

Silicon Field Stop(FS) Trench IGBT

Description

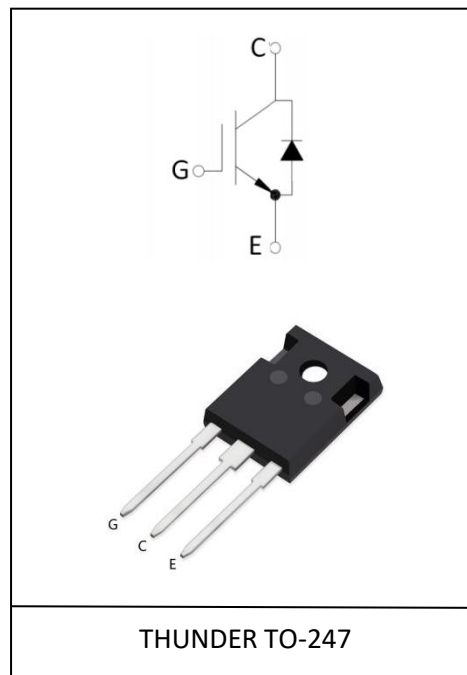
The THG50T65FQK is use advanced field stop(FS) technology. The 650V FS IGBT offers superior conduction and switching performances.

General Features

- 650V Breakdown Voltage
- Low saturation voltage: $V_{CE(sat), typ}=1.90V$
@ $I_C=50A$ and $T_C=25^{\circ}C$
- FS Trench Technology, Positive temperature coefficient

Application

- Solar 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	100	A
	Collector Current @ $T_C=100^{\circ}C$	50	A
I_{CM}	Pulsed Collector Current	150	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}C$	50	A
I_{FM}	Diode Maximum Forward Current	100	A
P_D	Total Dissipation at @ $T_C=100^{\circ}C$	300	W
	Total Dissipation at @ $T_a=25^{\circ}C$	600	
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	$V_{GE}=15V, I_C=50A$		1.90	2.40	V
$V_{GE(th)}$	Gated Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	4.0	5.0	6.0	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	$V_{GE}=0V,$ $V_{CE}=30V,$ $f=1.0MHz$		3570		pF
C_{oes}	Output Capacitance			199		pF
C_{res}	Reverse Transfer Capacitance			137		pF
Q_g	Total Gate Charge	$V_{CE}=400V$		125		nC
Q_{ge}	Gate to Emitter Charge	$I_C=50A$		29		nC
Q_{gc}	Gate to Collector Charge	$V_{GE}=15V$		50		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=50A$ $V_{GE}=15V, R_G=10\Omega$		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	$TC=100^\circ C$	50			A
I_{FM}	Diode Maximum Forward Current	$TC=100^\circ C$	100			A
V_F	Diode Forward Voltage	$I_F=50A$		1.9	2.4	V
t_{rr}	Reverse Recovery Time	$T_J=25^\circ C, I_F=50A$ $di/dt=200A/\mu s$		55		nS
Q_{rr}	Reverse Recovery Charge			198		nC
I_{RRM}	Reverse Recovery Current			5.9		A

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

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

Typ
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Performance Characteristics

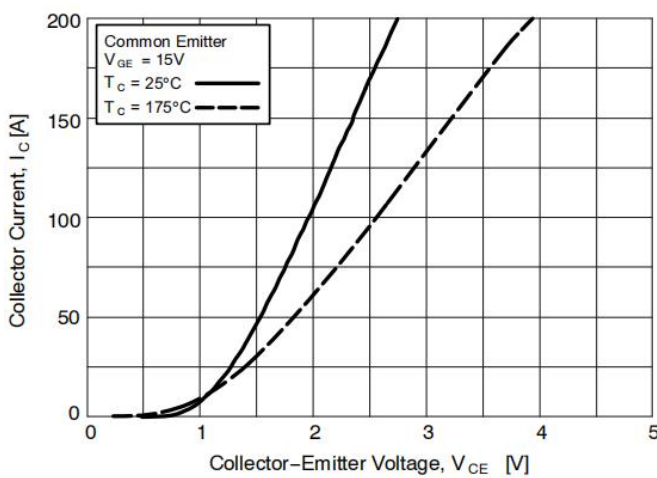


Figure 3. Typical Saturation Voltage

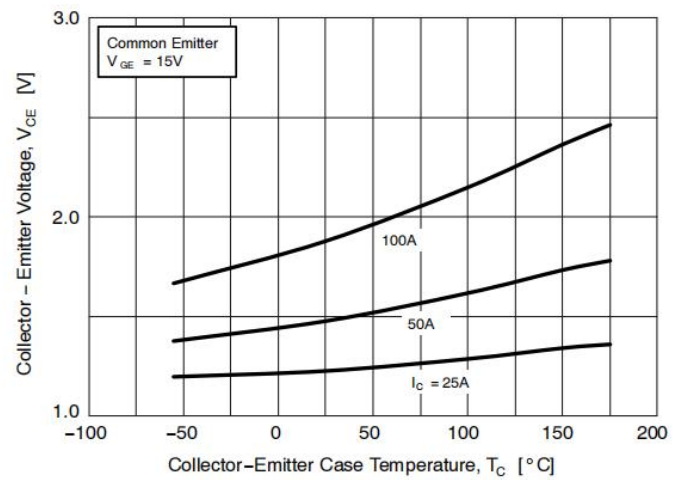


Figure 4. Saturation Voltage vs. Case Temperature

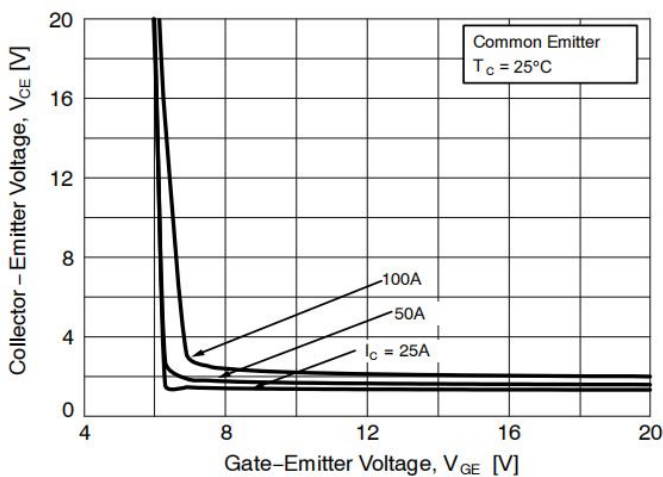


Figure 5. Saturation Voltage vs. V_{GE}

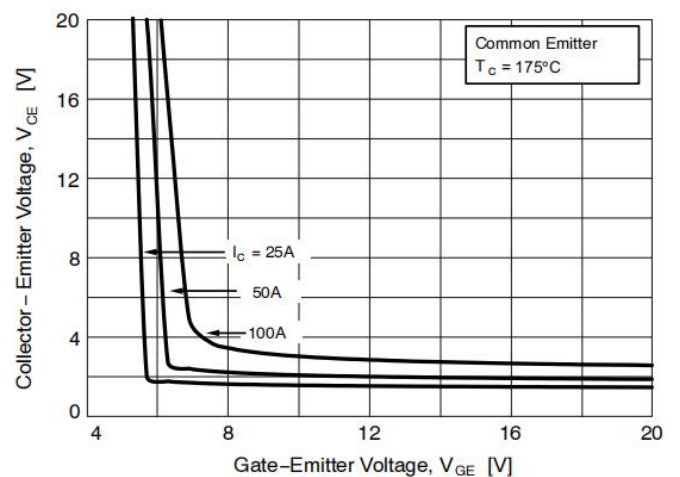


Figure 6. Saturation Voltage vs. V_{GE}

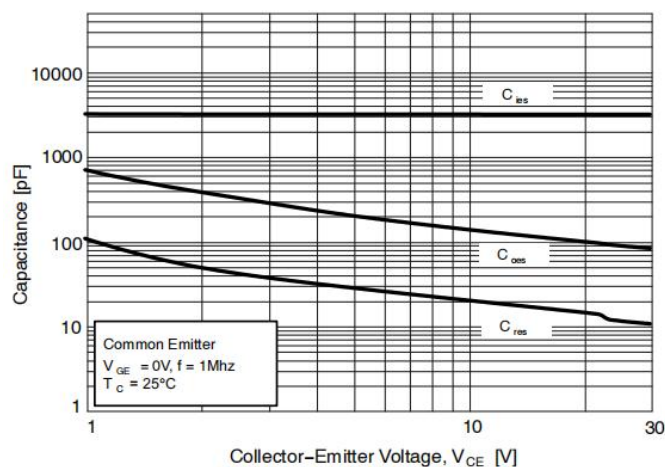


Figure 7. Capacitance Characteristics

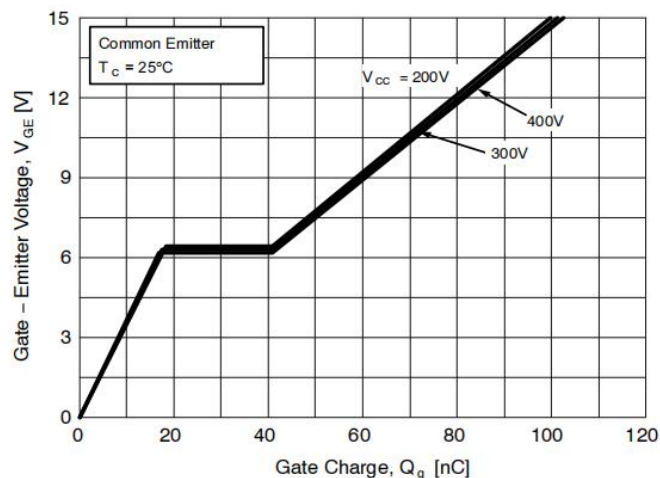


Figure 8. Gate Charge

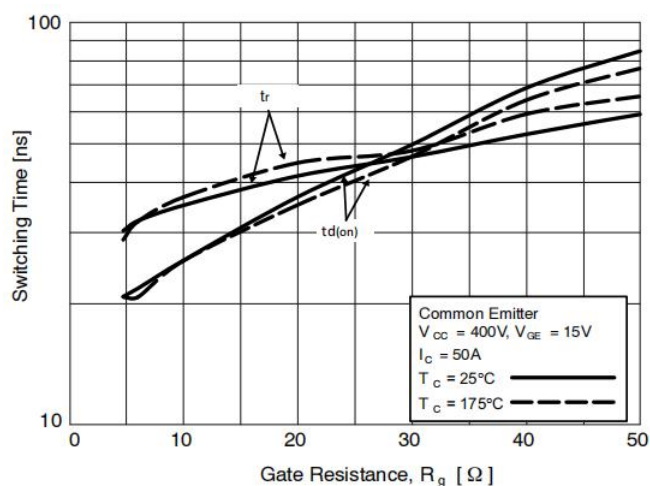


Figure 9. Turn-On Characteristics vs. Gate Resistance

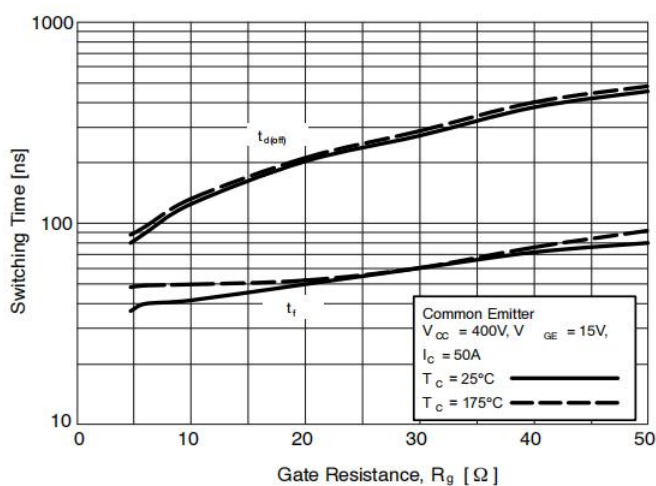


Figure 10. Turn-Off Characteristics vs. Gate Resistance

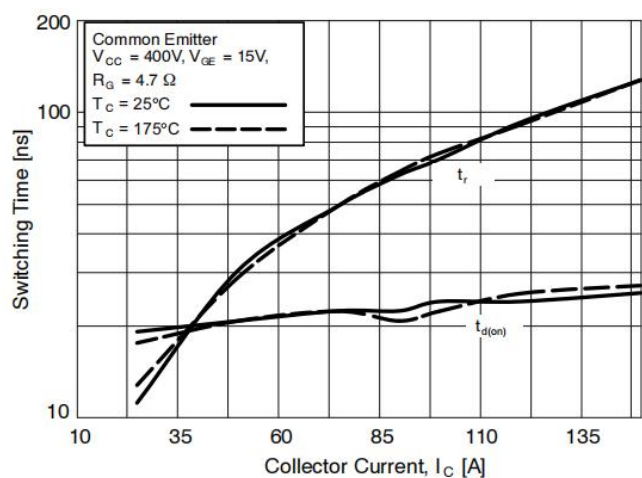


Figure 11. Turn-On Characteristics vs. Collector Current

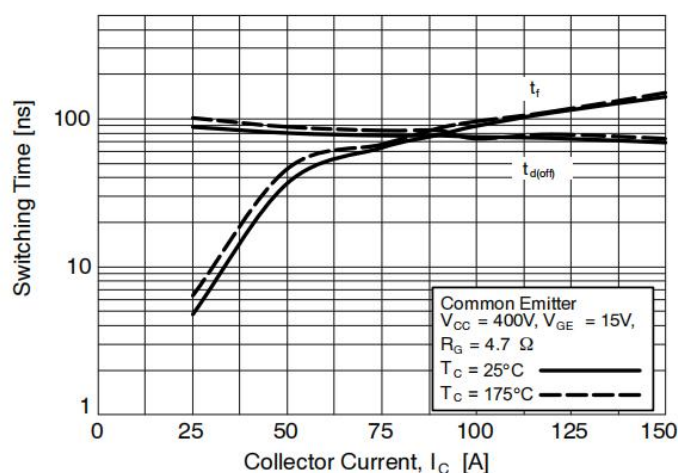


Figure 12. Turn-Off Characteristics vs. Collector Current

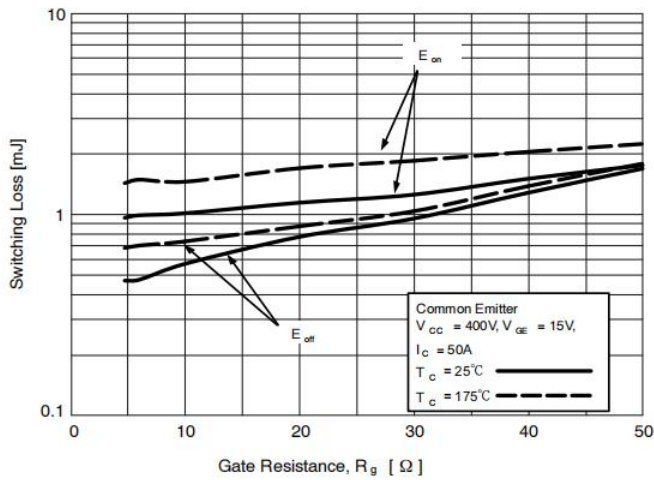


Figure 13. Switching Loss vs. Gate Resistance

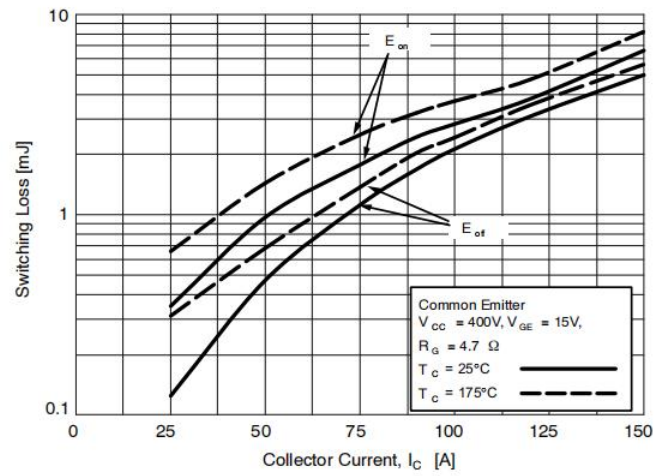


Figure 14. Switching Loss vs. Collector Current

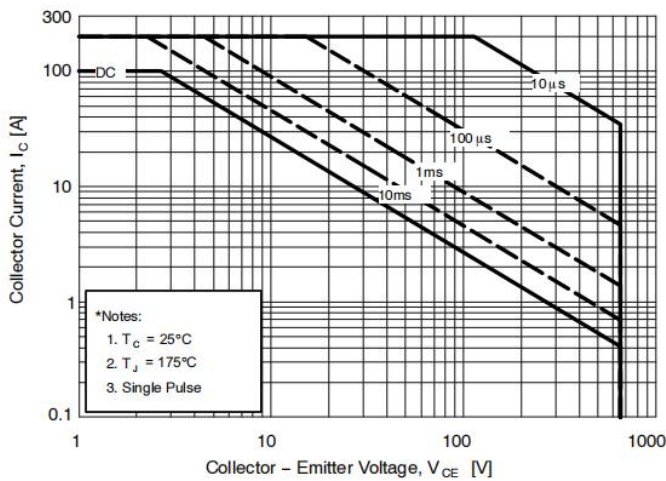


Figure 15. SOA Characteristics

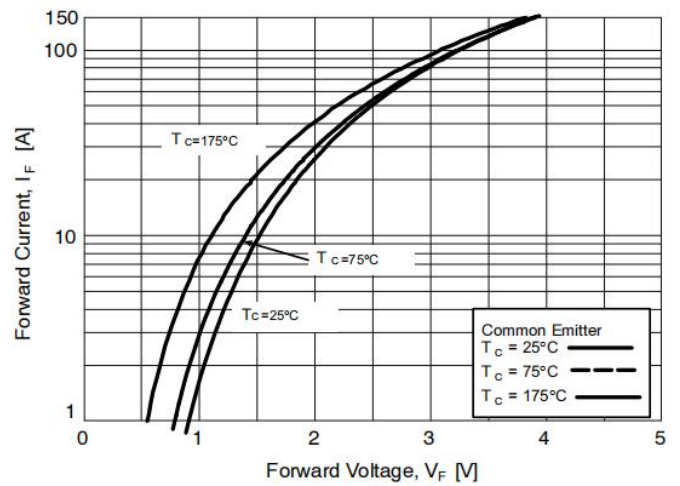


Figure 16. Forward Characteristics

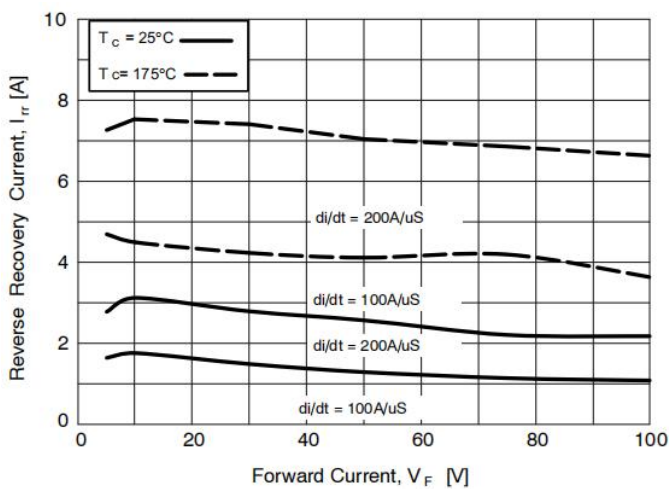


Figure 17. Reverse Recovery Current

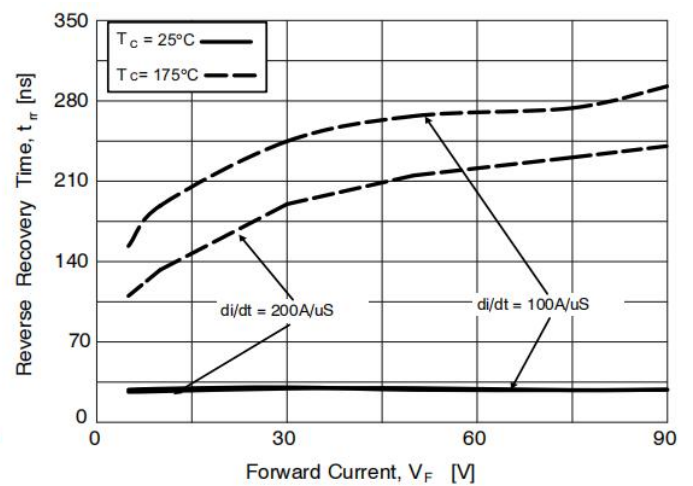


Figure 18. Reverse Recovery Time

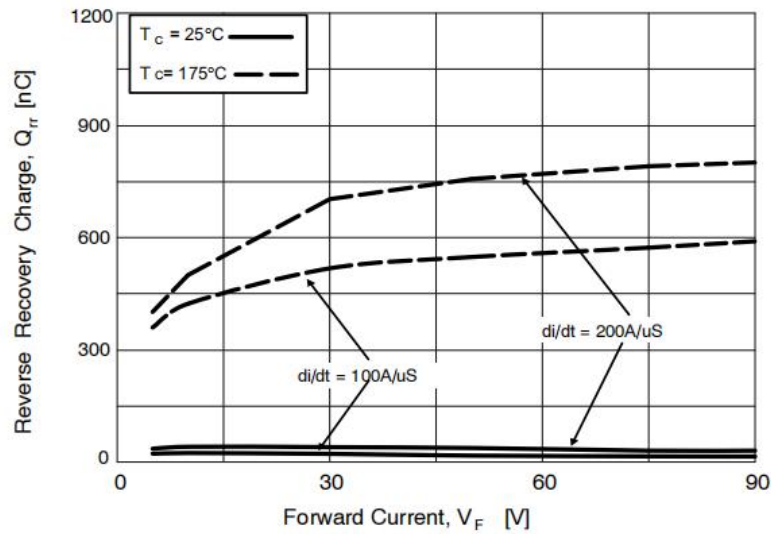


Figure 19. Stored Charge

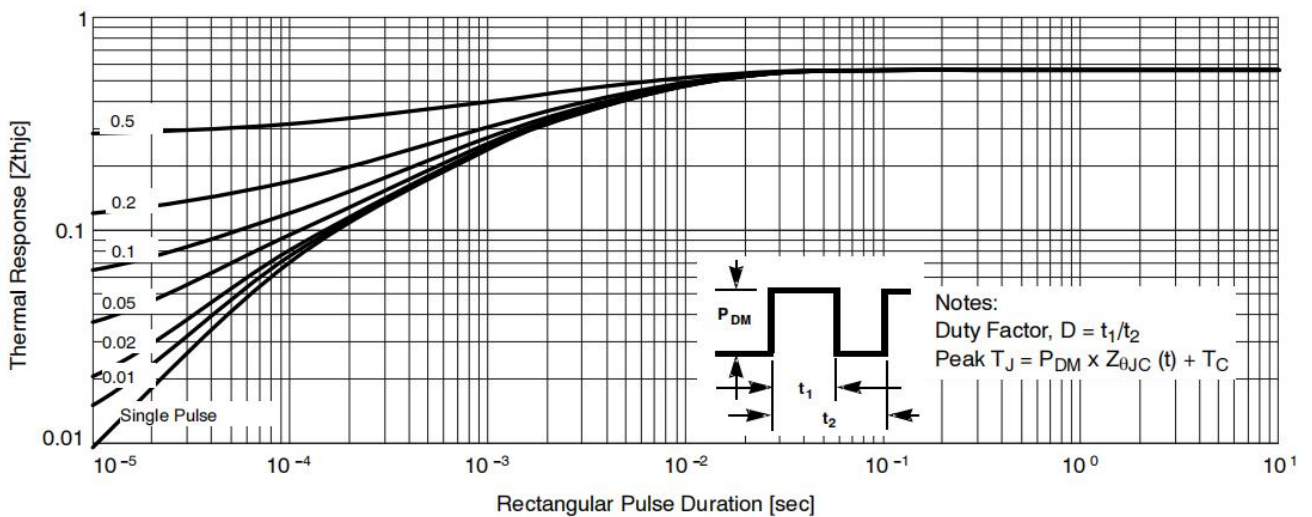


Figure 20. Transient Thermal Impedance of IGBT

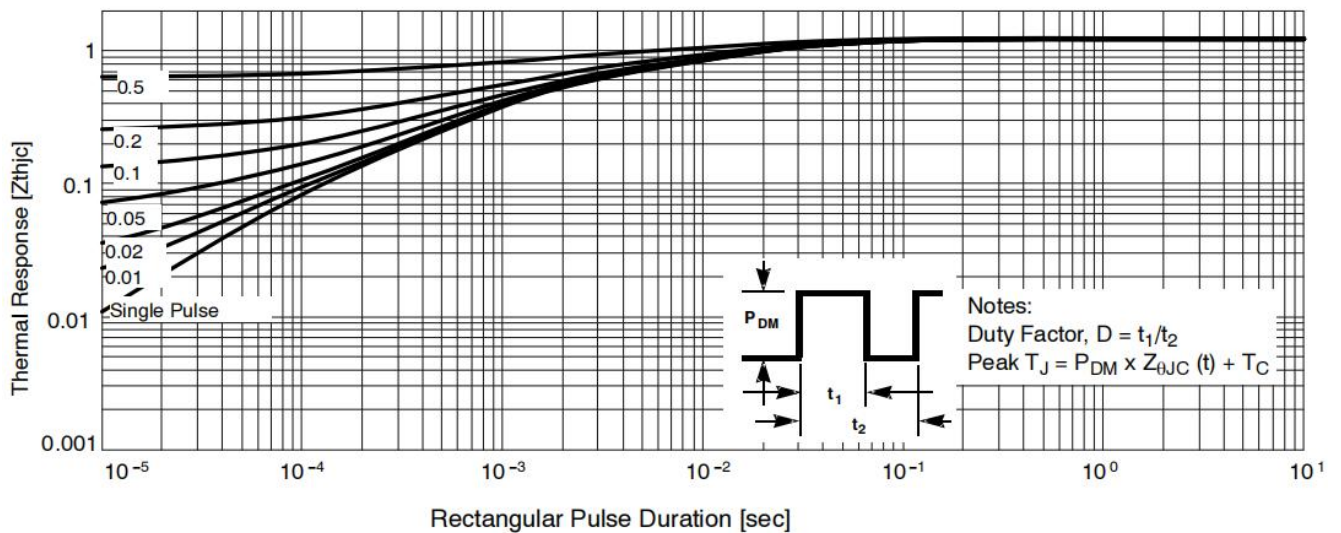
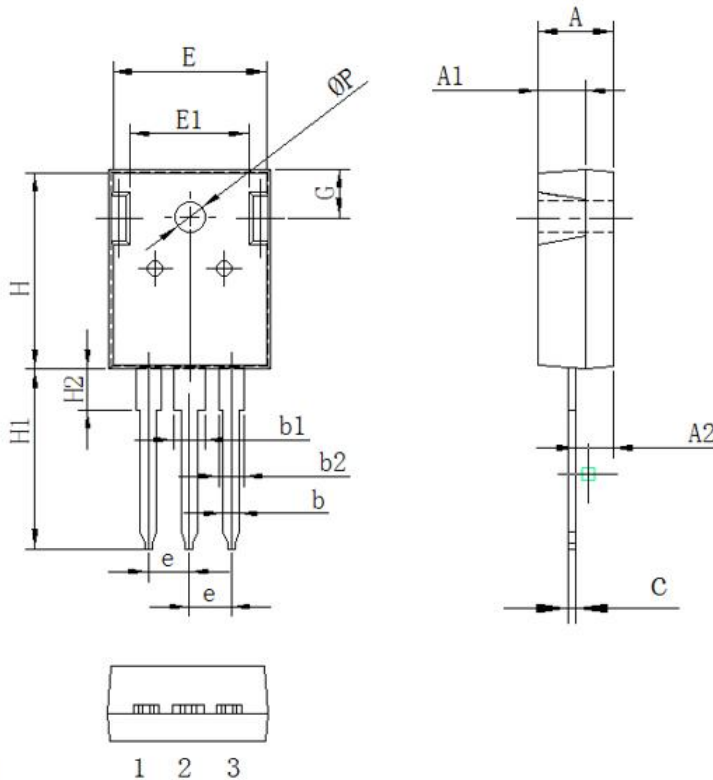


Figure 21. Transient Thermal Impedance of Diode

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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