

November 2013

FGA50N100BNTD2 1000 V NPT Trench IGBT

Features

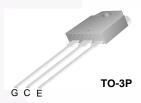
- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)} = 2.5 \text{ V} @ I_C = 60 \text{ A}$
- High Input Impedance
- Built-in Fast Recovery Diode
- · RoHS Compliant

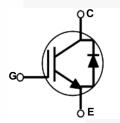
Applications

· UPS, Welder

General Description

Using Fairchild's proprietary trench design and advanced NPT technology, the 1000V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device offers the optimum performance for hard switching application such as UPS, welder applications.





Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V _{CES}	Collector to Emitter Voltage		1000	V
V _{GES}	Gate to Emitter Voltage		± 25	V
I _C	Collector Current	$@ T_C = 25^{\circ}C$	50	A
	Collector Current	$@ T_C = 100^{\circ}C$	35	A
I _{CM (1)}	Pulsed Collector Current		200	Α
	Diode Continuous Forward Current	@ T _C = 25°C	30	A
I _F Diode Continuous Forward Current		@ T _C = 100°C	15	A
I _{FM}	Diode Maximum Forward Current		150	A
P _D	Maximum Power Dissipation	@ T _C = 25°C	156	W
. п	Maximum Power Dissipation	@ T _C = 100°C	63	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 rating : Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Тур.	Max.	Unit
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	0.8	°C/W
$R_{\theta JC}(DIODE)$	PJC(DIODE) Thermal Resistance, Junction to Case		1.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40.0	°C/W

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGA50N100BNTD2	FGA50N100BNTD2	TO-3P	Tube	N/A	N/A	30

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

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	teristics		·		•	
BV _{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0 \text{ V}, I_{C} = 1 \text{ mA}$	1000	-	-	V
I _{CES}	Collector Cut-Off Current	V _{CE} = 1000 V, V _{GE} = 0 V	-	-	1.0	mA
I _{GES}	G-E Leakage Current	$V_{GE} = \pm 25 \text{ V}, V_{CE} = 0 \text{ V}$	-	-	±500	nA
On Charac	teristics					
V _{GE(th)}	G-E Threshold Voltage	$I_C = 60 \text{ mA}, V_{CE} = V_{GE}$	4.0	5.5	7.0	V
	Collector to Emitter Saturation Voltage	I _C = 10 A, V _{GE} = 15 V	-	1.5	1.8	V
V _{CE(sat)}		I _C = 60 A, V _{GE} = 15 V		2.5	2.9	V
		I _C = 60 A, V _{GE} = 15 V, T _C = 125°C	-	3.3	-	٧
Dynamic C	haracteristics			·		
C _{ies}	Input Capacitance		-	6000	-	pF
C _{oes}	Output Capacitance	$V_{CE} = 10 \text{ V}, V_{GE} = 0 \text{ V},$ f = 1 MHz	-	260	-	pF
C _{res}	Reverse Transfer Capacitance	1 = 1 1011 12	-	200	-	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time		-	34	-	ns
t _r	Rise Time	$V_{CC} = 600 \text{ V}, I_{C} = 60 \text{ A},$	-	68	-	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 10 \Omega$, $V_{GE} = 15 V$, Inductive Load, $T_C = 25^{\circ}C$	-	243	-	ns
t _f	Fall Time	, and the second	-	65	100	ns
Qg	Total Gate Charge		-	257	350	nC
Q _{ge}	Gate to Emitter Charge	$V_{CE} = 600 \text{ V}, I_{C} = 60 \text{ A},$ $V_{GF} = 15 \text{ V}, T_{C} = 25^{\circ}\text{C}$	-	45	-	nC
Q _{gc}	Gate to Collector Charge	GE - 10 v, 1C - 20 0	- /	95	-	nC

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

V _{FM} Diode Forward Voltage	Diode Forward Voltage	I _F = 15 A	-	2.9	3.2	V
	I _F = 60 A	-	4.0	4.7	V	
t _{rr}	Diode Reverse Recovery Time	$I_F = 60 \text{ A}, di_F/dt = 100 \text{ A/us}$	-	60	75	ns
I _R	Instantaneous Reverse Current	VRRM = 1000 V	-	-	2	μА

Figure 1. Typical Output Characteristics

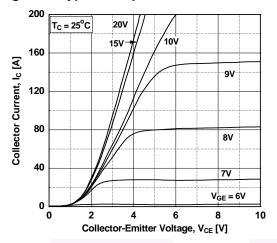


Figure 3. Typical Saturation Voltage Characteristics

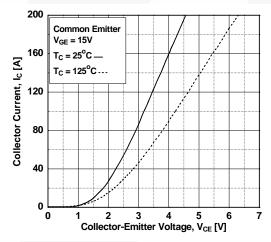


Figure 5. Saturation Voltage vs. Case
Temperature at Variant Current Level

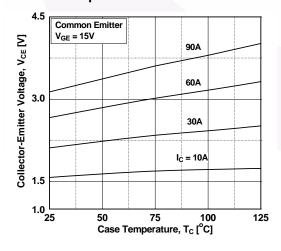


Figure 2. Typical Output Characteristics

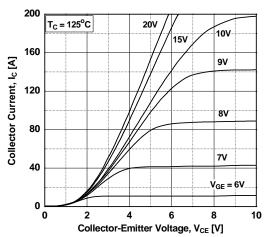


Figure 4. Transfer Characteristics

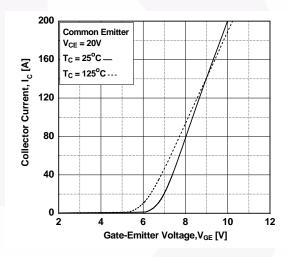


Figure 6. Saturation Voltage vs. V_{GE}

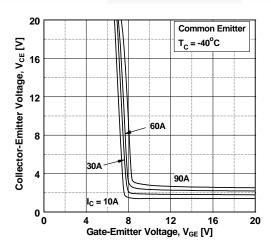


Figure 7. Saturation Voltage vs. V_{GE}

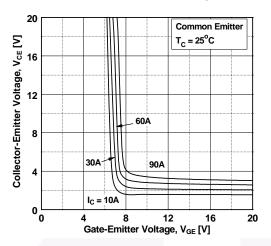


Figure 9. Capacitance Characteristics

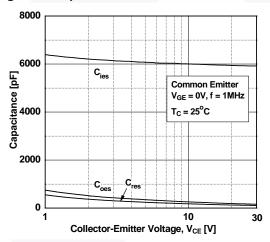


Figure 11. SOA Characteristics

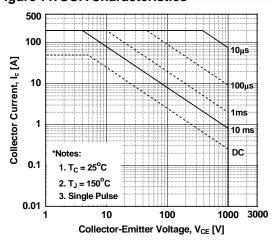


Figure 8. Saturation Voltage vs. V_{GE}

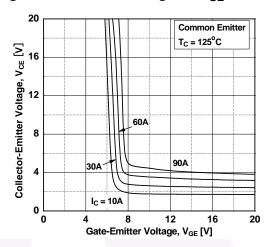


Figure 10. Gate charge Characteristics

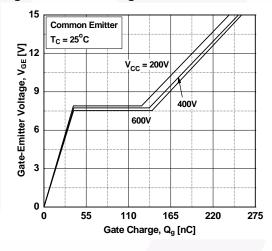


Figure 12. Load Current vs. Frequency

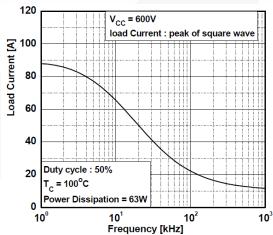


Figure 13. Turn-on Characteristics vs.
Gate Resistance

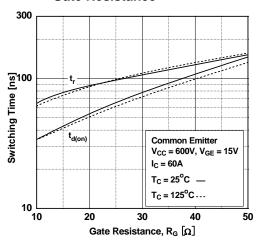


Figure 15. Turn-on Characteristics vs. Collector Current

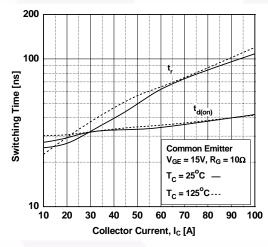


Figure 17. Switching Loss vs. Gate Resistance

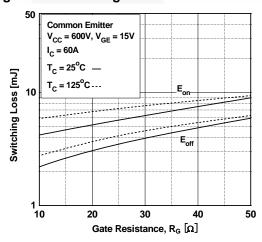


Figure 14. Turn-off Characteristics vs.
Gate Resistance

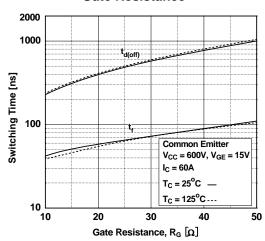


Figure 16. Turn-off Characteristics vs.
Collector Current

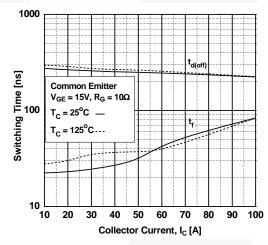


Fig 18. Switching Loss vs. Collector Current

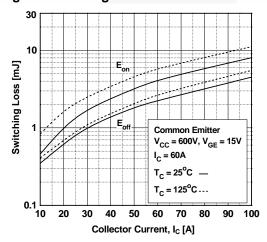


Figure 19. Turn off Switching SOA Characterisics

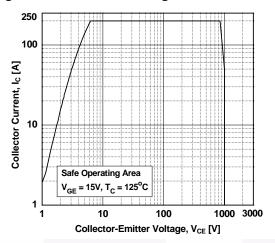


Figure 21. Reverse Current

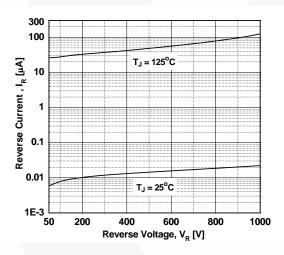


Figure 23. Reverse Recovery Characteristics vs. Forward Current

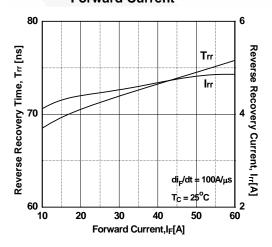


Figure 20. Forward Characteristics

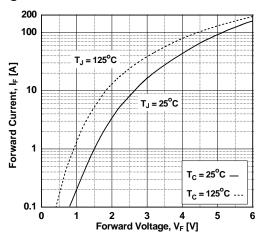


Figure 22. Reverse Recovery Characteristics vs. di_F/dt

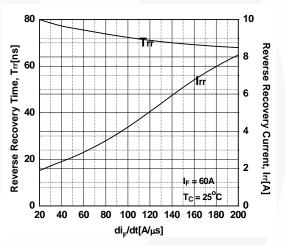
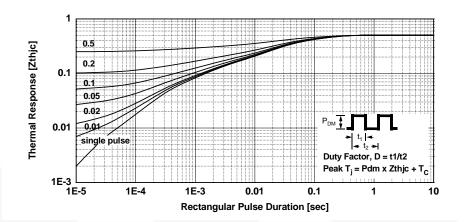


Figure 24.Transient Thermal Impedance of IGBT



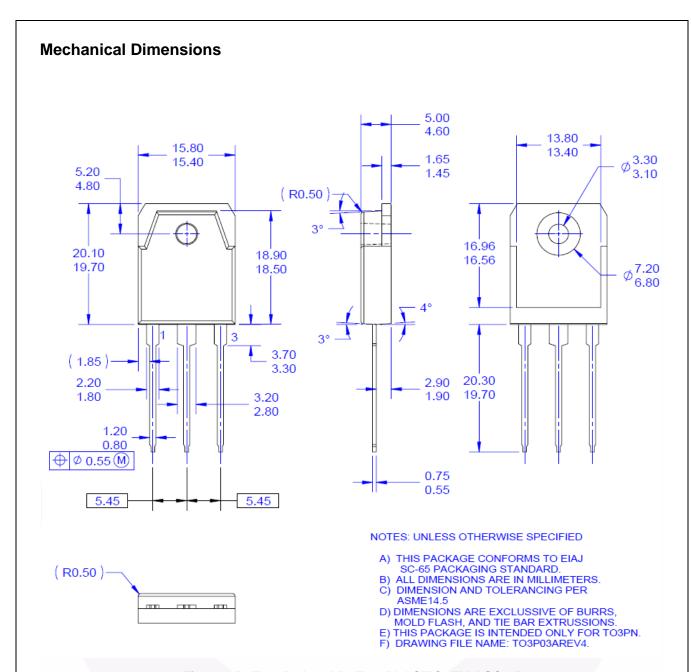


Figure 25. TO-3P 3L - 3LD, T03, PLASTIC, EIAJ SC-65

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