



FGA50N100BNTD2

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

Features

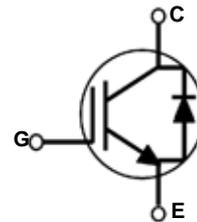
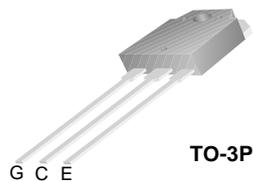
- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)} = 2.5\text{ V @ } I_C = 60\text{ A}$
- High Input Impedance
- Built-in Fast Recovery Diode
- RoHS Compliant

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 micro-wave, Induction heating (I-H) Jar, induction heater, home appliance.

Applications

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



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 @ $T_C = 25^\circ\text{C}$	50	A
	Collector Current @ $T_C = 100^\circ\text{C}$	35	A
I_{CM} (1)	Pulsed Collector Current	200	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	15	A
I_{FM}	Diode Maximum Forward Current	150	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.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance, Junction to Case	-	0.8	$^\circ\text{C/W}$
$R_{\theta JC}$ (DIODE)	Thermal Resistance, Junction to Case	-	1.2	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40.0	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA50N100BNTD2	FGA50N100BNTD2	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	$V_{GE} = \pm 25V, V_{CE} = 0V$	-	-	± 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
		$I_C = 60A, V_{GE} = 15V, T_C = 125^\circ C$	-	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	$V_{CC} = 600V, I_C = 60A, R_G = 10\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 25^\circ C$	-	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		-	257	350	nC
Q_{ge}	Gate to Emitter Charge		$V_{CE} = 600V, I_C = 60A, V_{GE} = 15V, T_C = 25^\circ C$	-	45	-
Q_{gc}	Gate to Collector Charge	-	95	-	nC	

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

V_{FM}	Diode Forward Voltage	$I_F = 15A$	-	2.9	3.2	V
		$I_F = 60A$	-	4.0	4.7	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 60A, di/dt = 100A/us$	-	60	75	ns
I_R	Instantaneous Reverse Current	$V_{RRM} = 1000V$	-	-	2	μA

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

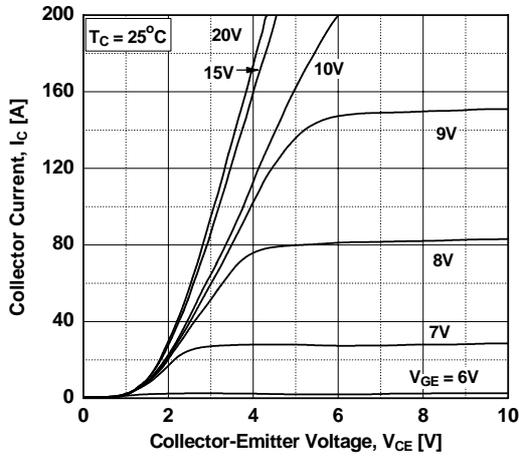


Figure 2. Typical Output Characteristics

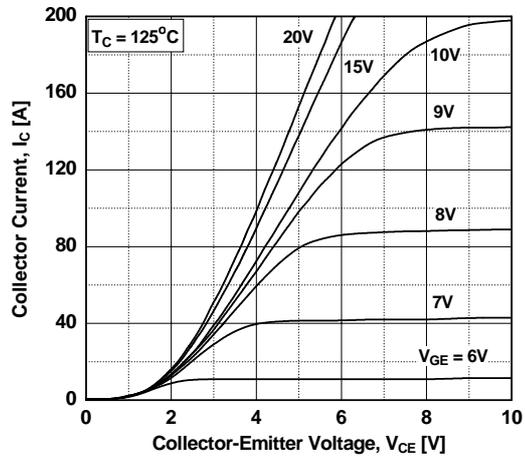


Figure 3. Typical Saturation Voltage Characteristics

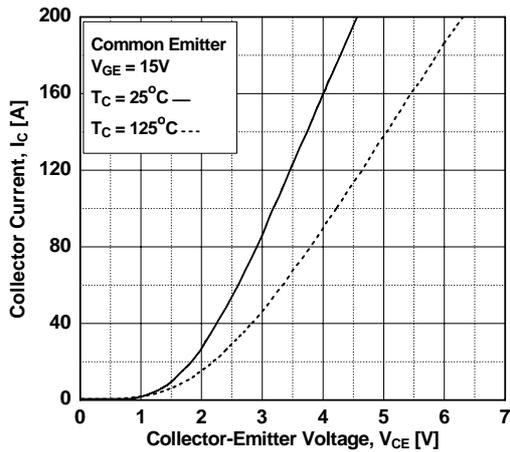


Figure 4. Transfer Characteristics

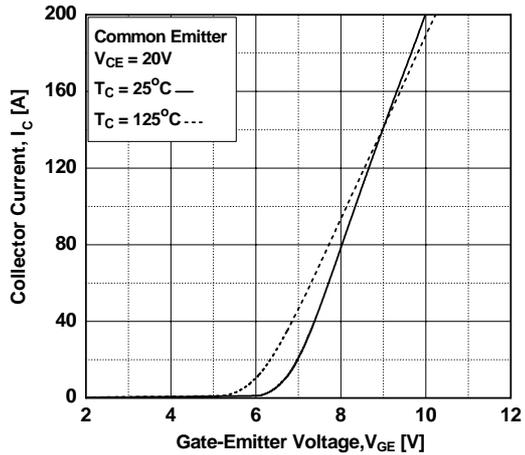


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

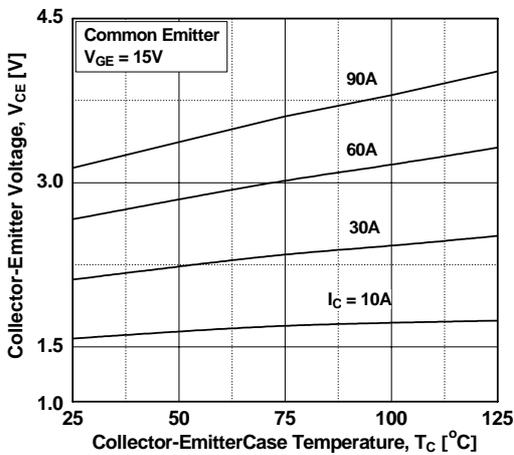
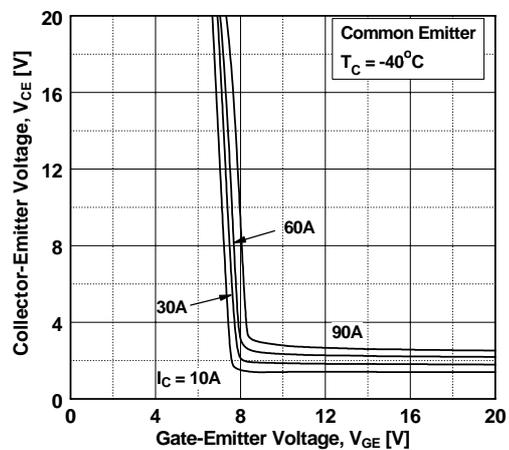


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

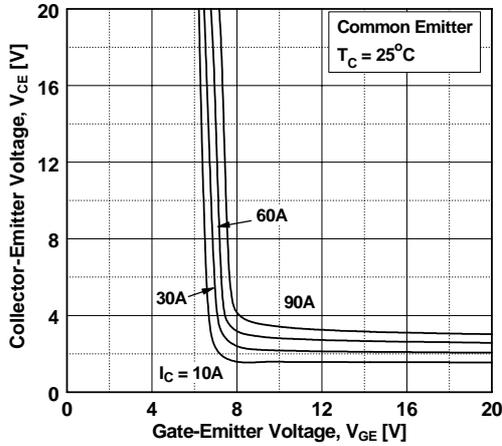


Figure 8. Saturation Voltage vs. V_{GE}

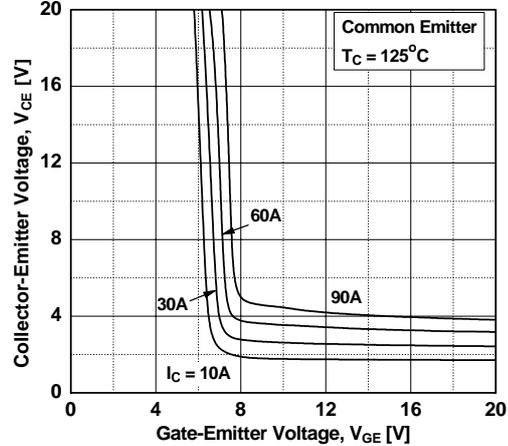


Figure 9. Capacitance Characteristics

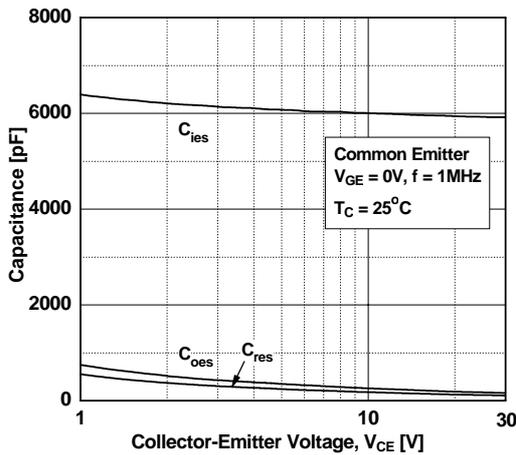


Figure 10. Gate charge Characteristics

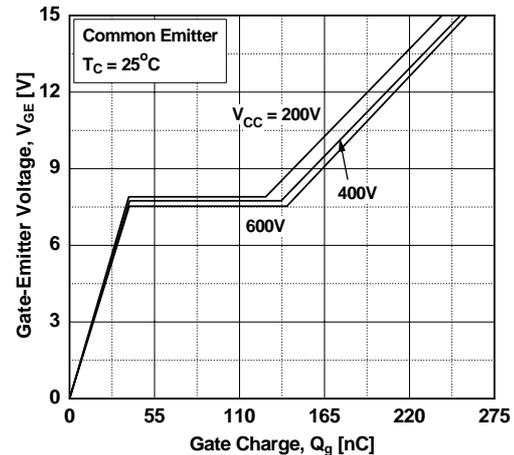


Figure 11. SOA Characteristics

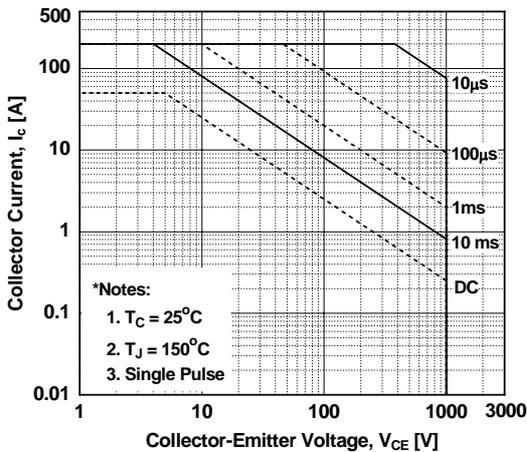
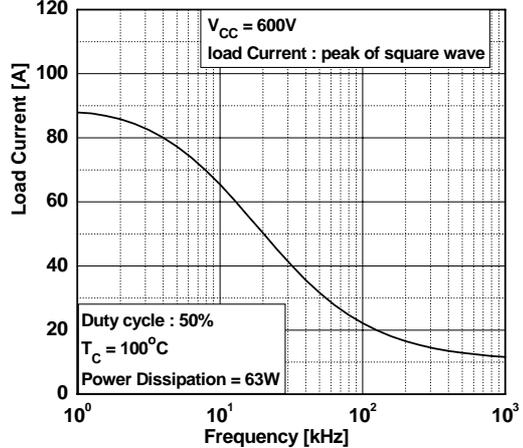


Figure 12. Load Current vs. Frequency



Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Gate Resistance

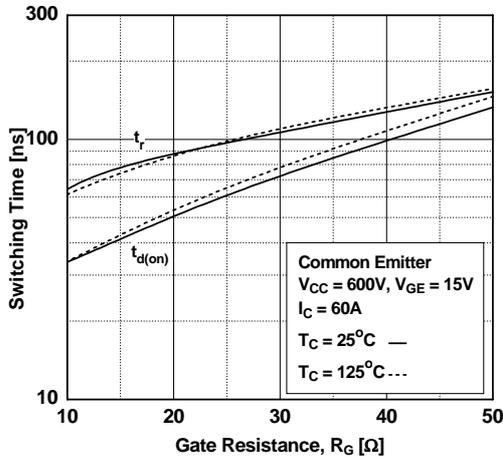


Figure 14. Turn-off Characteristics vs. Gate Resistance

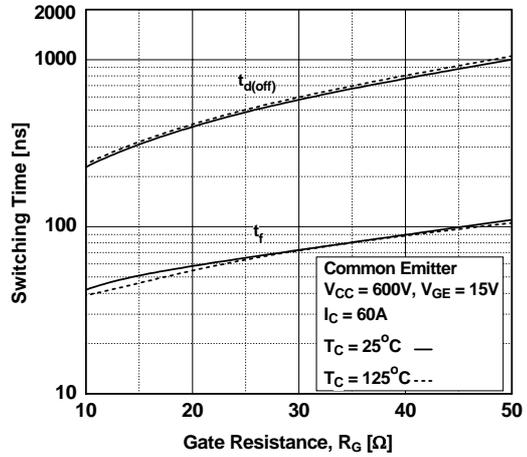


Figure 15. Turn-on Characteristics vs. Collector Current

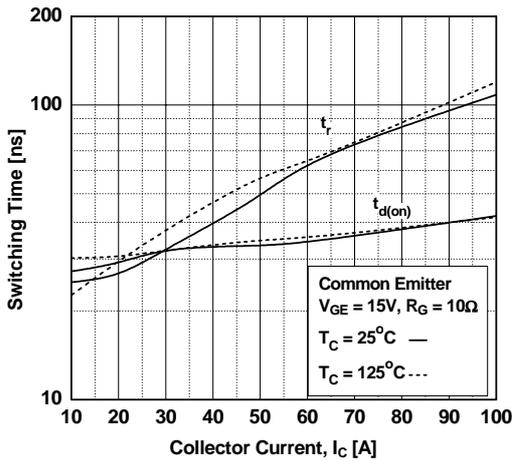


Figure 16. Turn-off Characteristics vs. Collector Current

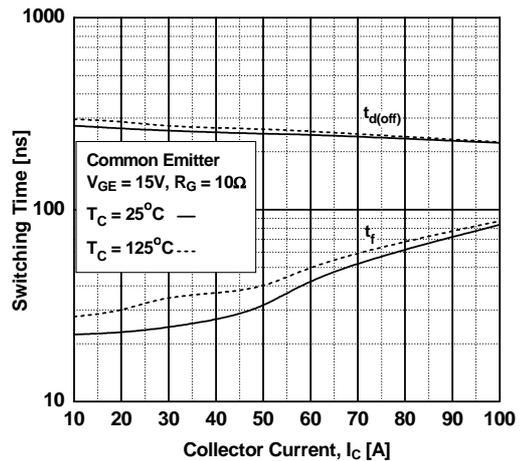


Figure 17. Switching Loss vs. Gate Resistance

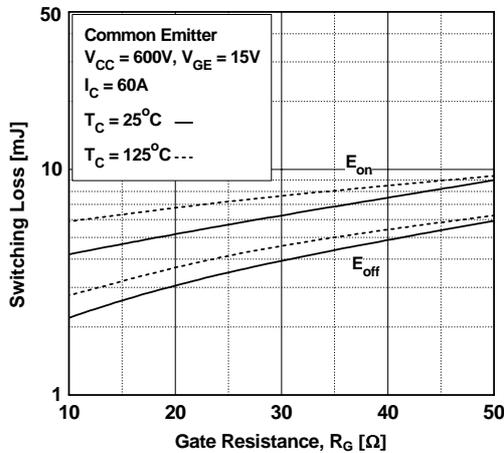
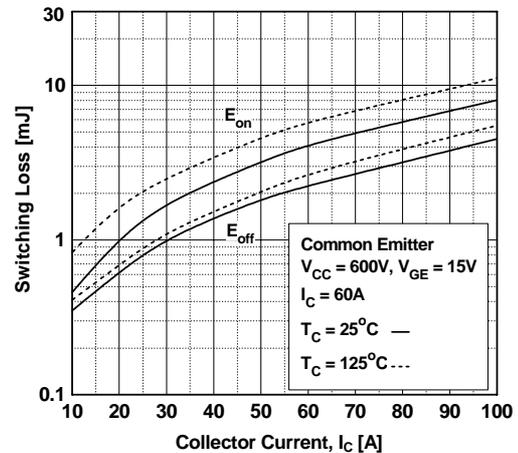


Fig 18. Switching Loss vs. Collector Current



Typical Performance Characteristics

Figure 19. Turn off Switching SOA Characteristics

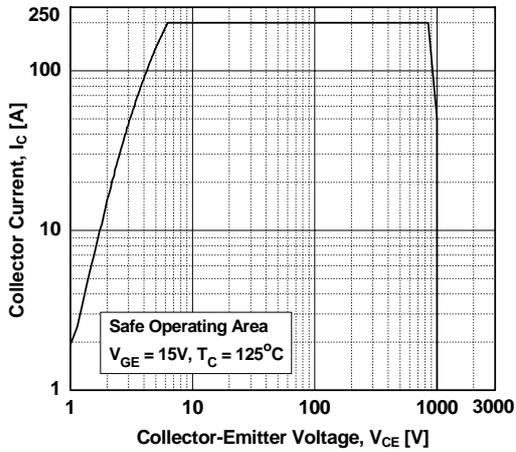


Figure 20. Forward Characteristics

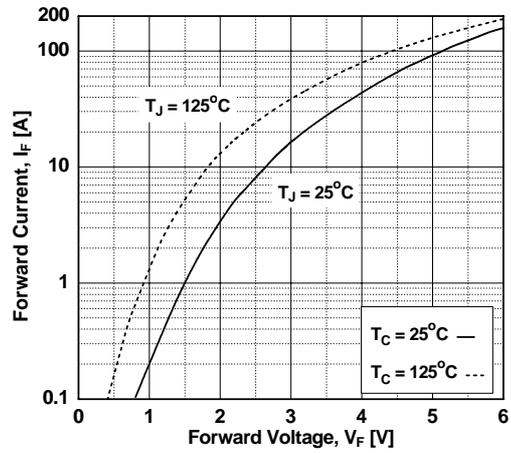


Figure 21. Reverse Current

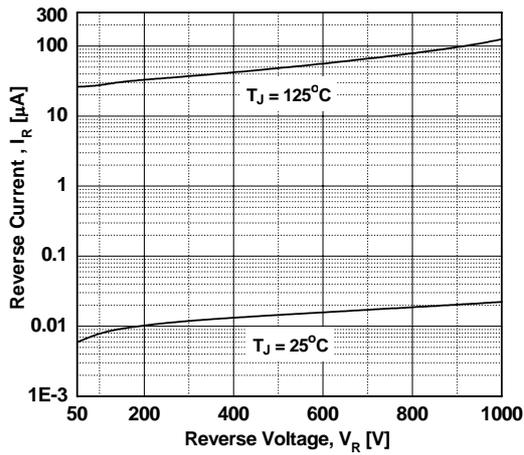


Figure 22. Reverse Recovery Characteristics vs. di/dt

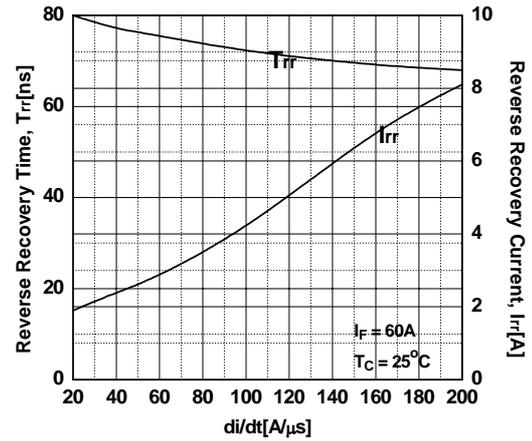
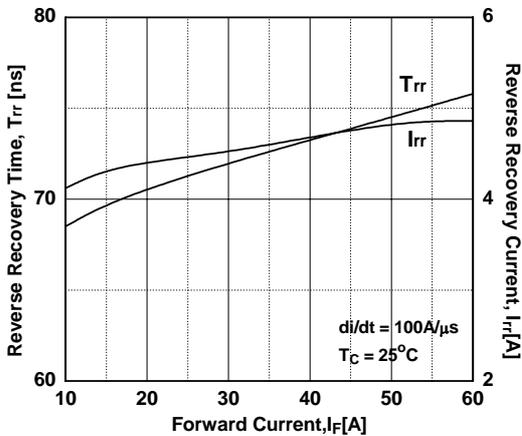
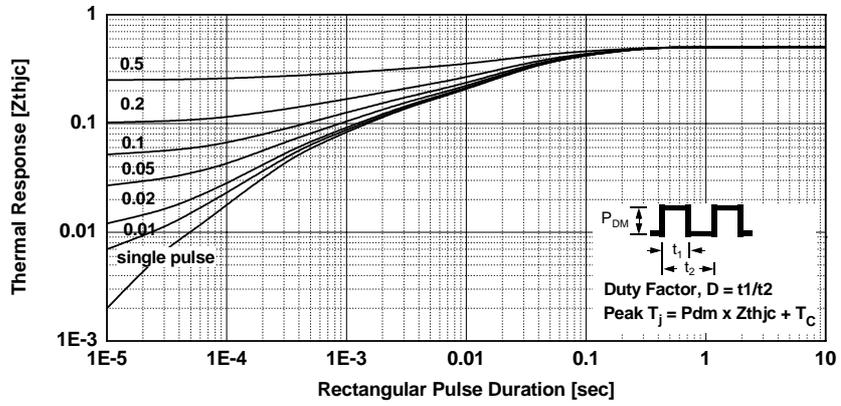


Figure 23. Reverse Recovery Characteristics vs. Forward Current



Typical Performance Characteristics

Figure 24. Transient Thermal Impedance of IGBT





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