Silicon Trench NPT IGBT

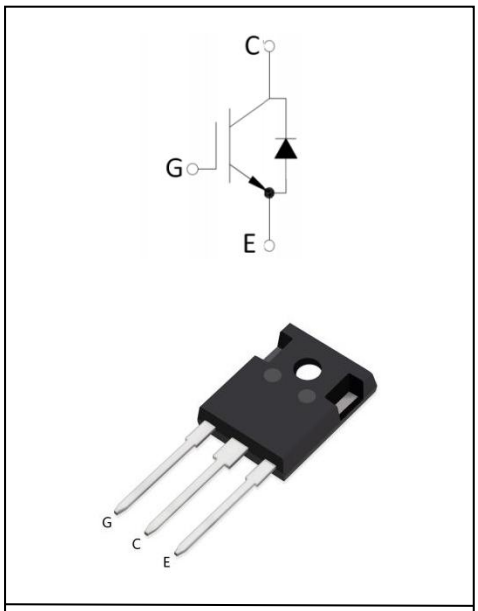
Description

The THG60T65NQK 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=1.95V

  @I_C=50A and T_C=25℃
- Tench NPT Technology, Positive temperature coefficient



THUNDER TO-247

Application

- Driver Converters
- Welding Converters
- UPS

Electrical Characteristics @ Tc=25℃(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	120	A
	Collector Current @Tc=100℃	60	A
I_{CM}	Pulsed Collector Current	180	A
I_F	Diode Continuous Forward Current @Tc=100℃	60	A
I_{FM}	Diode Maximum Forward Current	180	A
P_D	Total Dissipation at @Tc = 25°C	652	W
	Total Dissipation at @Tc = 100°C	326	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	℃
T_L	Max Temperature For Soldering	260	℃
T_{SC}	Short circuit withstand time VGE=15V, VCC≤400V, Allowed number of short circuits<1000Time between short circuits:≥1.0s,Tj≤150°C	5	us

b) Electrical Parameters:

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{CES}	Collector-Emitter Voltage	V_{GE}=0V, I_{CE}=250μA	650			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=60A		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	uA
$I_{GES(F)}$	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 I_C=60A V_{GE}=15V		165		nC
Q_{ge}	Gate to Emitter Charge			15		nC
Q_{gc}	Gate to Collector Charge			96		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=400V,I_C=60A V_{GE}=15V,R_G=10Ω		42		nS
t_r	Rise Time			50		nS
$t_{d(off)}$	Turn-off Delay Time			218		nS
t_f	Fall Time			57		nS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_F	Diode Continuous Forward Current	TC=100℃	60			A
I_{FM}	Diode Maximum Forward Current	TC=100℃	180			A
V_F	Diode Forward Voltage	I_F=60A		1.4	3.0	V
t_{rr}	Reverse Recovery Time	T_J=25℃,I_F=60A di/dt=200A/us		120		nS
Q_{rr}	Reverse Recovery Charge			240		nC
*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%						

Symbol	Paramter	Typ	MAX	Units
$R_{\theta JC}$	Themal Resistance,Junction to case for IGBT	--	0.23	℃/W
$R_{\theta JC}$	Themal Resistance,Junction to case for Diode	--	1.25	℃/W
$R_{\theta JA}$	Themal Resistance,Junction to Ambient	--	40	℃/W

Typical Performance Characteristics

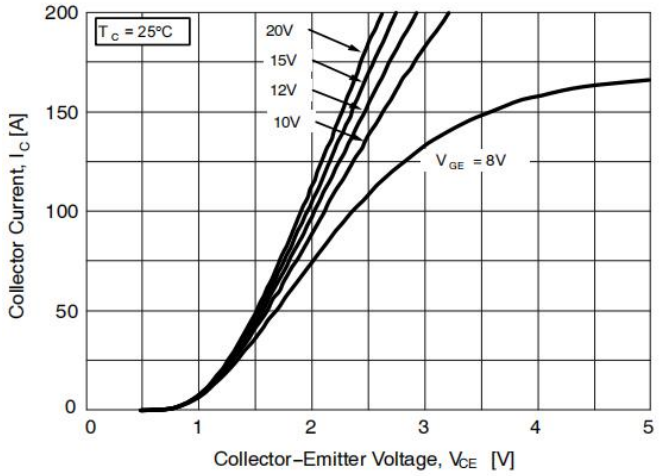


Figure 1. Typical Output Characteristics

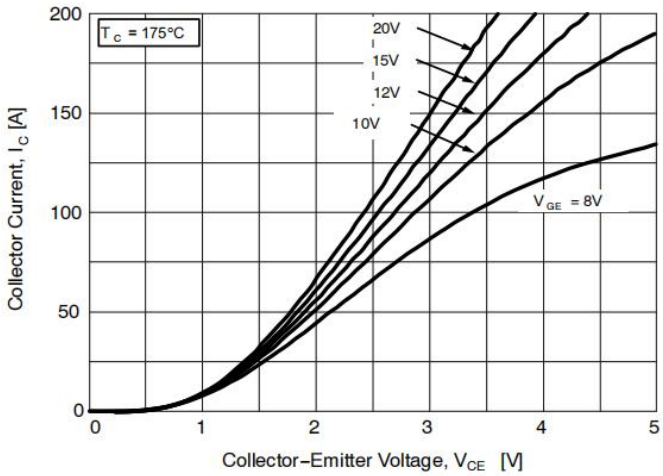


Figure 2. Typical Output Characteristics

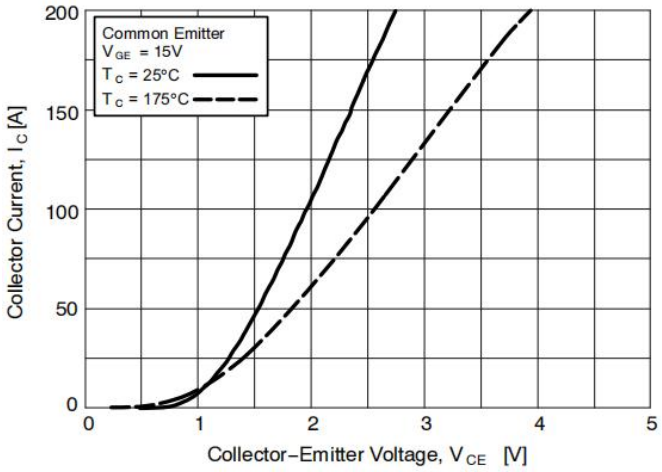


Figure 3. Typical Saturation Voltage

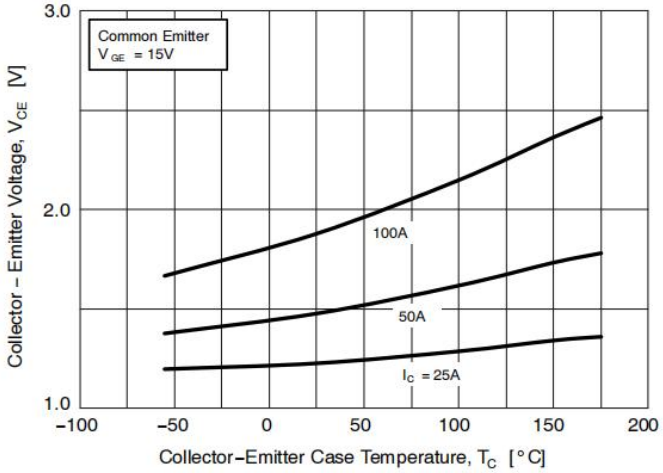


Figure 4. Saturation Voltage vs. Case Temperature

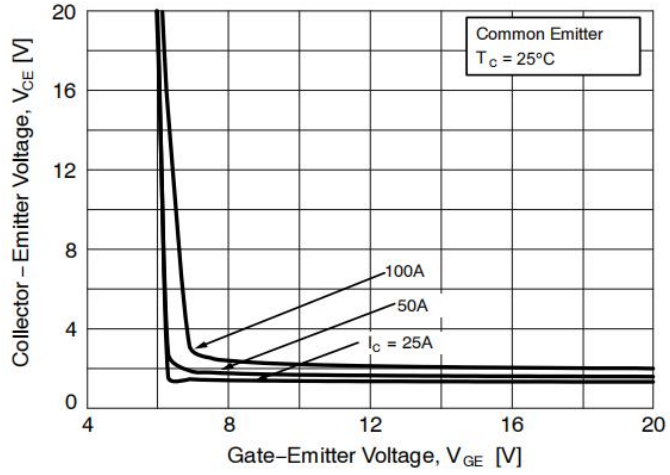


Figure 5. Saturation Voltage vs. V_{GE}

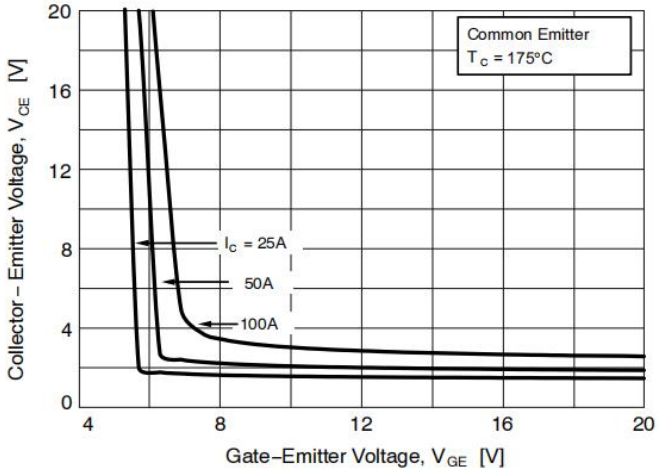


Figure 6. Saturation Voltage vs. V_{GE}

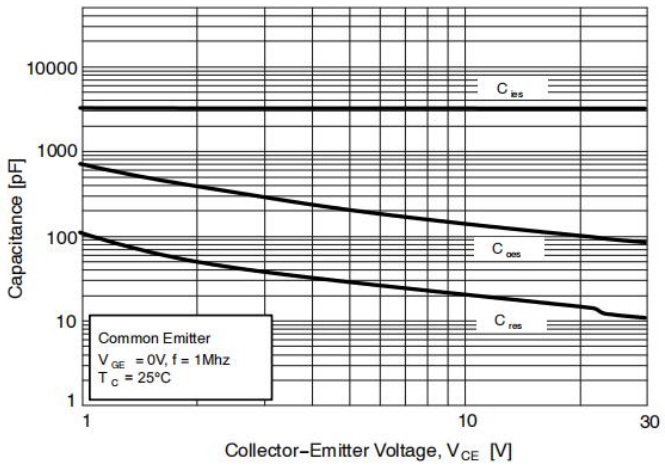


Figure 7. Capacitance Characteristics

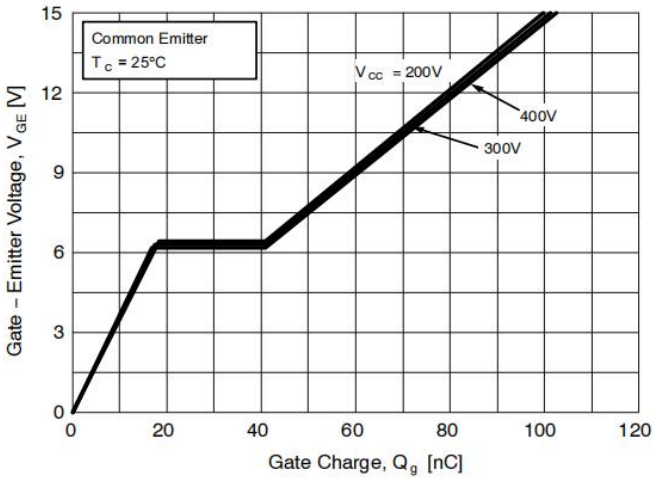


Figure 8. Gate Charge

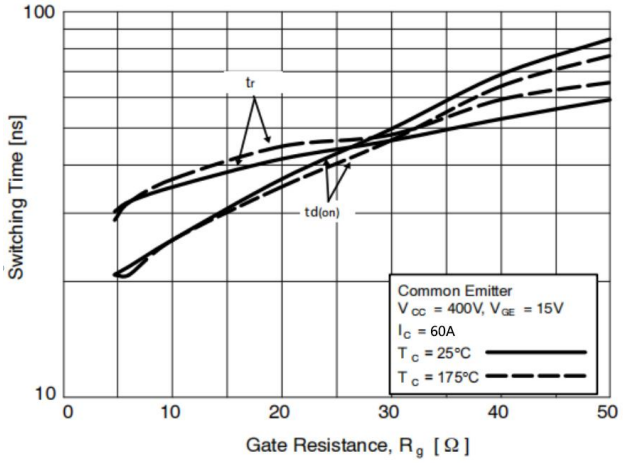


Figure 9. Turn–On Characteristics vs. Gate Resistance

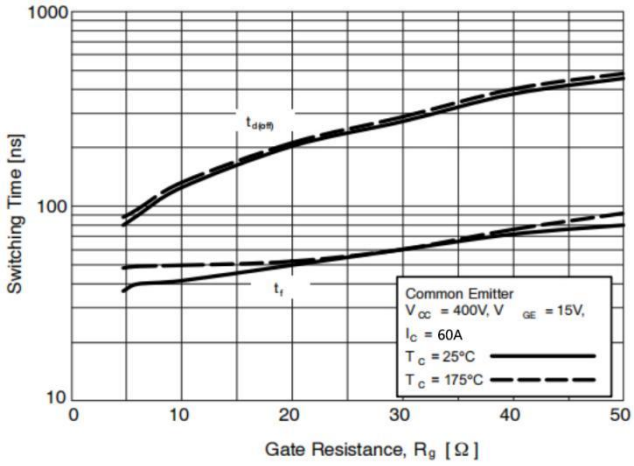


Figure 10. Turn–Off Characteristics vs. Gate Resistance

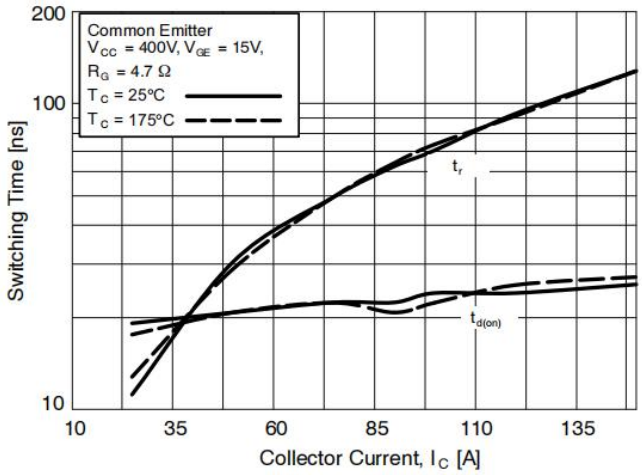


Figure 11. Turn–On Characteristics vs. Collector Current

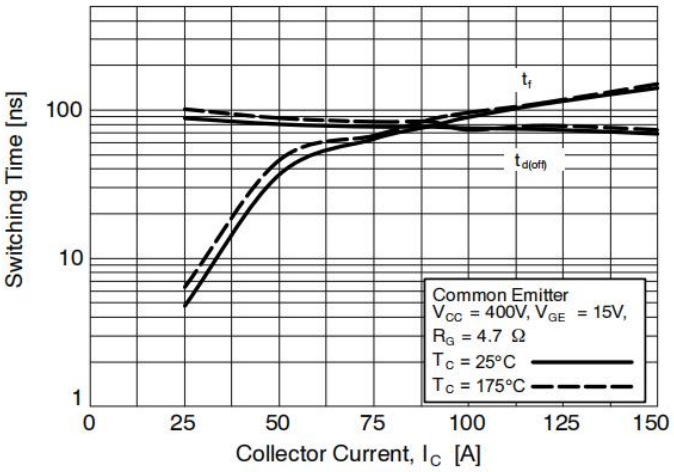


Figure 12. Turn–Off Characteristics vs. Collector Current

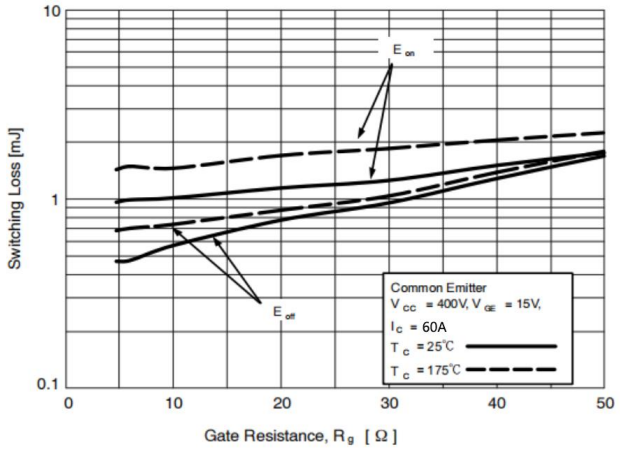


Figure 13. Switching Loss vs. Gate Resistance

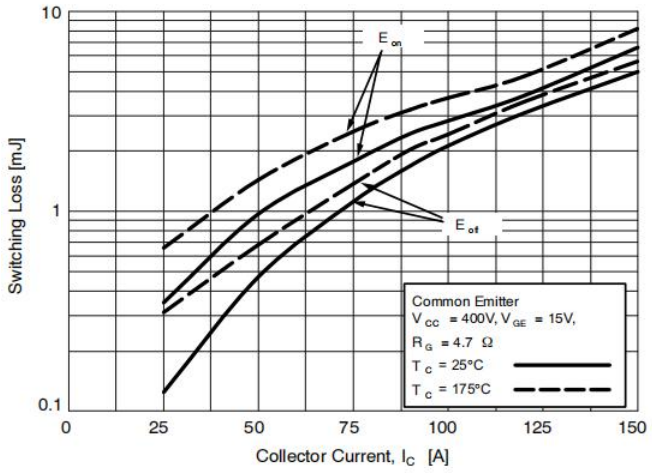


Figure 14. Switching Loss vs. Collector Current

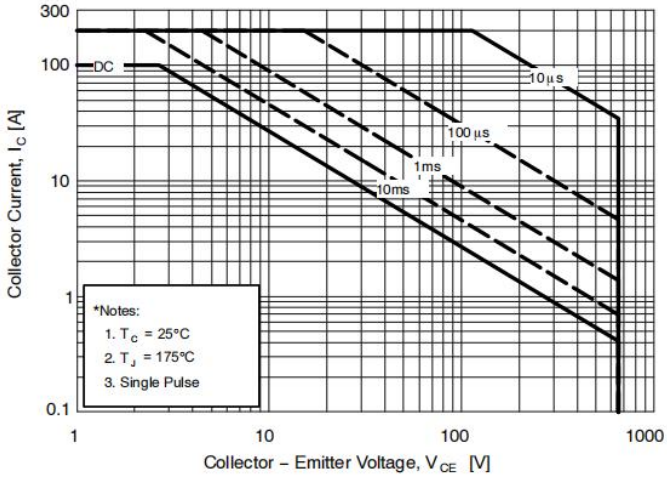


Figure 15. SOA Characteristics

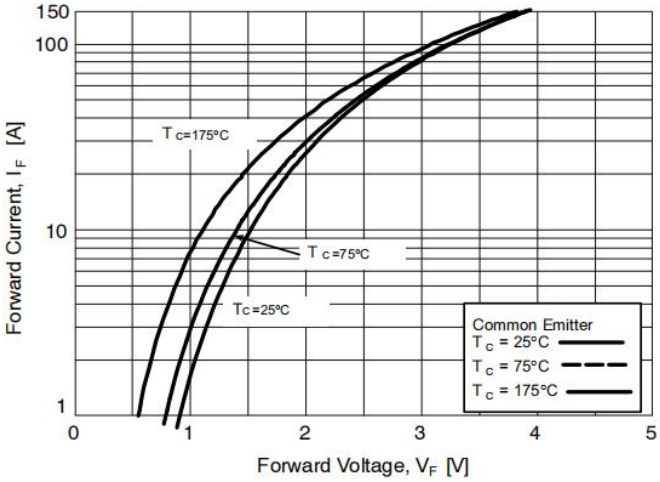


Figure 16. Forward Characteristics

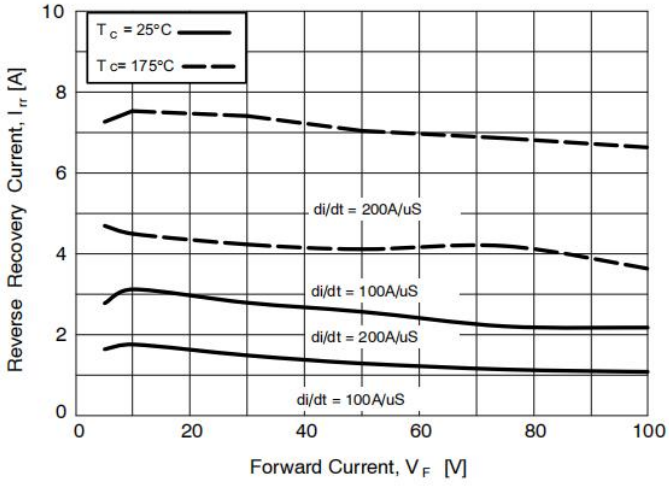


Figure 17. Reverse Recovery Current

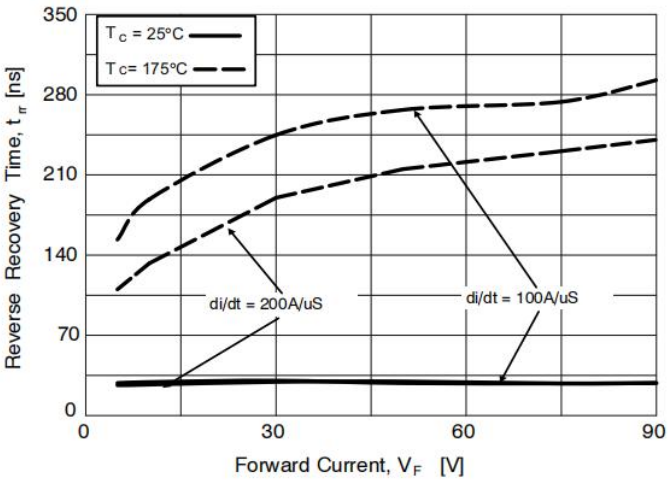


Figure 18. Reverse Recovery Time

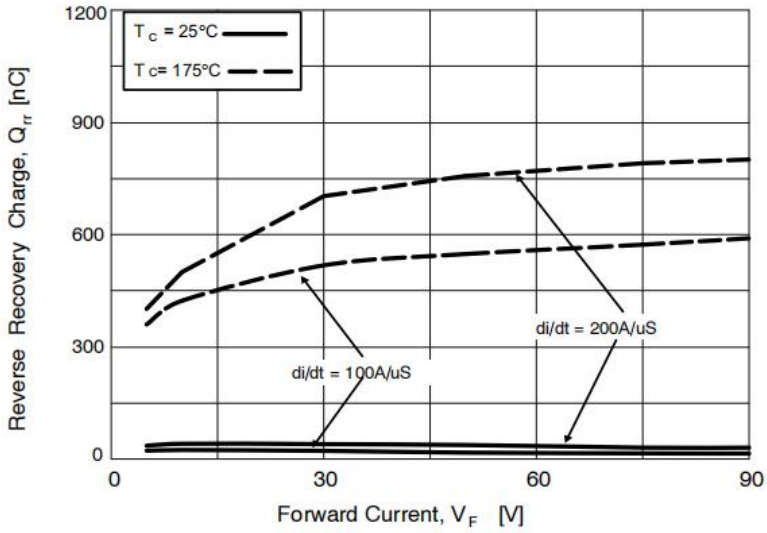


Figure 19. Stored Charge

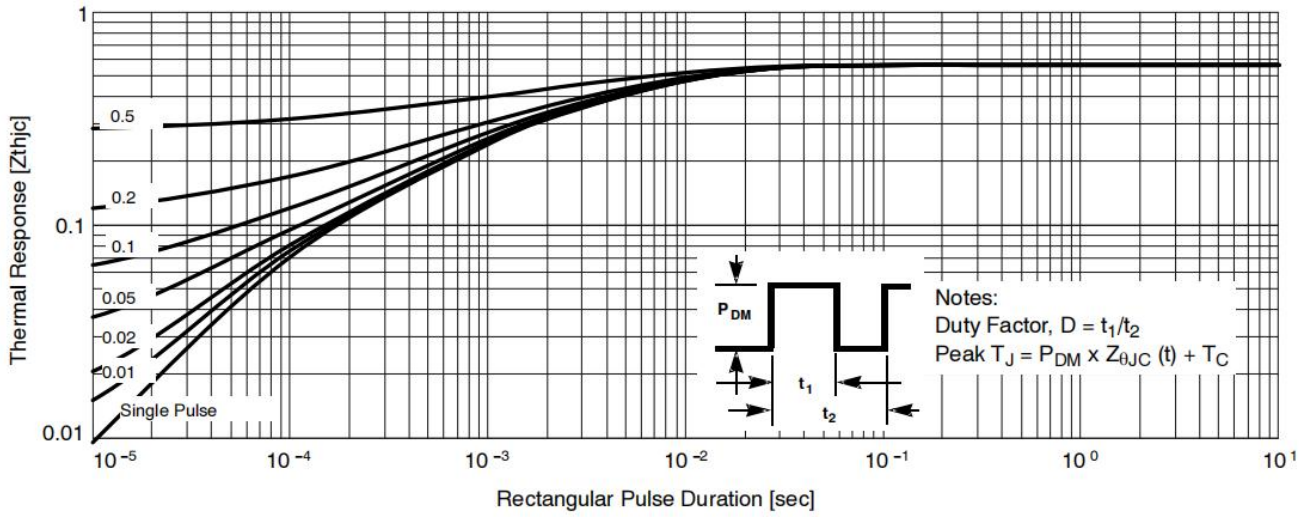


Figure 20. Transient Thermal Impedance of IGBT

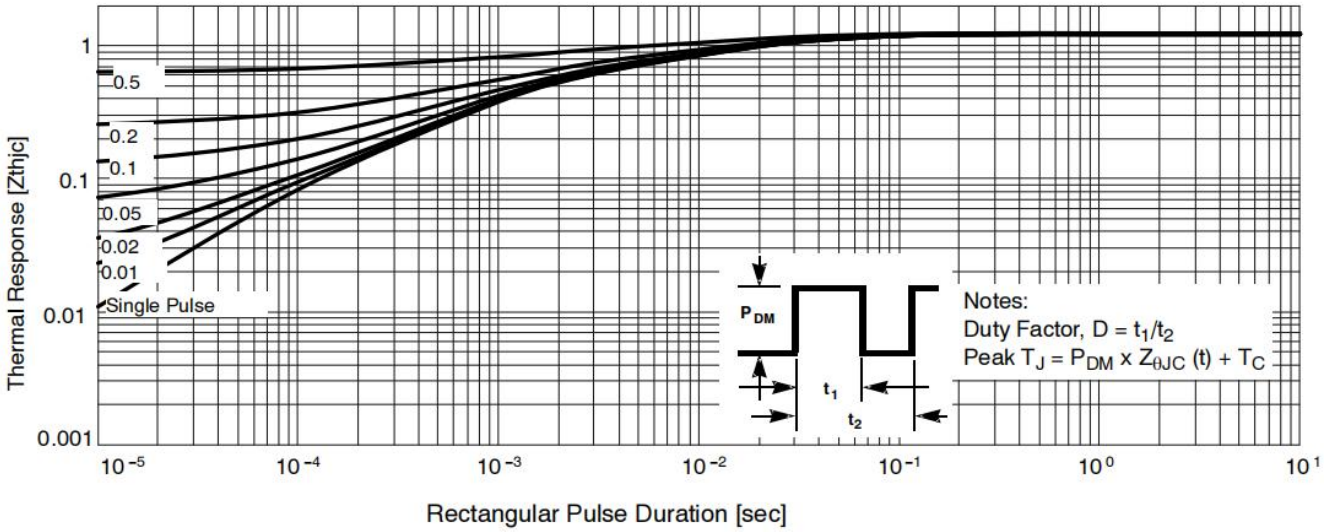
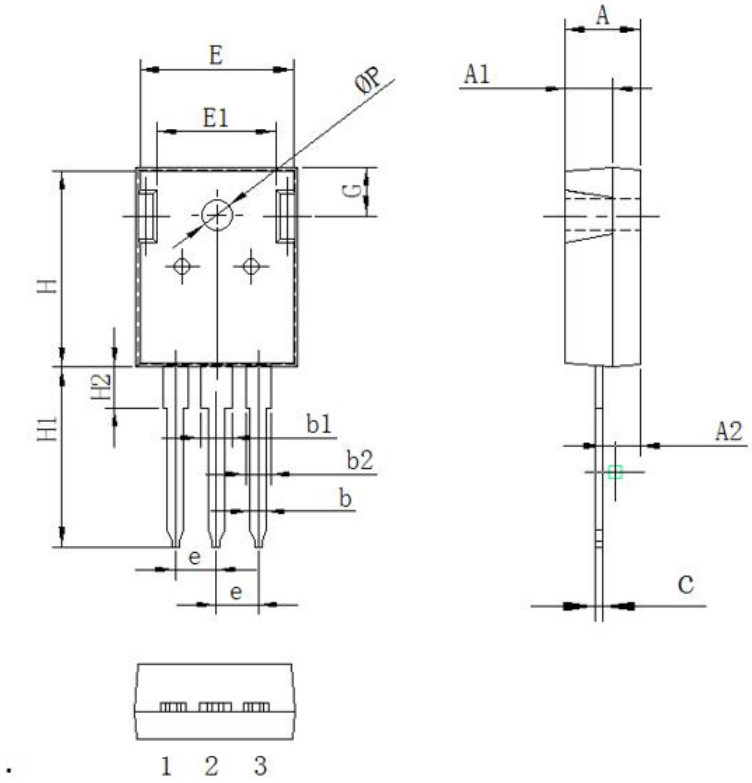


Figure 21. Transient Thermal Impedance of Diode

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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