FAIRCHILD
SEMICONDUCTOR®

October 2008

FGA30N60LSD

Features

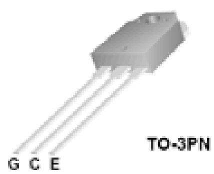
- Low saturation voltage: $V_{CE(sat)}$ =1.1V @ I_C = 30A
- High Input Impedance
- Low Conduction Loss

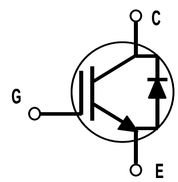
Applications

- Solar Inverters
- UPS, Welder

General Description

The FGA30N60LSD 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		FGA30N60LSD	Units
V_{CES}	Collector-Emitter Voltage		600	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Collector Current	@ T_C = 25°C	60	A
	Collector Current	@ T_C = 100°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°C	480	W
	Maximum Power Dissipation	@ T_C = 100°C	192	W
T_J	Operating Junction Temperature		-55 to +150	°C
T_{stg}	Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8” from case for 5 seconds		300	°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	°C/W
$R_{\theta JC}$(Diode)	Thermal Resistance, Junction-to-Case	--	0.92	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA30N60LSD	FGA30N60LSDTU	TO-3PN	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_{VCES}/ 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		--	21	--	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 400 V, I_C = 30A, R_G =6.8Ω, V_{GE} = 15V, Inductive Load, T_C = 125°C	--	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		--	1.1	--	mJ
E_{off}	Turn-Off Switching Loss		--	36	--	mJ
Q_g	Total Gate Charge	V_{CE} = 300 V, I_C = 30A, V_{GE} = 15V	--	225	--	nC
Q_{ge}	Gate-Emitter Charge		--	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°C unless otherwise noted

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

Typical Performance Characteristics

Figure 1.Typical Output Characteristics

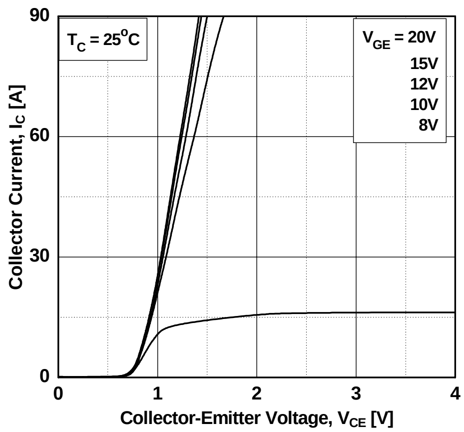


Figure 2. Typical Saturation Voltage Characteristics

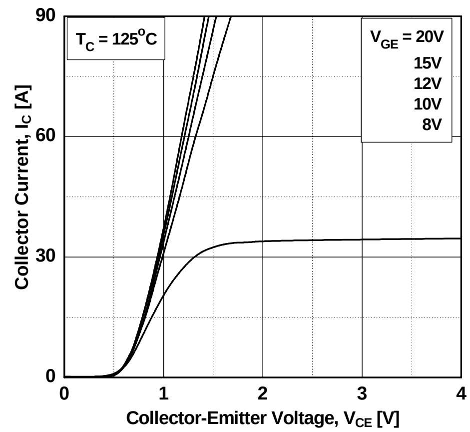


Figure 3. Typical Saturation Voltage Characteristics

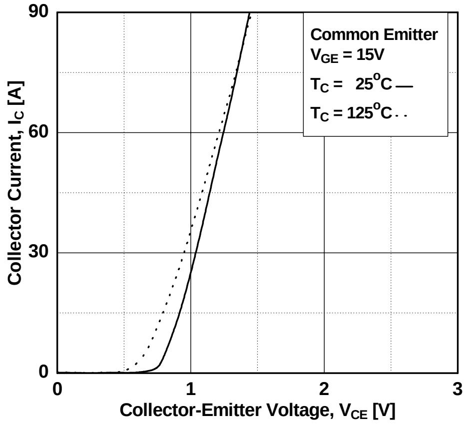


Figure 4. Transfer characteristics

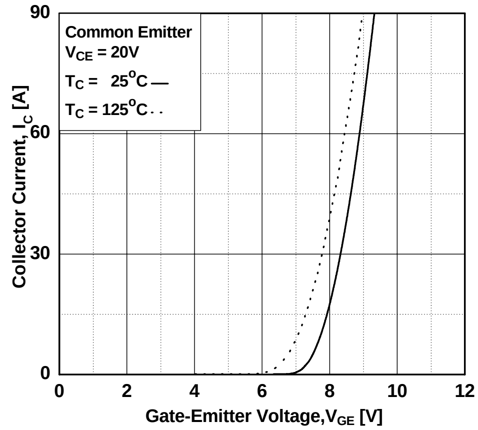


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

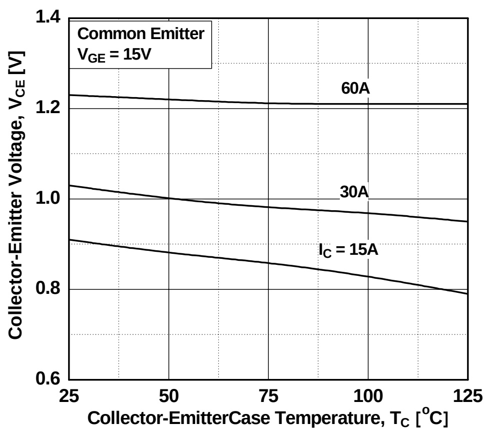
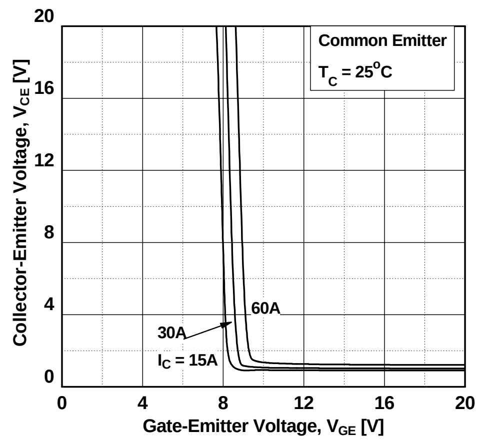


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. Vge

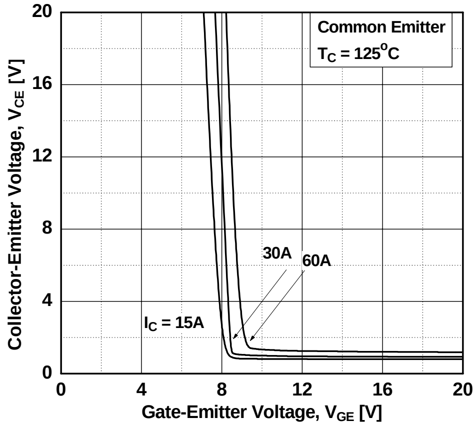


Figure 8. Capacitance characteristics

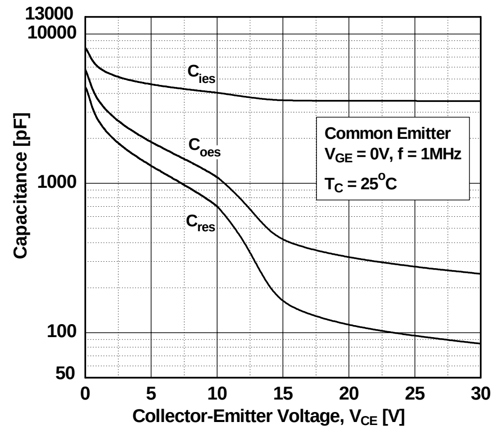


Figure 9. Gate Charge Characteristics

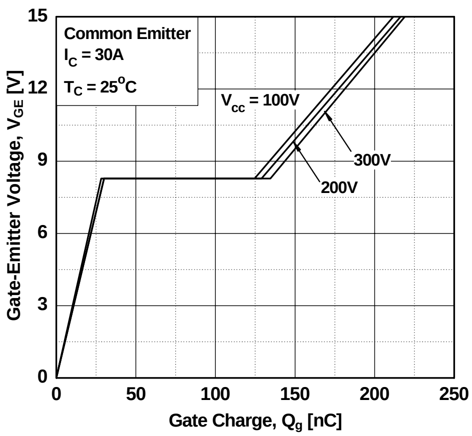


Figure 10. SOA Characteeristics

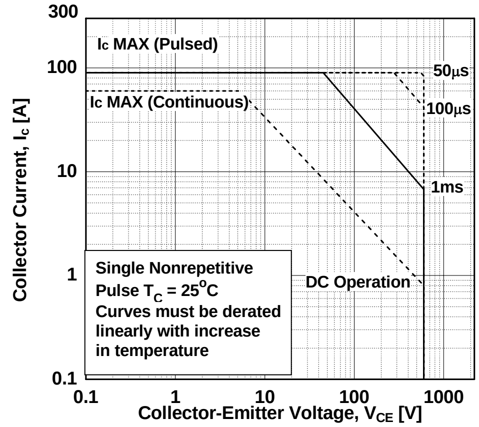


Figure 11. Load Current Vs. Frequency

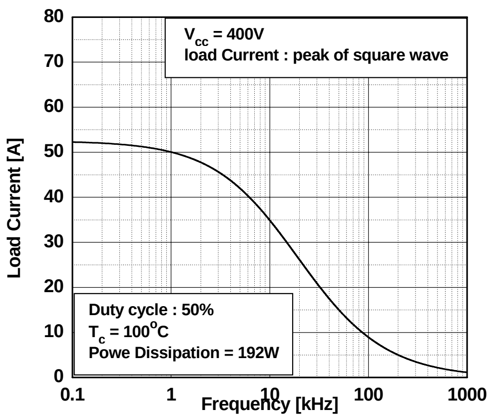
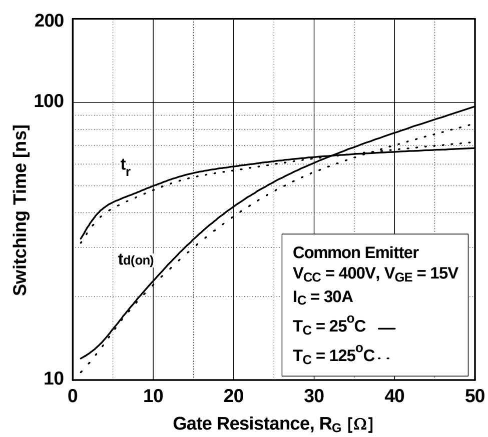


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

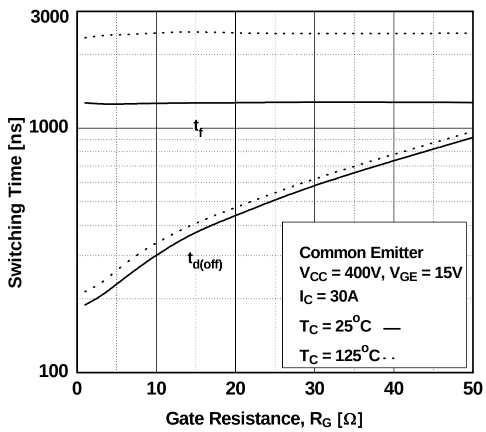


Figure 14. Turn-On Characteristics vs. Collector Current

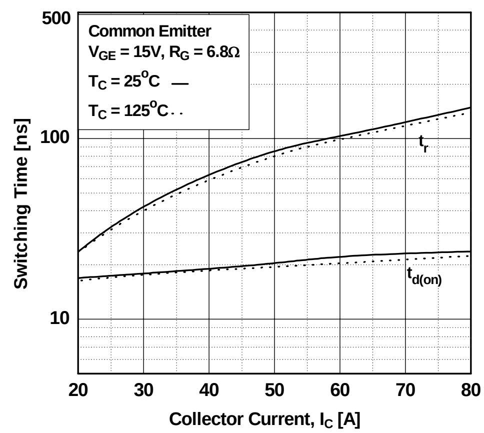


Figure 15. Turn-Off Characteristics vs. Collector Current

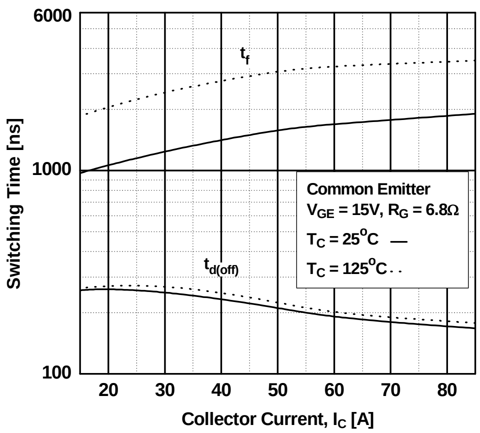


Figure 16. Switching Loss vs Gate Resistance

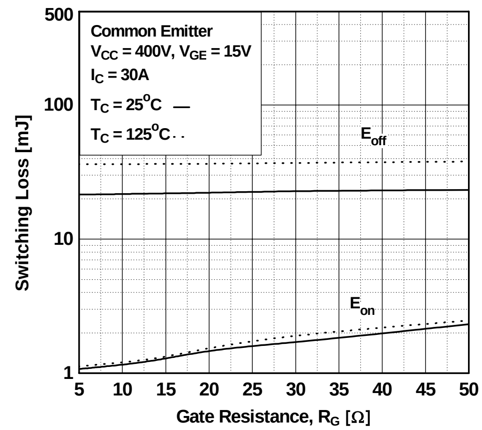


Figure 17. Switching Loss vs Collector Current

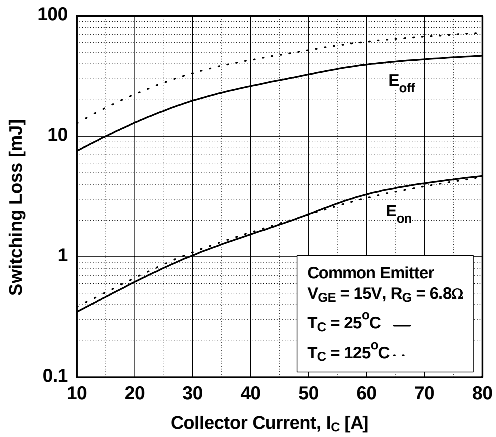
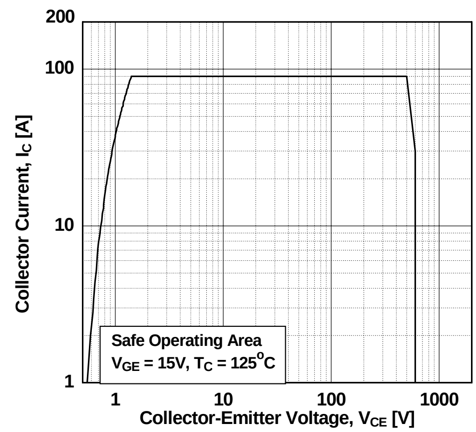


Figure 18. Turn-Off Switching SOA Characteristics



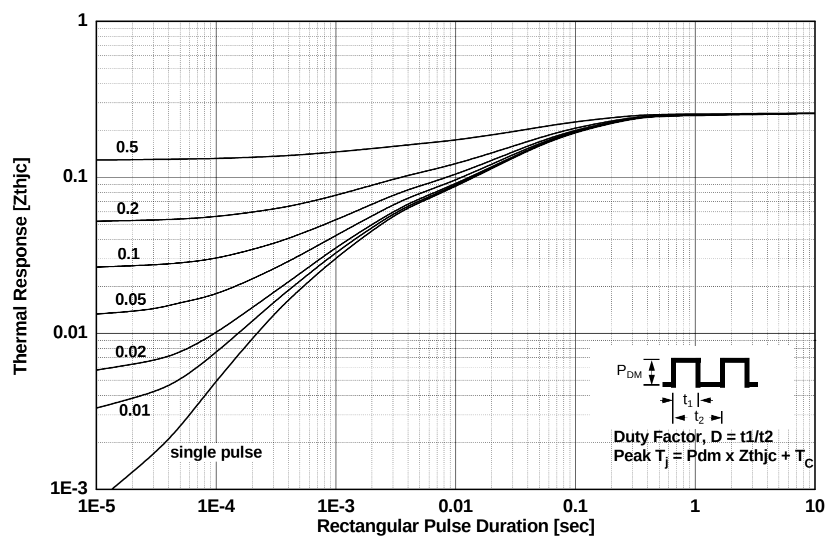


Figure 19. Transient Thermal Impedance of IGBT

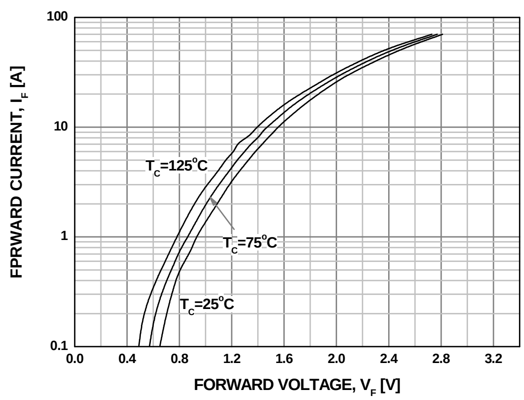


Figure 20. Typical Forward Voltage Drop

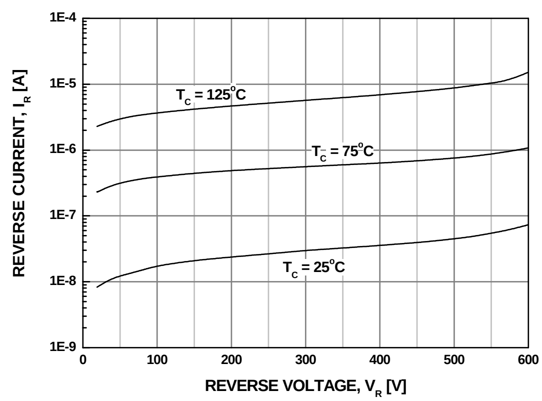


Figure 21. Typical Reverse Current

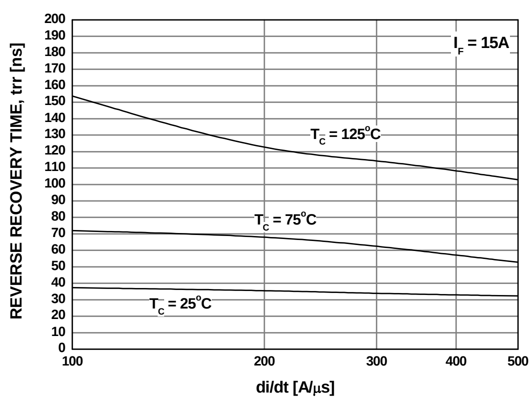
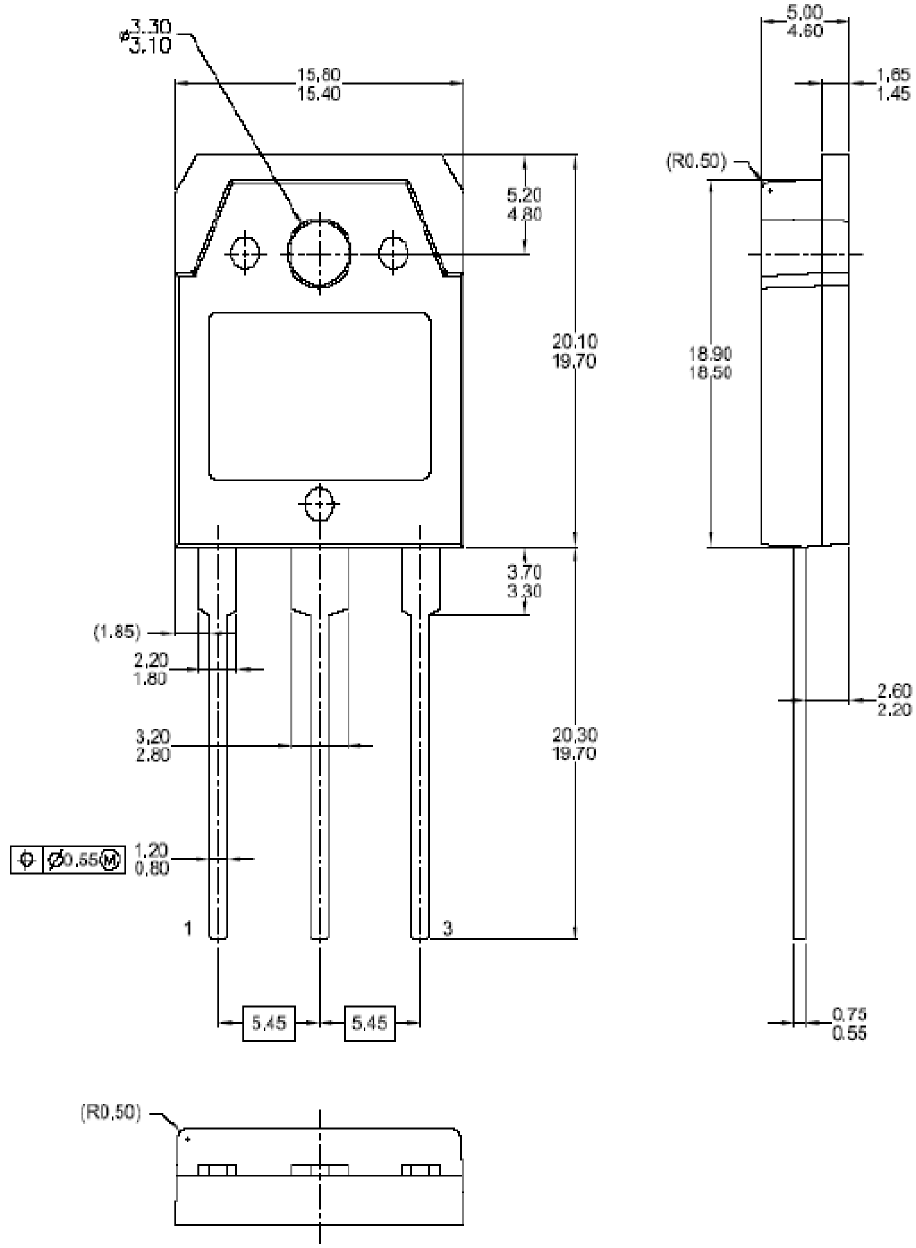


Figure 22. Typical Reverse Recovery Time

Mechanical Dimensions (continued)

TO-3PN



Dimensions in Millimeters

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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.
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