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FGA50N100BNTD

1000 V NPT Trench IGBT

General Description

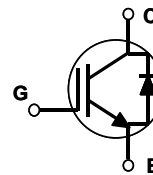
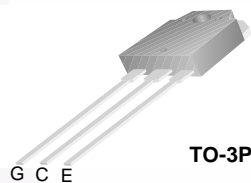
Using Fairchild's proprietary trench design and advanced NPT technology, the 1000V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device offers the optimum performance for hard switching application such as UPS, welder applications.

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

Application

UPS, Welder, Induction Heating, Microwave Oven



Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Description	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	1000	V
V_{GES}	Gate-Emitter Voltage	± 25	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	50	A
	Collector Current @ $T_C = 100^\circ\text{C}$	35	A
$I_{CM(1)}$	Pulsed Collector Current	100	A
I_F	Diode Continuous Forward Current @ $T_C = 25^\circ\text{C}$	30	A
	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	15	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	156	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	63	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Notes :

(1) Repetitive rating : Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.8	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	2.4	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	25	$^\circ\text{C/W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGA50N100BNTDTU	FGA50N100BNTD	TO-3P	Rail / Tube	N/A	N/A	30

Electrical Characteristics of IGBT

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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Off Characteristics

BV_{CES}	Collector Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	1000	--	--	V
I_{CES}	Collector Cut-Off Current	$V_{CE} = 1000\text{ V}, V_{GE} = 0\text{ V}$	--	--	1.0	mA
I_{GES}	G-E Leakage Current	$V_{GE} = \pm 25\text{ V}, V_{CE} = 0\text{ V}$	--	--	± 500	nA

On Characteristics

$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 60\text{ mA}, V_{CE} = V_{GE}$	4.0	5.0	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 10\text{ A}, V_{GE} = 15\text{ V}$	--	1.5	1.8	V
		$I_C = 60\text{ A}, V_{GE} = 15\text{ V}$	--	2.5	2.9	V

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE}=10\text{ V}, V_{GE} = 0\text{ V},$ $f = 1\text{ MHz}$	--	6000	--	pF
C_{oes}	Output Capacitance		--	260	--	pF
C_{res}	Reverse Transfer Capacitance		--	200	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600\text{ V}, I_C = 60\text{ A},$ $R_G = 51\ \Omega, V_{GE}=15\text{ V},$ Resistive Load, $T_C = 25^\circ\text{C}$	--	140	--	ns
t_r	Rise Time		--	320	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	630	--	ns
t_f	Fall Time		--	130	250	ns
Q_g	Total Gate Charge	$V_{CE} = 600\text{ V}, I_C = 60\text{ A},$ $V_{GE} = 15\text{ V}, T_C = 25^\circ\text{C}$	--	275	350	nC
Q_{ge}	Gate-Emitter Charge		--	45	--	nC
Q_{gc}	Gate-Collector Charge		--	95	--	nC

Electrical Characteristics of DIODE

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{FM}	Diode Forward Voltage	$I_F = 15\text{ A}$	--	1.2	1.7	V
		$I_F = 60\text{ A}$	--	1.8	2.1	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 60\text{ A}, di_F/dt = 20\text{ A/us}$	--	1.2	1.5	us
I_R	Instantaneous Reverse Current	$V_{RRM} = 1000\text{ V}$	--	0.05	2	uA

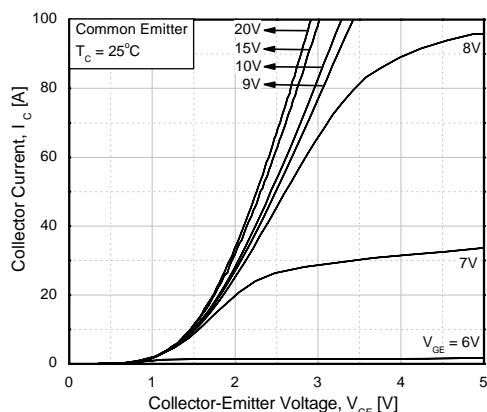


Fig 1. Typical Output Characteristics

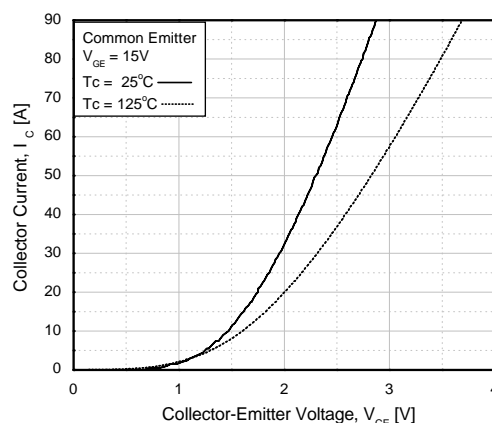


Fig 2. Typical Saturation Voltage Characteristics

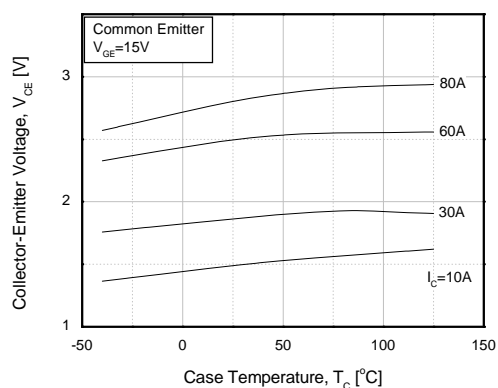


Fig 3. Saturation Voltage vs. Case Temperature at Varient Current Level

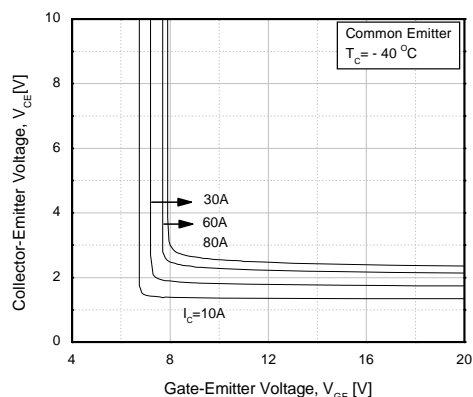


Fig 4. Saturation Voltage vs. V_{GE}

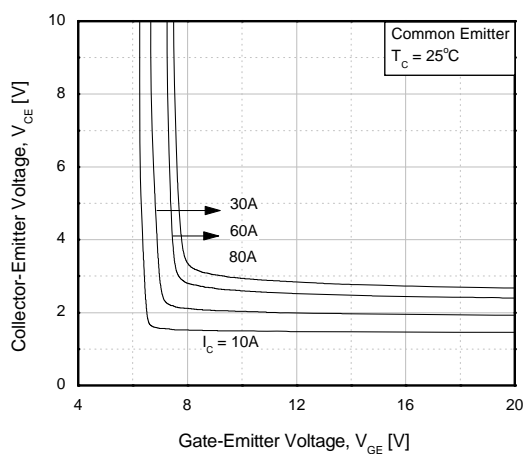


Fig 5. Saturation Voltage vs. V_{GE}

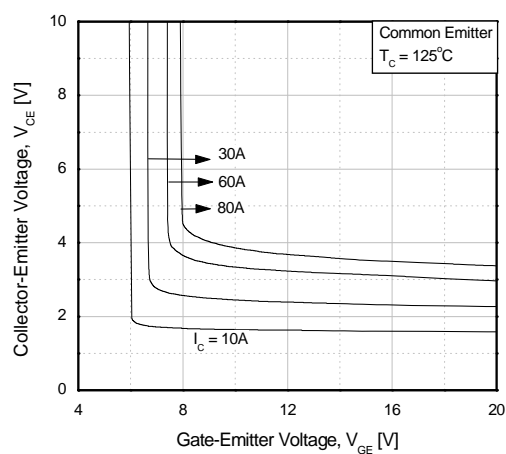


Fig 6. Saturation Voltage vs. V_{GE}

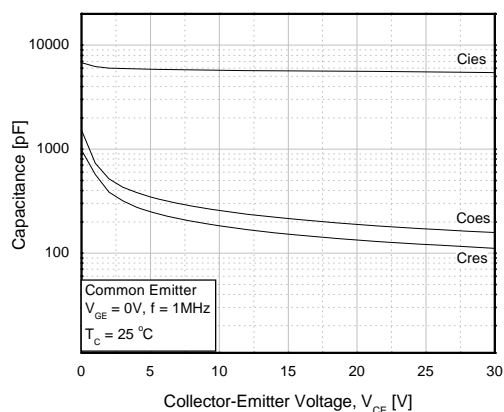


Fig 7. Capacitance Characteristics

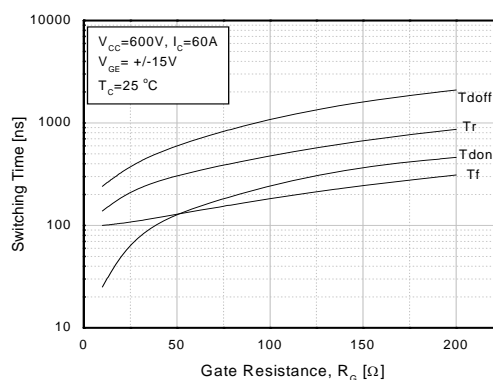


Fig 8. Switching Characteristics vs. Gate Resistance

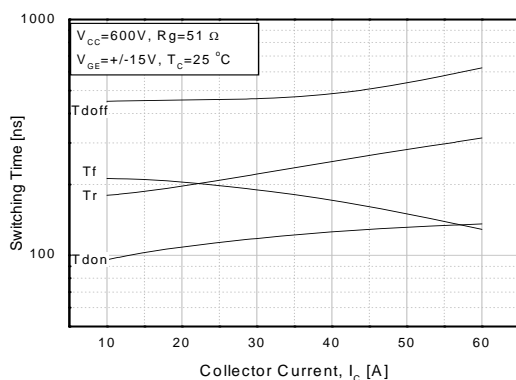


Fig 9. Switching Characteristics vs. Collector Current

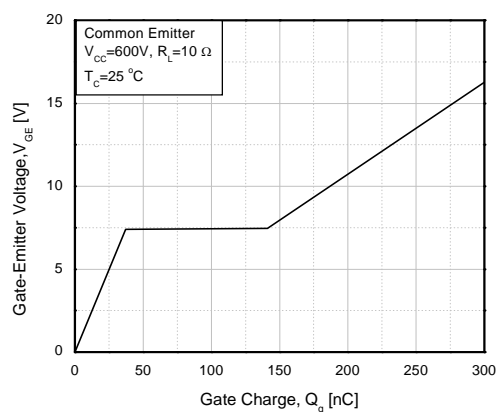


Fig 10. Gate Charge Characteristics

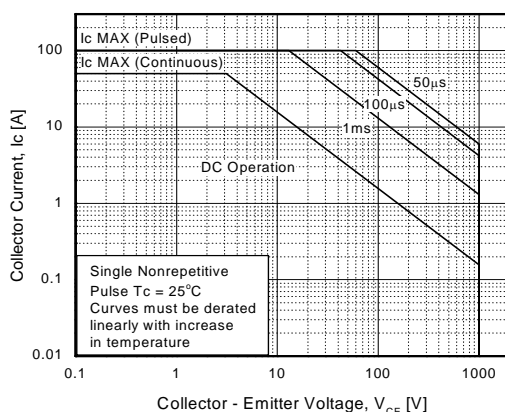


Fig 11. SOA Characteristics

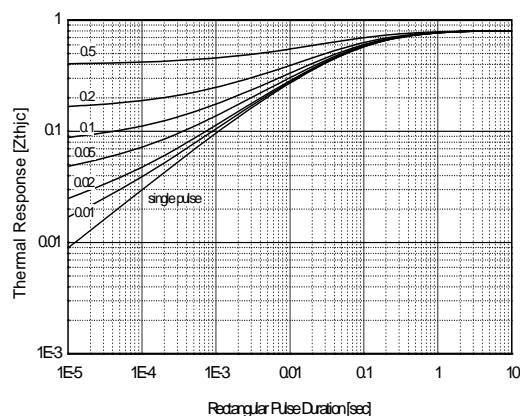


Fig 12. Transient Thermal Impedance of IGBT

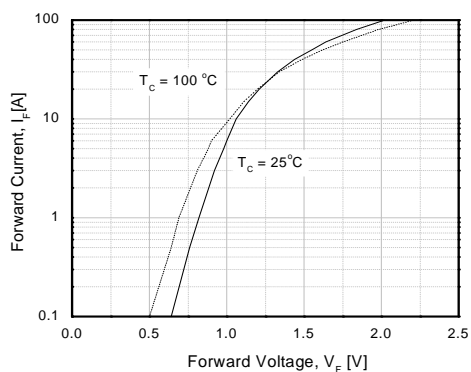


Fig 13. Forward Characteristics

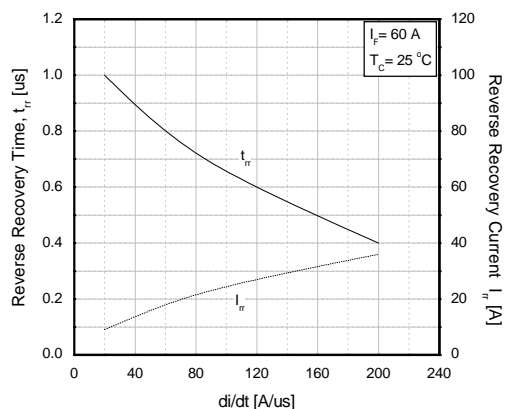


Fig 14. Reverse Recovery Characteristics vs. di_F/dt

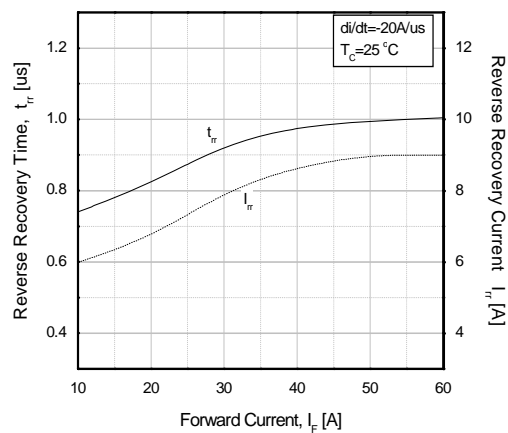


Fig 15. Reverse Recovery Characteristics vs. Forward Current

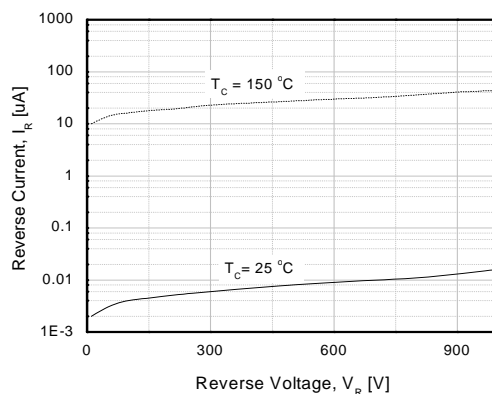


Fig 16. Reverse Current vs. Reverse Voltage

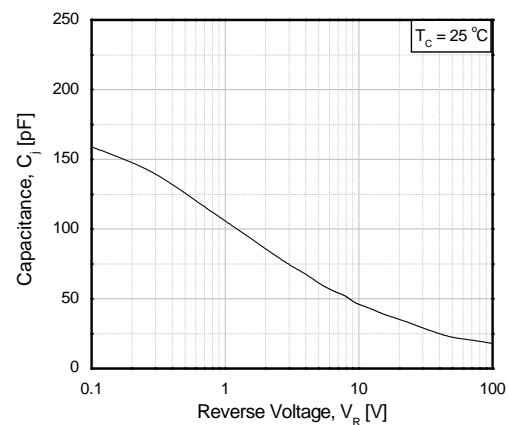


Fig 17. Junction capacitance

Mechanical Dimensions

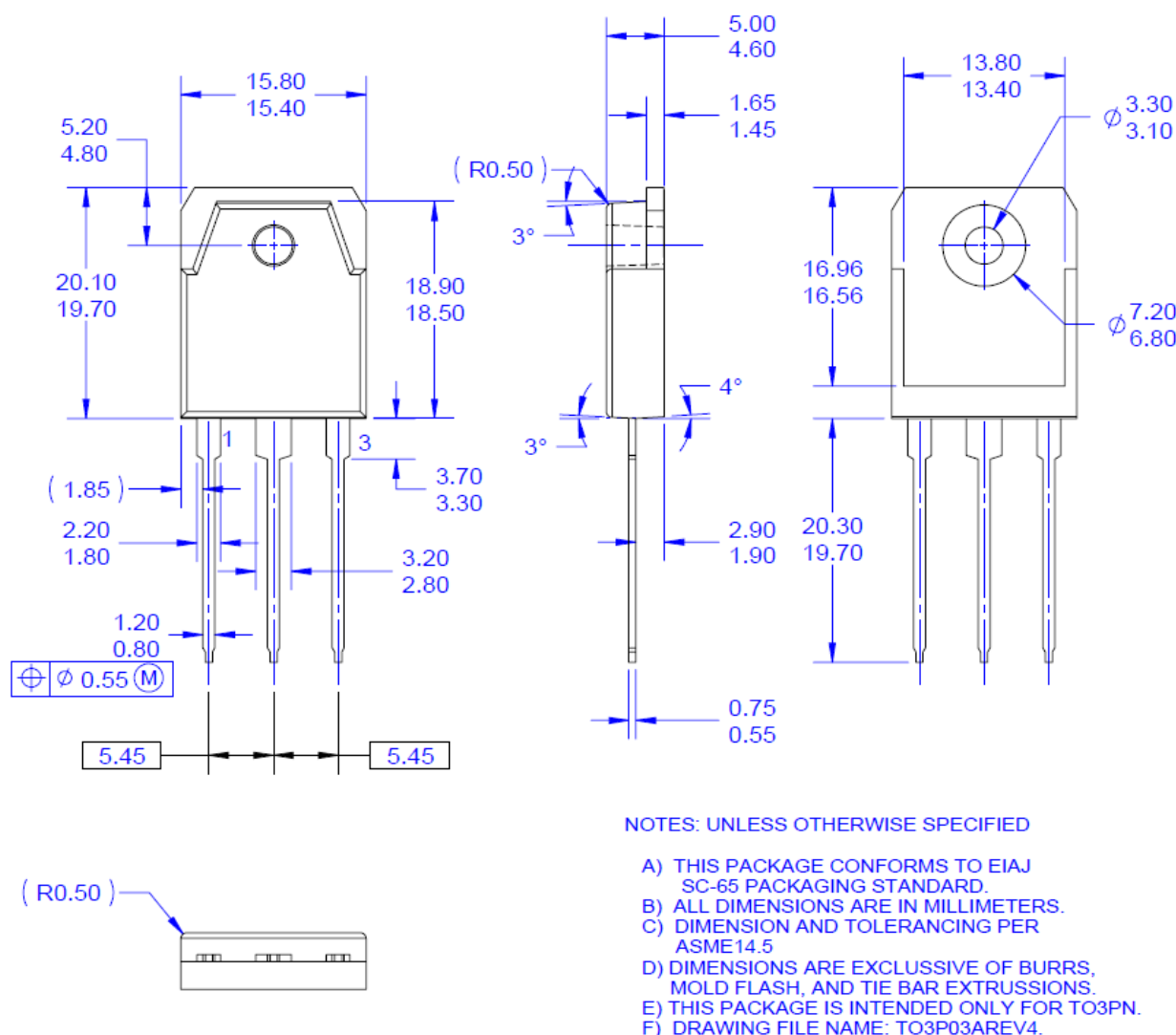


Figure 18. TO-3P 3L - 3LD, T03, PLASTIC, EIAJ SC-65

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