

FAIRCHILD
SEMICONDUCTOR®

December 2007

FGA70N30T 300V, 70A PDP IGBT

Features

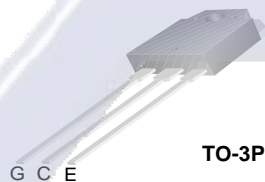
- High current capability
- Low saturation voltage: $V_{CE(sat)} = 1.5V @ I_C = 40A$
- High input impedance
- Fast switching
- RoHS compliant

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.



Absolute Maximum Ratings

Symbol	Description	Ratings	Units
V_{CES}	Collector-Emitter Voltage	300	V
V_{GES}	Gate-Emitter Voltage	± 30	V
$I_C \text{ pulse}(1)^*$	Pulsed Collector Current @ $T_C = 25^\circ\text{C}$	160	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	201	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	90.6	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	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.62	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C}/\text{W}$

Notes:

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

* $I_C \text{ pulse}$ limited by max T_J

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA70N30T	FGA70N30TTU	TO-3P	Tube	30ea	-

Electrical Characteristics 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	300	--	--	V
ΔB _{VCES} /ΔT _J	Temperature Coefficient of Breakdown Voltage	V _{GE} = 0V, I _C = 250uA	--	0.2	--	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	--	--	± 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°C	--	1.8	--	V
		I _C = 70A, V _{GE} = 15V T _C = 125°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°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°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

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

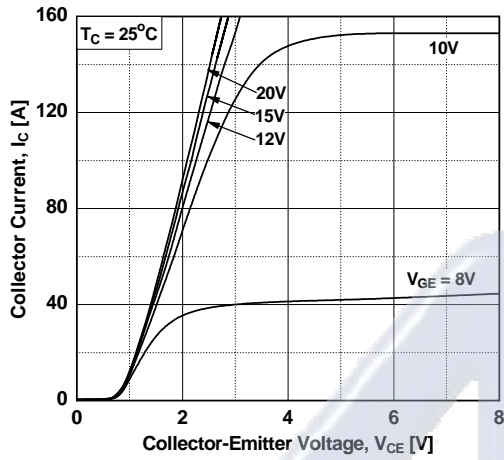


Figure 2. Typical Output Characteristics

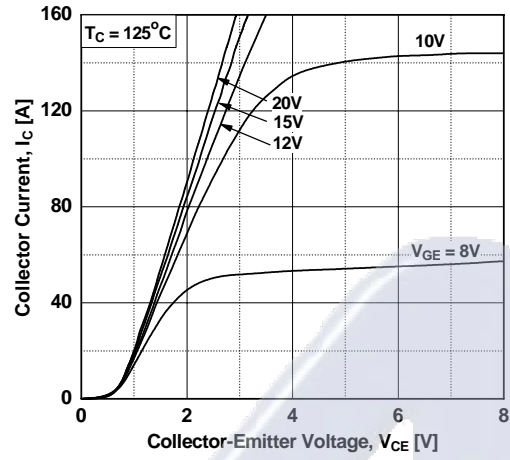


Figure 3. Typical Saturation Voltage Characteristics

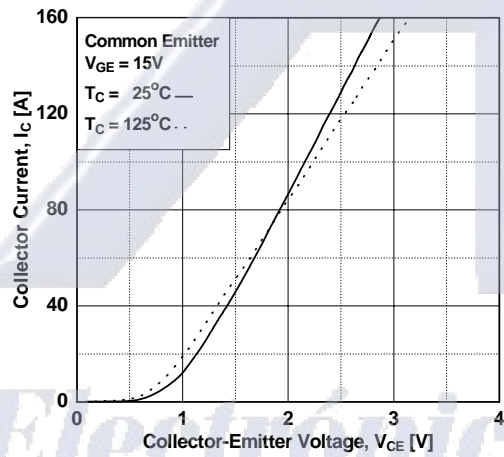


Figure 4. Transfer Characteristics

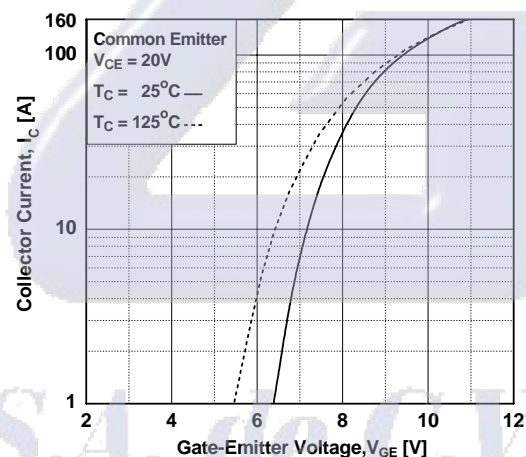


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

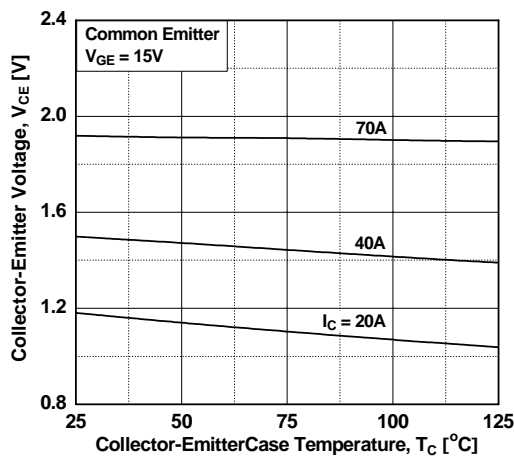
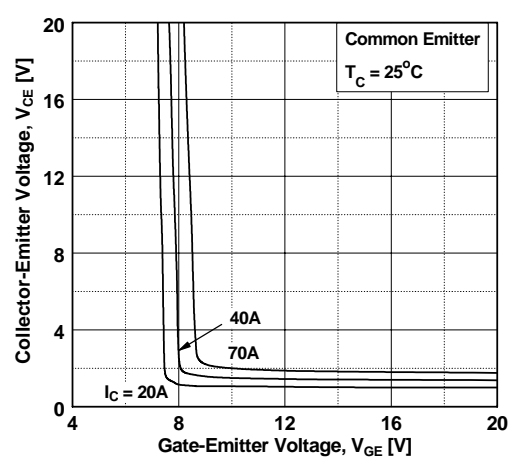


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

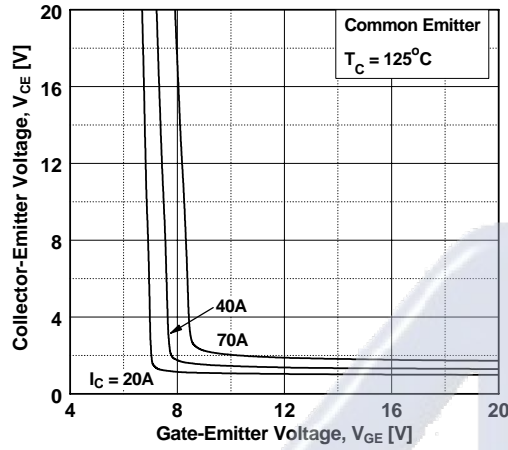


Figure 8. Capacitance Characteristics

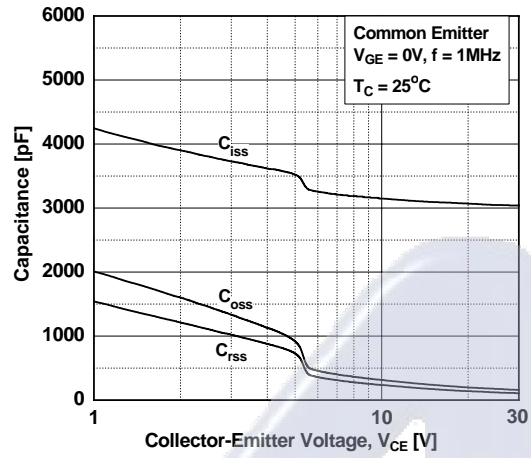


Figure 9. Gate Charge Characteristics

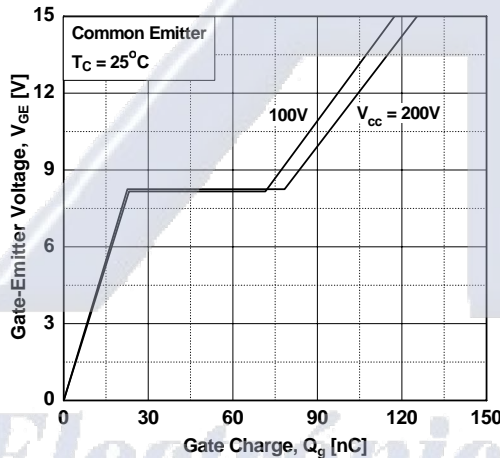


Figure 10. SOA Characteristics

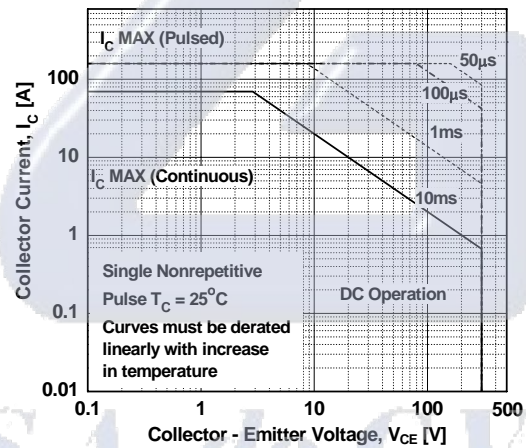


Figure 11. Turn-on Characteristics vs. Gate Resistance

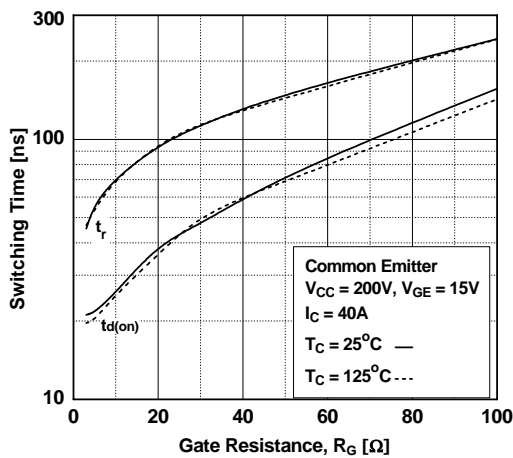
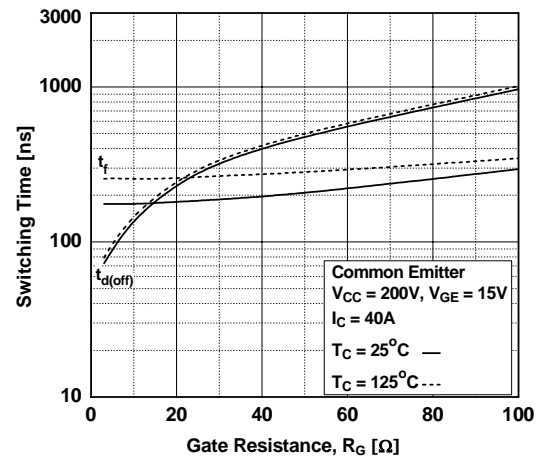


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-on Characteristics vs. Collector Current

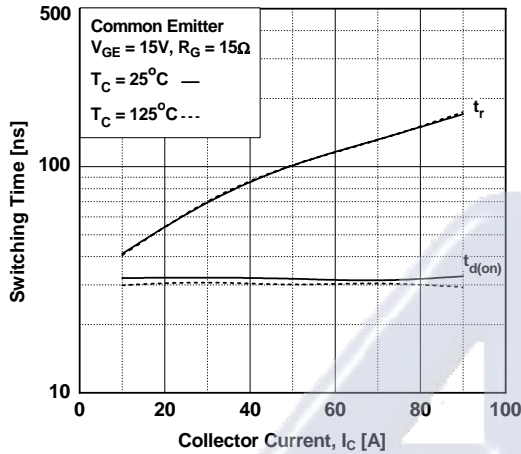


Figure 14. Turn-off Characteristics vs. Collector Current

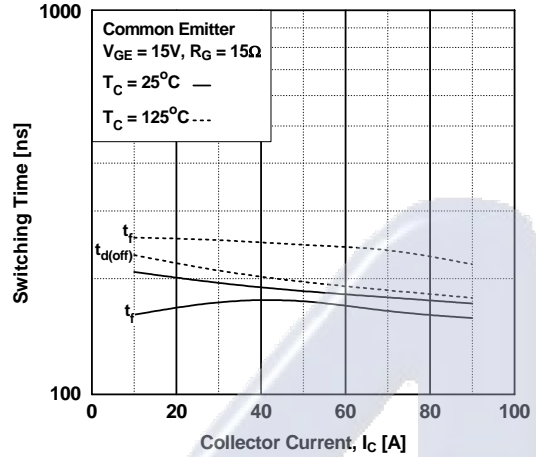


Figure 15. Switching Loss vs. Gate Resistance

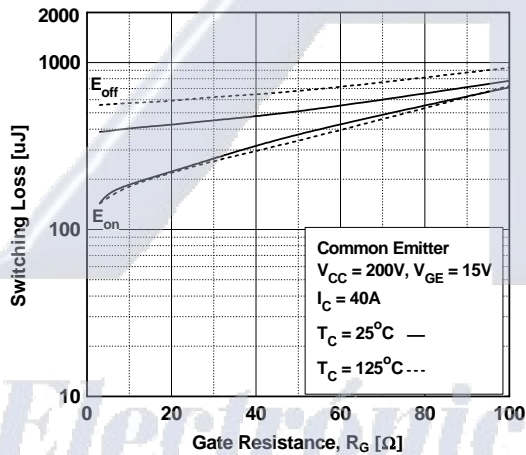


Figure 16. Switching Loss vs. Collector Current

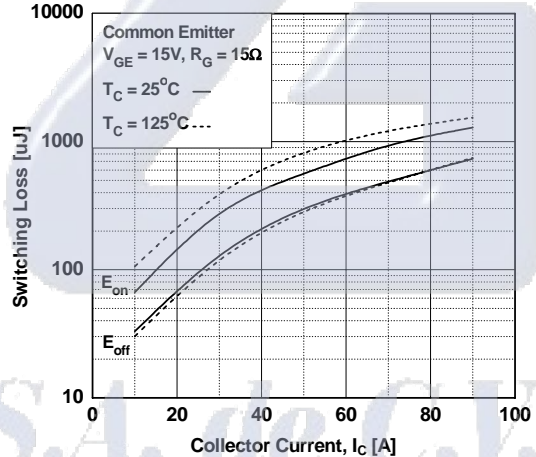
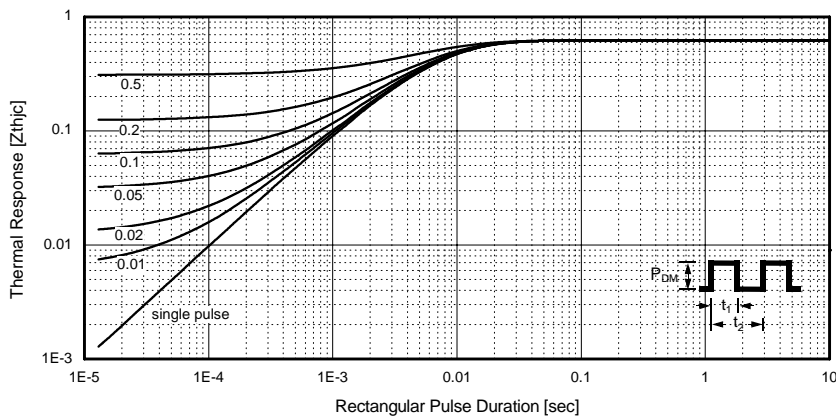
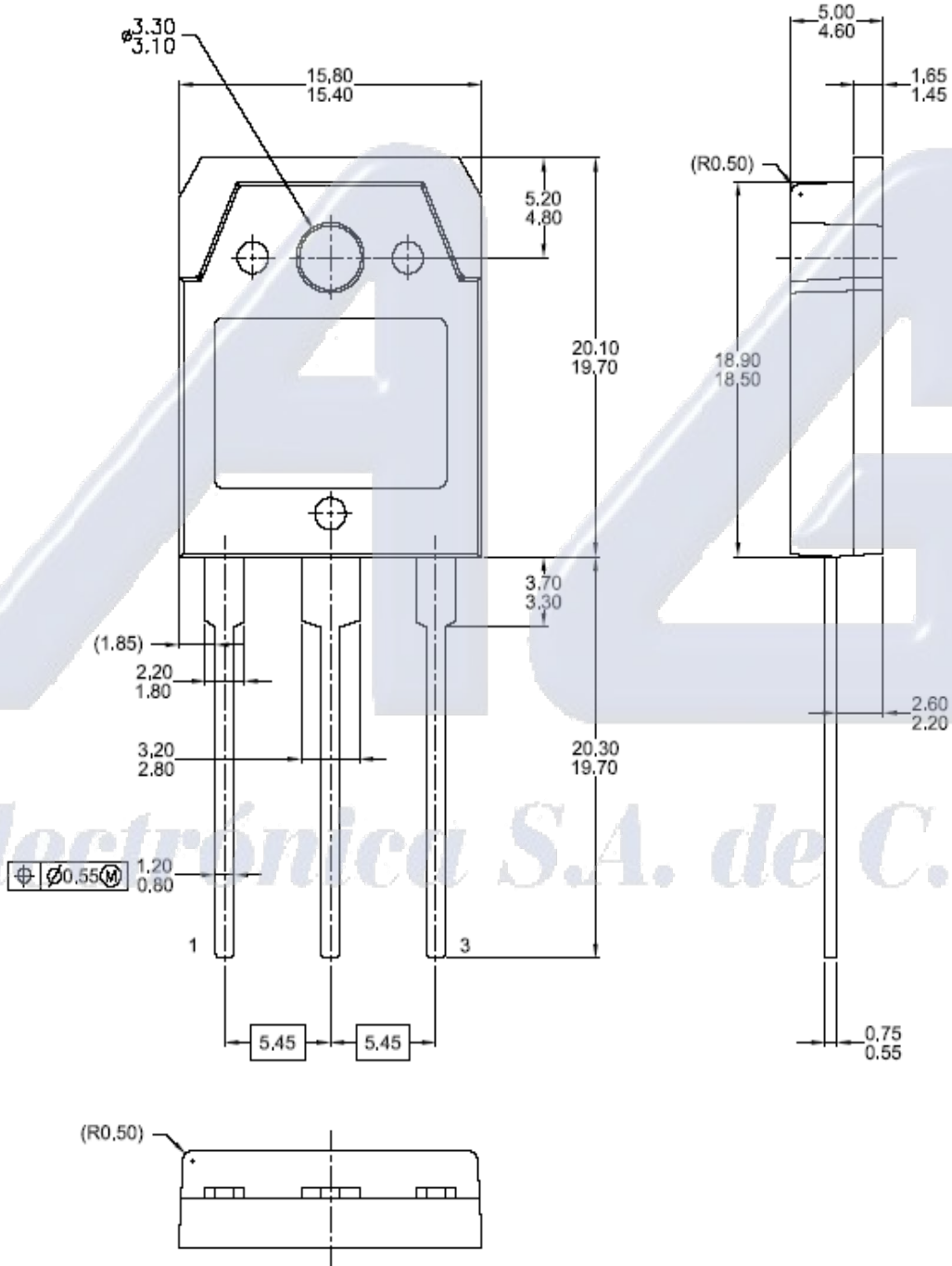


Figure 17. Transient Thermal Impedance of IGBT



TO-3PN



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