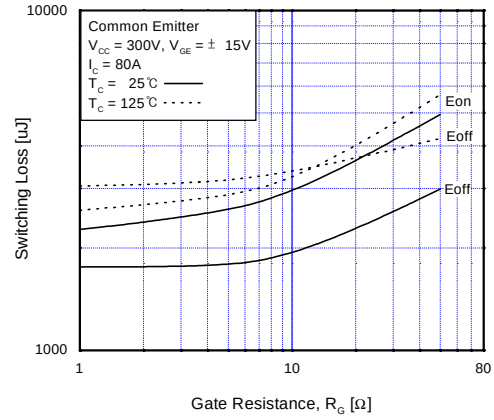


Fig 10. Switching Loss vs. Gate Resistance

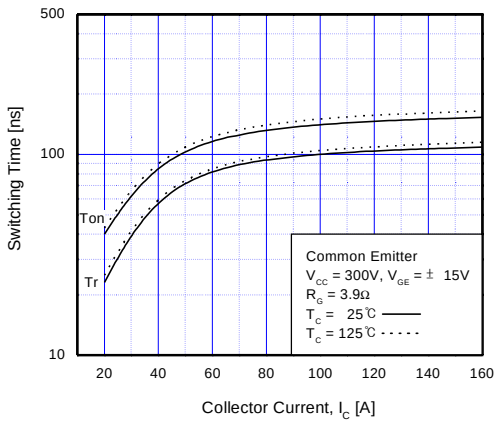


Fig 11. Turn-On Characteristics vs. Collector Current

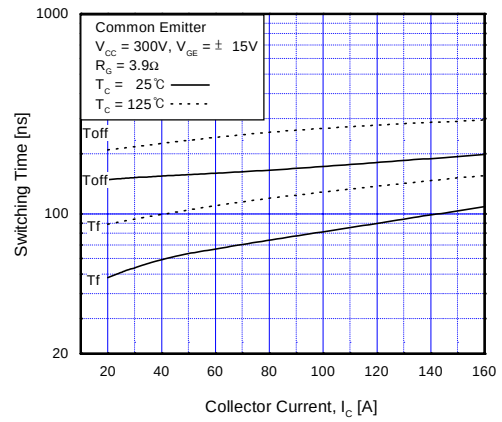


Fig 12. Turn-Off Characteristics vs. Collector Current

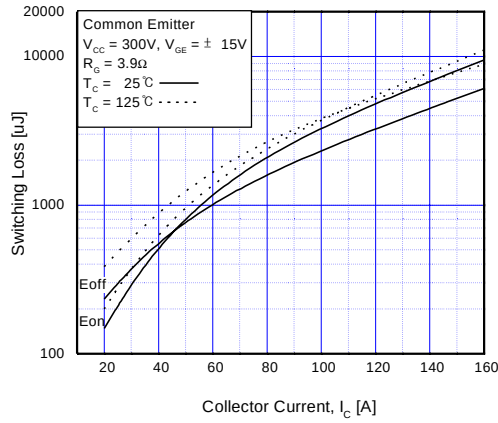


Fig 13. Switching Loss vs. Collector Current

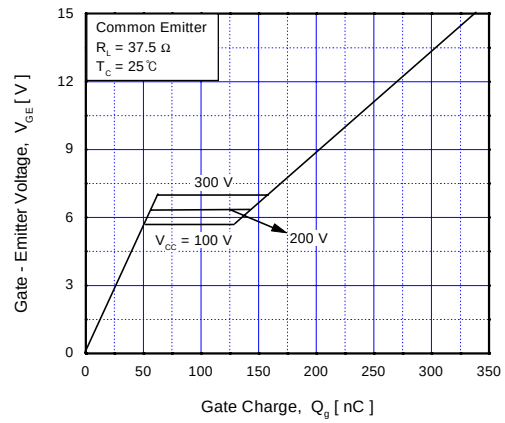


Fig 14. Gate Charge Characteristics

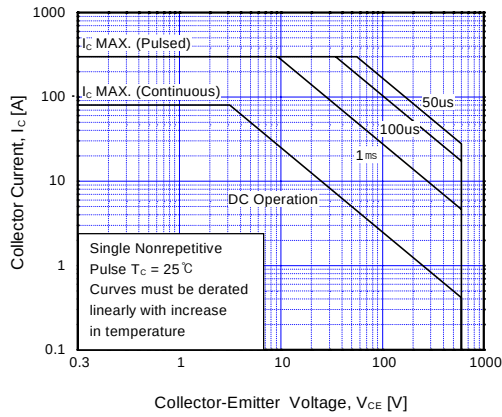


Fig 15. SOA Characteristic

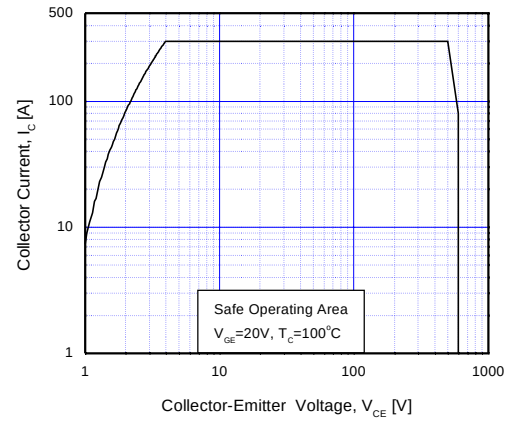


Fig 16. Turn-Off SOA Characteristics

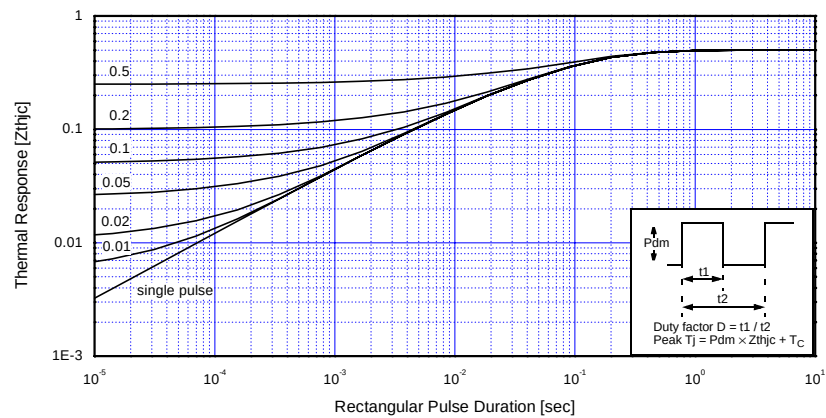


Fig 17. Transient Thermal Impedance of IGBT

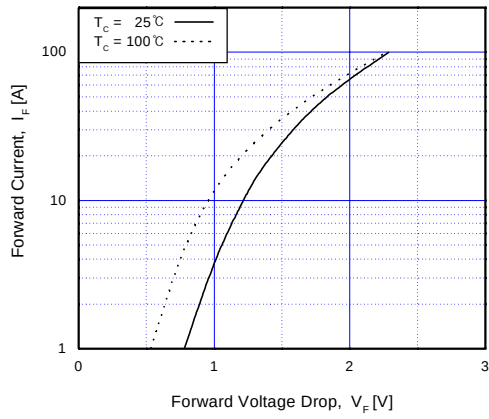


Fig 18. Forward Characteristics

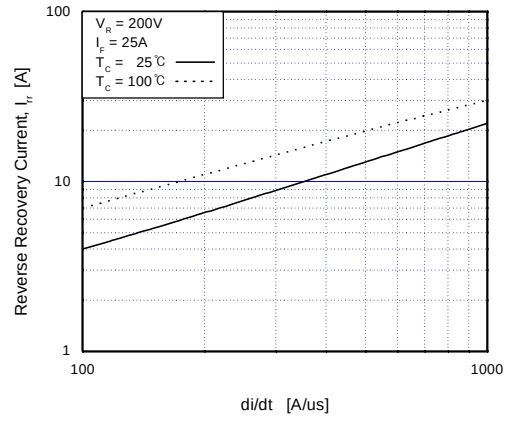


Fig 19. Reverse Recovery Current

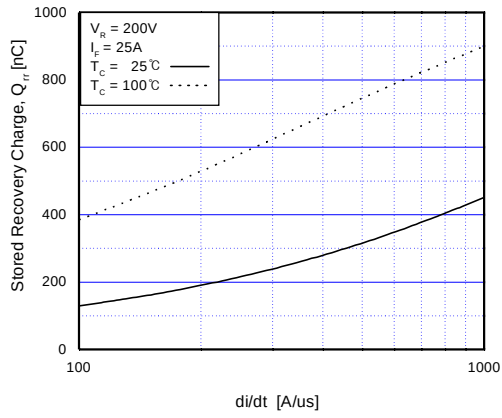


Fig 20. Stored Charge

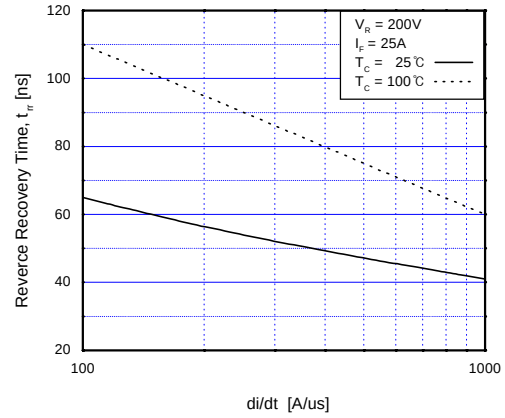
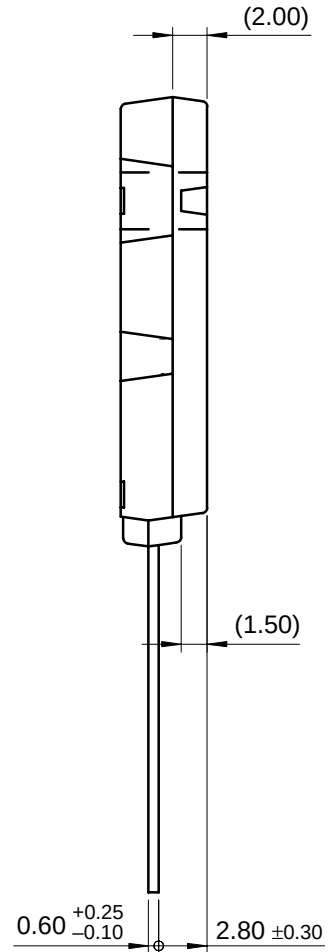
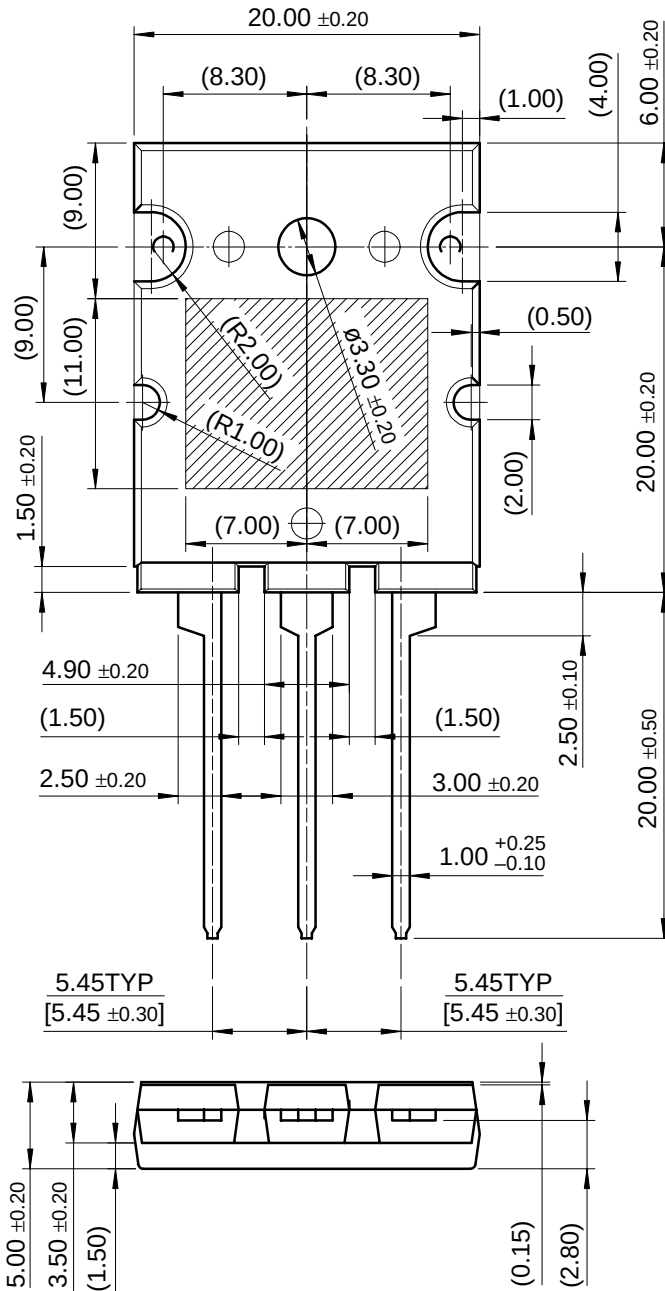


Fig 21. Reverse Recovery Time

Package Dimension

TO-264



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.

ACE ^{Ex} TM	FACT TM	ImpliedDisconnect TM	PACMAN TM	SPM TM
ActiveArray TM	FACT Quiet Series TM	ISOPLANAR TM	POP TM	Stealth TM
Bottomless TM	FAST [®]	LittleFET TM	Power247 TM	SuperSOT TM -3
CoolFET TM	FAST ^r TM	MicroFET TM	PowerTrench [®]	SuperSOT TM -6
CROSSVOLT TM	FRFET TM	MicroPak TM	QFET TM	SuperSOT TM -8
DOME TM	GlobalOptoisolator TM	MICROWIRE TM	QS TM	SyncFET TM
EcoSPARK TM	GTO TM	MSX TM	QT Optoelectronics TM	TinyLogic TM
E ² CMOS TM	HiSeC TM	MSXPro TM	Quiet Series TM	TruTranslation TM
EnSigna TM	I ² C TM	OCX TM	RapidConfigure TM	UHC TM
Across the board. Around the world. TM		OCXPro TM	RapidConnect TM	UltraFET [®]
The Power Franchise TM		OPTOLOGIC [®]	SILENT SWITCHER [®]	VCX TM
Programmable Active Droop TM		OPTOPLANAR TM	SMART START TM	

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.

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692
Email amall@ameya360.com
QQ 800077892
Skype ameyasales1 ameyasales2

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333
Email mkt@ameya360.com