FAIRCHILD SEMICONDUCTOR®

December 2007

FGA70N30TD
300V, 70A PDP IGBT

Features

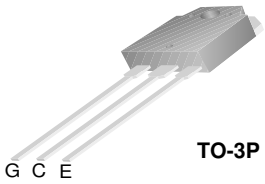
- High current capability
- Low saturation voltage: $V_{CE(sat)}$ =1.5V @ I_C = 40A
- High input impedance
- Fast switching
- RoHS complaint

Application

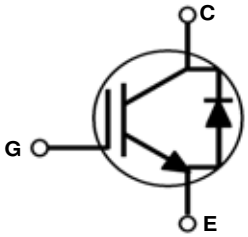
. PDP System

General Description

Using Novel Trench IGBT Technology, Fairchild's new series of trench IGBTs offer the optimum performance for PDP applications where low conduction and switching losses are essential.



TO-3P



Absolute Maximum Ratings

Symbol	Description		Ratings	Units
V_{CES}	Collector-Emitter Voltage		300	V
V_{GES}	Gate-Emitter Voltage		±30	V
$I_{C\ pulse(1)*}$	Pulsed Collector Current	@ T_C = 25°C	160	A
I_F	Diode Continuous Forward Current	@ T_C = 100°C	10	A
I_{FM}	Diode Maximum Forward Current		40	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	201	W
	Maximum Power Dissipation	@ T_C = 100°C	90.6	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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction-to-Case	--	0.62	°C/W
$R_{\theta JC}$(DIODE)	Thermal Resistance, Junction-to-Case for Diode	--	1.56	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	°C/W

Notes:

(1)Repetitive test , pluse width = 100usec , Duty = 0.2

* Ic_pluse limited by max Tj

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA70N30TD	FGA70N30TDTU	TO-3P	Tube	30ea	-

Electrical Characteristics $T_C = 25^oC$ 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	300	--	--	V
$\Delta B_{VCES}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0V, I_C = 250uA	--	0.2	--	V/^{o}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	--	--	± 400	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C = 250uA, V_{CE} = V_{GE}	3.0	4.5	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C =20A, V_{GE} = 15V	--	1.2	1.5	V
		I_C =40A, V_{GE} = 15V	--	1.5	--	V
		I_C =70A, V_{GE} = 15V T_C = 25^{o}C	--	1.8	--	V
		I_C = 70A, V_{GE} = 15V T_C = 125^{o}C	--	1.9	--	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V f = 1MHz	--	3000	--	pF
C_{oes}	Output Capacitance		--	160	--	pF
C_{res}	Reverse Transfer Capacitance		--	110	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200V, I_C = 40A R_G = 15Ω, V_{GE} = 15V Resistive Load, T_C = 25^{o}C	--	32	--	ns
t_r	Rise Time		--	90	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	175	--	ns
t_f	Fall Time		--	170	300	ns
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200V, I_C = 40A R_G = 15Ω, V_{GE} = 15V Resistive Load, T_C = 125^{o}C	--	30	--	ns
t_r	Rise Time		--	90	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	185	--	ns
t_f	Fall Time		--	235	--	ns
Q_g	Total Gate Charge	V_{CE} = 200V, I_C = 40A V_{GE} = 15V	--	125	--	nC
Q_{ge}	Gate-Emitter Charge		--	25	--	nC
Q_{gc}	Gate-Collector Charge		--	55	--	nC

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_{FM}	Diode Forward Voltage	I_F = 10A	T_C = 25°C	--	1.1	1.4	V
			T_C = 125°C	--	0.9	--	
t_{rr}	Diode Reverse Recovery Time	I_F = 10A dI/dt = 200A/μs Diode Forward Voltage	T_C = 25°C	--	21	--	ns
			T_C = 125°C	--	35	--	
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25°C	--	2.8	--	A
			T_C = 125°C	--	5.6	--	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	--	29.4	--	nC
			T_C = 125°C	--	98	--	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

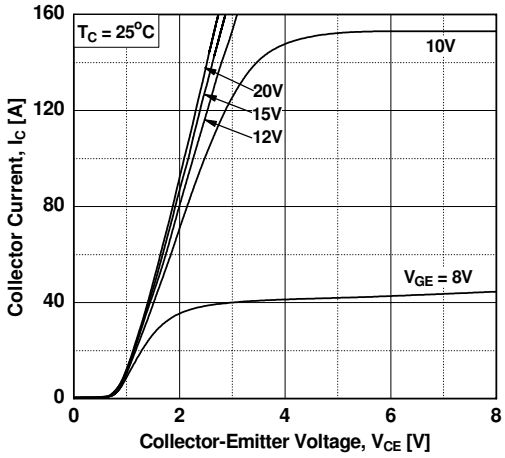


Figure 2. Typical Output Characteristics

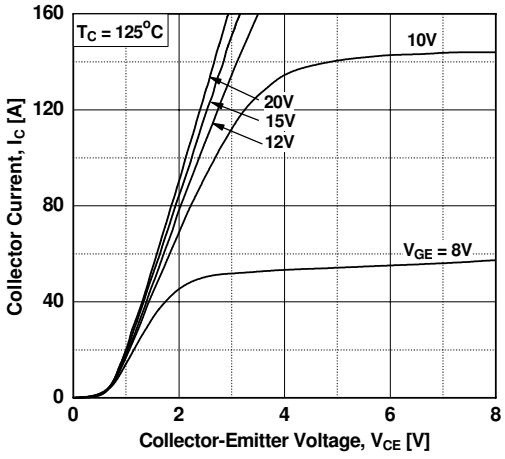


Figure 3. Typical Saturation Voltage Characteristics

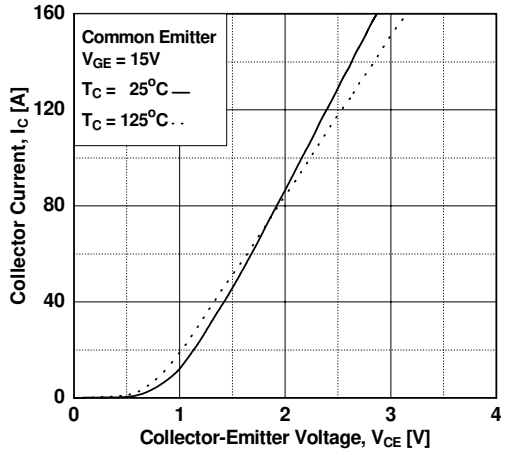


Figure 4. Transfer Characteristics

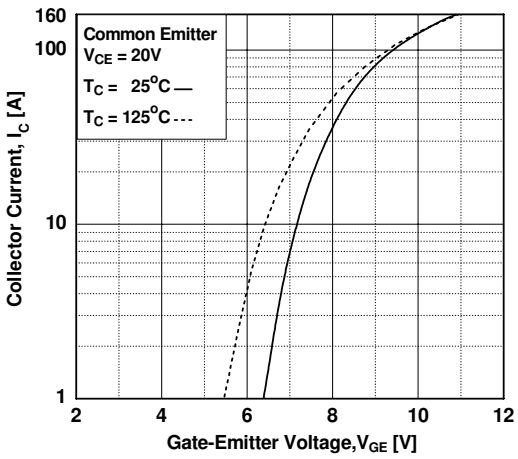


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

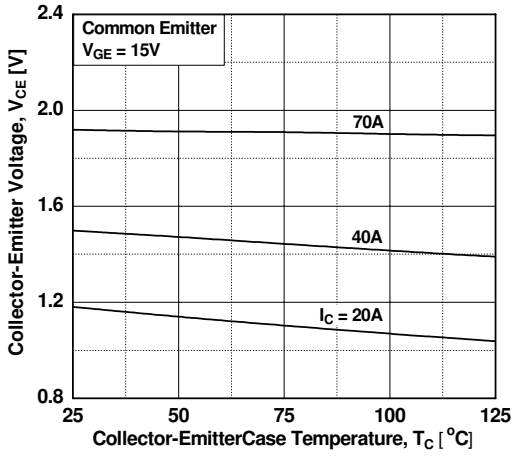
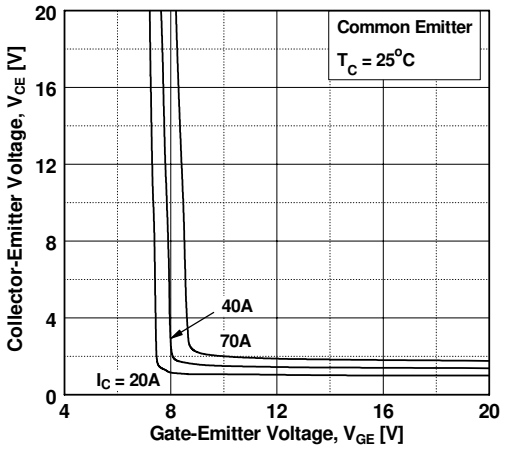


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

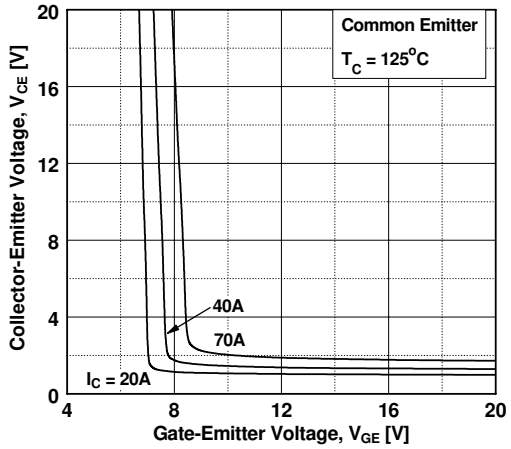


Figure 8. Capacitance Characteristics

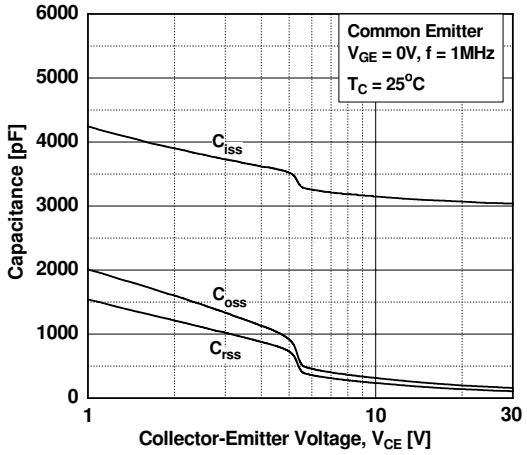


Figure 9. Gate Charge Characteristics

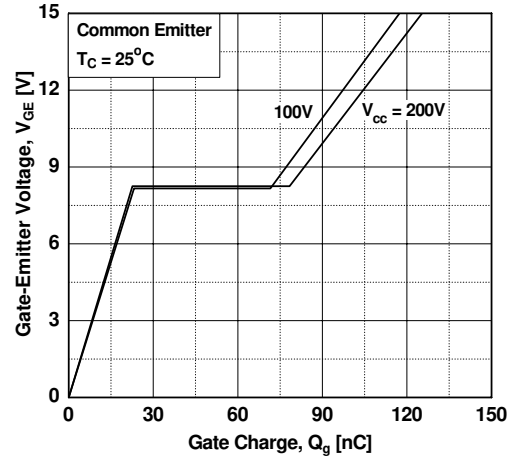


Figure 10. SOA Characteristics

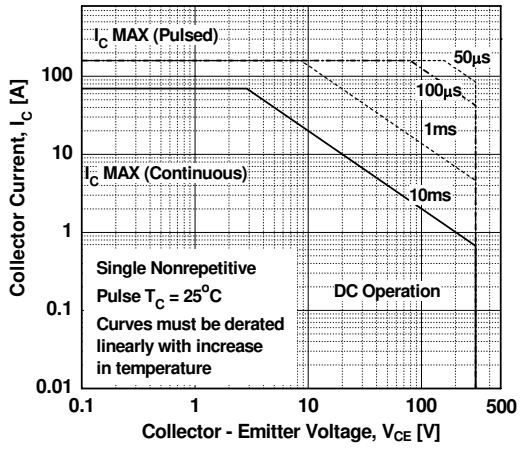


Figure 11. Turn-on Characteristics vs. Gate Resistance

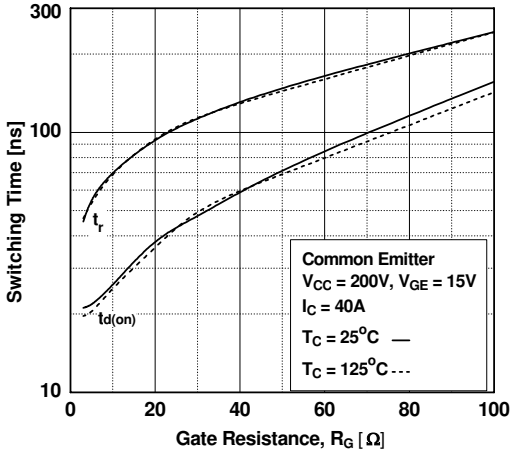
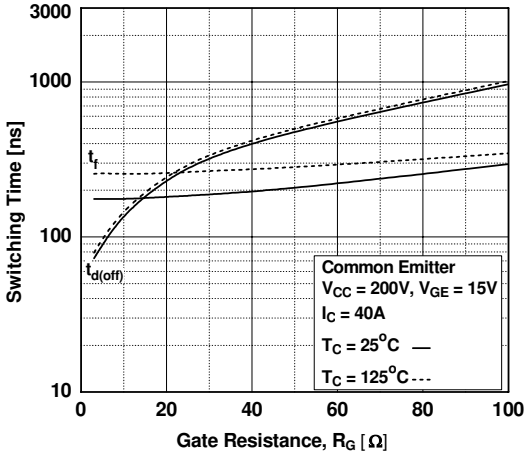


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-on Characteristics vs. Collector Current

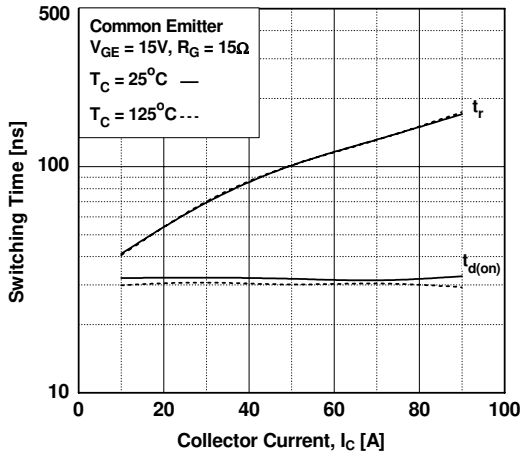


Figure 14. Turn-off Characteristics vs. Collector Current

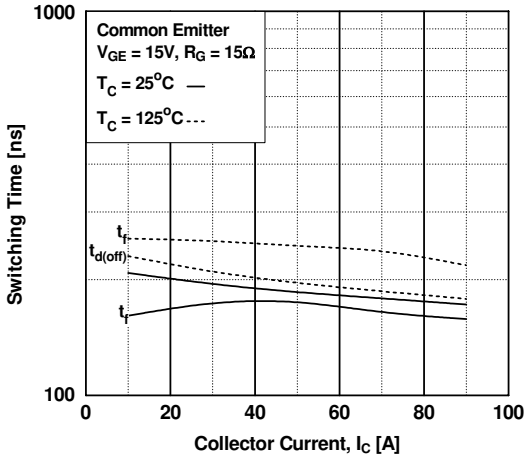


Figure 15. Switching Loss vs. Gate Resistance

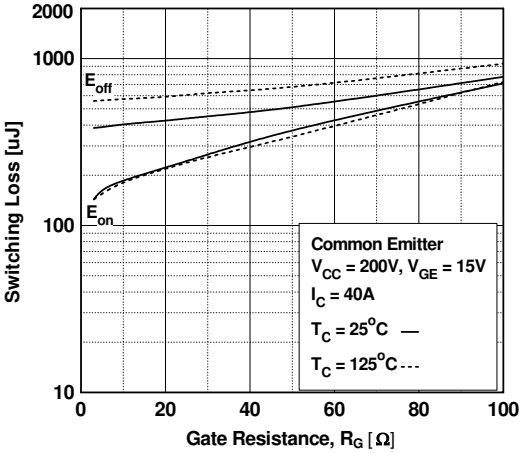


Figure 16. Switching Loss vs. Collector Current

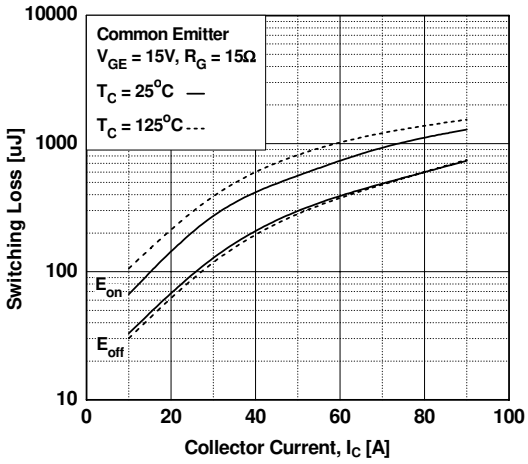
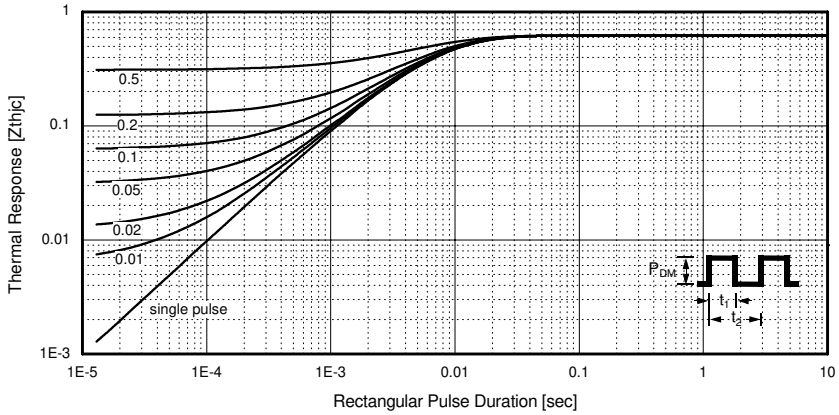


Figure 17. Transient Thermal Impedance of IGBT



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

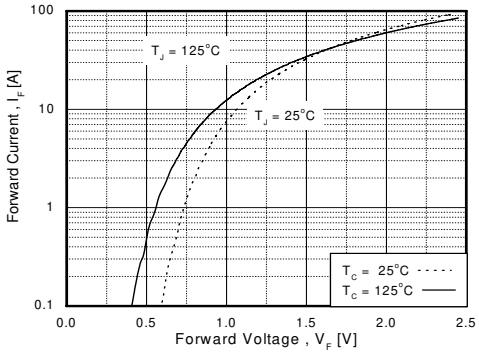


Figure 19. Typical Reverse Recovery Current

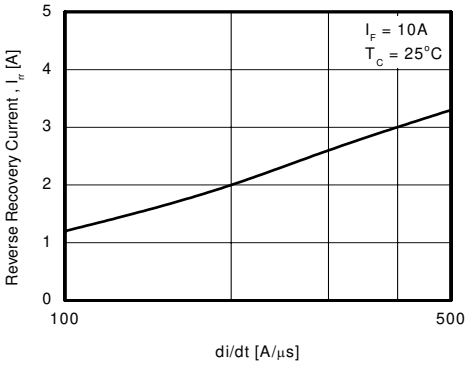
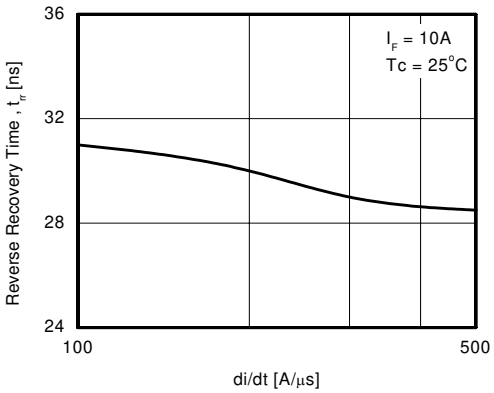
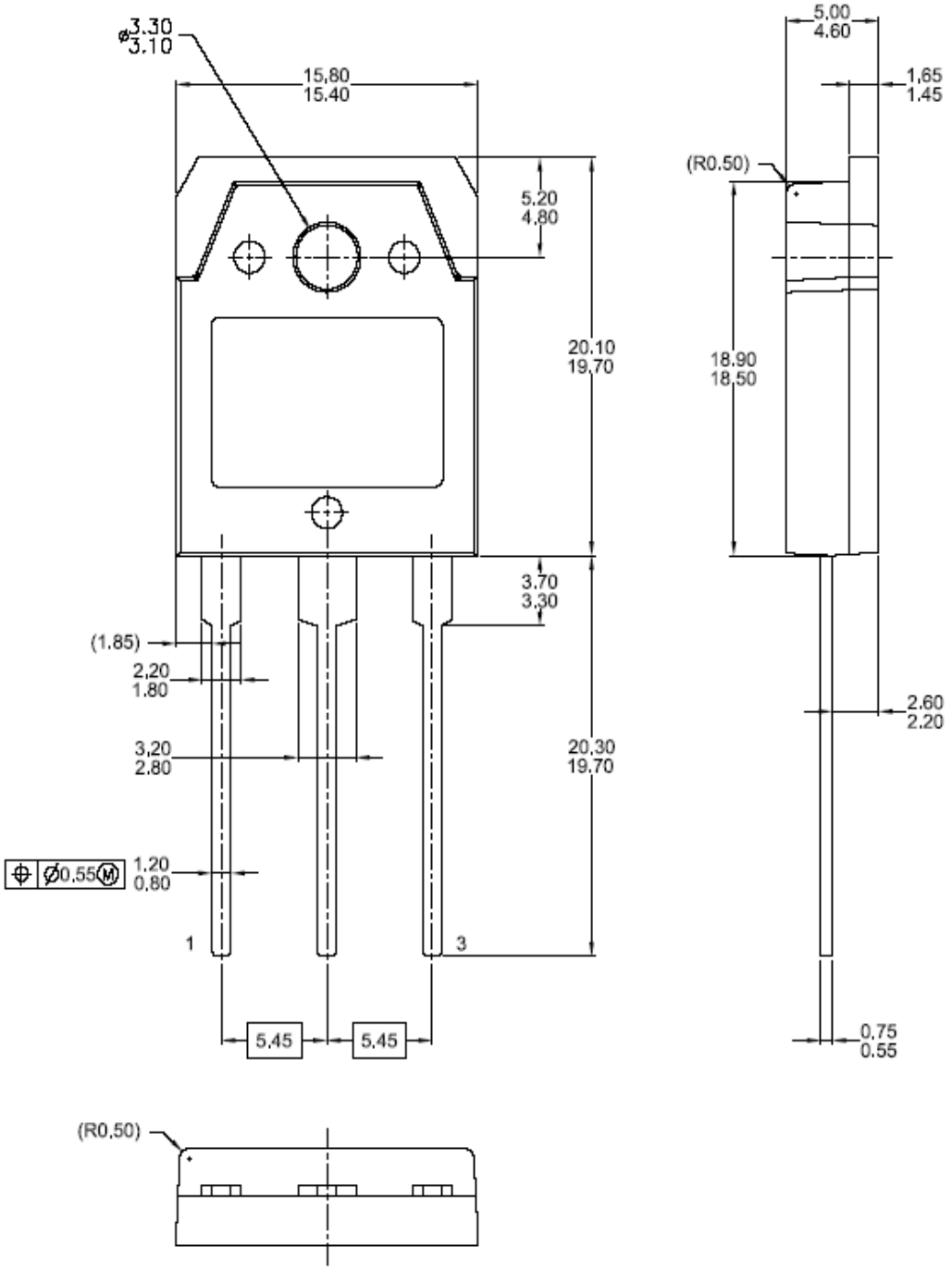


Figure 20. Typical Reverse Recovery Time



TO-3PN


ø3.30
3.10
15.80
15.40
5.20
4.80
20.10
19.70
3.70
3.30
(1.85)
2.20
1.80
3.20
2.80
20.30
19.70
Ø0.55 M
1.20
0.80
1
3
5.45
5.45
(R0.50)
5.00
4.60
1.65
1.45
(R0.50)
18.90
18.50
2.60
2.20
0.75
0.55
(R0.50)

FAIRCHILD
SEMICONDUCTOR®

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®	HiSeC™	PowerSaver™	TinyBoost™
Across the board. Around the world.™	*i-Lo*™	PowerTrench¬	TinyBuck™
ActiveArray™	ImpliedDisconnect™	Programmable Active Droop™	TinyLogic®
Bottomless™	IntelliMAX™	QFET®	TINYOPTO™
Build it Now™	ISOPLANAR™	QS™	TinyPower™
CoolFET™	MICROCOUPLER™	QT Optoelectronics™	TinyWire™
CROSSVOLT™	MicroPak™	Quiet Series™	TruTranslation™
CTL™	MICROWIRE™	RapidConfigure™	µSerDes™
Current Transfer Logic™	Motion-SPM™	RapidConnect™	UHC®
DOME™	MSX™	ScalarPump™	UniFET™
E^2CMOS™	MSXPro™	SMART START™	VCX™
EcoSPARK®	OCX™	SPM®	Wire™
EnSigna™	OCXPro™	STEALTH™	
FACT Quiet Series™	OPTOLOGIC®	SuperFET™	
FACT®	OPTOPLANAR®	SuperSOT™-3	
FAST®	PACMAN™	SuperSOT™-6	
FASTr™	PDP-SPM™	SuperSOT™-8	
FPS™	POP™	SyncFET™	
FRFET®	Power220®	TCM™	
GlobalOptoisolator™	Power247®	The Power Franchise®	
GTO,	PowerEdge,	™	

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; 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	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice 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. I25