FAIRCHILD SEMICONDUCTOR®

September 2006

FGA90N30D

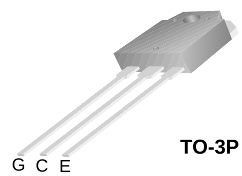
300V PDP IGBT

Features

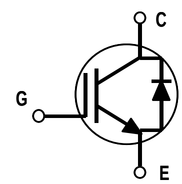
- High Current Capability
- Low saturation voltage: $V_{CE(sat)}$, Typ = 1.1V@ I_C = 20A
- High Input Impedance

Description

Employing Unified IGBT Technology, FGA90N30D provides low conduction and switching loss. FGA90N30D offers the optimum solution for PDP applications where low condution loss is essential.



TO-3P



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Description		FGA90N30D	Units
V_{CES}	Collector-Emitter Voltage		300	V
V_{GES}	Gate-Emitter Voltage		± 30	V
I_C	Collector Current	@ T_C = 25°C	90	A
I_{CM}	Pulsed Collector Current (Note 1)	@ T_C = 25°C	220	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	219	W
	Maximum Power Dissipation	@ T_C = 100°C	87	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 test , pulse width = 100usec , Duty = 0.5

* Ic_pulse limited by max Tj

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction-to-Case for IGBT	--	0.57	°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

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA90N30D	FGA90N30D	TO-3P	--	--	30

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 = 250μA	300	--	--	V
$\Delta B_{VCES}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0V, I_C = 250μA	--	0.6	--	V/°C
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}$, V_{GE} = 0V	--	--	100	μA
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, $V_{CE} = V_{GE}$	2.5	4.0	5.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 20A, V_{GE} = 15V	--	1.1	1.4	V
		I_C = 90A, V_{GE} = 15V	--	1.9	--	V
		I_C = 90A, V_{GE} = 15V, T_C = 125°C	--	2.0	--	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz	--	1700	-	pF
C_{oes}	Output Capacitance		--	290	-	pF
C_{res}	Reverse Transfer Capacitance		--	80	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200V, I_C = 20A, R_G = 10Ω, V_{GE} = 15V, Resistive Load, T_C = 25°C	--	30	--	ns
t_r	Rise Time		--	200	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	110	--	ns
t_f	Fall Time		--	140	300	ns
E_{on}	Turn-On Switching Loss		--	0.15	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.45	--	mJ
E_{ts}	Total Switching Loss		--	0.6	--	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200V, I_C = 20A, R_G = 10Ω, V_{GE} = 15V, Resistive Load, T_C = 125°C	--	30	--	ns
t_r	Rise Time		--	210	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	110	--	ns
t_f	Fall Time		--	200	--	ns
E_{on}	Turn-On Switching Loss		--	0.16	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.72	--	mJ
E_{ts}	Total Switching Loss		--	0.88	--	mJ
Q_g	Total Gate Charge	V_{CE} = 200V, I_C = 20A, V_{GE} = 15V	--	87	130	nC
Q_{ge}	Gate-Emitter Charge		--	12	18	nC
Q_{gc}	Gate-Collector Charge		--	38	57	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	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

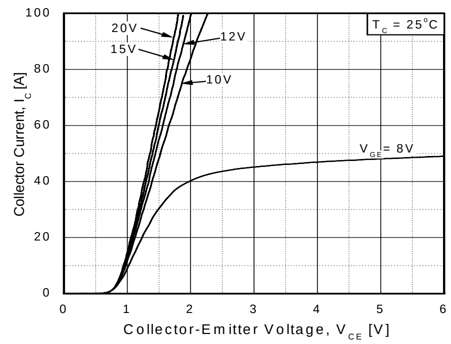


Figure 2. Typical Output Characteristics

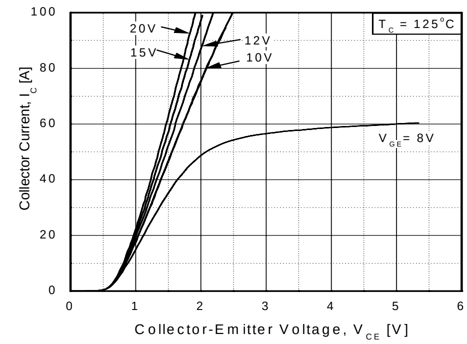


Figure3. Typical Saturation Voltage Characteristics

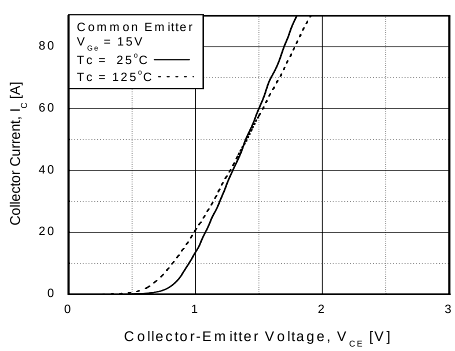


Figure 4. Transfer characteristics

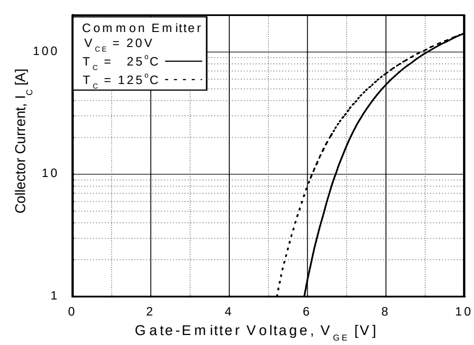


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

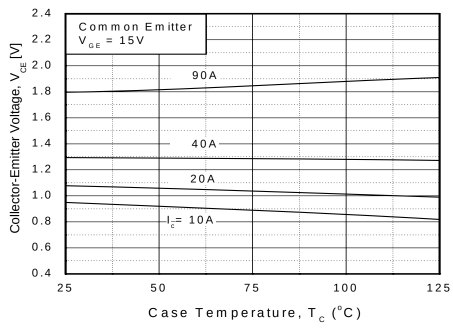
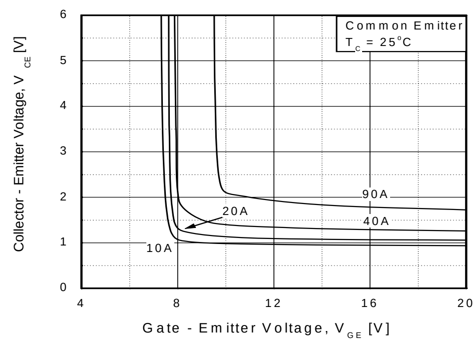


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

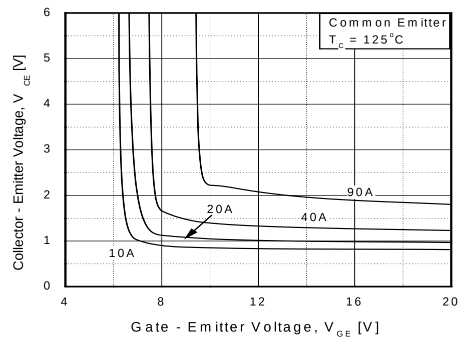


Figure 8. Capacitance Charaacteristics

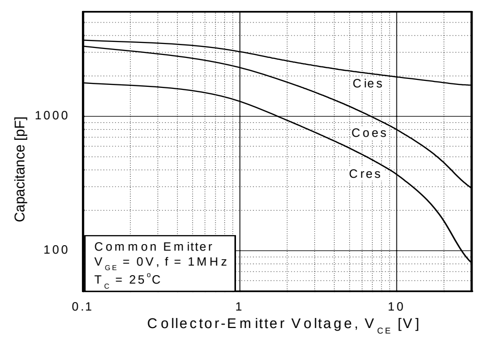


Figure 9. Gate Charge Characteristics

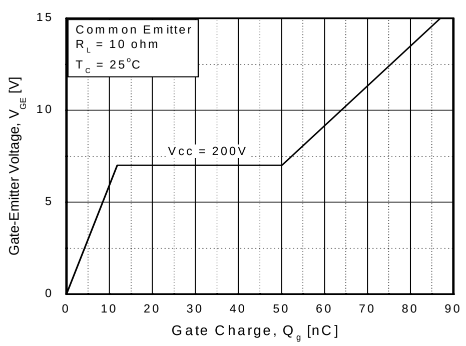


Figure 10. SOA Characteristics

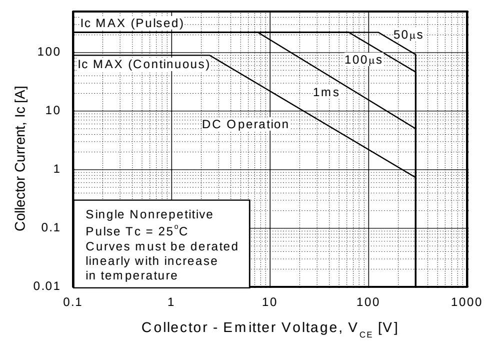


Figure 11. Turn-On Characteristics vs. Gate Resistance

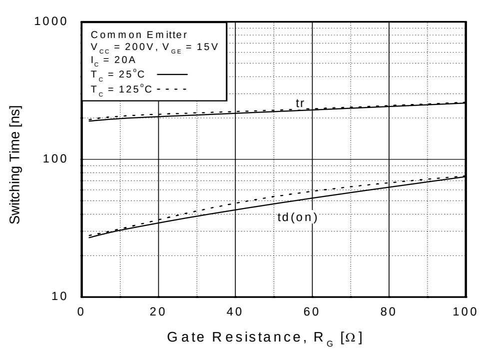
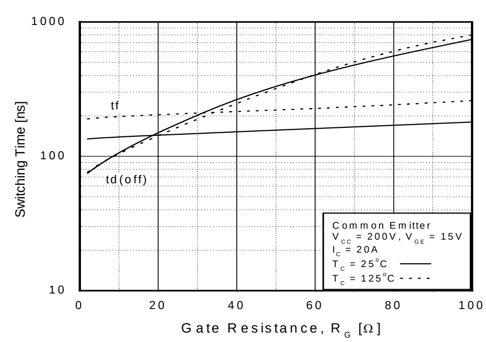


Figure12.Turn-OffCharacteristicsvs.Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-On Characteristics vs. Collector Current

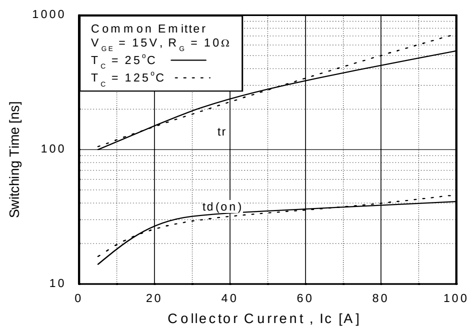


Figure 14. Turn-Off Characteristics vs. Collector Current

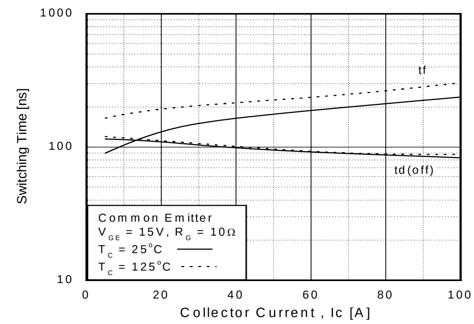


Figure 15. Switching Loss vs. Gate Resistance

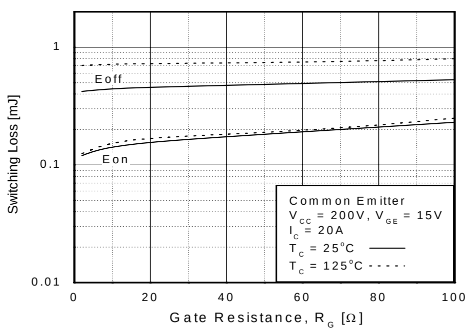


Figure 16. Switching Loss vs. Collector Current

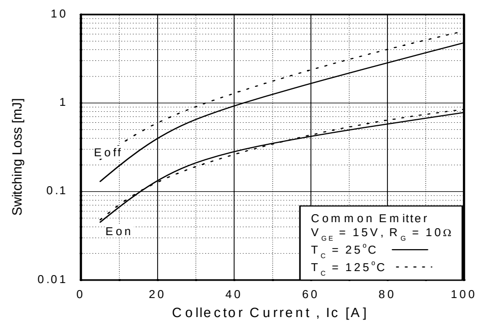
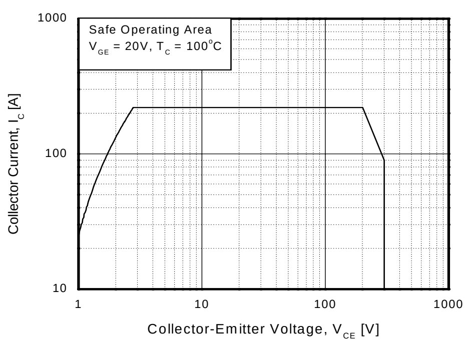


Figure 17. Turn-Off SOA Figure



Typical Performance Characteristics (Continued)

Figure 18. Transient Thermal Impedance of IGBT

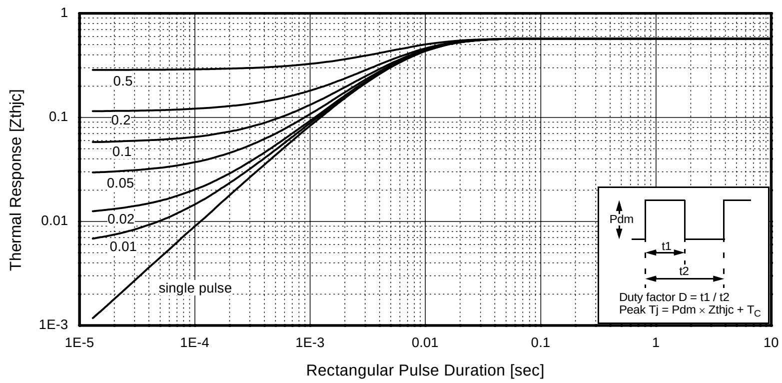


Figure 19. Forward Characteristics

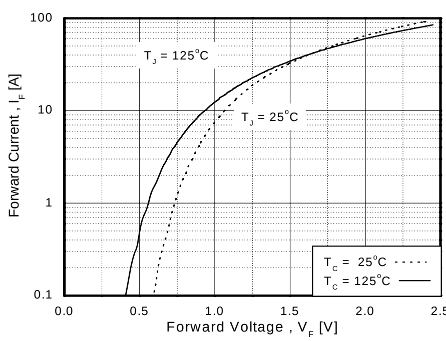


Figure 20. Typical Reverse Recovery Current

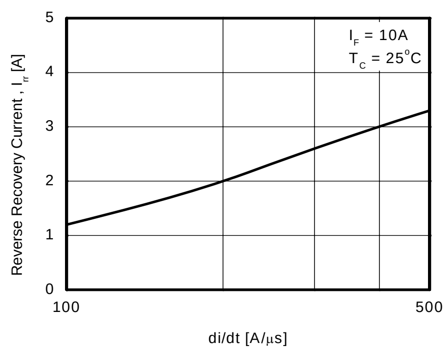
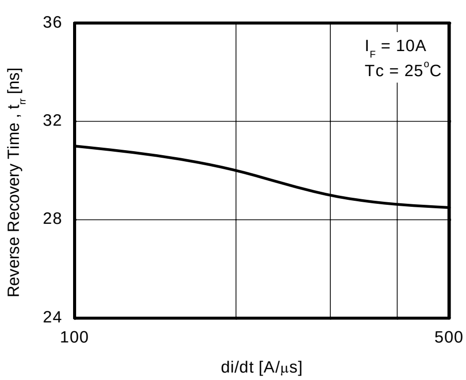
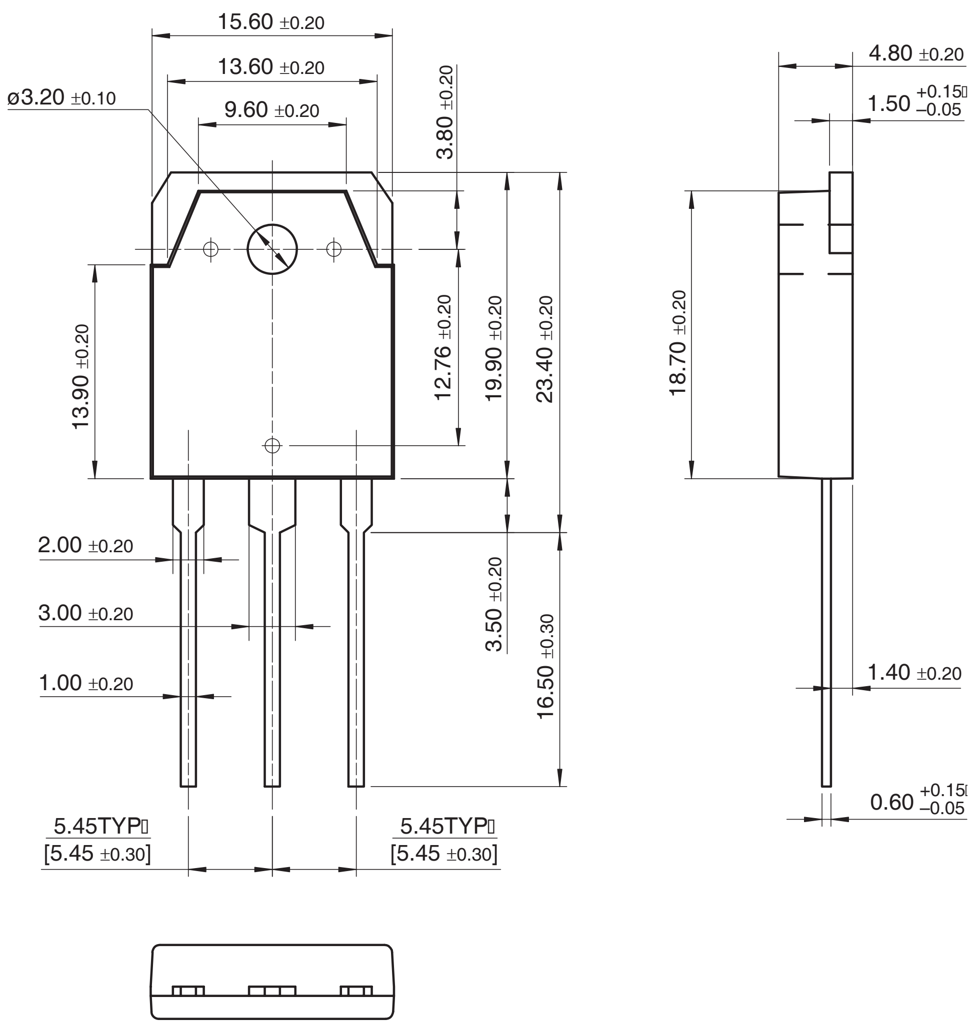


Figure 21. Typical Reverse Recovery Time



Mechanical Dimensions

TO-3P



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