

Silicon Field Stop(FS) Trench IGBT

Description

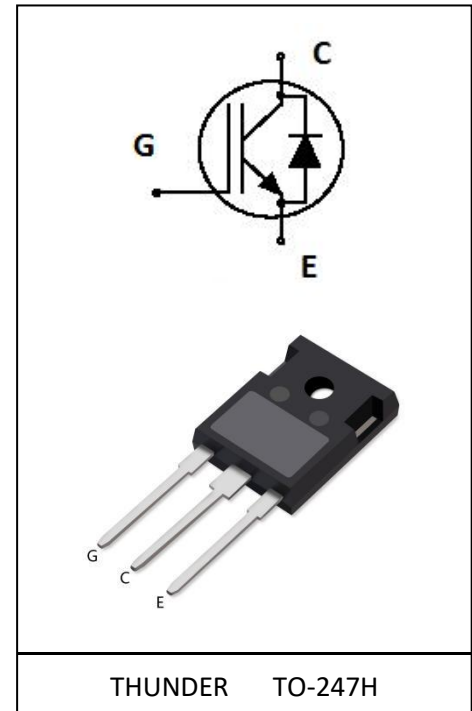
The THG60T65FQKH is use advanced field stop(FS) trench technology. The 650V FS trench IGBT offers superior conduction and switching performances.

General Features

- 650V Breakdown Voltage
- Low saturation voltage: $V_{CE(sat)}$, typ=1.85V
@ $I_C=60A$ and $T_C=25^{\circ}C$
- FS Trench Technology, Positive temperature coefficient

Application

- Solar Converters
- Welding Converters
- UPS
- PFC
- PV Inverter



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	120	A
	Collector Current @ $T_C=100^{\circ}C$	60	A
I_{CM}	Pulsed Collector Current	240	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}C$	60	A
I_{FM}	Diode Maximum Forward Current	240	A
P_D	Total Dissipation at @ $T_C=100^{\circ}C$	240	W
	Total Dissipation at @ $T_a=25^{\circ}C$	440	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	$^{\circ}C$
T_L	Max Temperature For Soldering	265	$^{\circ}C$

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	$V_{GE}=15V, I_C=60A$		1.85	2.40	V
$V_{GE(th)}$	Gated Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	4.5	5.5	6.5	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=650V$			10	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	$V_{GE}=0V,$ $V_{CE}=30V,$ $f=1.0MHz$		4452		pF
C_{oes}	Output Capacitance			238		pF
C_{res}	Reverse Transfer Capacitance			167		pF
Q_g	Total Gate Charge	$V_{CE}=400V$		135		nC
Q_{ge}	Gate to Emitter Charge	$I_C=60A$		35		nC
Q_{gc}	Gate to Collector Charge	$V_{GE}=15V$		58		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=60A$ $V_{GE}=15V, R_G=10\Omega$		73		nS
t_r	Rise Time			158		nS
$t_{d(off)}$	Turn-off Delay Time			335		nS
t_f	Fall Time			141		nS
E_{on}	Turn-on Energy			2.69		mJ
E_{off}	Turn-off Energy			1.29		mJ
E_{tot}	Total Switching Energy			3.98		mJ

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I _F	Diode Continuous Forward Current	TC=100℃	60			A
I _{FM}	Diode Maximum Forward Current		240			A
V _F	Diode Forward Voltage	I _F =60A		1.65	2.4	V
t _{rr}	Reverse Recovery Time	T _J =25℃, I _F =60A di/dt=200A/us		55		nS
Q _{rr}	Reverse Recovery Charge			198		nC
I _{RRM}	Reverse Recovery Current			5.9		A
*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%						

Symbol	Paramter	Typ	MAX	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.343	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	0.47	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^{\circ}\text{C}/\text{W}$

Typical Performance Characteristics

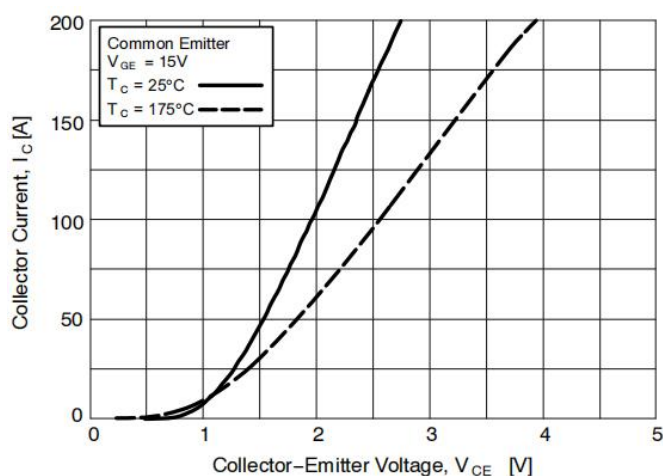


Figure 1. Typical Saturation Voltage

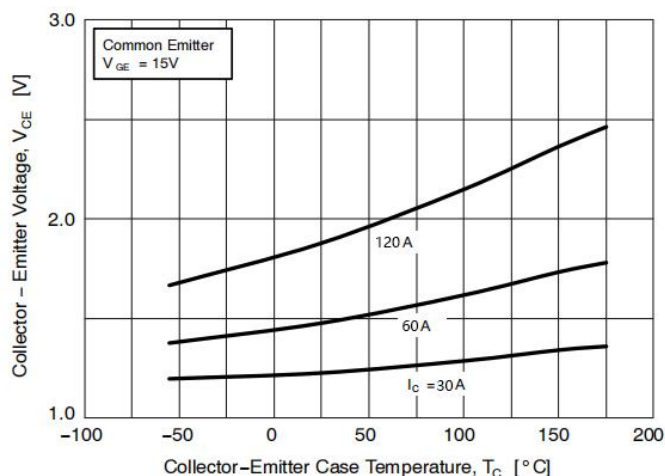


Figure 2. Saturation Voltage vs. Case Temperature

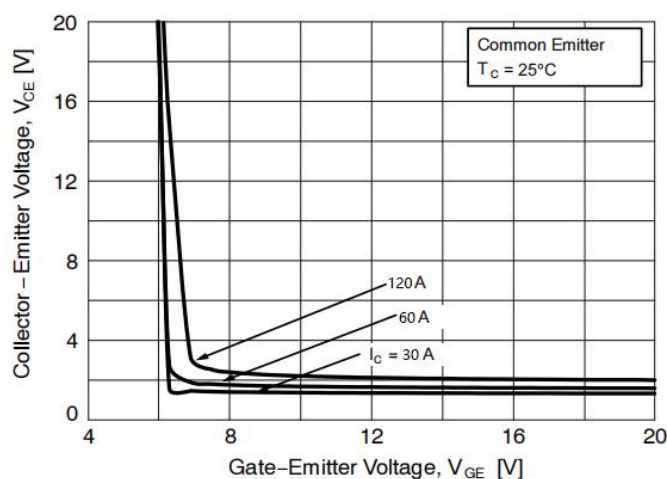


Figure 3. Saturation Voltage vs. V_{GE}

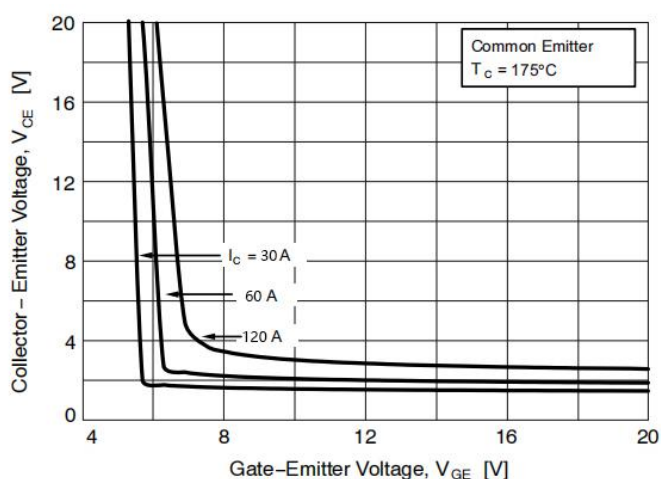


Figure 4. Saturation Voltage vs. V_{GE}

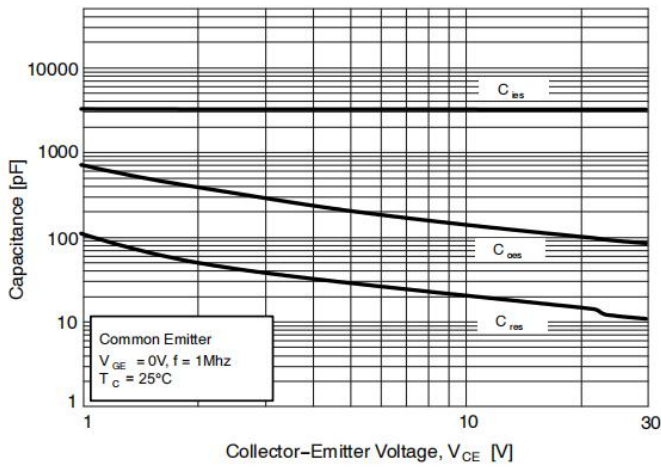


Figure 5. Capacitance Characteristics

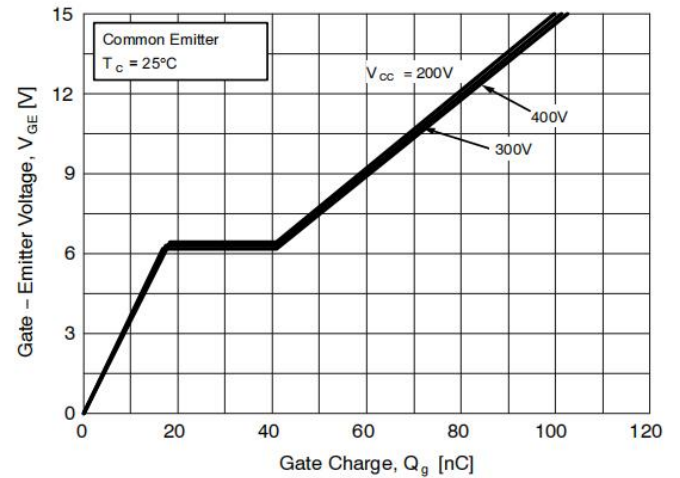


Figure 6. Gate Charge

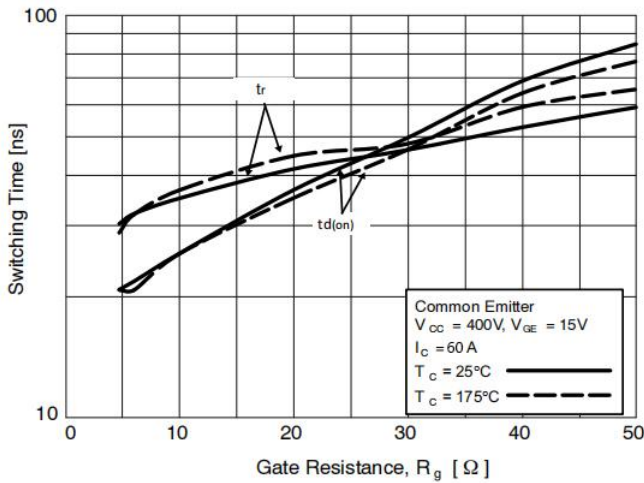


Figure 7. Turn-On Characteristics vs. Gate Resistance

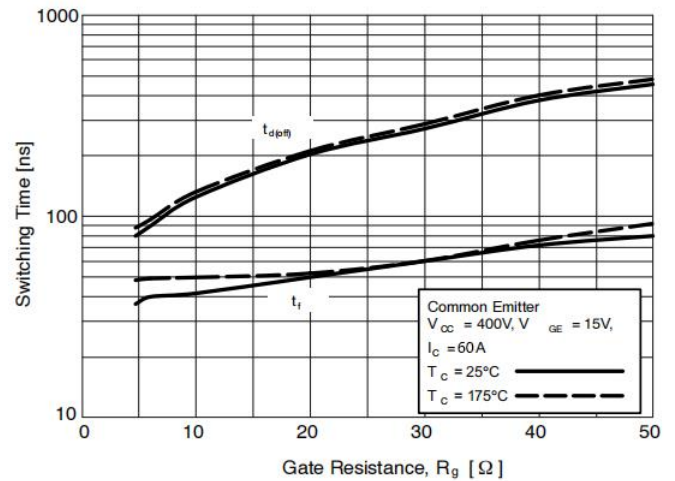


Figure 8. Turn-Off Characteristics vs. Gate Resistance

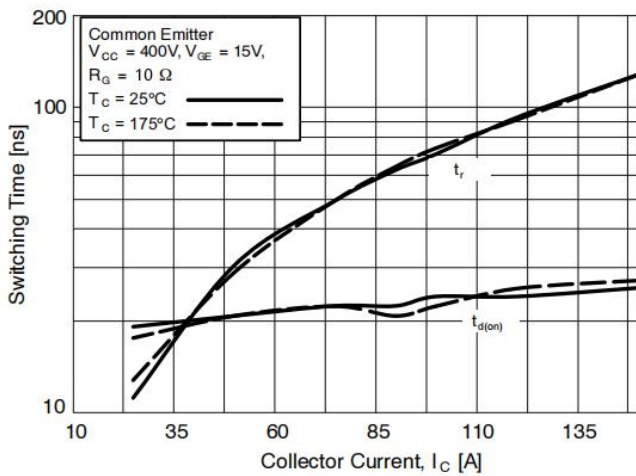


Figure 9. Turn-On Characteristics vs. Collector Current

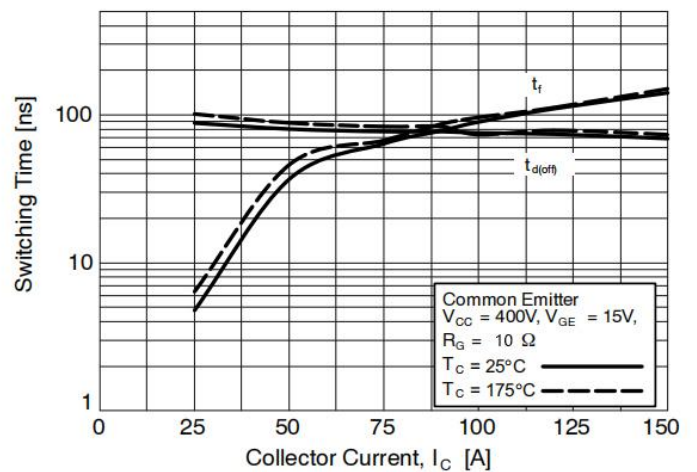


Figure 10. Turn-Off Characteristics vs. Collector Current

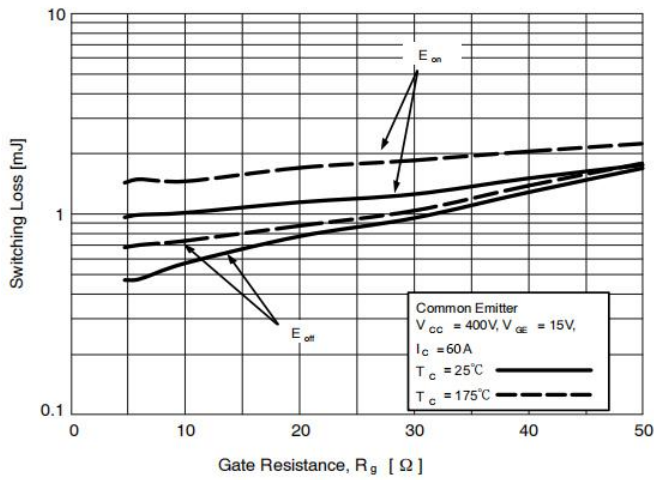


Figure 11. Switching Loss vs. Gate Resistance

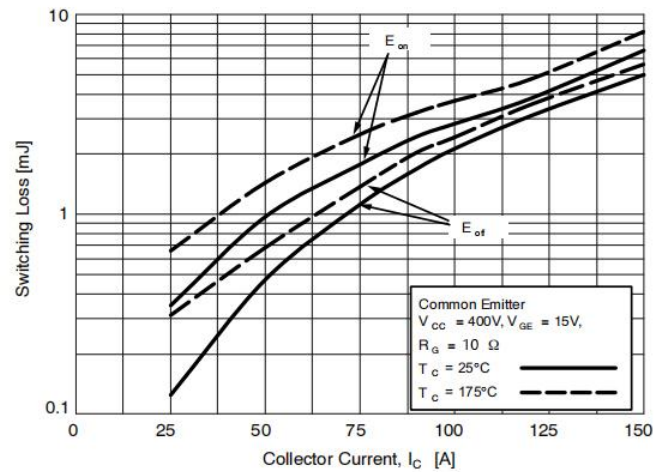


Figure 12. Switching Loss vs. Collector Current

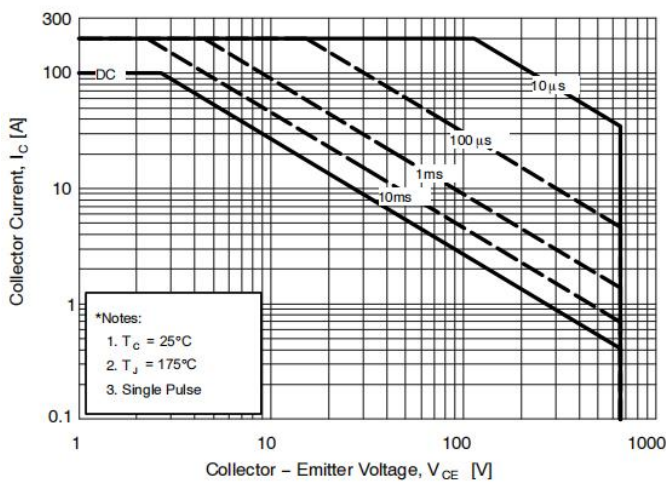


Figure 13. SOA Characteristics

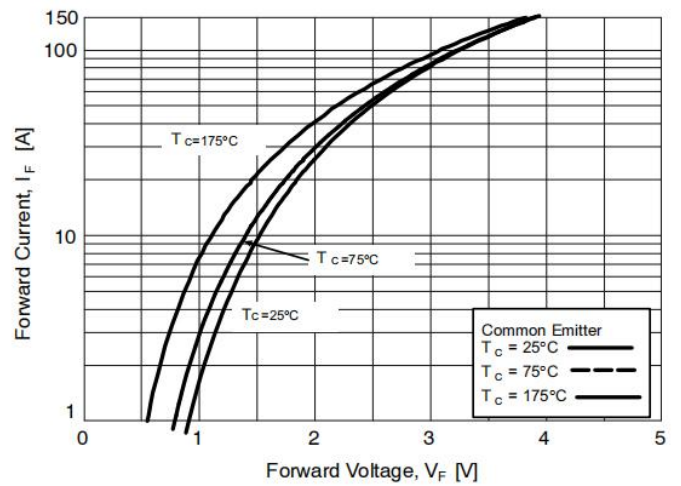


Figure 14. Forward Characteristics

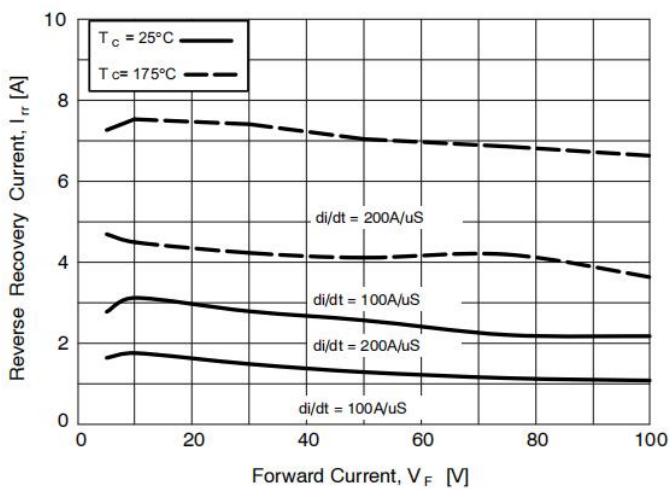


Figure 15. Reverse Recovery Current

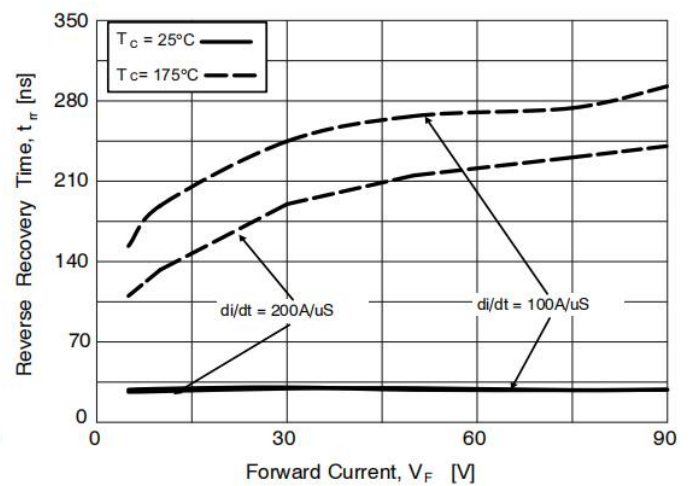


Figure 16. Reverse Recovery Time

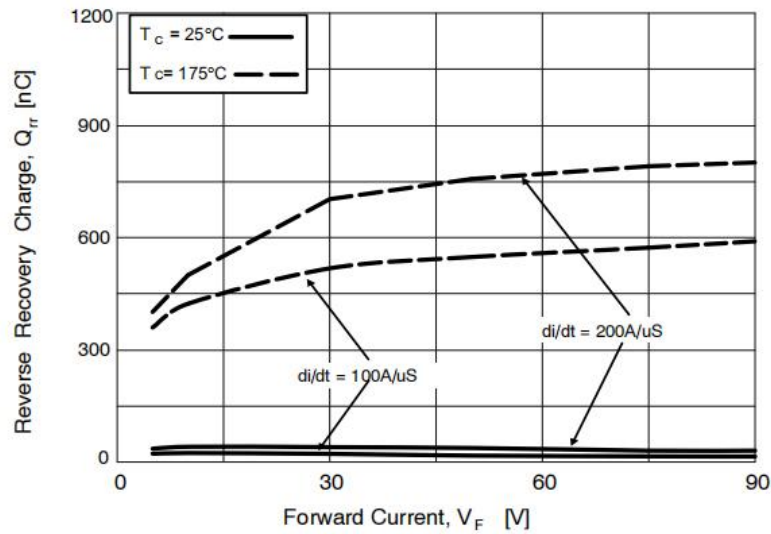


Figure 17. Stored Charge

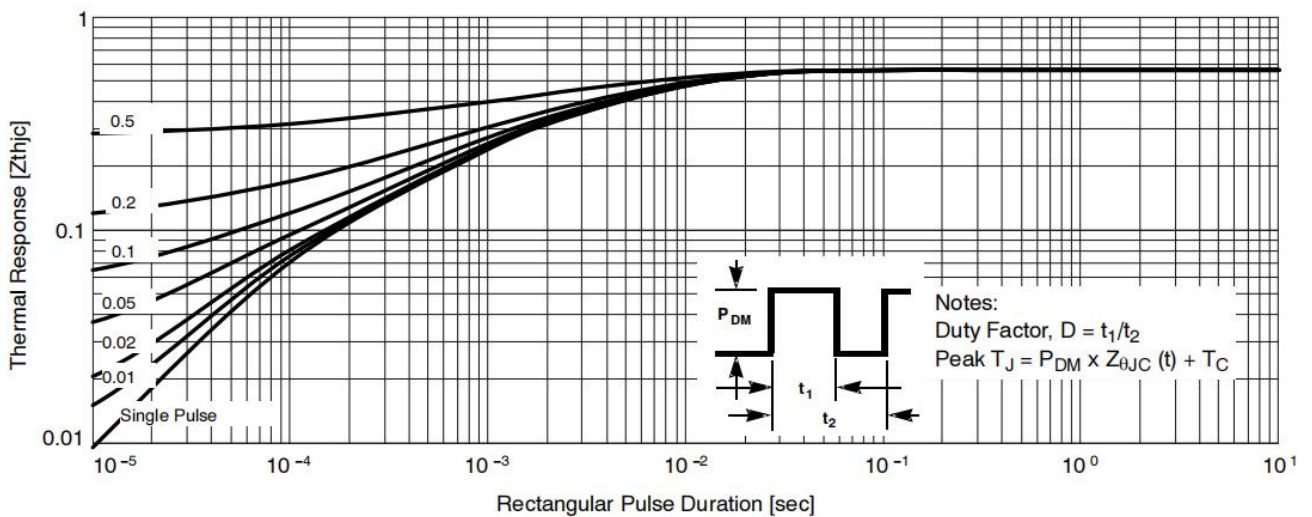


Figure 18. Transient Thermal Impedance of IGBT

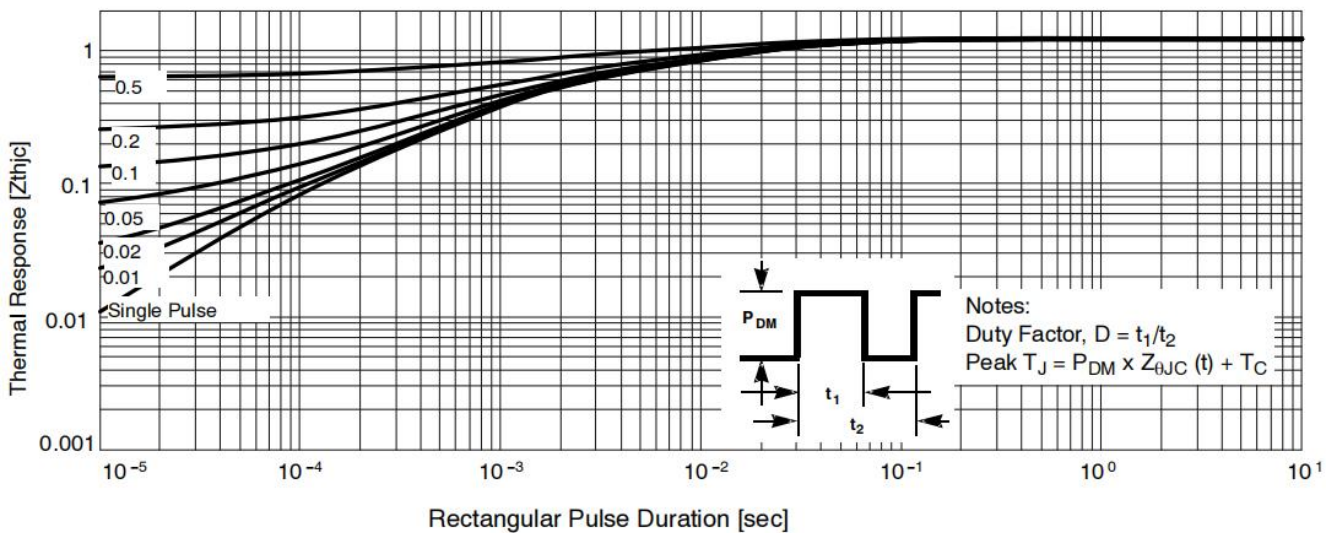
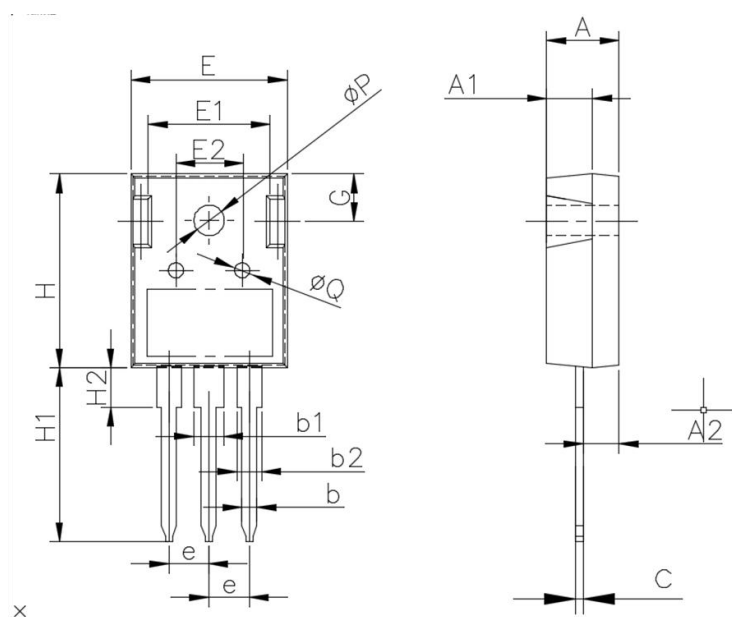


Figure 19. Transient Thermal Impedance of Diode

Package Information

TO-247H PACKAGE

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.80	3.00	3.20
A2	2.20	2.40	2.60
b	1.05	1.20	1.35
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
c	0.50	0.60	0.70
e	5.35	5.45	5.75
E	15.6	15.80	16.0
E1	12.3	12.50	12.7
E2	6.00	6.20	6.40
H	20.8	21.0	21.2
H1	19.5	20.0	20.5
H2	3.70	4.00	4.30
G	5.70	5.90	6.10
ΦP	3.30	3.50	3.70
ΦQ	2.30	2.50	2.70

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