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FAIRCHILD
SEMICONDUCTOR®

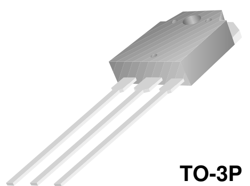
March 2009

FGA50N100BNT
1000V, 50A NPT-Trench IGBT CO-PAK

Features
- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)}$ = 2.5 V @ I_C = 60A
- High Input Impedance
- RoHS Compliant

Applications
- UPS, PFC, I-H Jar, Induction Heater, Home Appliance.

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 UPS, PFC, I-H Jar, induction Heater and Home Appliance.



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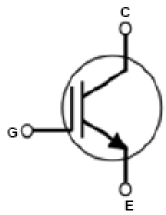


Absolute Maximum Ratings

Symbol	Description		Ratings	Units
V_{CES}	Collector to Emitter Voltage		1000	V
V_{GES}	Gate to Emitter Voltage		± 25	V
I_C	Collector Current	@ T_C = 25°C	50	A
	Collector Current	@ T_C = 100°C	35	A
$I_{CM\ (1)}$	Pulsed Collector Current		200	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	156	W
	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	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	-	0.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40.0	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA50N100BNT	FGA50N100BNTTU	TO-3PN	Rail / Tube	30ea	-

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 to 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} = ±25V, V_{CE} = 0V	-	-	±500	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C = 60mA, V_{CE} = V_{GE}	4.0	5.5	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
		I_C = 60A, V_{GE} = 15V, T_C = 125°C	-	3.1	-	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 = 10Ω, V_{GE} = 15V, Inductive Load, T_C = 25°C	-	34	-	ns
t_r	Rise Time		-	68	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	243	-	ns
t_f	Fall Time		-	65	100	ns
Q_g	Total Gate Charge	V_{CE} = 600V, I_C = 60A, V_{GE} = 15V, T_C = 25°C	-	257	350	nC
Q_{ge}	Gate to Emitter Charge		-	45	-	nC
Q_{gc}	Gate to Collector Charge		-	95	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

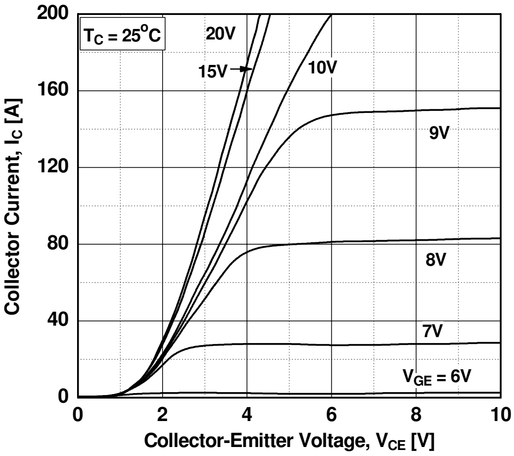


Figure 2. Typical Output Characteristics

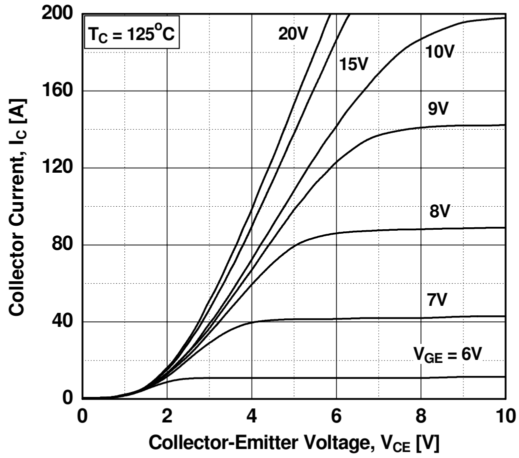


Figure 3. Typical Saturation Voltage Characteristics

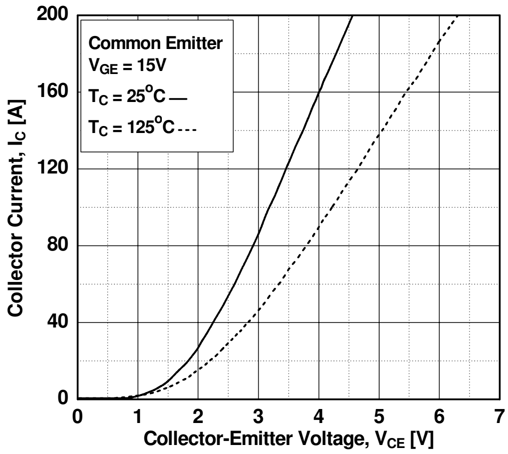


Figure 4. Transfer Characteristics

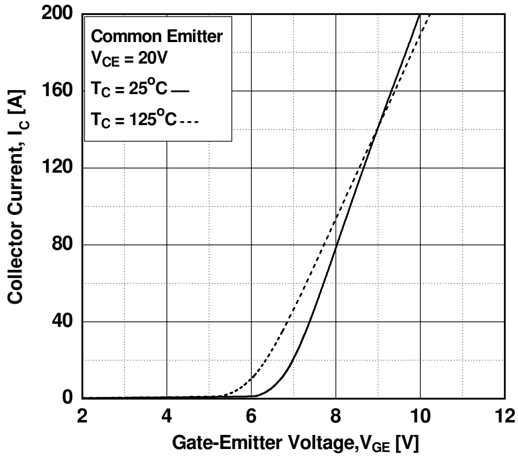


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

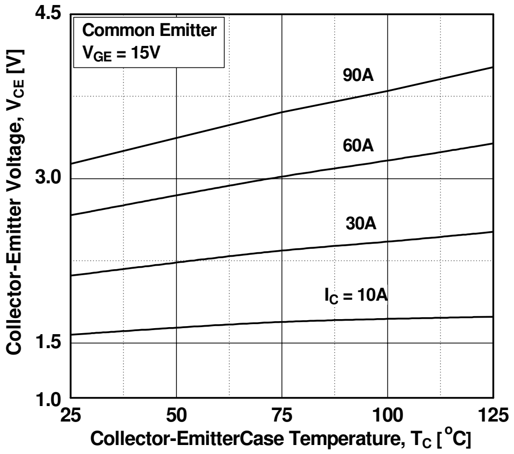
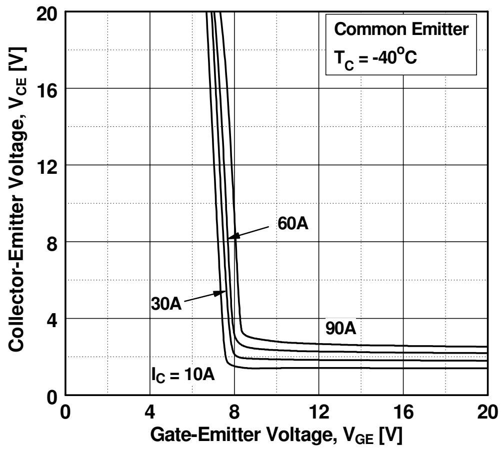


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

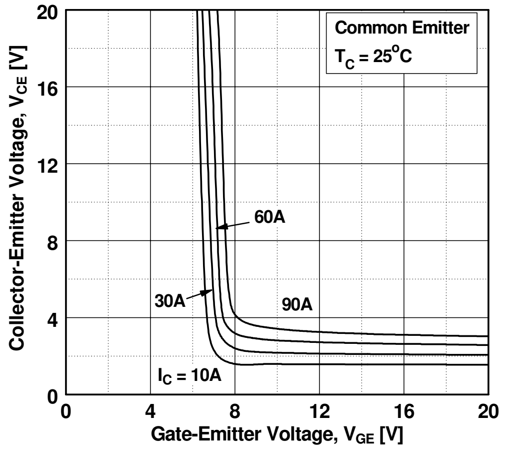


Figure 8. Saturation Voltage vs. V_{GE}

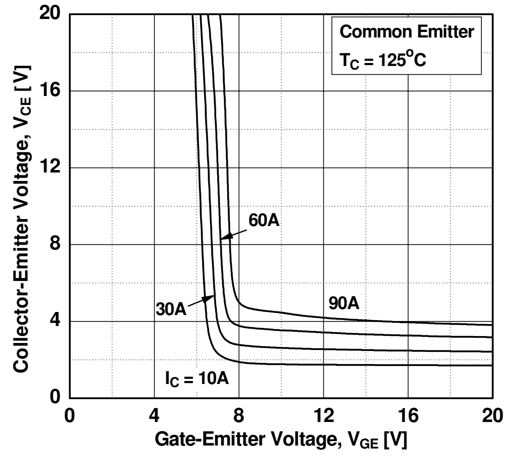


Figure 9. Capacitance Characteristics

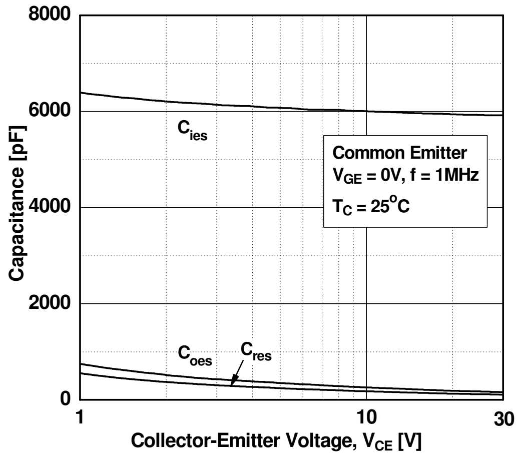


Figure 10. Gate charge Characteristics

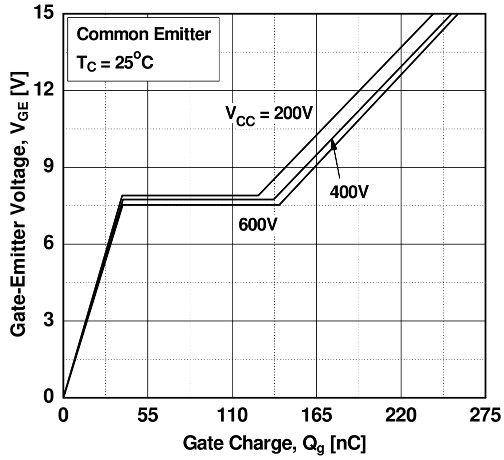


Figure 11. SOA Characteristics

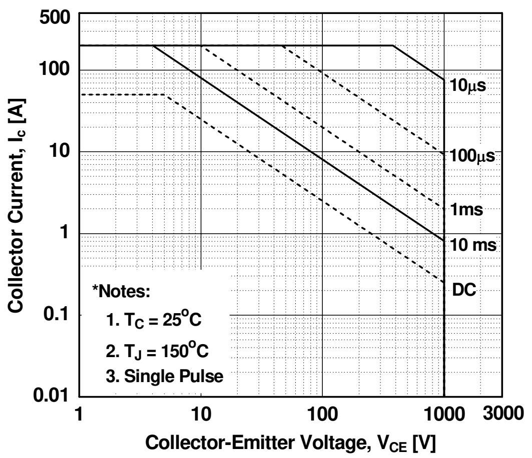
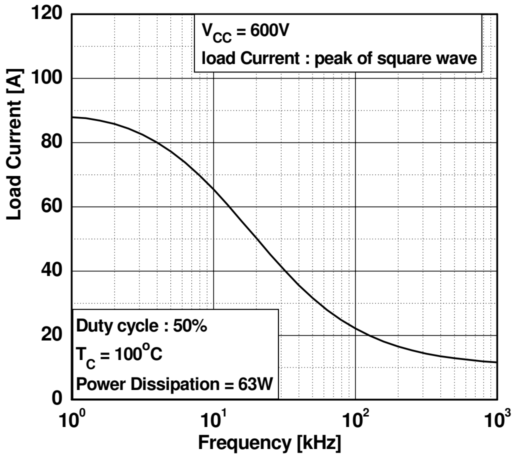


Figure 12. Load Current vs. Frequency



Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Gate Resistance

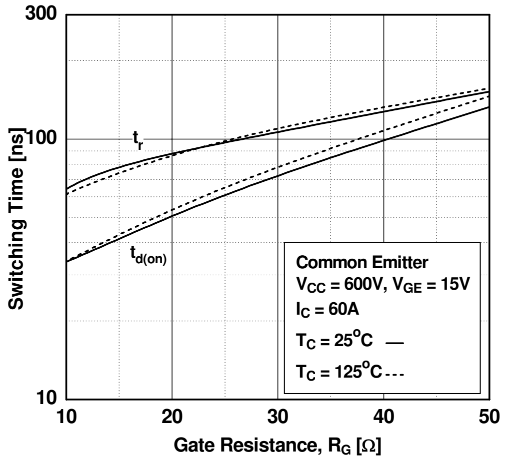


Figure 14. Turn-off Characteristics vs. Gate Resistance

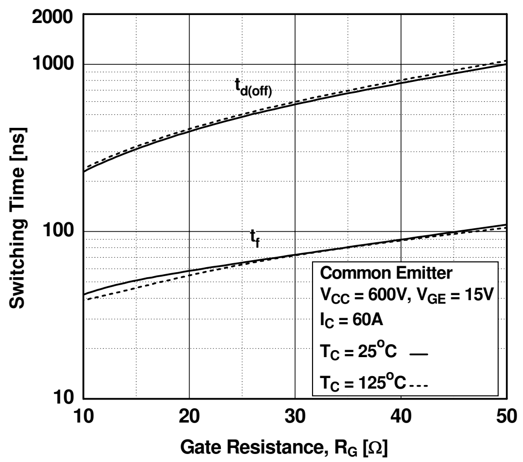


Figure 15. Turn-on Characteristics vs. Collector Current

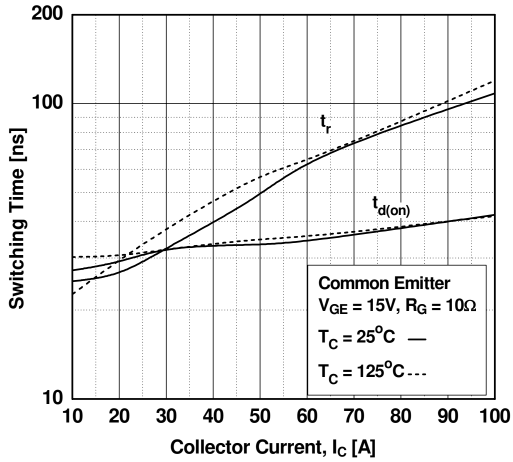


Figure 16. Turn-off Characteristics vs. Collector Current

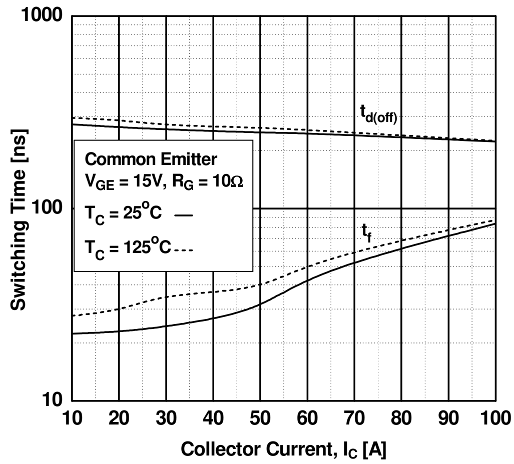


Figure 17. Switching Loss vs. Gate Resistance

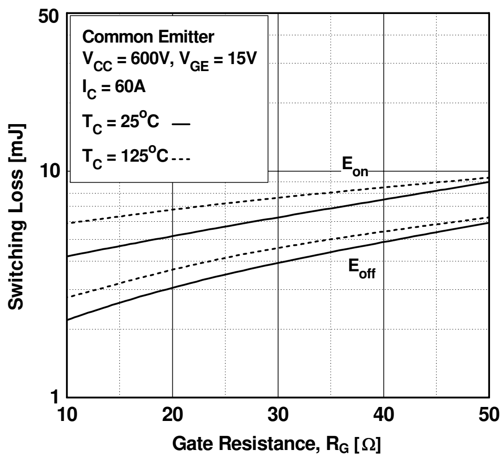
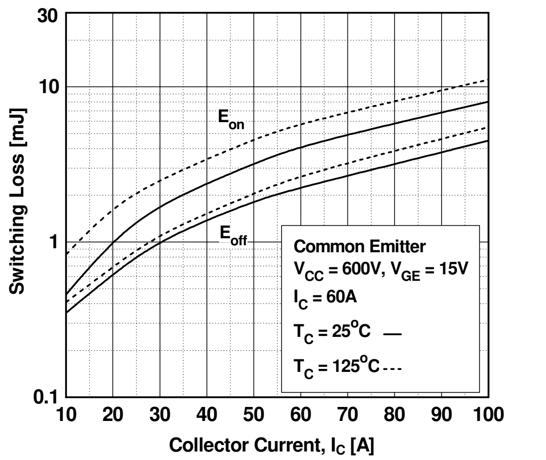


Fig 18. Switching Loss vs. Collector Current



Typical Performance Characteristics

Figure 19. Turn off Switching SOA Characterisics

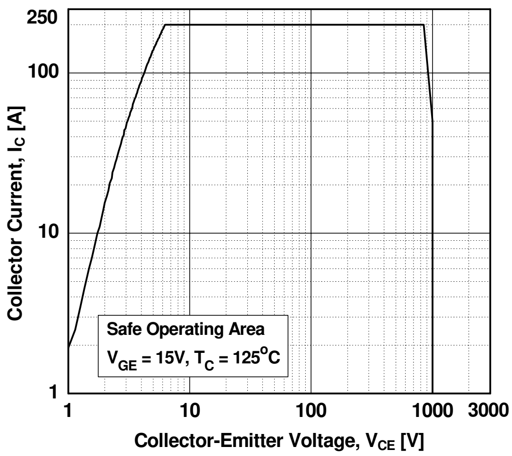
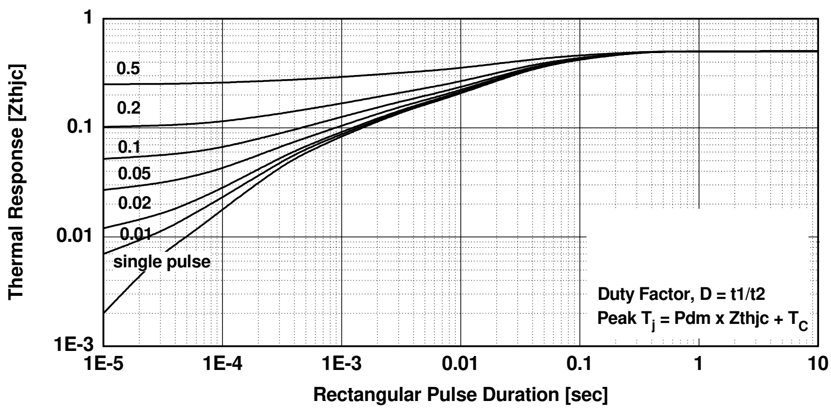
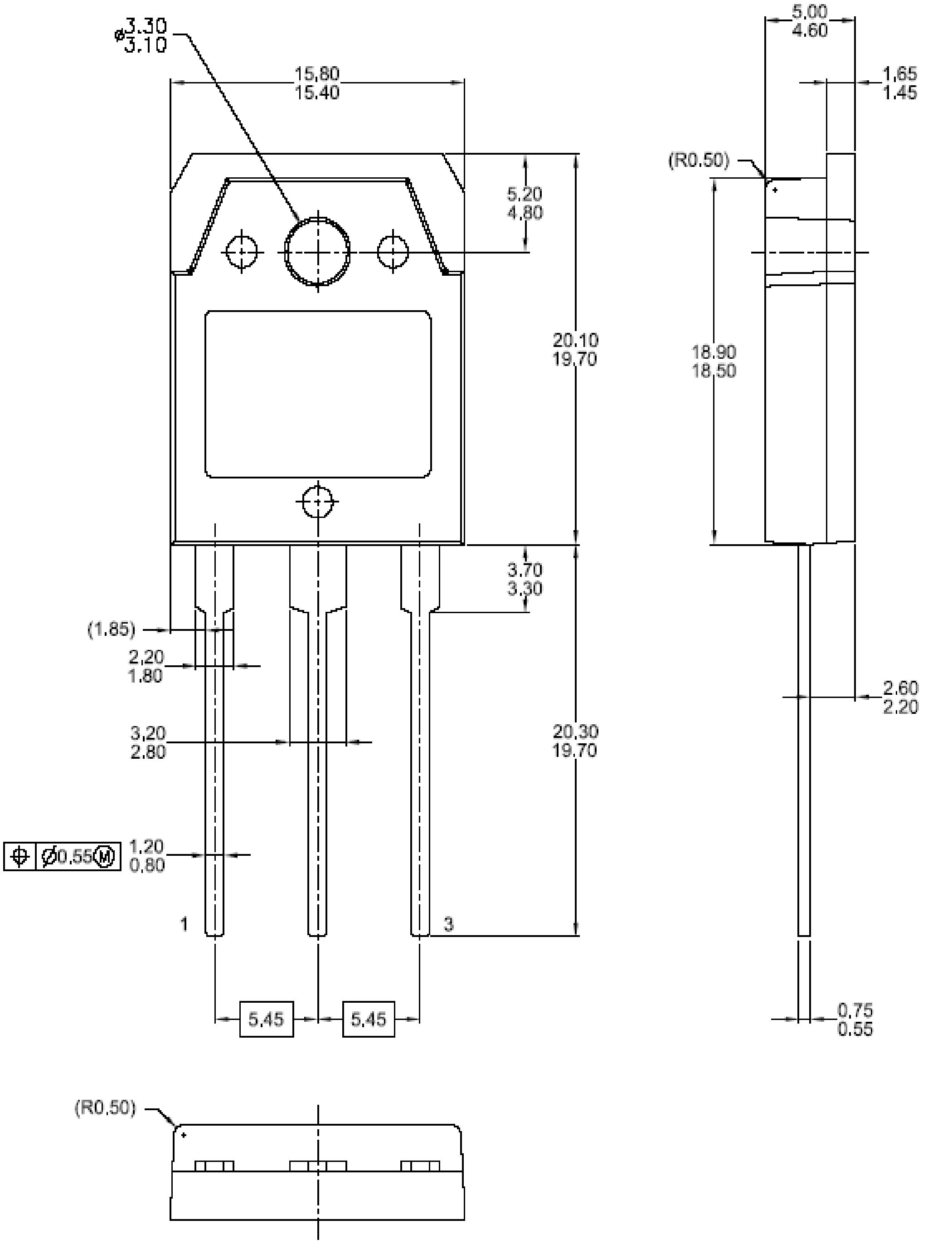


Figure 20.Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3PN



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