Silicon Field Stop(FS) Trench IGBT

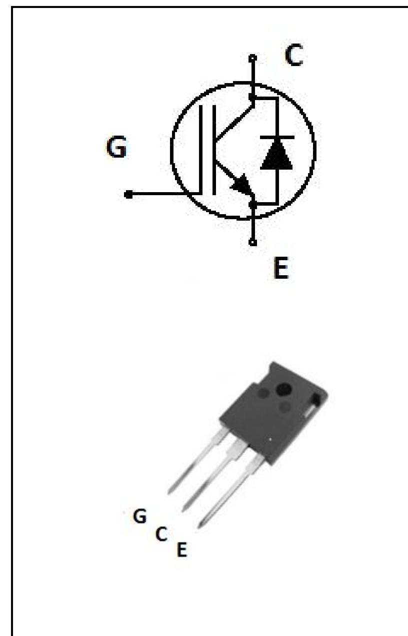
Description

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=1.6V

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



Application

- Solar 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	100	A
	Collector Current @Tc=100℃	50	A
I_{CM}	Pulsed Collector Current	150	A
I_F	Diode Continuous Forward Current @Tc=100℃	50	A
I_{FM}	Diode Maximum Forward Current	100	A
P_D	Total Dissipation at @Tc=100℃	220	W
	Total Dissipation at @Ta=25℃	440	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	℃
T_L	Max Temperature For Soldering	265	℃

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=50A		1.6	2.2	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	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		3570		pF
C_{oes}	Output Capacitance			199		pF
C_{res}	Reverse Transfer Capacitance			137		pF
Q_g	Total Gate Charge	V_{CE}=400V I_C=50A V_{GE}=15V		125		nC
Q_{ge}	Gate to Emitter Charge			29		nC
Q_{gc}	Gate to Collector Charge			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=10Ω		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℃	50			A
I_{FM}	Diode Maximum Forward Current	TC=100℃	100			A
V_F	Diode Forward Voltage	I_F=50A		1.9	2.4	V
t_{rr}	Reverse Recovery Time	T_J=25℃,I_F=50A 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
$R_{\theta JC}$	Themal Resistance,Junction to case for IGBT	--	0.343	℃/W
$R_{\theta JC}$	Themal Resistance,Junction to case for Diode	--	0.47	℃/W
$R_{\theta JA}$	Themal Resistance,Junction to Ambient	--	40	℃/W

Typical

Performance Characteristics

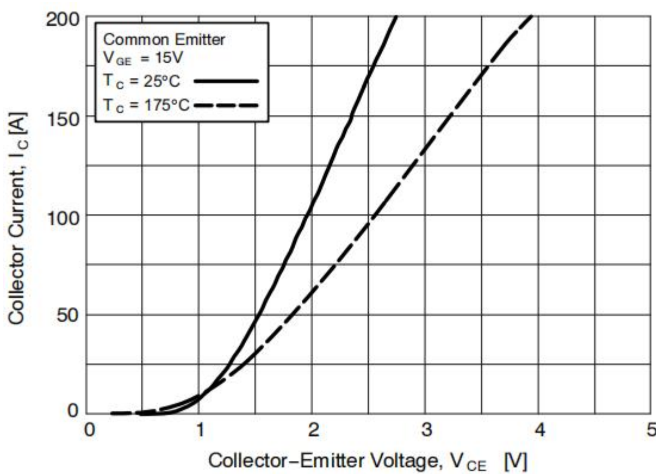


Figure 3. Typical Saturation Voltage

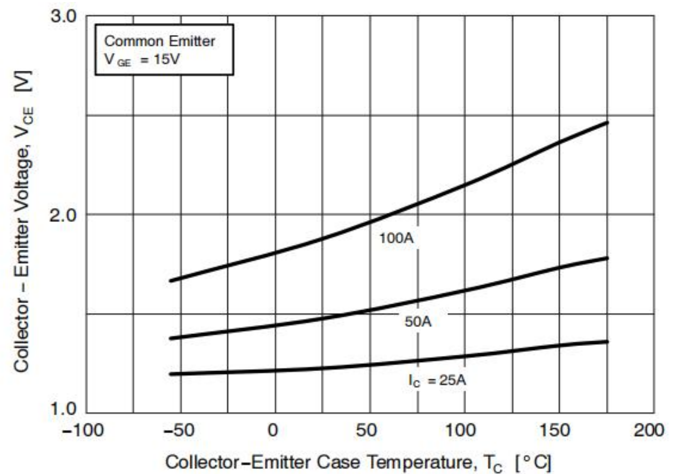


Figure 4. Saturation Voltage vs. Case Temperature

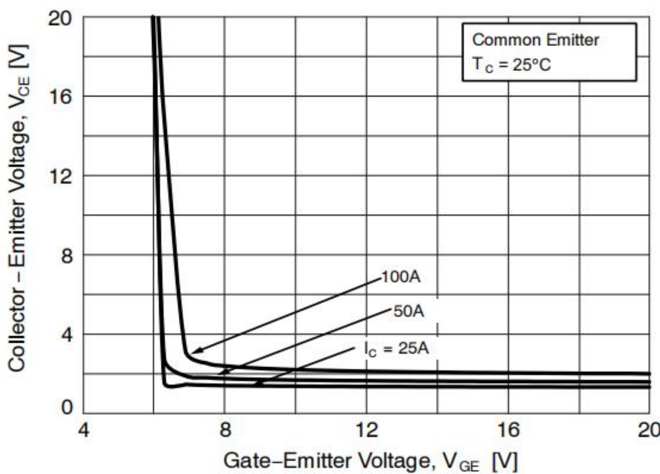


Figure 5. Saturation Voltage vs. V_{GE}

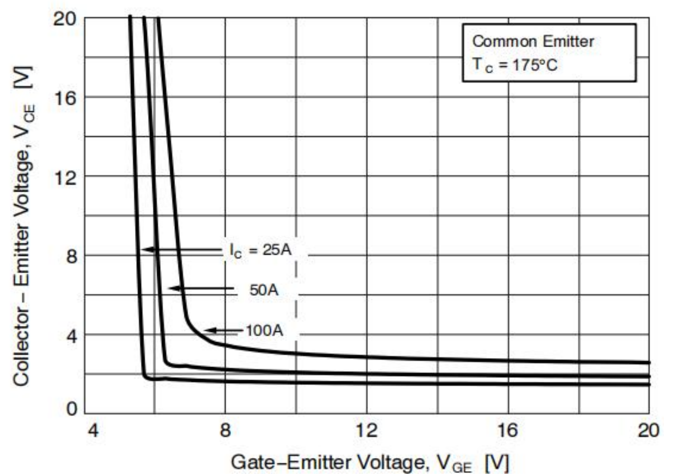


Figure 6. Saturation Voltage vs. V_{GE}

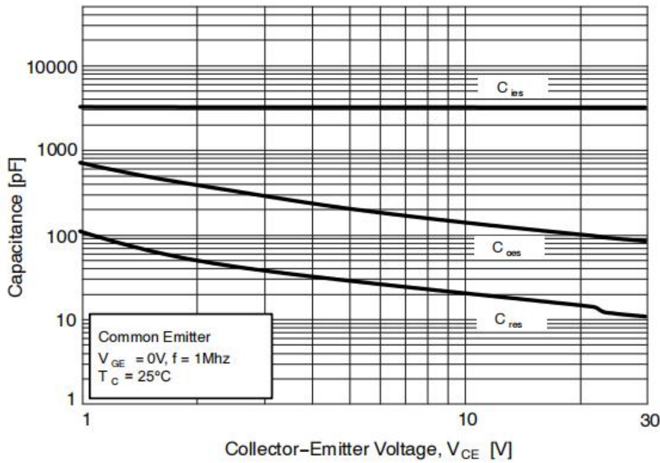


Figure 7. Capacitance Characteristics

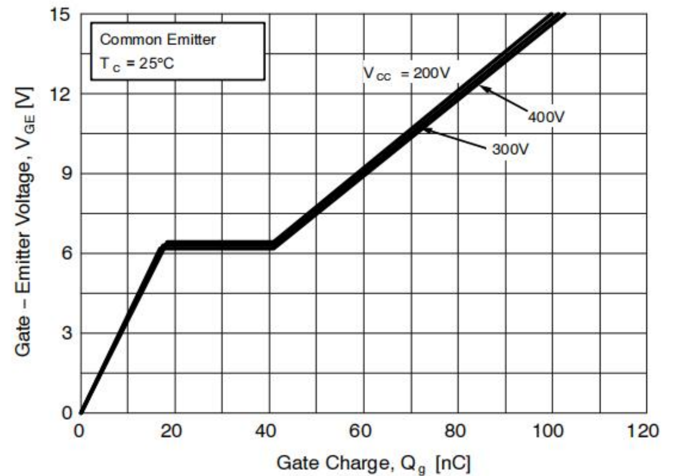


Figure 8. Gate Charge

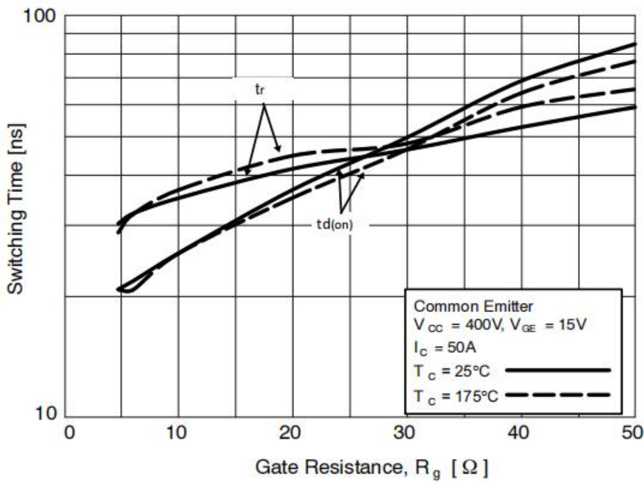


Figure 9. Turn-On Characteristics vs. Gate Resistance

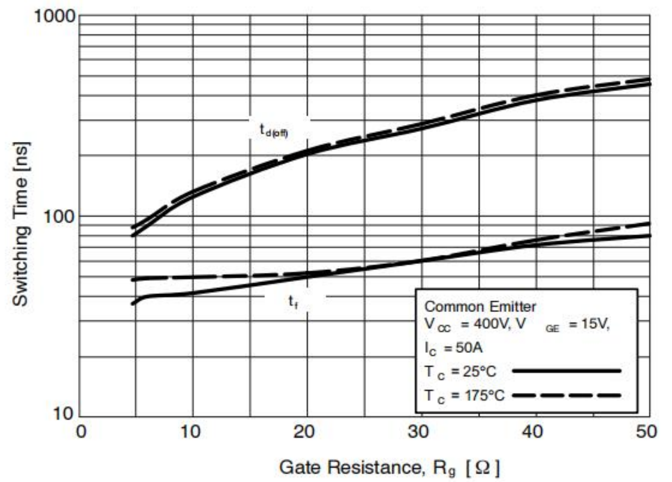


Figure 10. Turn-Off Characteristics vs. Gate Resistance

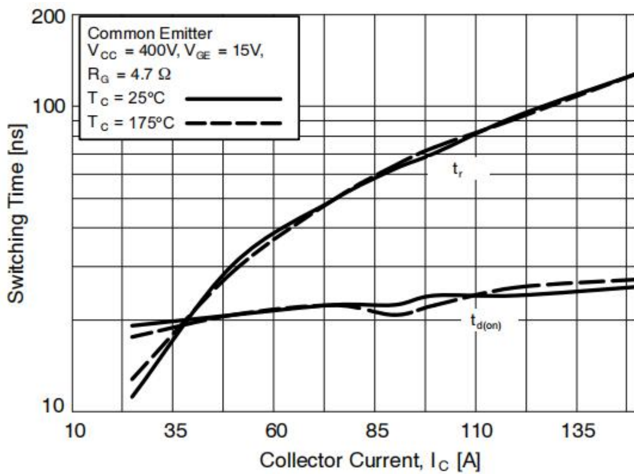


Figure 11. Turn-On Characteristics vs. Collector Current

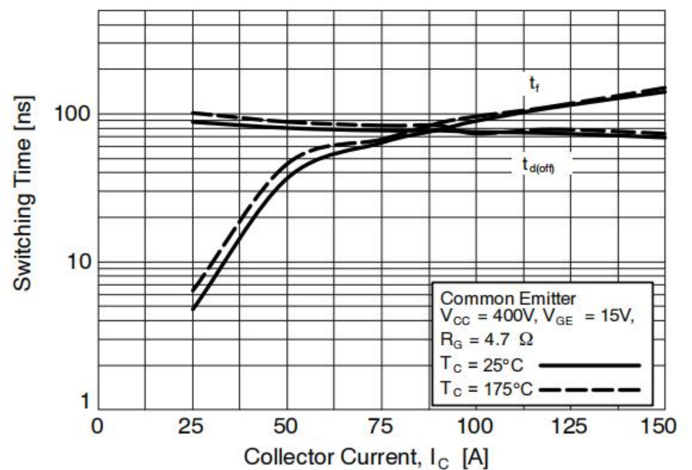


Figure 12. Turn-Off Characteristics vs. Collector Current

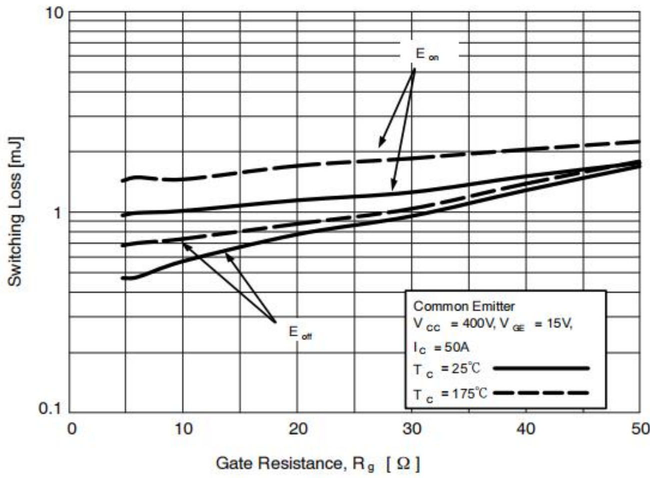


Figure 13. Switching Loss vs. Gate Resistance

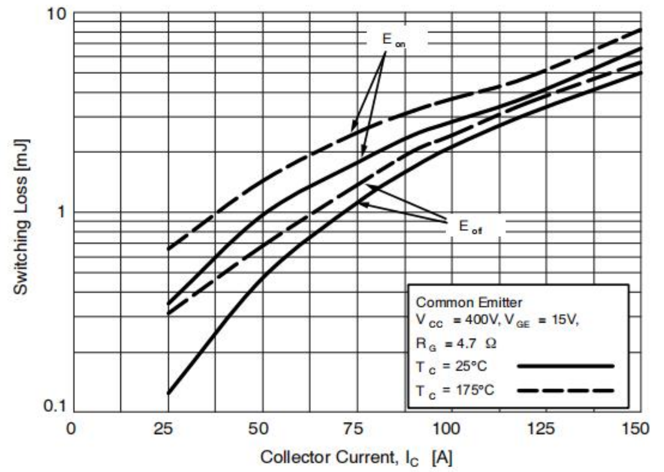


Figure 14. Switching Loss vs. Collector Current

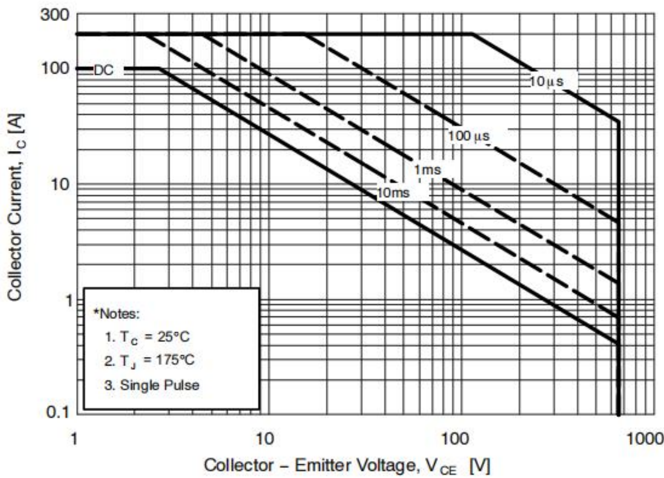


Figure 15. SOA Characteristics

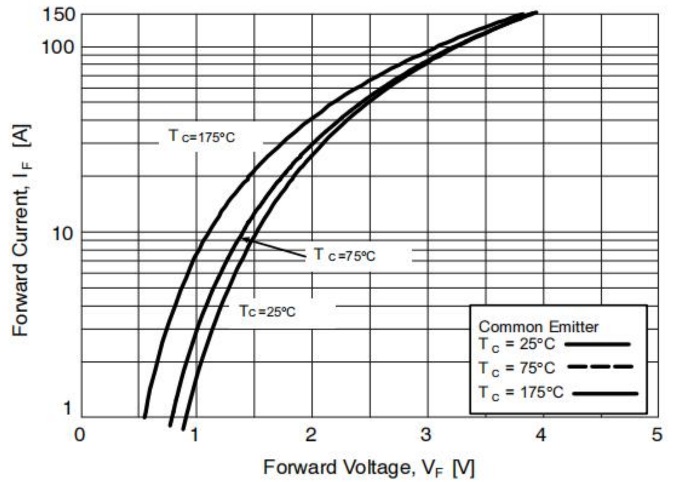


Figure 16. Forward Characteristics

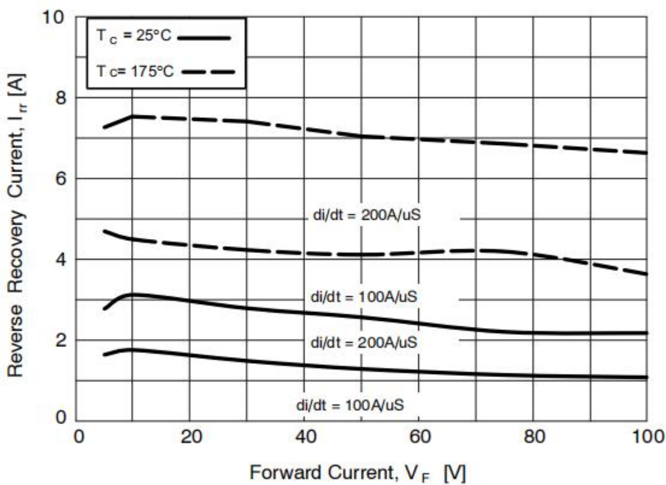


Figure 17. Reverse Recovery Current

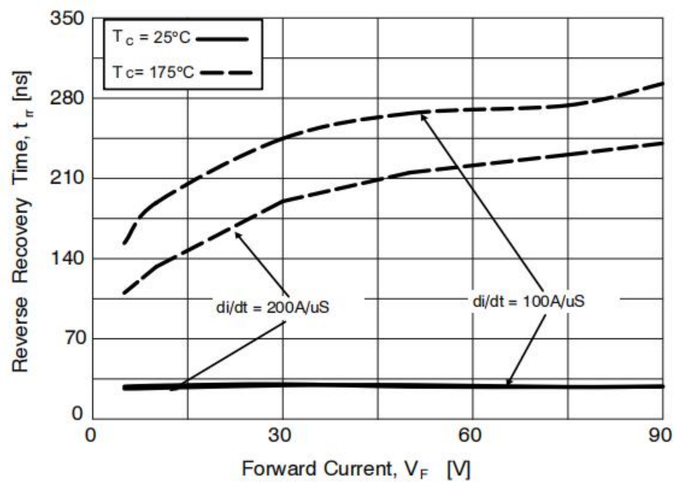


Figure 18. Reverse Recovery Time

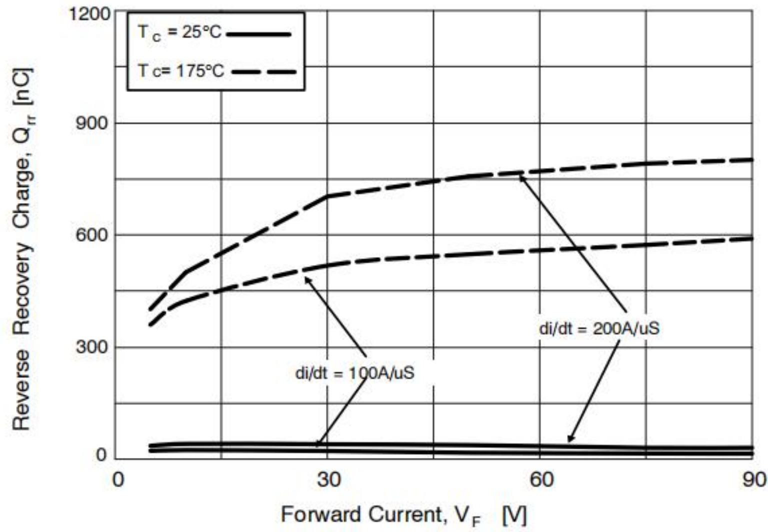


Figure 19. Stored Charge

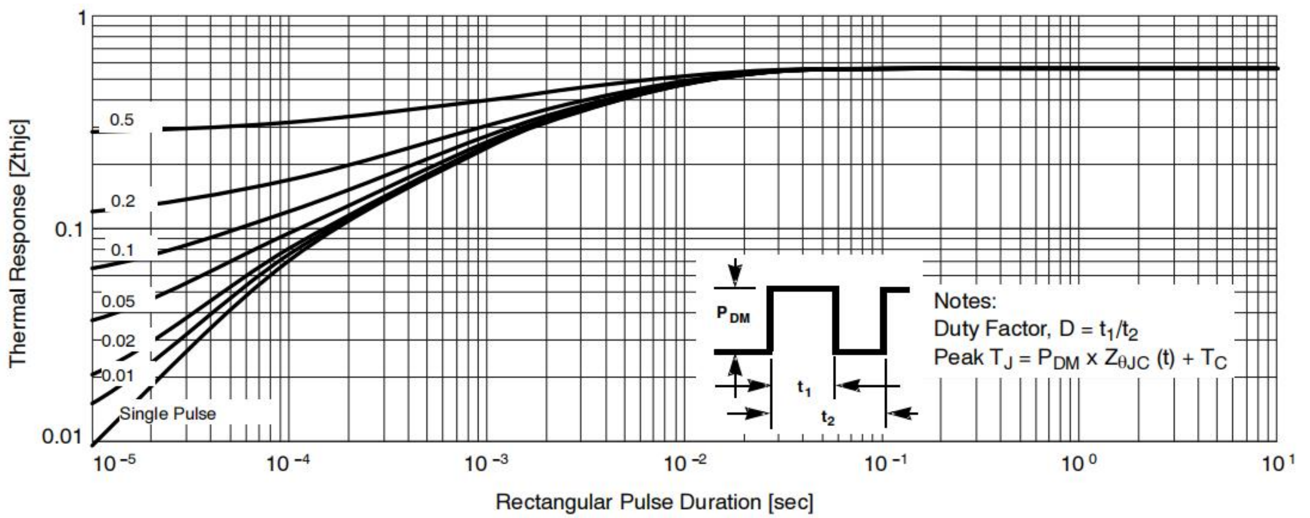


Figure 20. Transient Thermal Impedance of IGBT

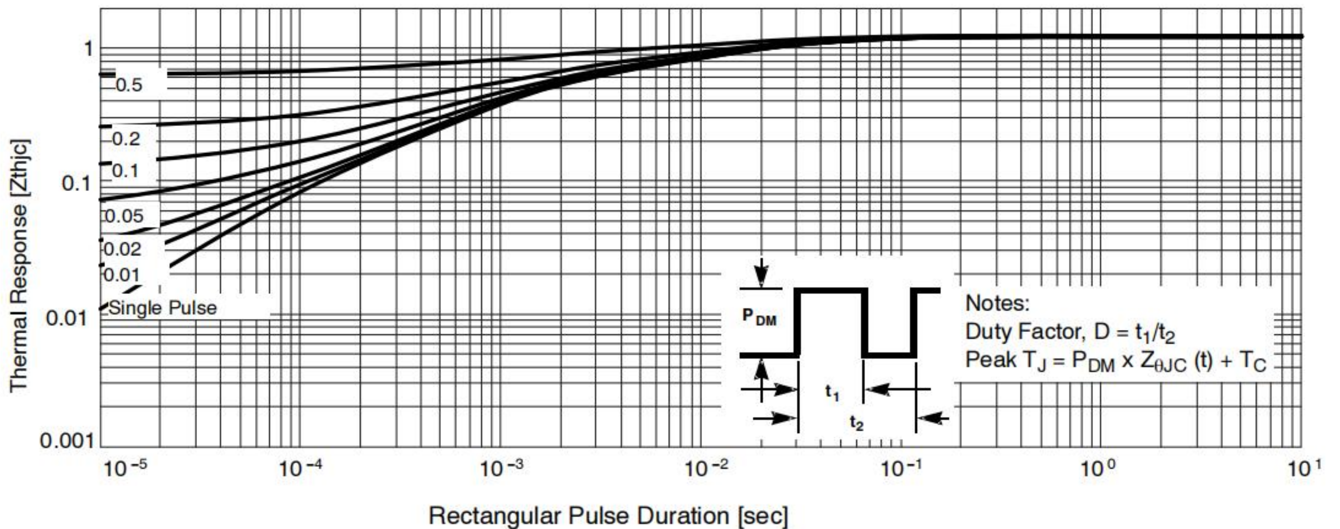
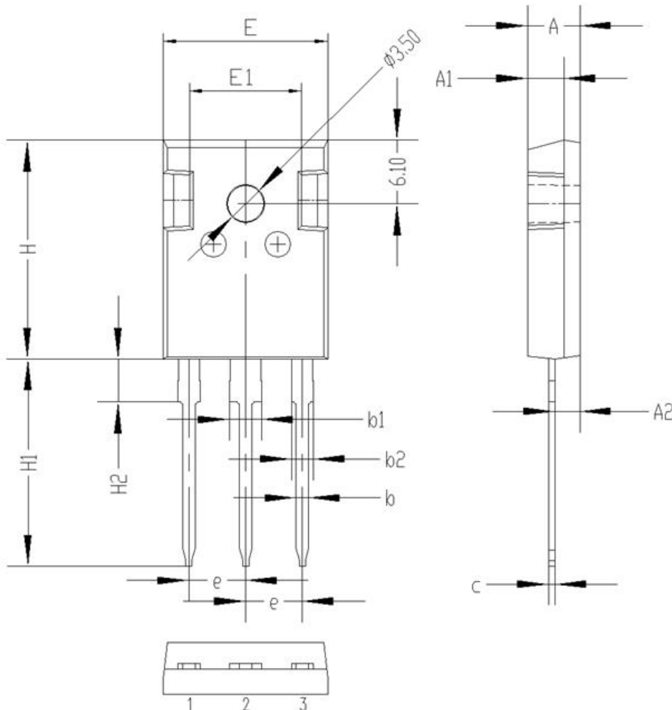


Figure 21. Transient Thermal Impedance of Diode

Package Information

TO-247 PACKAGE



Symbol	Dimensions(millimeters)	
	Min.	Max.
A	4.80	5.20
A1	3.30	3.70
A2	2.10	2.50
b	1.00	1.40
b1	2.90	3.30
b2	1.90	2.30
c	0.40	0.80
e	5.25	5.65
E	15.6	16.0
E1	10.6	11.00
H	20.8	21.2
H1	19.4	20.4
H2	3.90	4.30
G	5.90	6.30
ΦP	3.30	3.70

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