

August 2011

FGA90N33ATD 330V, 90A PDP Trench IGBT

Features

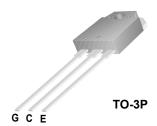
- · High current capability
- Low saturation voltage: $V_{CE(sat)} = 1.1V @ I_C = 20A$
- · High input impedance
- · Fast switching
- · RoHS compliant

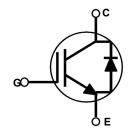
Applications

· 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 to Emitter Voltage		330	V	
V_{GES}	Gate to Emitter Voltage		± 30	V	
I _C	Collector Current	@ T _C = 25°C	90	Α	
I _{C pulse(1)}	Pulsed Collector Current	@ T _C = 25°C	220	Α	
I _{C pulse(2)}	Pulsed Collector Current	@ T _C = 25°C	330	Α	
P _D	Maximum Power Dissipation	@ T _C = 25°C	223	W	
	Maximum Power Dissipation	$@T_C = 100^{\circ}C$	89	W	
T _J	Operating Junction Temperature		-55 to +150	°C	
T _{stg}	Storage Temperature Range		-55 to +150	°C	
TL	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	°C	

Thermal Characteristics

Symbol	Parameter	Тур.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	0.56	°C/W
$R_{\theta JC}(Diode)$	ode) Thermal Resistance, Junction to Case		1.16	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40	°C/W

(1) Repetitive test , Pulse width=100usec , Duty=0.1 (2) Half sine wave , D<0.01, Pulse width<5usec *I_C pluse limited by max Tj

Package Marking and Ordering Information

			Packaging		Max Qty	
Device Marking	Device	Package	Type	Qty per Tube	per Box	
FGA90N33ATD	FGA90N33ATDTU	TO-3P	Tube	30ea	-	

Electrical Characteristics of the IGBT $T_C = 25$ °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
Off Charac	teristics					
BV _{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_{C} = 400\mu A$	330	-	-	V
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0V	-	-	400	μА
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	±400	nA
On Charac	teristics					
V _{GE(th)}	G-E Threshold Voltage	$I_{C} = 250 \mu A, V_{CE} = V_{GE}$	2.5	4.0	5.5	V
,		I _C = 20A, V _{GE} = 15V	-	1.1	1.4	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 45A, V _{GE} = 15V,	-	1.3	-	V
VCE(sat)	Concetter to Emiliar Cataration Voltage	I _C = 90A, V _{GE} = 15V,	-	1.6	-	V
		I _C = 90A, V _{GE} = 15V, T _C = 125°C	-	1.7	-	V
Dynamic C	haracteristics					
C _{ies}	Input Capacitance		-	2200	-	pF
C _{oes}	Output Capacitance	V _{CE} = 30V _, V _{GE} = 0V, f = 1MHz	-	135	-	pF
C _{res}	Reverse Transfer Capacitance	- 1 - 11VII 12	-	100	-	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time		-	23	-	ns
t _r	Rise Time	$V_{CC} = 200V, I_C = 20A,$	-	40	-	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 5\Omega$, $V_{GE} = 15V$, Resistive Load, $T_C = 25^{\circ}C$	-	100	-	ns
t _f	Fall Time		-	180	240	ns
t _{d(on)}	Turn-On Delay Time		-	20	-	ns
t _r	Rise Time	$V_{CC} = 200V, I_{C} = 20A,$ $R_{G} = 5\Omega, V_{GE} = 15V,$	-	40	-	ns
t _{d(off)}	Turn-Off Delay Time	R _G = 5 Ω , V _{GE} = 15V, Resistive Load, T _C = 125°C	-	110	-	ns
t _f	Fall Time		-	250	300	ns
Qg	Total Gate Charge		-	95	-	nC
Q _{ge}	Gate to Emitter Charge	V _{CE} = 200V, I _C = 20A, V _{GE} = 15V	-	12	-	nC
Q _{gc}	Gate to Collector Charge	GE 15V	-	40	-	nC

Electrical Characteristics of the Diode $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Test Condition	าร	Min.	Тур.	Max	Units
V _{FM}	Diode Forward Voltage	I _F = 10A	T _C = 25°C	-	1.1	1.5	V
FIVI	Diodo i ornara voltago	1F - 1074	T _C = 125°C	-	0.96	-]
t	Diode Reverse Recovery Time		T _C = 25°C	-	23	-	ns
ι _{rr} ι	Electricity Time		T _C = 125°C	-	36	-	
I	Diode Peak Reverse Recovery		T _C = 25°C	-	2.8	-	Α
Current	_		T _C = 125°C	-	5.1	-] ^`
Q _{rr} Di	Diode Reverse Recovery Charge		$T_{\rm C} = 25^{\rm o}{\rm C}$	-	32	-	nC
≪II.	Disas Noveles Nessovery Charge		T _C = 125°C	-	91	-]

Figure 1. Typical Output Characteristics

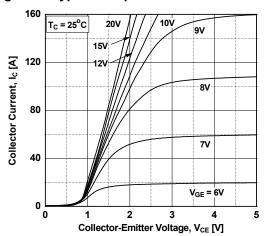


Figure 3. Typical Saturation Voltage Characteristics

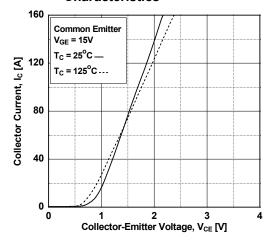


Figure 5. Saturation Voltage vs. Case
Temperature at Variant Current Level

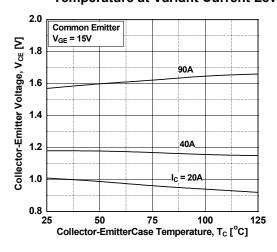


Figure 2. Typical Output Characteristics

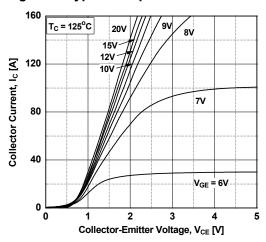


Figure 4. Transfer Characteristics

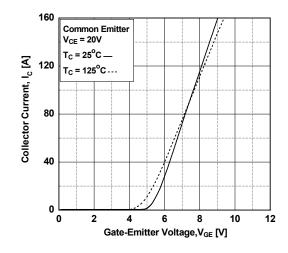


Figure 6. Saturation Voltage vs. V_{GE}

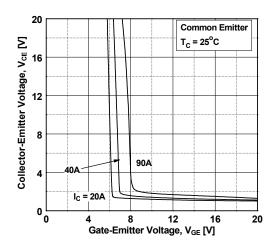


Figure 7. Saturation Voltage vs. V_{GE}

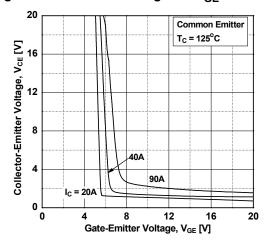


Figure 9. Gate charge Characteristics

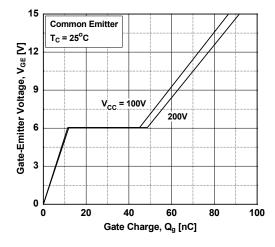


Figure 11. Turn-on Characteristics vs.
Gate Resistance

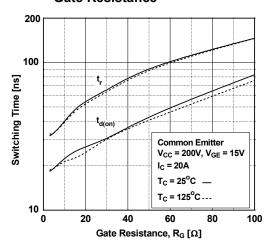


Figure 8. Capacitance Characteristics

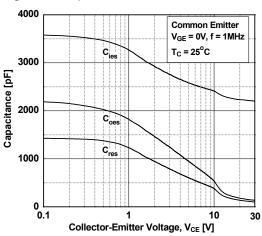


Figure 10. SOA Characteristics

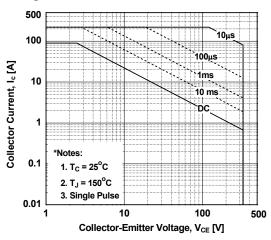


Figure 12. Turn-off Characteristics vs.
Gate Resistance

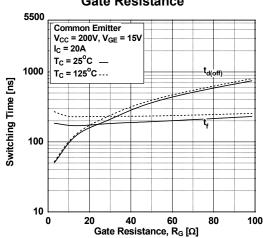


Figure 13. Turn-on Characteristics vs. Collector Current

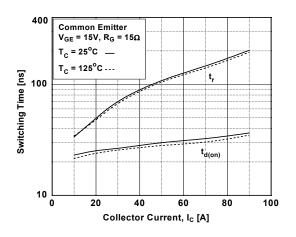


Figure 14. Turn-off Characteristics vs. Collector Current

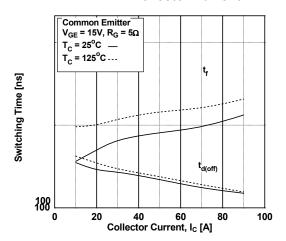
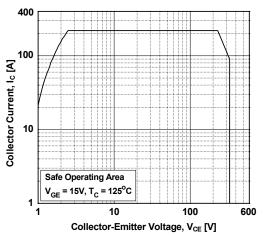


Figure 15. Turn off Switching SOA Characteristics Figure 16. Forward Characteristics



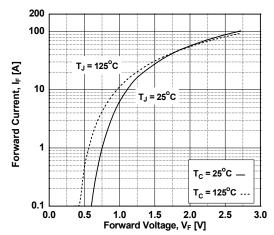


Figure 17. Reverse Recovery Current

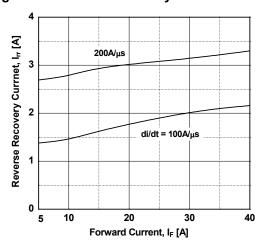


Figure 18. Stored Charge

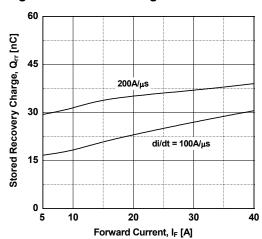


Figure 19. Reverse Recovery Current

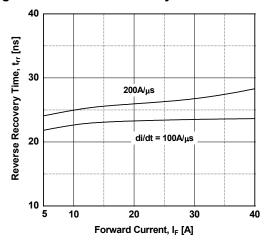
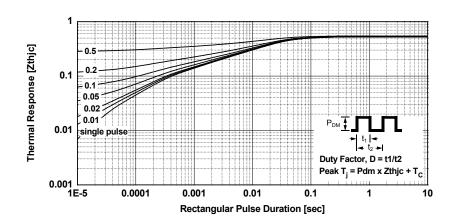
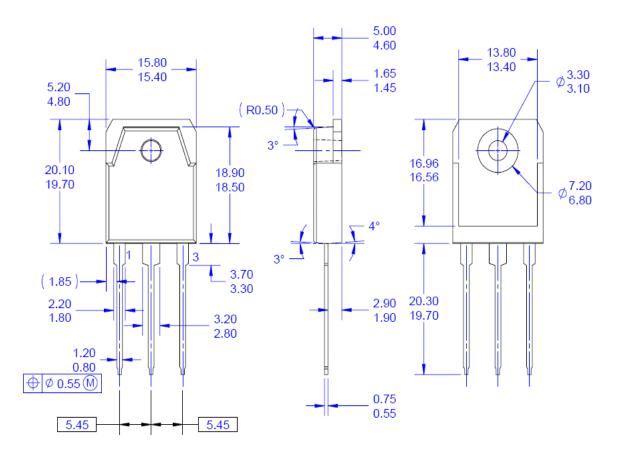


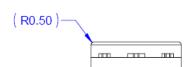
Figure 20.Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3PN





NOTES: UNLESS OTHERWISE SPECIFIED

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