



September 2006

# FGA90N30

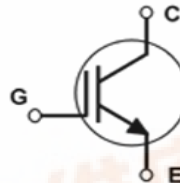
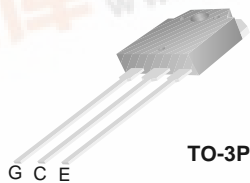
## 300V PDP IGBT

### Features

- High Current Capability
- Low saturation voltage:  $V_{CE(sat)}$ , Typ = 1.1V @  $I_C = 20A$
- High Input Impedance

### Description

Employing Unified IGBT Technology, FGA90N30 provides low conduction and switching loss. FGA90N30 offers the optimum solution for PDP applications where low conduction loss is essential.



### Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Description	FGA90N30	Units
$V_{CES}$	Collector-Emitter Voltage	300	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 30$	V
$I_C$	Collector Current @ $T_C = 25^\circ C$	90	A
$I_{CM}$	Pulsed Collector Current (Note 1) @ $T_C = 25^\circ C$	220	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ C$	219	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	87	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	$^\circ C$

**Notes:**

(1) Repetitive test, pulse width = 100usec, Duty = 0.5

\*  $I_{c\_pulse}$  limited by max  $T_j$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction-to-Case for IGBT	--	0.57	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ C/W$



### Package Marking and Ordering Information

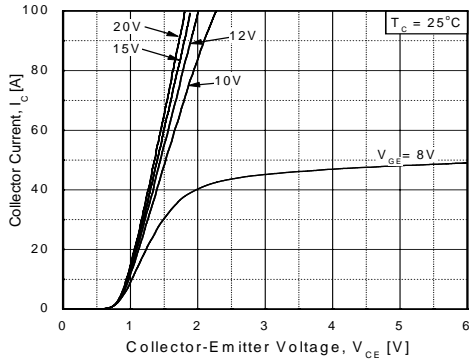
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA90N30	FGA90N30	TO-3P	--	--	30

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

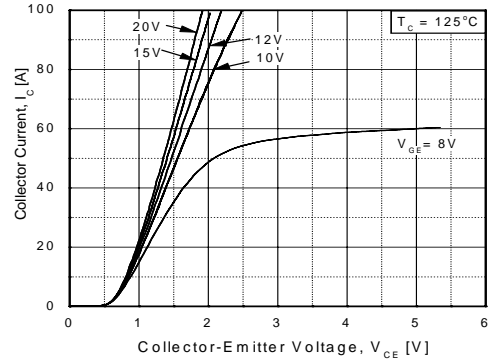
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
BV <sub>CES</sub>	Collector-Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 250μA	300	--	--	V
ΔB <sub>V<sub>CES</sub></sub> /ΔT <sub>J</sub>	Temperature Coefficient of Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 250μA	--	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	μA
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> = 250μA, V <sub>CE</sub> = V <sub>GE</sub>	2.5	4.0	5.0	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 20A, V <sub>GE</sub> = 15V	--	1.1	1.4	V
		I <sub>C</sub> = 90A, V <sub>GE</sub> = 15V	--	1.9	--	V
		I <sub>C</sub> = 90A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 125°C	--	2.0	--	V
<b>Dynamic Characteristics</b>						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V, f = 1MHz	--	1700	-	pF
C <sub>oes</sub>	Output Capacitance		--	290	-	pF
C <sub>res</sub>	Reverse Transfer Capacitance		--	80	-	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 20A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Resistive Load, T <sub>C</sub> = 25°C	--	30	--	ns
t <sub>r</sub>	Rise Time		--	200	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	110	--	ns
t <sub>f</sub>	Fall Time		--	140	300	ns
E <sub>on</sub>	Turn-On Switching Loss		--	0.15	--	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	0.45	--	mJ
E <sub>ts</sub>	Total Switching Loss	--	0.6	--	mJ	
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 200V, I <sub>C</sub> = 20A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Resistive Load, T <sub>C</sub> = 125°C	--	30	--	ns
t <sub>r</sub>	Rise Time		--	210	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	110	--	ns
t <sub>f</sub>	Fall Time		--	200	--	ns
E <sub>on</sub>	Turn-On Switching Loss		--	0.16	--	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	0.72	--	mJ
E <sub>ts</sub>	Total Switching Loss	--	0.88	--	mJ	
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 200V, I <sub>C</sub> = 20A, V <sub>GE</sub> = 15V	--	87	130	nC
Q <sub>ge</sub>	Gate-Emitter Charge		--	12	18	nC
Q <sub>gc</sub>	Gate-Collector Charge		--	38	57	nC

## Typical Performance Characteristics

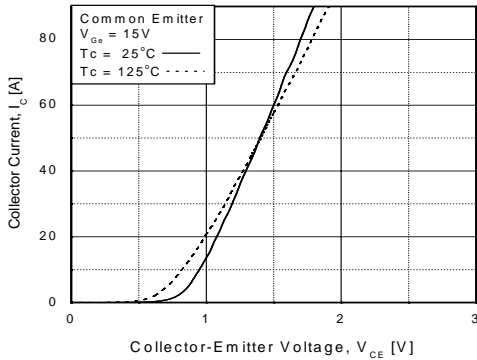
**Figure 1. Typical Output Characteristics**



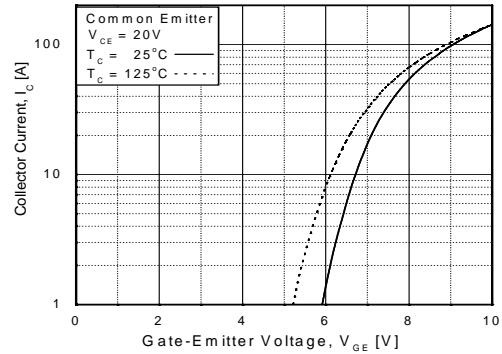
**Figure 2. Typical Output Characteristics**



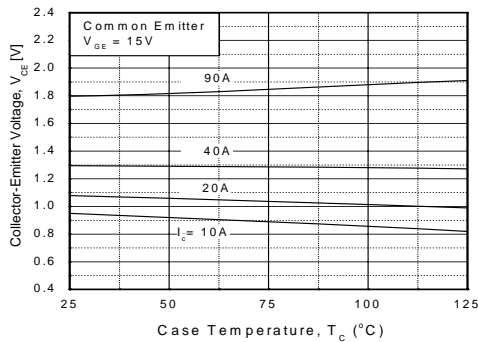
**Figure 3. Typical Saturation Voltage Characteristics**



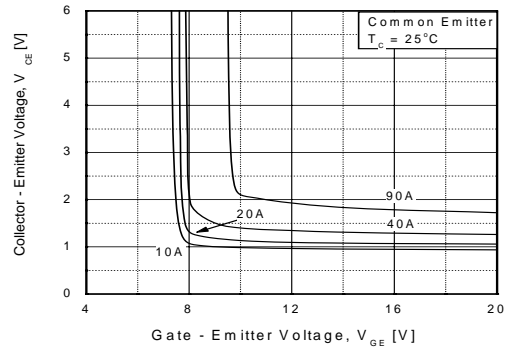
**Figure 4. Transfer characteristics**



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

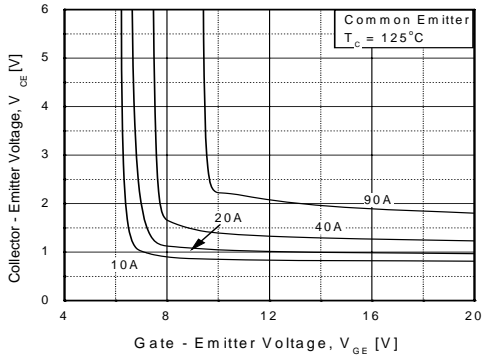


**Figure 6. Saturation Voltage vs. Vge**

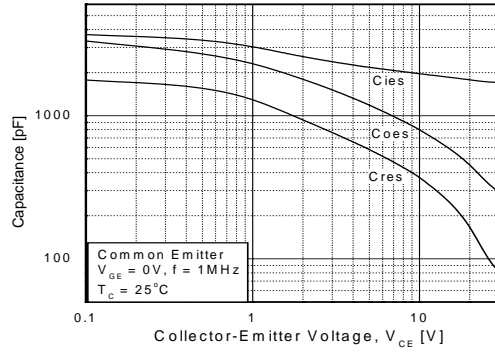


**Typical Performance Characteristics (Continued)**

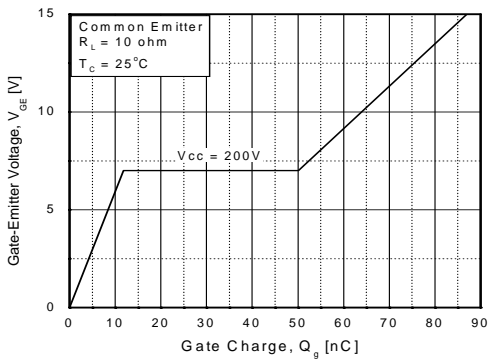
**Figure 7. Saturation Voltage vs.  $V_{GE}$**



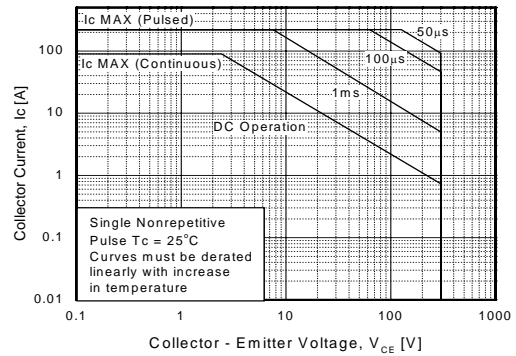
**Figure 8. Capacitance Characteristics**



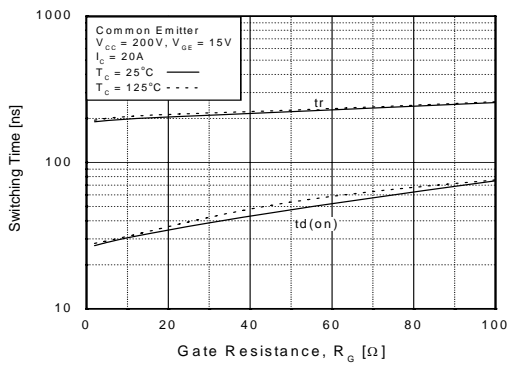
**Figure 9. Gate Charge Characteristics**



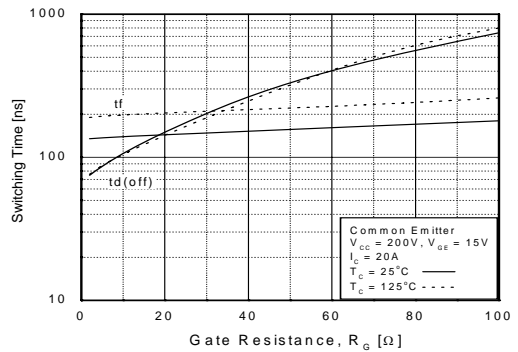
**Figure 10. SOA Characteristics**



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

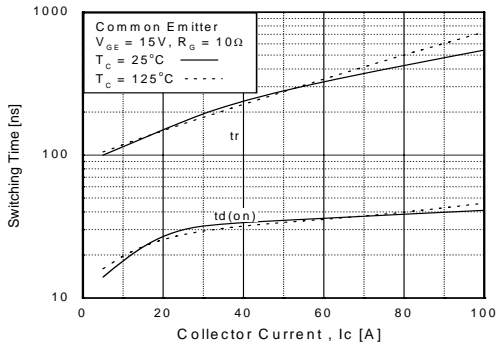


**Figure 12. Turn-Off Characteristics vs. Gate Resistance**

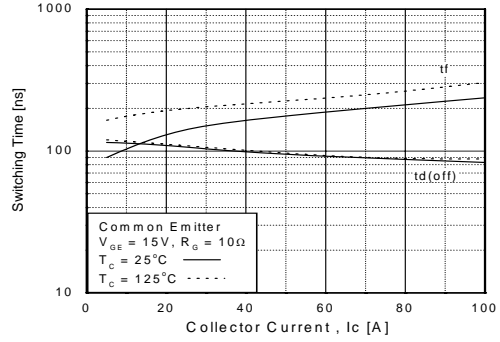


**Typical Performance Characteristics** (Continued)

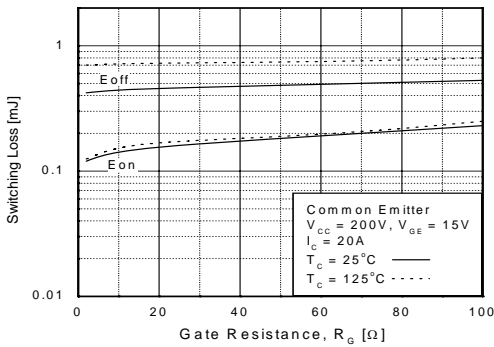
**Figure 13. Turn-On Characteristics vs. Collector Current**



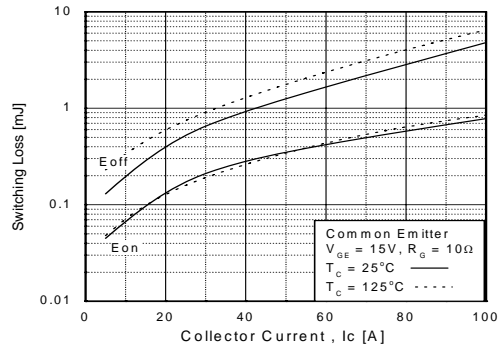
**Figure 14. Turn-Off Characteristics vs. Collector Current**



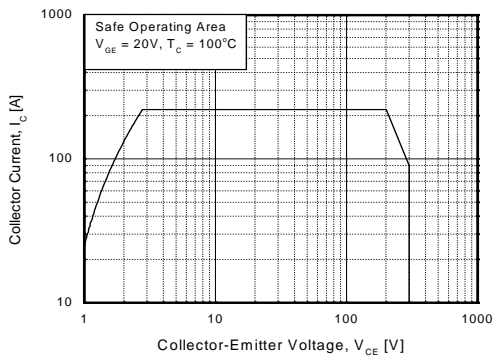
**Figure 15. Switching Loss vs. Gate Resistance**



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

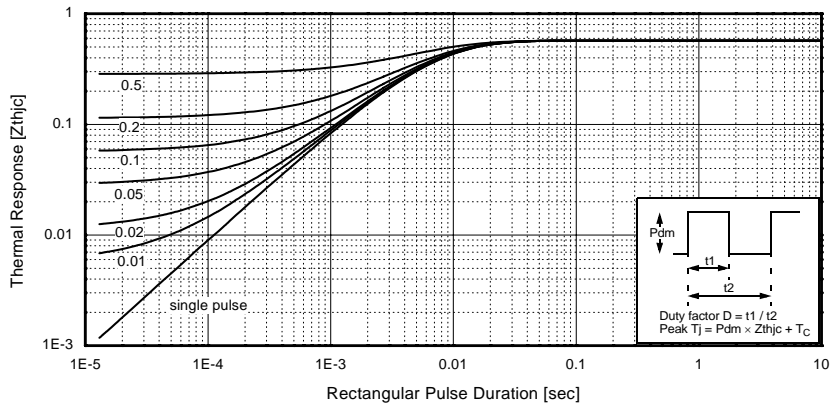


**Figure 17. Turn-Off SOA Figure**



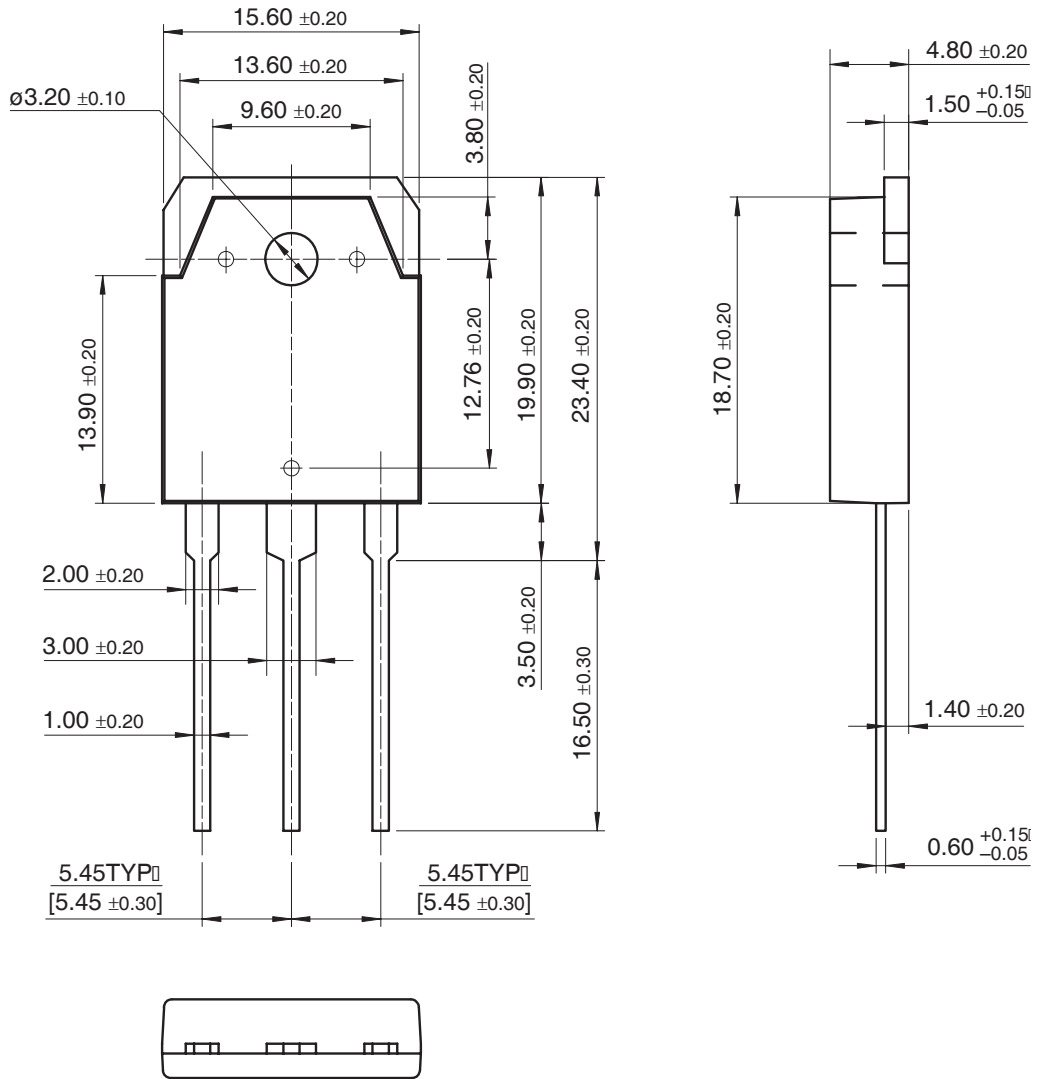
Typical Performance Characteristics (Continued)

Figure 18. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3P



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