



October 2006

# FGPF70N30

## 300V, 70A PDP IGBT

### Features

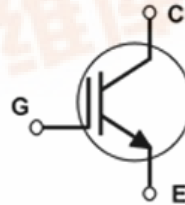
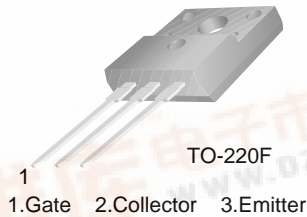
- High Current Capability
- Low saturation voltage:  $V_{CE(sat)} = 1.4V @ I_C = 40A$
- High Input Impedance
- Fast switching
- RoHS Complaint

### General Description

Employing Unified IGBT Technology, Fairchild's PDP IGBTs provides low conduction and switching loss. FGPF70N30 offers the optimum solution for PDP applications where low-conduction loss is essential.

### Application

- PDP System



### Absolute Maximum Ratings

Symbol	Description	FGPF70N30	Units
$V_{CES}$	Collector-Emitter Voltage	300	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 30$	V
$I_C \text{ pulse}(1)$	Pulsed Collector Current @ $T_C = 25^\circ C$	160	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ C$	52	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	20.8	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	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction-to-Case	--	2.4	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	$^\circ C/W$

**Notes:**

(1) Repetitive test, pulse width = 100usec, Duty = 0.1

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



### Package Marking and Ordering Information

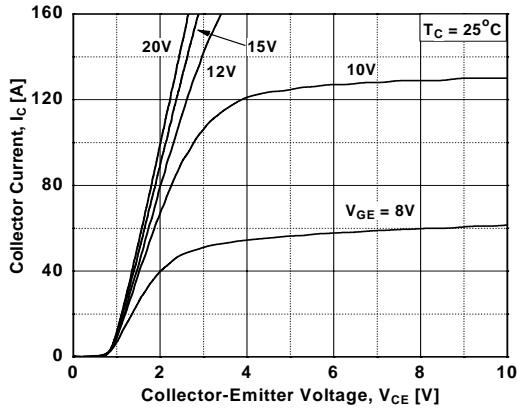
Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGPF70N30	FGPF70N30TU	TO-220F	Rail / Tube	50ea	-

### Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

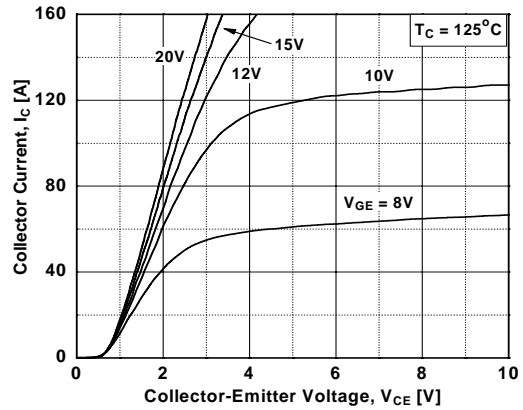
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
BV <sub>CES</sub>	Collector-Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 250uA	300	--	--	V
ΔBV <sub>CES</sub> /ΔT <sub>J</sub>	Temperature Coefficient of Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 250uA	--	0.6	--	V/°C
I <sub>CES</sub>	Collector Cut-Off Current	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	--	--	100	uA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	--	--	± 250	nA
<b>On Characteristics</b>						
V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 250uA, V <sub>CE</sub> = V <sub>GE</sub>	2.5	4.0	5	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 20A, V <sub>GE</sub> = 15V	--	1.2	1.5	V
		I <sub>C</sub> = 40A, V <sub>GE</sub> = 15V	--	1.4	--	V
		I <sub>C</sub> = 70A, V <sub>GE</sub> = 15V T <sub>C</sub> = 25°C	--	1.8	--	V
		I <sub>C</sub> = 70A, V <sub>GE</sub> = 15V T <sub>C</sub> = 125°C	--	1.9	--	V
<b>Dynamic Characteristics</b>						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V f = 1MHz	--	1300	--	pF
C <sub>oes</sub>	Output Capacitance		--	180	--	pF
C <sub>res</sub>	Reverse Transfer Capacitance		--	60	--	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 40A R <sub>G</sub> = 15Ω, V <sub>GE</sub> = 15V Resistive Load, T <sub>C</sub> = 25°C	--	17	--	ns
t <sub>r</sub>	Rise Time		--	83	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	103	--	ns
t <sub>f</sub>	Fall Time		--	160	300	ns
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 40A R <sub>G</sub> = 15Ω, V <sub>GE</sub> = 15V Resistive Load, T <sub>C</sub> = 125°C	--	18	--	ns
t <sub>r</sub>	Rise Time		--	83	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	104	--	ns
t <sub>f</sub>	Fall Time		--	250	--	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 200V, I <sub>C</sub> = 40A V <sub>GE</sub> = 15V	--	71	--	nC
Q <sub>ge</sub>	Gate-Emitter Charge		--	10	--	nC
Q <sub>gc</sub>	Gate-Collector Charge		--	34	--	nC

**Typical Performance Characteristics Typical Saturation Voltage Characteristics**

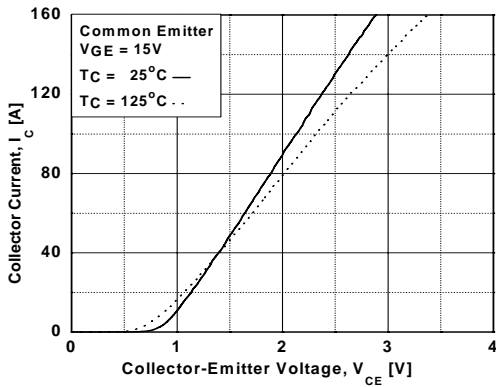
**Figure 1. Typical Output Characteristics**



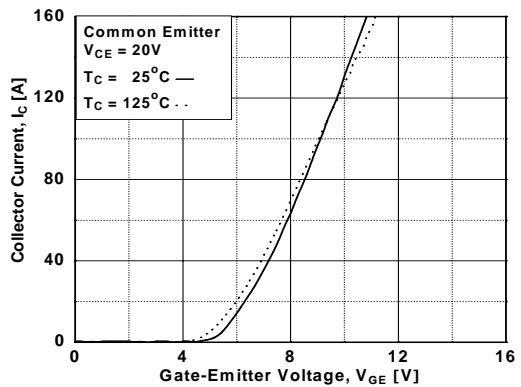
**Figure 2. Typical Output Characteristics**



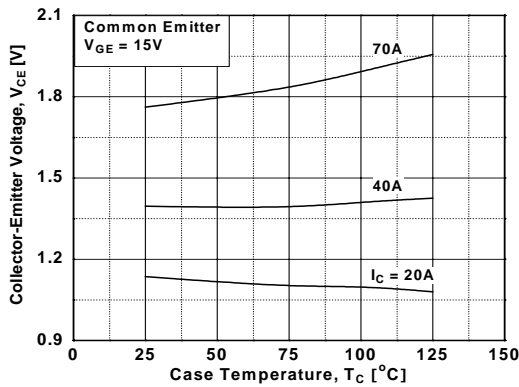
**Figure 3. Typical Saturation Voltage Characteristics**



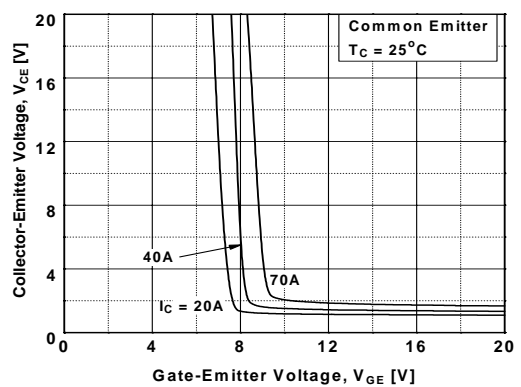
**Figure 4. Transfer Characteristics**



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

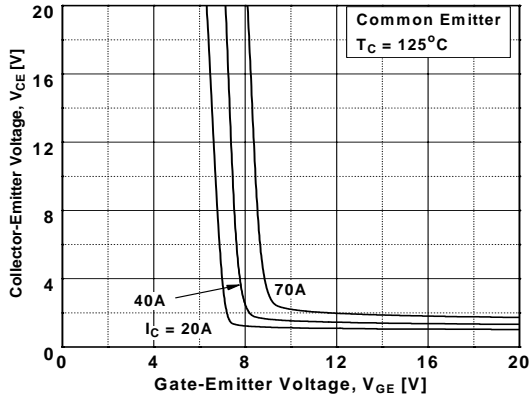


**Figure 6. Saturation Voltage vs.  $V_{GE}$**

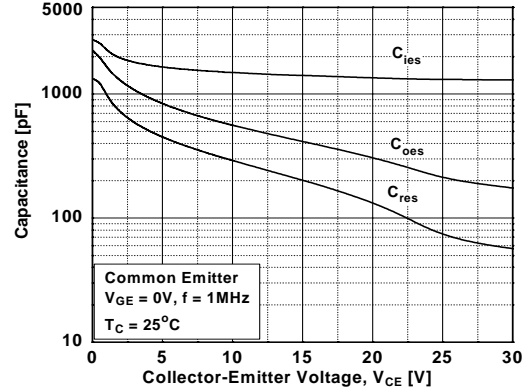


**Typical Performance Characteristics** (Continued)

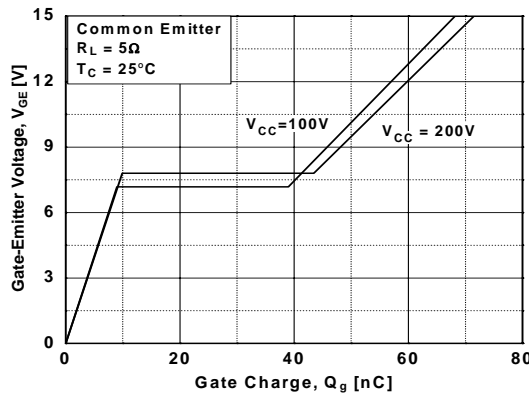
**Figure 7. Saturation Voltage vs.  $V_{GE}$**



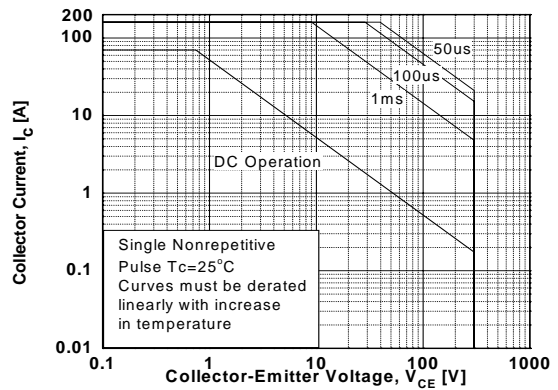
**Figure 8. Capacitance Characteristics**



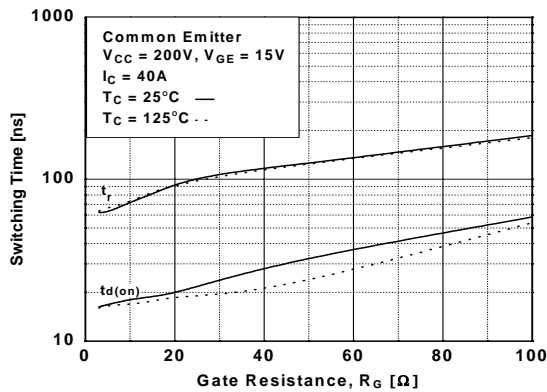
**Figure 9. Gate Charge Characteristics**



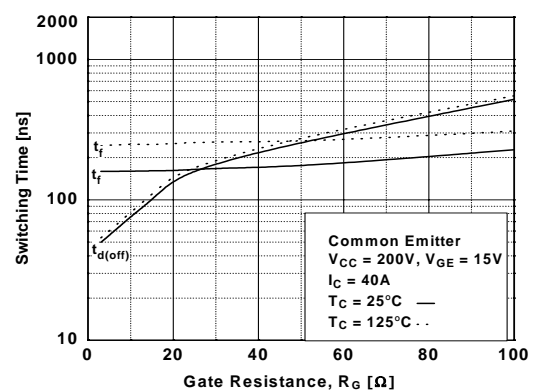
**Figure 10. SOA Characteristics**



**Figure 11. Turn-On Characteristics vs. Gate Resistance**

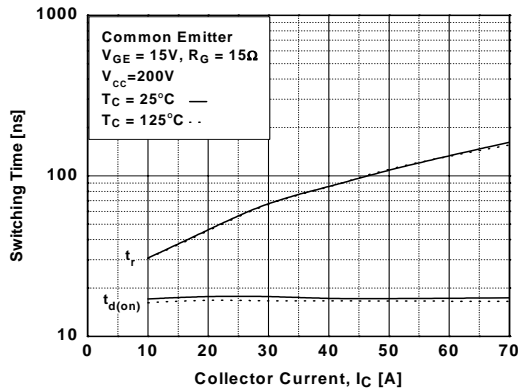


**Figure 12. Turn Off Characteristics vs. Gate Resistance**

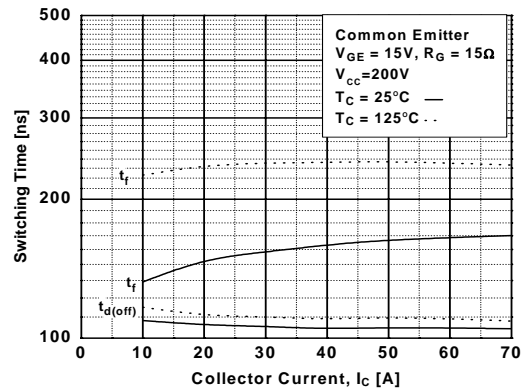


**Typical Performance Characteristics** (Continued)

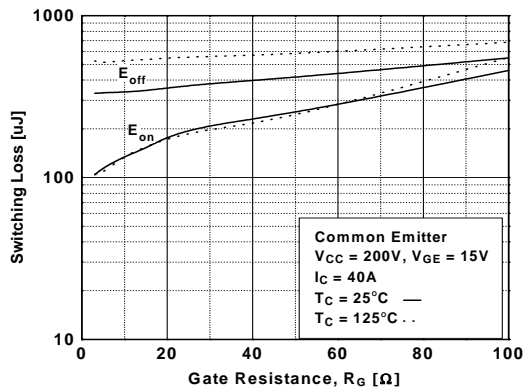
**Figure 13. Turn-On Characteristics vs. Collector Current**



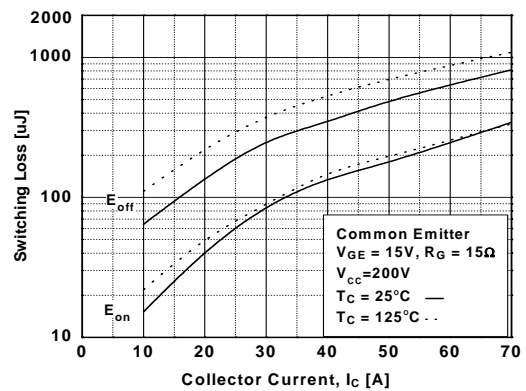
**Figure 14. Turn-Off Characteristics vs. Collector Current**



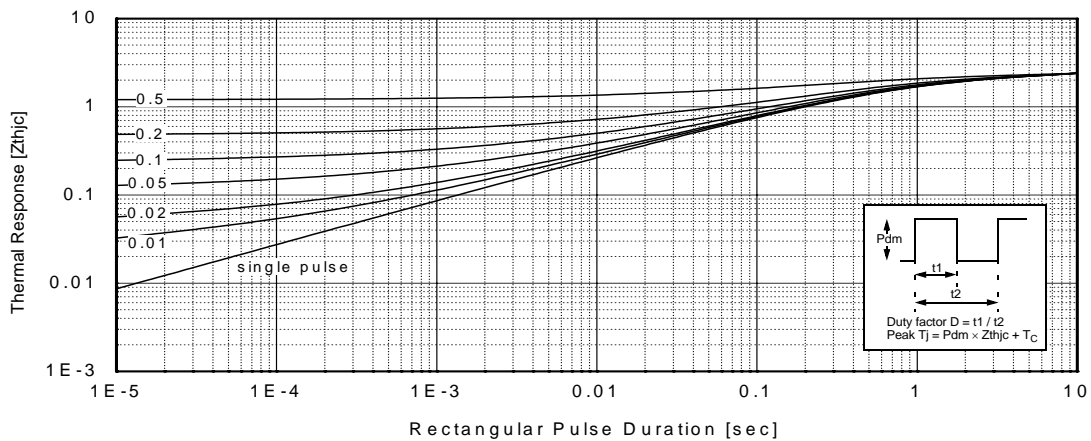
**Figure 15. Switching Loss vs Gate Resistance**



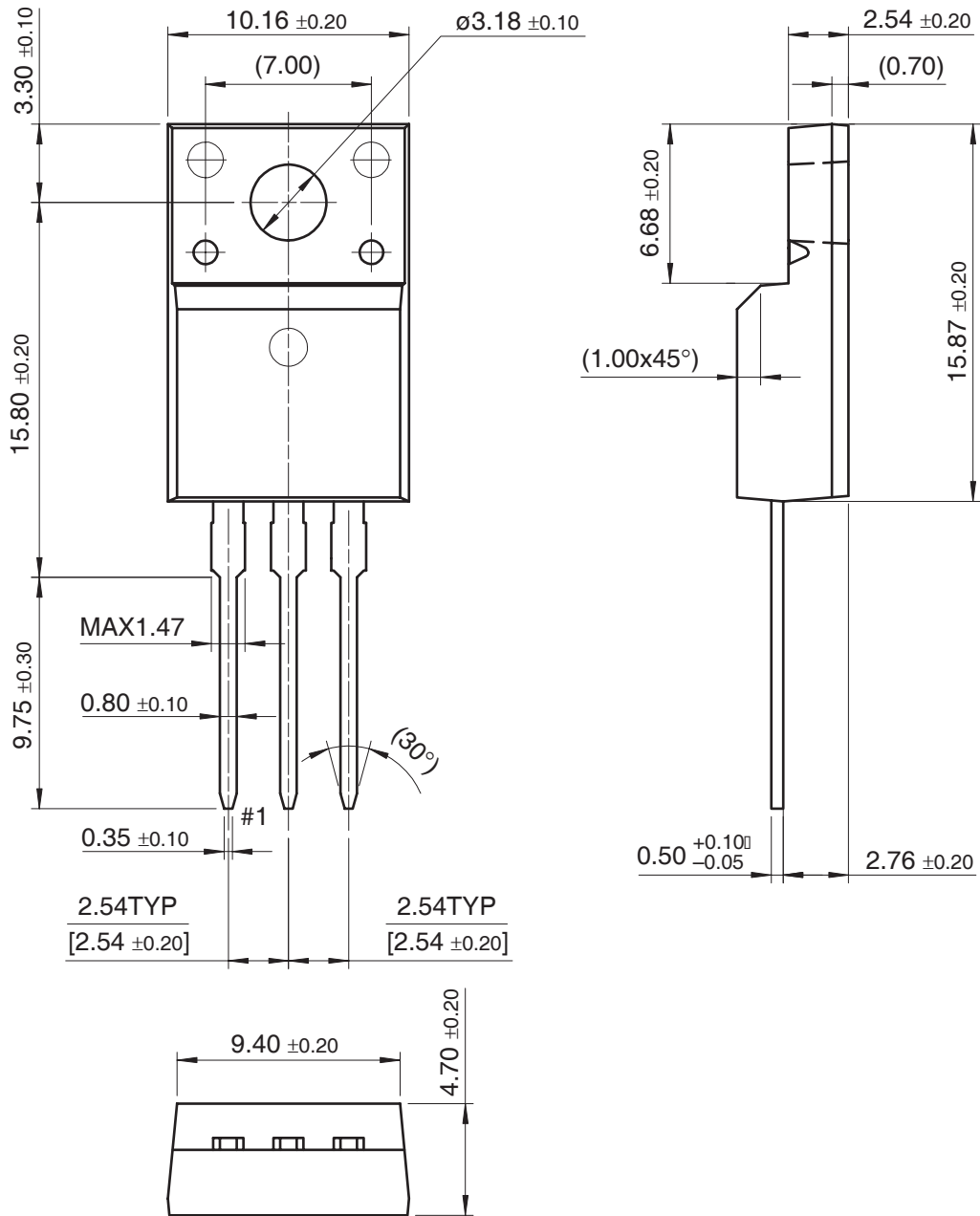
**Figure 16. Switching Loss VS Collector Current**



**Figure 17. Transient Thermal Impedance of IGBT**



# TO-220F



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