



January 2006

FGA50N100BNTD

1000V, 50A NPT-Trench IGBT CO-PAK

General Description

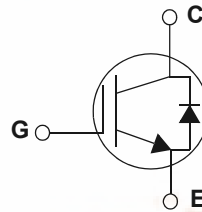
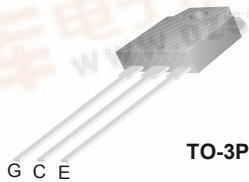
Trench insulated gate bipolar transistors (IGBTs) with NPT technology show outstanding performance in conduction and switching characteristics as well as enhanced avalanche ruggedness. These devices are well suited for Induction Heating (I-H) applications

Features

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

Application

Micro- Wave Oven, I-H Cooker, I-H Jar, Induction Heater, Home Appliance



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Description	FGA50N100BNTD	Units
V_{CES}	Collector-Emmitter Voltage	1000	V
V_{GES}	Gate-Emmitter 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	100	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ C$	15	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ C$	156	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	63	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	$^\circ C$

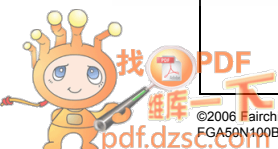
Notes :

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

Thermal Characteristics

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

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Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA50N100BNTD	FGA50N100BNTDTU	TO-3P	Rail / Tube	30ea	-

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

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

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

On Characteristics

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

Dynamic Characteristics

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

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 60A, R_G = 51\Omega, V_{GE}=15V, \text{Resistive Load, } T_C = 25^\circ C$	--	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	$V_{CE} = 600V, I_C = 60A, V_{GE} = 15V, T_C = 25^\circ C$	--	275	350	nC
Q_{ge}	Gate-Emitter Charge		--	45	--	nC
Q_{gc}	Gate-Collector Charge		--	95	--	nC

Electrical Characteristics of DIODE T_C = 25°C unless otherwise noted

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

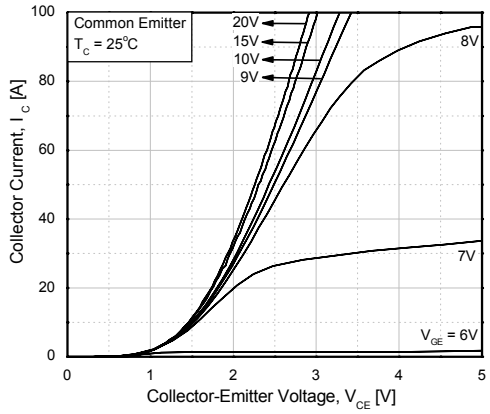


Fig 1. Typical Output Characteristics

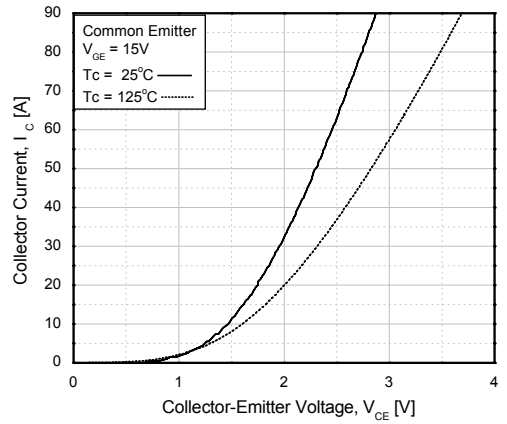


Fig 2. Typical Saturation Voltage Characteristics

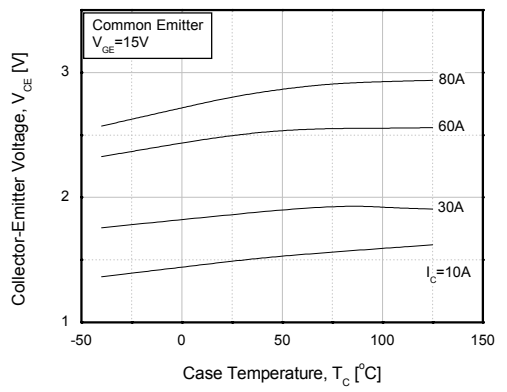


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

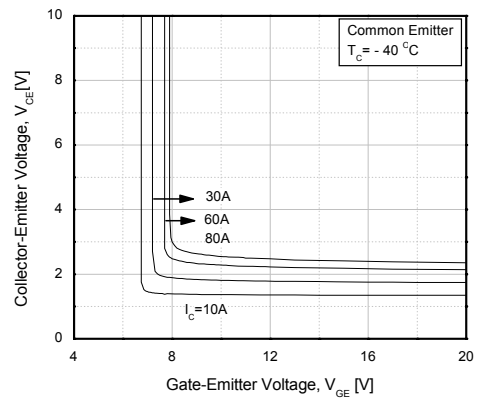


Fig 4. Saturation Voltage vs. V_GE

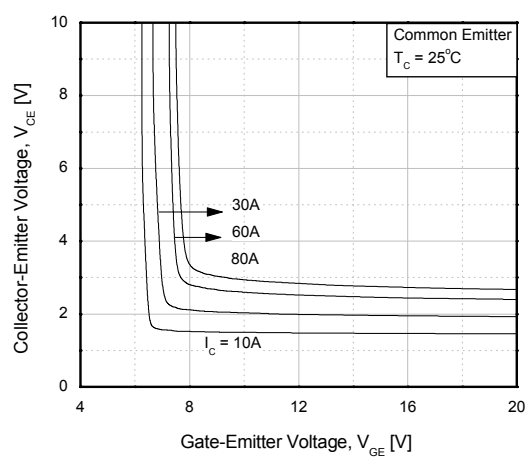


Fig 5. Saturation Voltage vs. V_GE

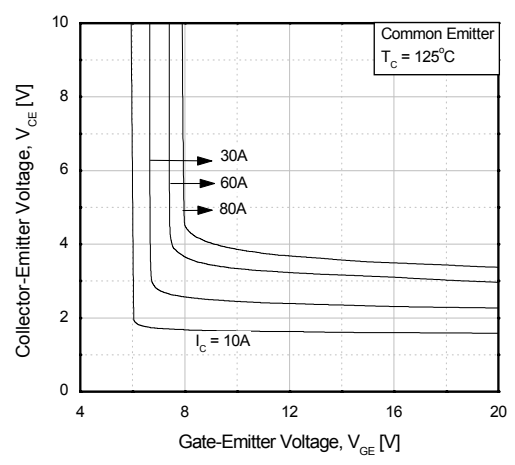


Fig 6. Saturation Voltage vs. V_GE

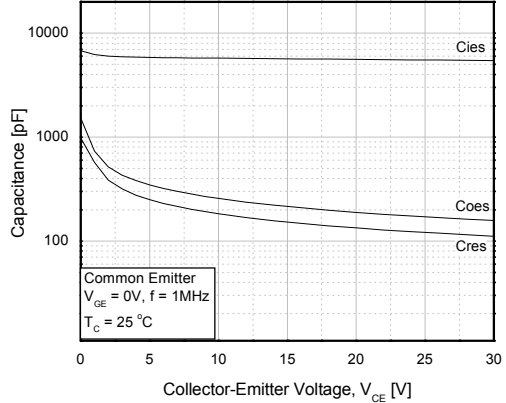


Fig 7. Capacitance Characteristics

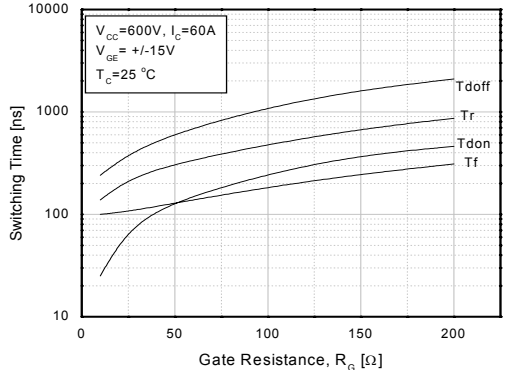


Fig 8. Switching Characteristics vs. Gate Resistance

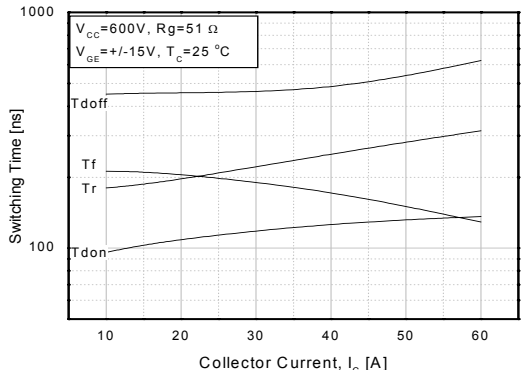


Fig 9. Switching Characteristics vs. Collector Current

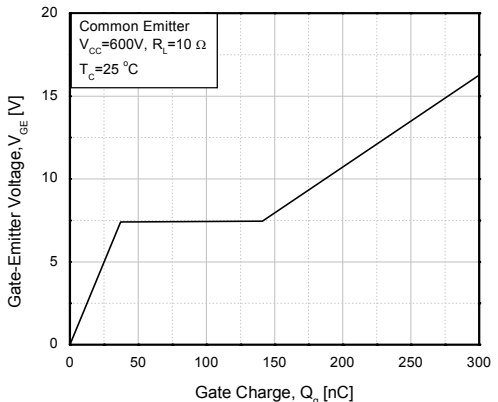


Fig 10. Gate Charge Characteristics

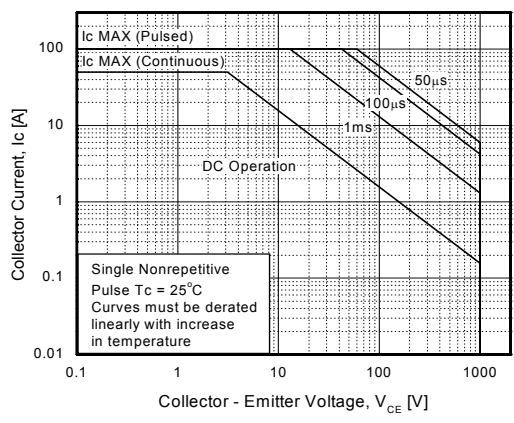


Fig 11. SOA Characteristics

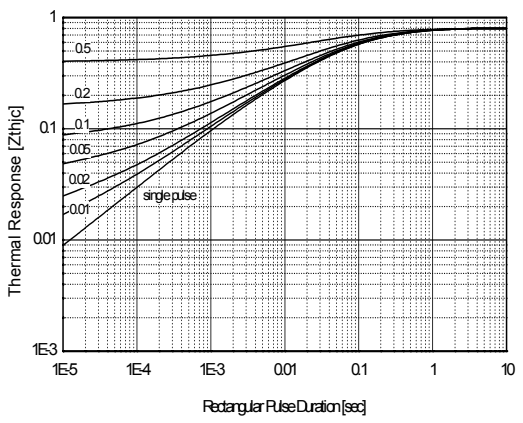


Fig 12. Transient Thermal Impedance of IGBT

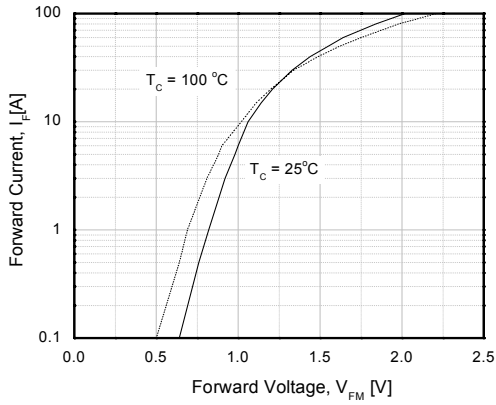


Fig 13. Forward Characteristics

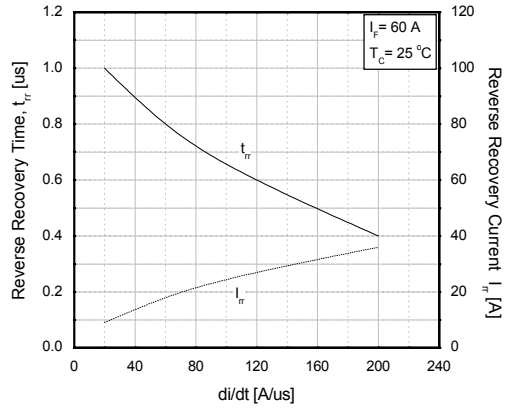


Fig 14. Reverse Recovery Characteristics vs. di/dt

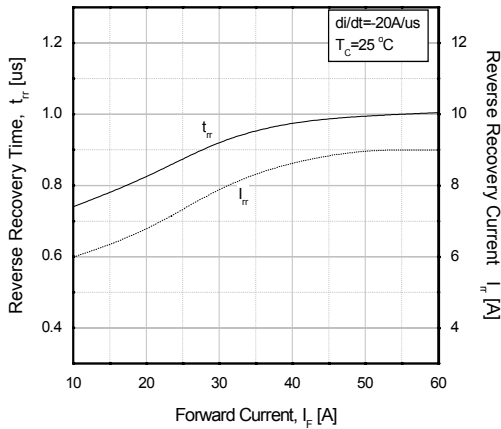


Fig 15. Reverse Recovery Characteristics vs. Forward Current

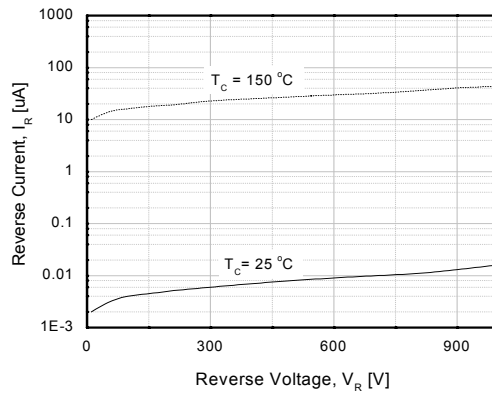


Fig 16. Reverse Current vs. Reverse Voltage

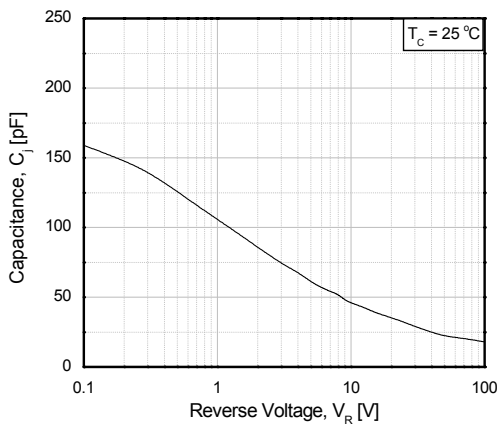
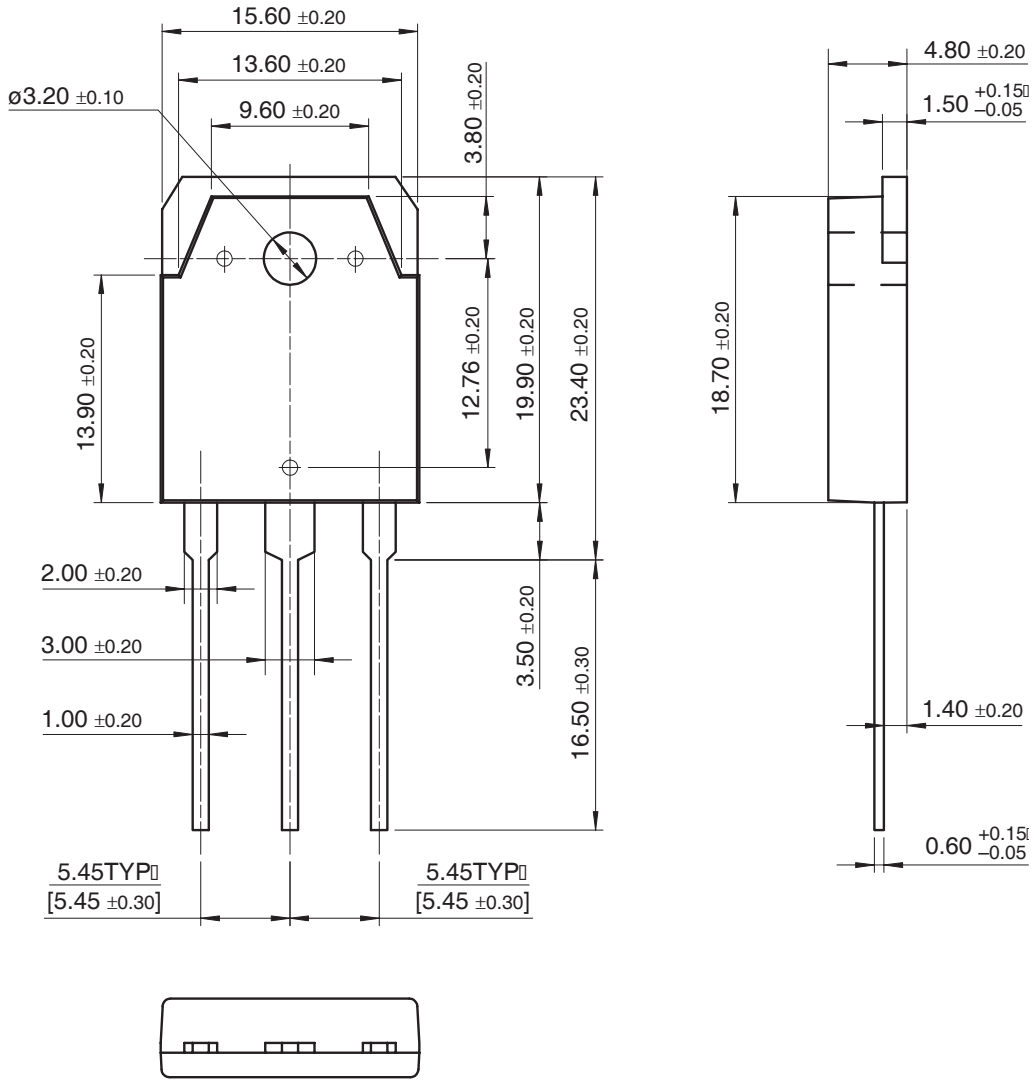


Fig 17. Junction capacitance

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Package Dimension

TO-3P



Dimensions in Millimeters

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PRODUCT STATUS DEFINITIONS

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