

Silicon Trench NPT IGBT

Description

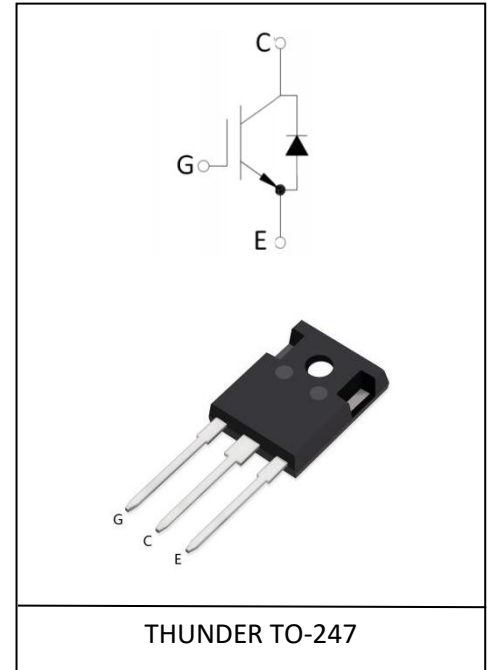
The THG40T65NQG is use advanced trench NPT technology. The 650V trench NPT IGBT offers superior conduction and switching performances.

General Features

- 650V Breakdown Voltage
- Low saturation voltage: $V_{CE(sat), typ}=1.9V$
@ $I_C=40A$ and $T_C=25^{\circ}C$
- Trench NPT Technology, Positive temperature coefficient

Application

- Driver Converters
- Welding Converters
- UPS



Electrical Characteristics @ $T_C=25^{\circ}C$ (unless otherwise specified)

a) Limited Parameters:

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	+/-20	V
I_C	Collector Current	80	A
	Collector Current @ $T_C=100^{\circ}C$	40	A
I_{CM}	Pulsed Collector Current	120	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}C$	40	A
I_{FM}	Pulsed Diode Forward Current	120	A
P_D	Total Dissipation at @ $T_a=25^{\circ}C$	187	W
	Total Dissipation at @ $T_C=100^{\circ}C$	93	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	$^{\circ}C$
T_L	Max Temperature For Soldering	260	$^{\circ}C$
T_{SC}	Short circuit data $V_{GE}=15V$, $V_{CC} \leq 360V$, $T_{vj}=150^{\circ}C$	5	us

b) Electrical Parameters:

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{CES}	Collector-Emitter Voltage	$V_{GE}=0V, I_{CE}=250\mu A$	650			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=40A$		1.9	2.3	V
$V_{GE(th)}$	Gated Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	4.8	5.7	6.6	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=650V$			5.0	μA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+20V,$			250	nA
$I_{GES(R)}$	Gate to Emitter Reverse Leakage	$V_{GE}=-20V,$			-250	nA
C_{ies}	Input Capacitance	$V_{GE}=0V,$ $V_{CE}=30V,$ $f=1.0MHz$		3070		pF
C_{oes}	Output Capacitance			123		pF
C_{res}	Reverse Transfer Capacitance			80		pF
Q_g	Total Gate Charge	$V_{CE}=400V$		165		nC
Q_{ge}	Gate to Emitter Charge	$I_C=40A$		15		nC
Q_{gc}	Gate to Collector Charge	$V_{GE}=15V$		96		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=40A$ $V_{GE}=15V, R_G=10\Omega$		42		nS
t_r	Rise Time			50		nS
$t_{d(off)}$	Turn-off Delay Time			207		nS
t_f	Fall Time			53		nS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_F	Diode Continuous Forward Current	$TC=100^\circ C$	40			A
I_{FM}	Pulsed Diode Forward Current	$TC=25^\circ C$	120			A
V_F	Diode Forward Voltage	$I_F=40A$		1.5	2.2	V
t_{rr}	Reverse Recovery Time	$T_J 25^\circ C, I_F=40A$ $di/dt=200A/\mu s$		120		nS
Q_{rr}	Reverse Recovery Charge			240		nC

*Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Symbol	Parameter	Typ	MAX	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.8	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ C/W$

Typical Performance Characteristics

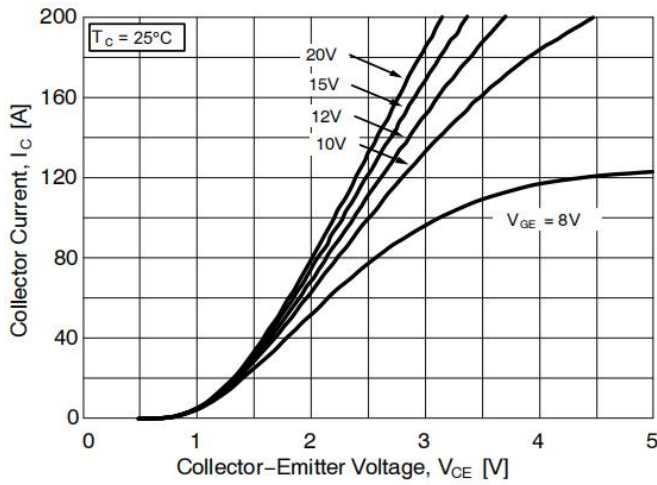


Figure 1. Typical Output Characteristics

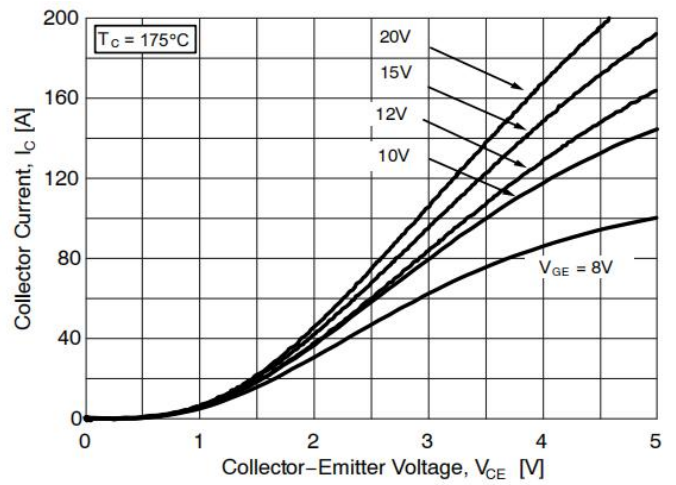


Figure 2. Typical Output Characteristics

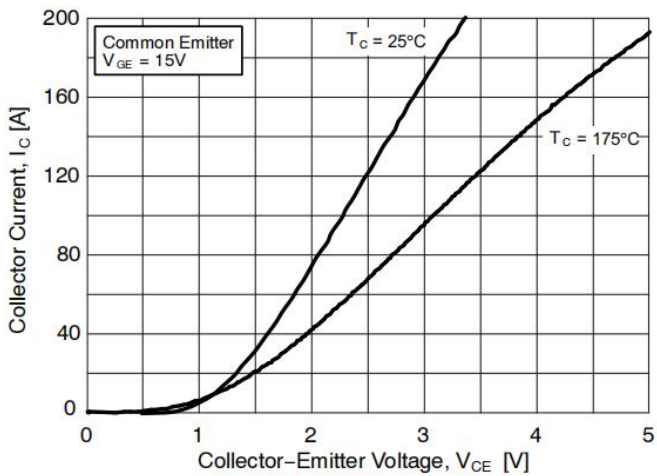


Figure 3. Typical Saturation Voltage

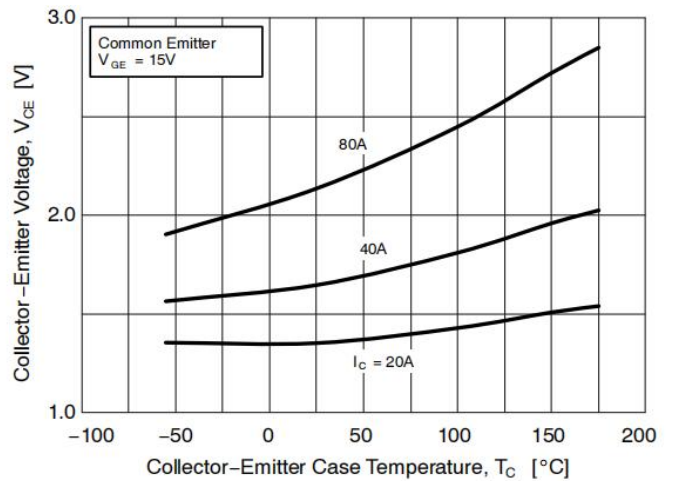


Figure 4. Saturation Voltage vs. Case Temperature

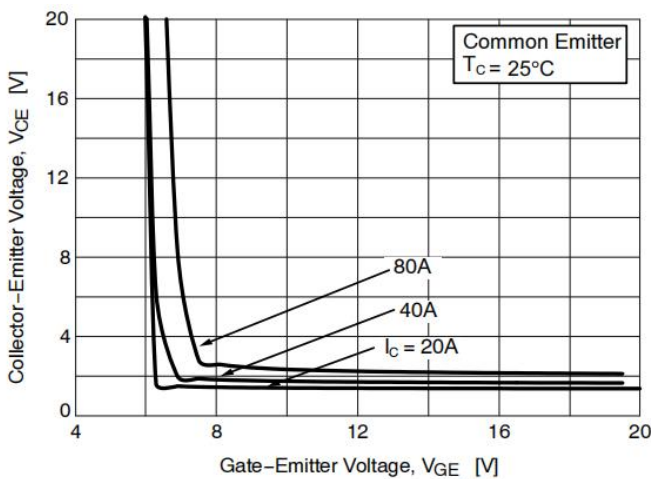


Figure 5. Saturation Voltage vs. V_{GE}

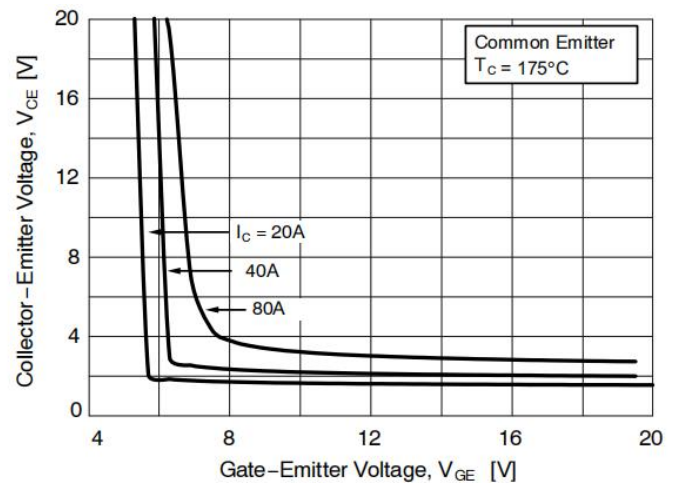


Figure 6. Saturation Voltage vs. V_{GE}

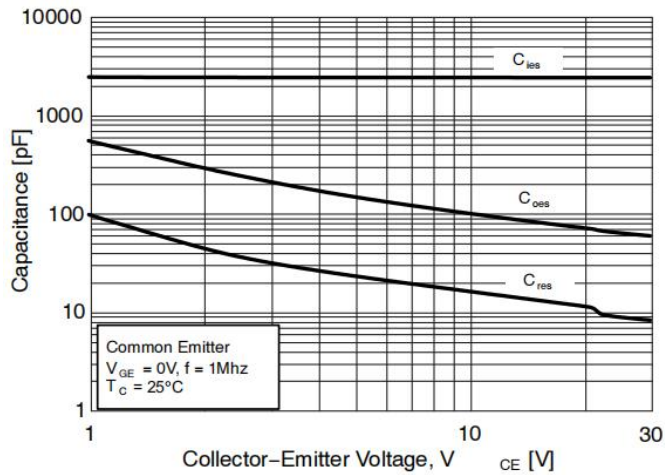


Figure 7. Capacitance Characteristics

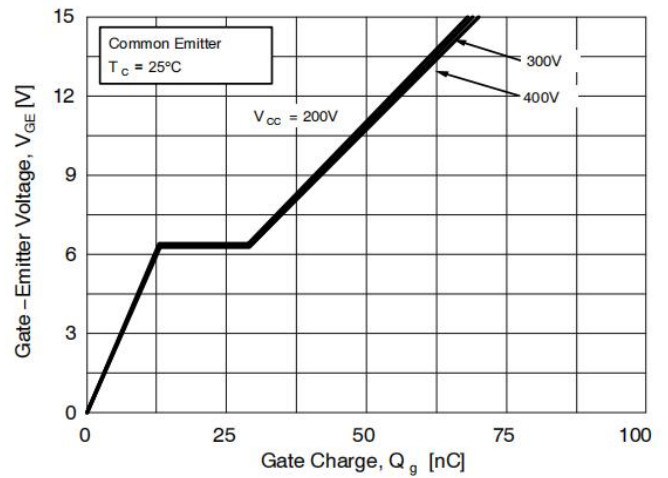


Figure 8. Gate Charge

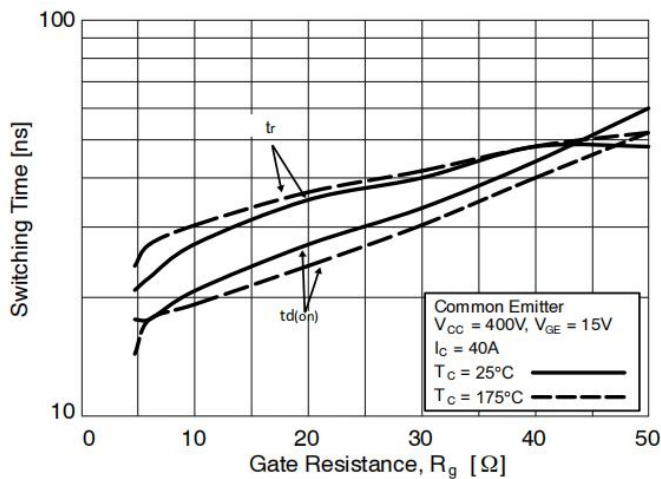


Figure 9. Turn-On Characteristics vs. Gate Resistance

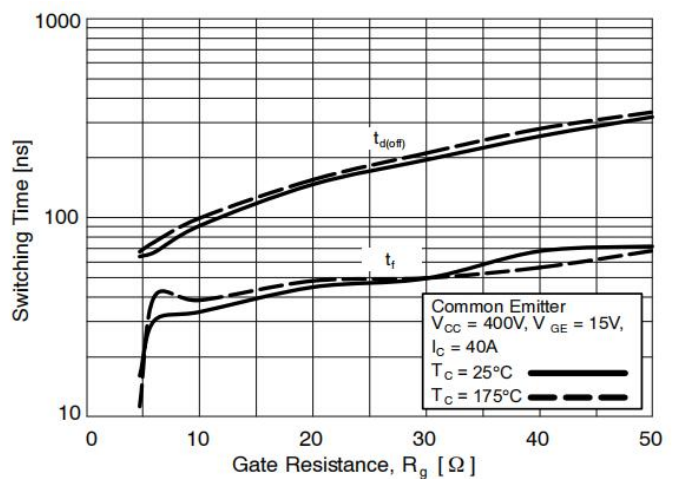


Figure 10. Turn-Off Characteristics vs. Gate Resistance

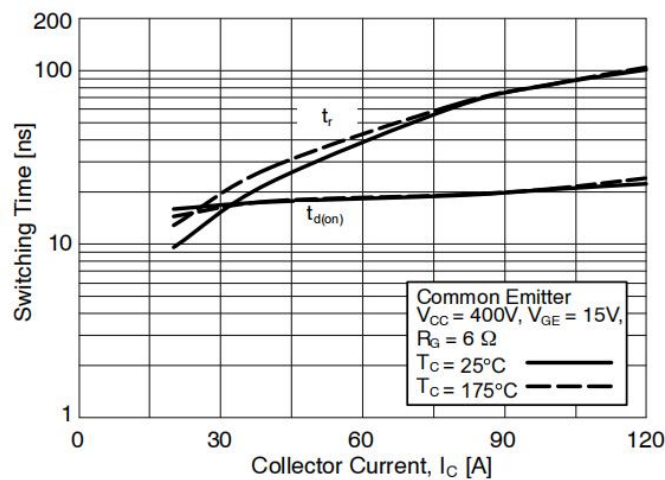


Figure 11. Turn-On Characteristics vs. Collector Current

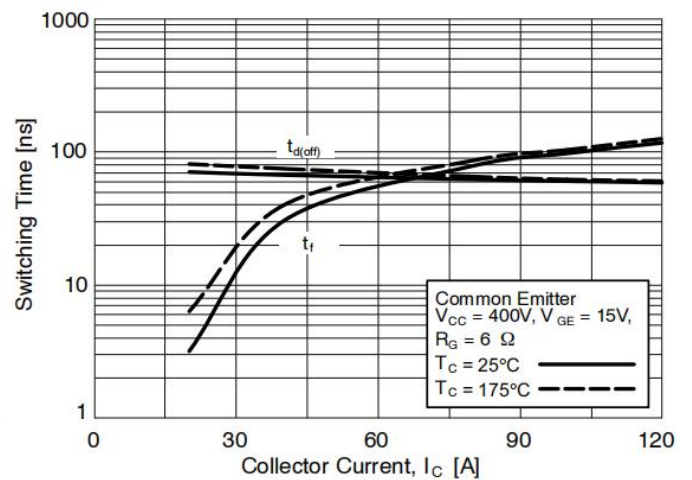


Figure 12. Turn-Off Characteristics vs. Collector Current

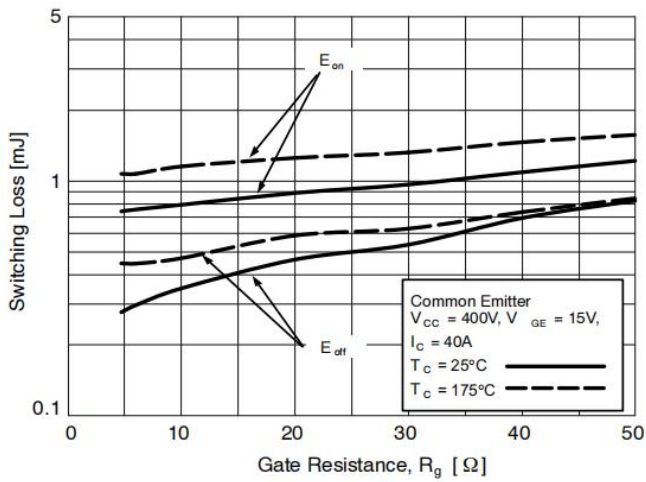


Figure 13. Switching Loss vs. Gate Resistance

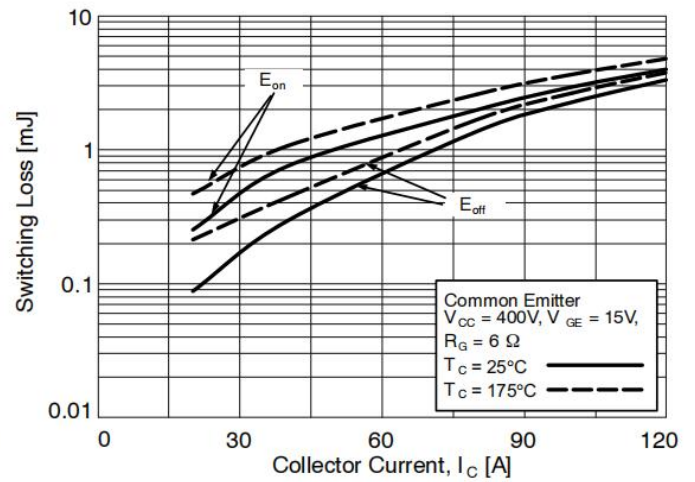


Figure 14. Switching Loss vs. Collector Current

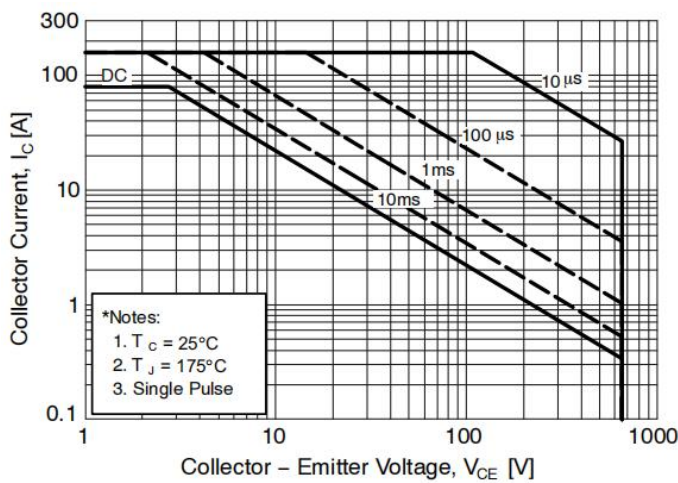


Figure 15. SOA Characteristics

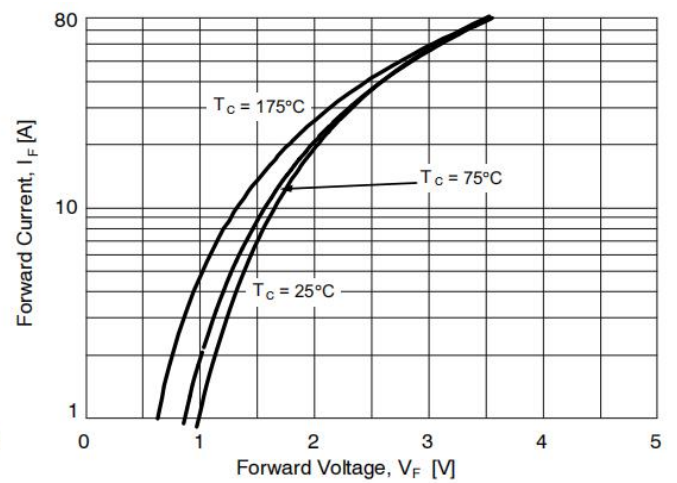


Figure 16. Forward Characteristics

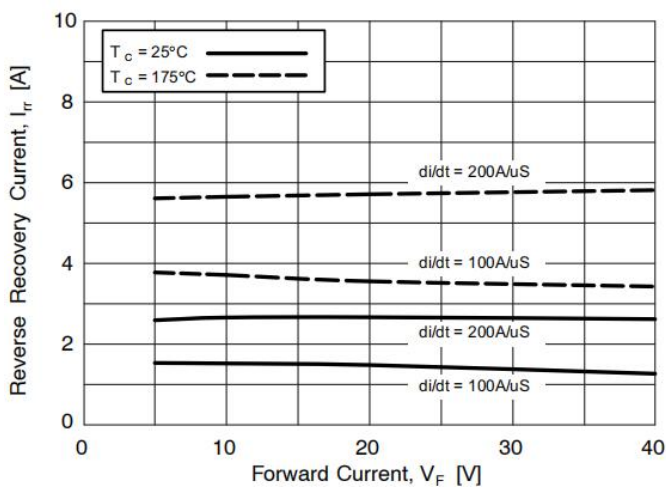


Figure 17. Reverse Recovery Current

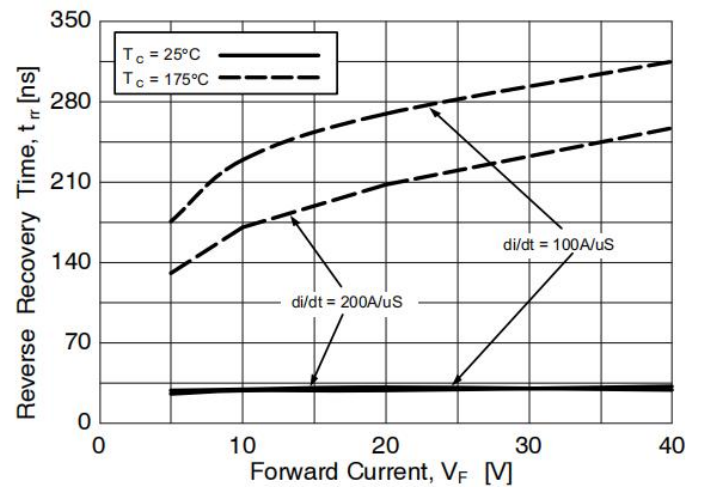


Figure 18. Reverse Recovery Time

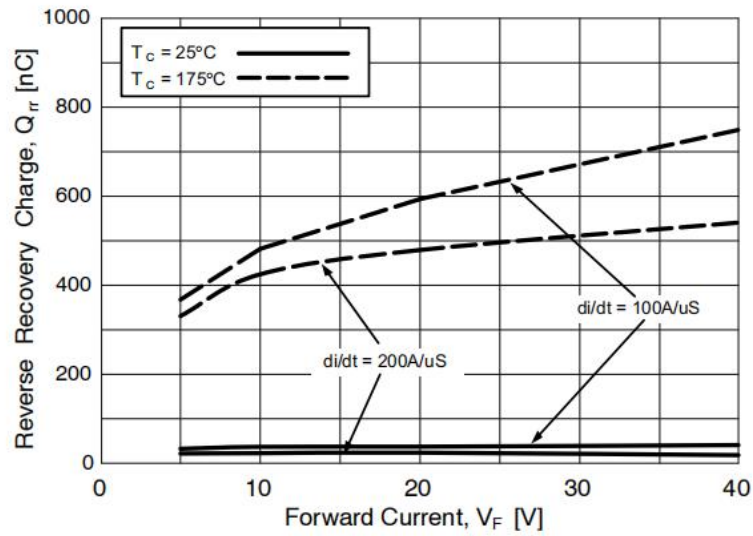


Figure 19. Stored Charge

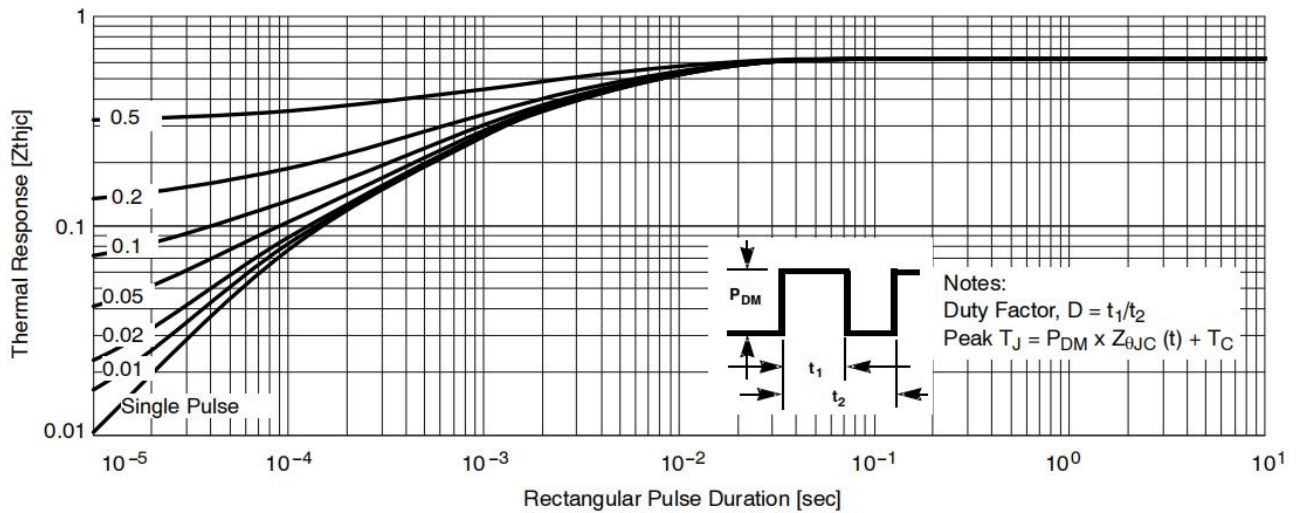


Figure 20. Transient Thermal Impedance of IGBT

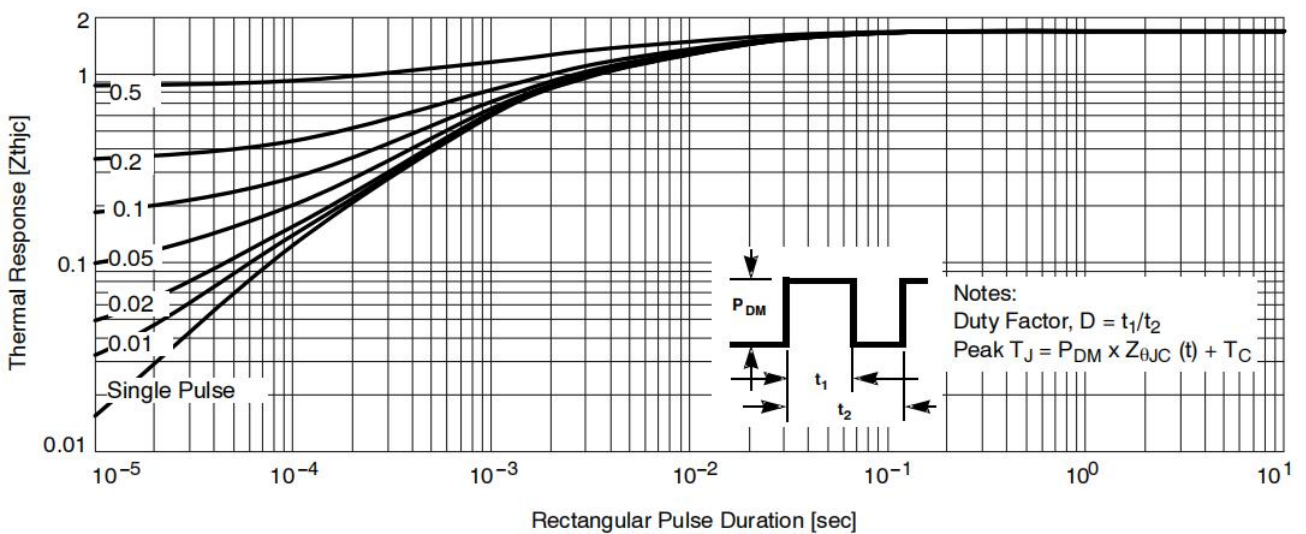
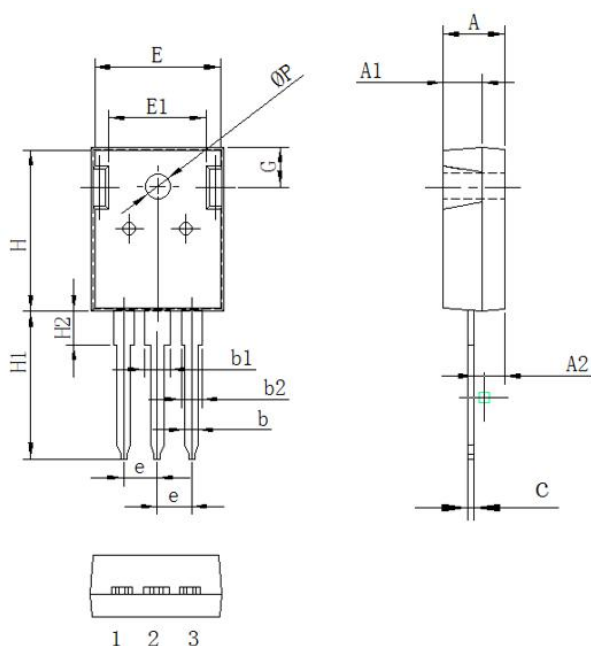


Figure 21. Transient Thermal Impedance of Diode

Package Information

TO-247 PACKAGE

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.8	5.00	5.20
A1	3.3	3.5	3.7
A2	2.20	2.40	2.60
b	1.00	1.2	1.40
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c	0.50	0.60	0.70
e	5.25	5.45	5.65
E	15.2	15.7	16.2
E1	10.2	10.7	11.2
H	20.8	21	21.2
H1	19.5	20.0	20.5
H2	4.00	4.20	4.40
G	5.60	5.80	600
ΦP	3.50	3.70	3.90

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