

H06T65

650V, 6A IGBT with soft and fast recovery anti-parallel diode

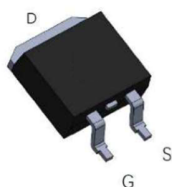
Features

- Trench epi-Fs Technology
- High efficient turn-on di/dt controllability
- Low VCE(SAT) enable high efficiencies
- Low Turn-off switching loss and softness
- Very Good EMI and High Short-Circuit Ruggedness

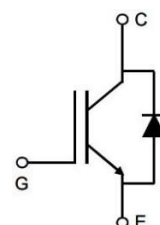
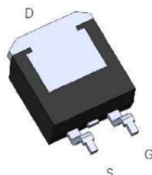
Product Summary

VCE	650V
IC(TC=100°C)	6A
VCE(sat)(TJ=25°C)	1.73V

View and Internal Schematic Diagram



TO263



Internal Schematic

Package Marking and Ordering Information

Part Number	Package	Marking	Packing	Qty
H06T65	TO-263	H06T65	Tape & Reel	800pcs

Maximum Ratings (@TA = +25°C unless otherwise specified.)

Parameters		Symbol	Max	Units
Collector-Emitter Voltage		V _{CE}	650	V
Gate-Emitter Voltage		V _{GE}	±30	V
Continuous Collector Current	T _C = +25°C	I _C	12	A
	T _C = +100°C		6	
Pulsed Collector Current, Limited by T _{Jmax}		I _{CM}	35	A
Turn off SOA, V _{CE} ≤ 650V, Limited by T _{Jmax}		I _{LM}	35	A
Continuous Diode Forward Current	T _C = +25°C	I _F	12	A
	T _C = +100°C		6	
Short Circuit with standing time V _{GE} =15V, V _{CC} ≤ 400V, T _J ≤ 175°C		t _{SC}	5	us
Power Dissipation	T _C = +25°C	P _D	96.2	W
	T _C = +100°C		39	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5s		T _L	300	°C

Thermal Characteristics

Characteristic	Symbol	Typ	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$
Maximum IGBT Junction-to-Case	$R_{\theta JC}$	1.8	$^{\circ}\text{C/W}$
Maximum Diode Junction-to-Case	$R_{\theta JC}$	2.2	$^{\circ}\text{C/W}$

Electrical Characteristics (@ $T_A = +25^{\circ}\text{C}$ unless otherwise specified.)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV _{CES}	Collector-Emitter Breakdown Voltage	I _C =1mA, V _{GE} =0V		650	-	-	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =6A	T _J =25°C	-	1.73	1.98	V
			T _J =125°C	-	2.05	-	
			T _J =175°C	-	2.21	-	
V _F	Diode Forward Voltage	V _{GE} =0V, I _C =6A	T _J =25°C	-	1.9	2.25	V
			T _J =125°C	-	1.58	-	
			T _J =175°C	-	1.3	-	
V _{GE(th)}	Gate-Emitter Threshold Voltage	V _{CE} =5V I _C =1mA		-	5.3	-	V
I _{CES}	Zero Gate Voltage Collector current	V _{CE} =650V, V _{GE} =0A	T _J =25°C	-	-	10	uA
			T _J =125°C	-	-	100	
			T _J =175°C	-	-	5000	
I _{GES}	Gate-Emitter leakage current	V _{CE} =0V, V _{GE} = ±30V		-	-	±100	nA
g _{FS}	Forward Trans conductance	V _{CE} =20V, I _C =6A		-	2.8		S
DYNAMIC PARAMETERS							
C _{ies}	Input Capacitance	V _{GE} =0V, V _{CC} =25V, f=1MHz		-	243	-	pF
C _{oes}	Output Capacitance			-	36	-	pF
C _{res}	Reverse Transfer Capacitance			-	22	-	pF
Q _g	Total Gate Charge	V _{GE} =15V, V _{CC} =520V, I _C =6A		-	10	-	nC
Q _{ge}	Gate to Emitter Charge			-	3.2	-	nC
Q _{gc}	Gate to Collector Charge			-	3.5	-	nC
I _{C(SC)}	Short circuit collector current	V _{GE} =15V,V _{CC} =400V, t _{sc} ≤5us, T _J ≤175°C		-	30	-	A
R _g	Gate resistance	f=1MHz		-	6	-	Ω
SWITCHING PARAMETERS. (Load Inductive, T _J =25°C)							
t _{D(on)}	Turn-On Delay Time	T _J =25°C, V _{GE} =15V, V _{CC} =400V,		-	6	-	ns
t _r	Turn-On Rise Time			-	21	-	ns
t _{D(off)}	Turn-Off Delay Time			-	39	-	ns

t _f	Turn-Off Fall Time	I _C =6A, R _G =60Ω	-	121	-	ns
E _{on}	Turn-On Energy		-	0.09	-	mJ
E _{off}	Turn-Off Energy		-	0.13	-	mJ
E _{total}	Total Switching Energy		-	0.22	-	mJ
t _{rr}	Diode Reverse Recovery Time	T _J =25°C, I _F =6A, di/dt=200A/μs, V _{CC} =400V	-	91	-	ns
Q _{rr}	Diode Reverse Recovery Charge		-	0.25	-	uC
I _{rm}	Diode Peak Reverse Recovery Current		-	4.9	-	A
SWITCHING PARAMETERS, (Load Inductive, T _J =175°C)						
t _{D(on)}	Turn-On Delay Time	T _J =175°C, V _{GE} =15V, V _{CC} =400V, I _C =6A, R _G =60Ω	-	8	-	ns
t _r	Turn-On Rise Time		-	27	-	ns
t _{D(off)}	Turn-Off Delay Time		-	57	-	ns
t _f	Turn-Off Fall Time		-	180	-	ns
E _{on}	Turn-On Energy		-	0.11	-	mJ
E _{off}	Turn-Off Energy		-	0.19	-	mJ
E _{total}	Total Switching Energy		-	0.3	-	mJ
t _{rr}	Diode Reverse Recovery Time	T _J =175°C, I _F =6A, di/dt=200A/μs, V _{CC} =400V	-	122	-	ns
Q _{rr}	Diode Reverse Recovery Charge		-	0.44	-	uC
I _{rm}	Diode Peak Reverse Recovery Current		-	6.5	-	nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERIS

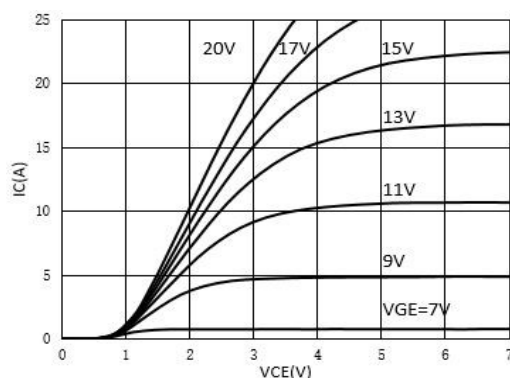


Figure1: Output Characteristics ($T_J=25^\circ C$)

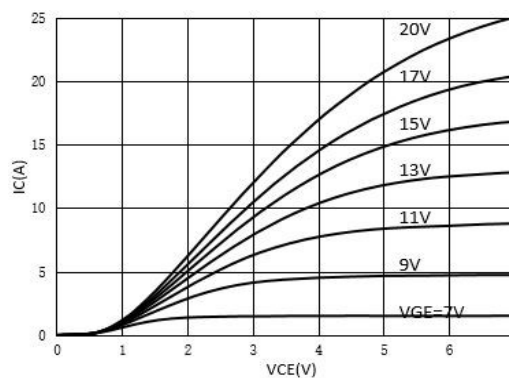


Figure 2: Output Characteristic ($T_J=175^\circ C$)

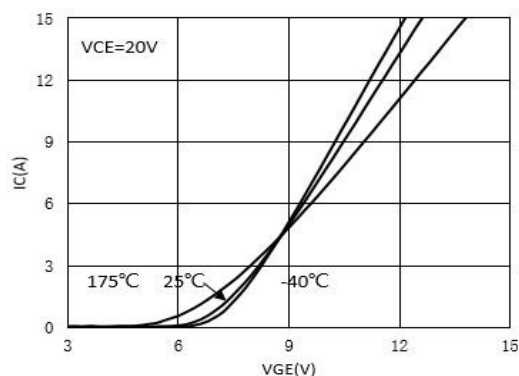


Figure3:Transfer Characteristic

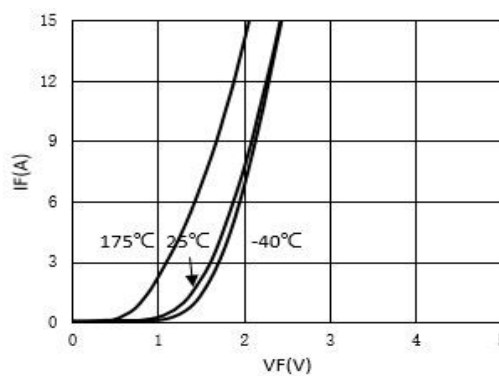


Figure 4: Diode Characteristic

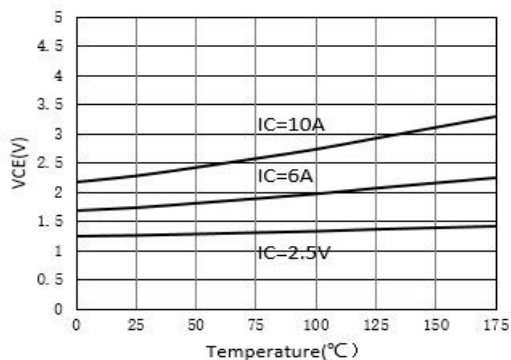


Figure 5: Collector-Emitter Saturation Voltage vs. Junction Temperature

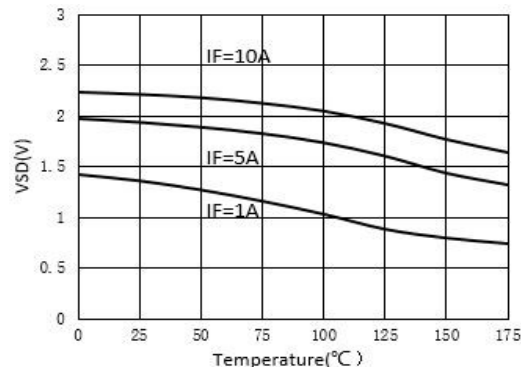


Figure 6: Diode Forward Voltage vs. Junction Temperature

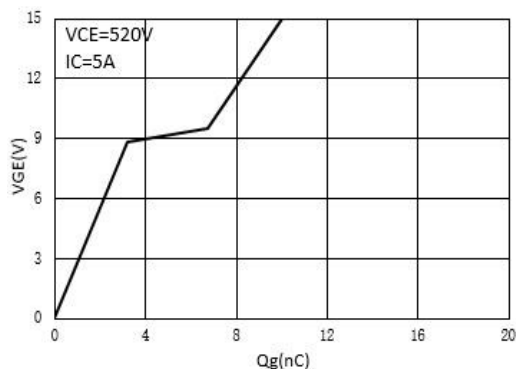


Figure 7: Gate-Charge Characteristics

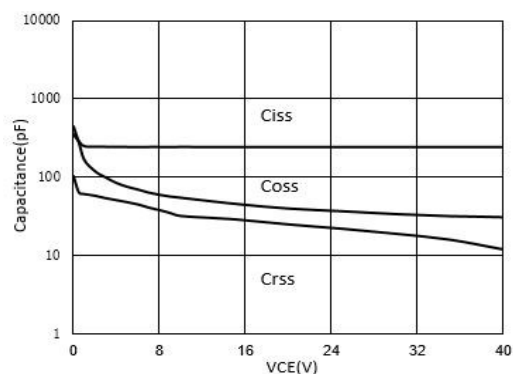


Figure 8: Capacitance Characteristics

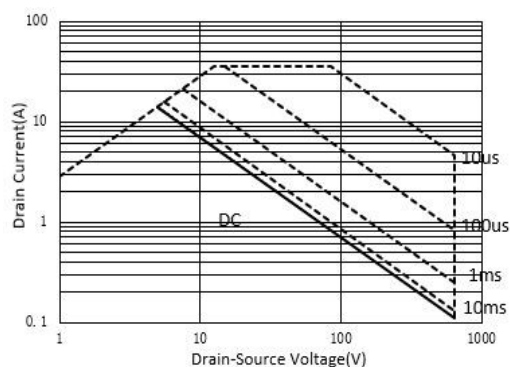


Figure 9: Forward Bias Safe Operating Area

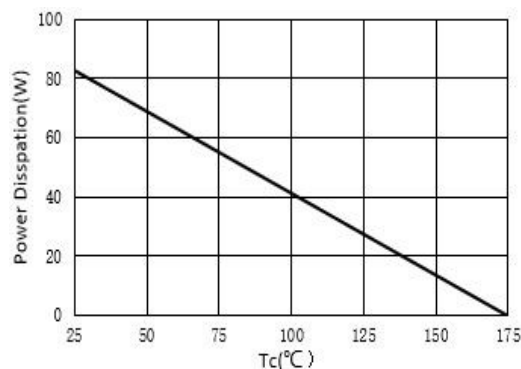


Figure 10: Power Dissipation as Function of Case

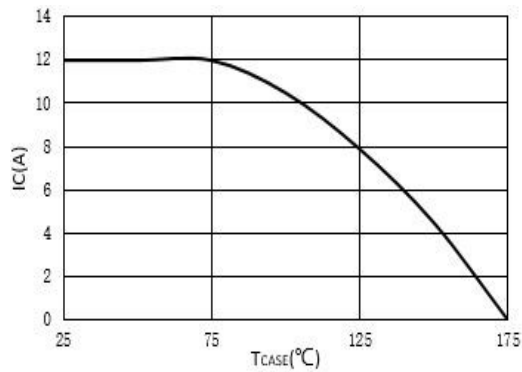


Figure 11: Current De-rating

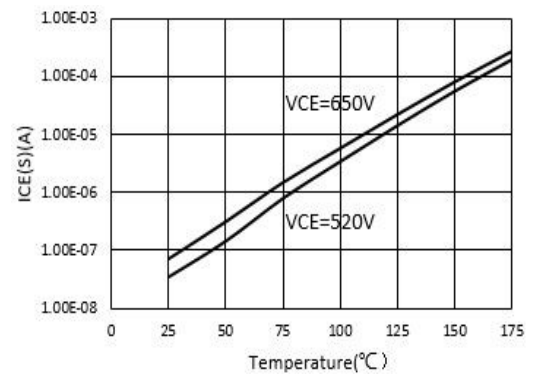


Figure 12: Diode Reverse Leakage Current vs. Junction Temperature

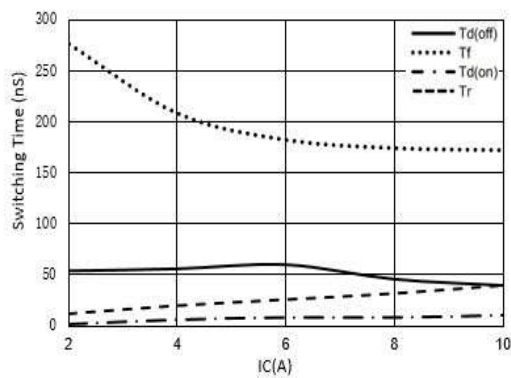


Figure 13: Switching Time vs. I_C
($T_J=175^{\circ}C$, $V_{GE}=15V$, $V_{CE}=400V$, $R_g=60\Omega$)

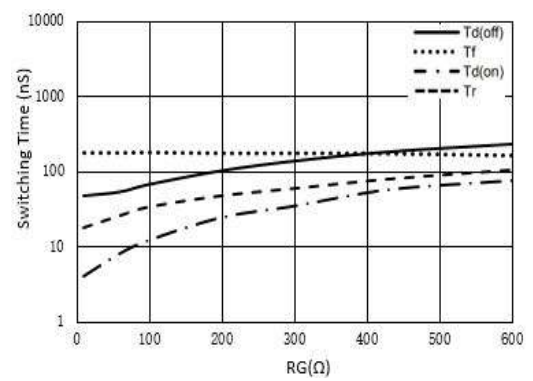


Figure 14: Switching Time vs. R_g
($T_J=175^{\circ}C$, $V_{GE}=15V$, $V_{CE}=400V$, $I_C=6A$)

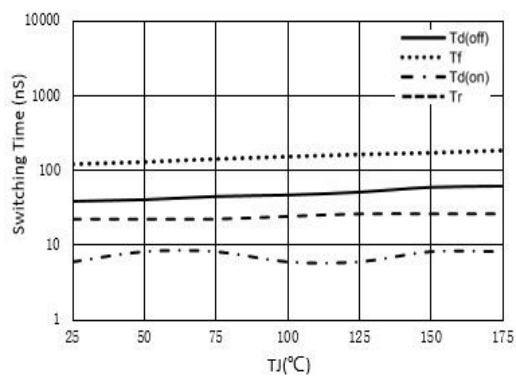


Figure 15: Switching Time vs. T_J
($V_{GE}=15V$, $V_{CE}=400V$, $I_C=6A$, $R_g=60\Omega$)

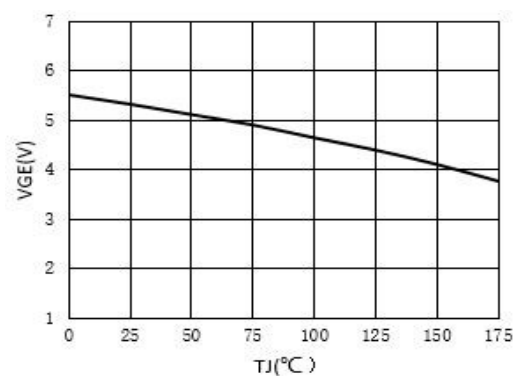


Figure 16: V_{CE} vs. T_J

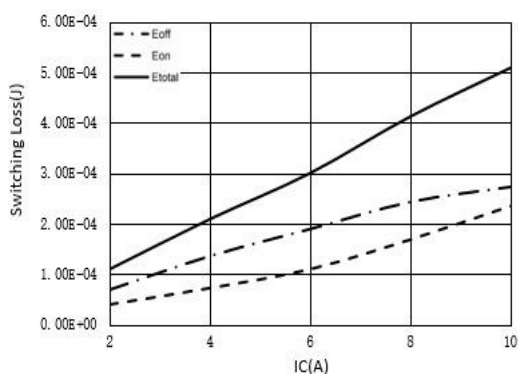


Figure 17: Switching Loss vs. I_C
($T_J=175^\circ\text{C}$, $V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $R_g=60\Omega$)

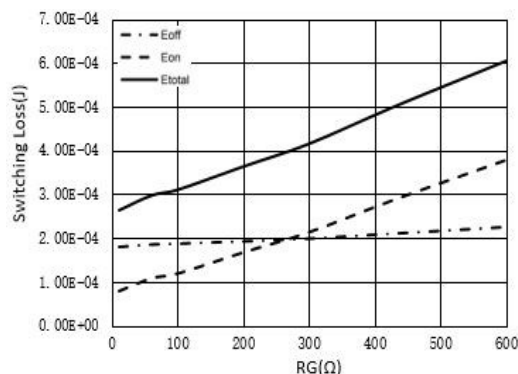


Figure 18: Switching Loss vs. R_g
($T_J=175^\circ\text{C}$, $V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $I_C=6\text{A}$)

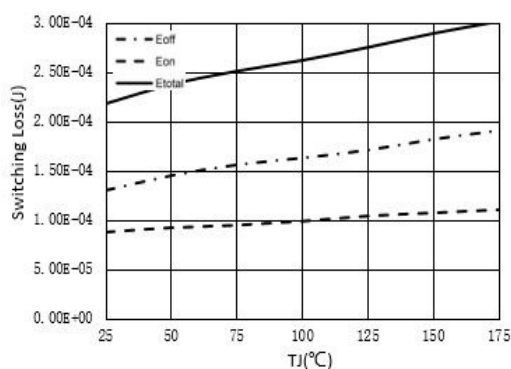


Figure 19: Switching Loss vs. T_J
($V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $I_C=6\text{A}$, $R_g=60\Omega$)

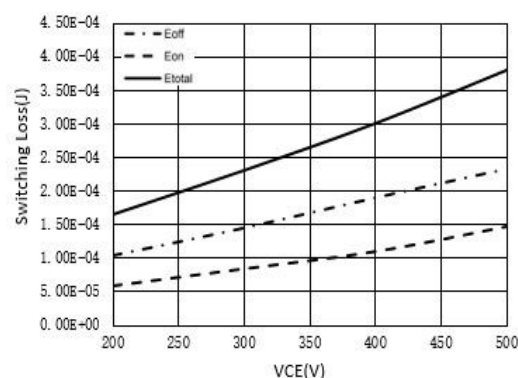


Figure 20: Switching Loss vs. V_{CE}
($T_J=175^\circ\text{C}$, $V_{GE}=15\text{V}$, $I_C=6\text{A}$, $R_g=60\Omega$)

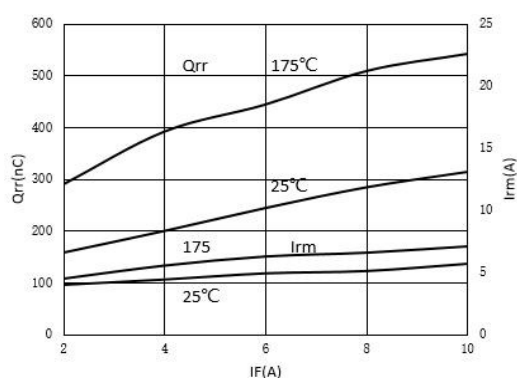


Figure 21: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current
($V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $di/dt=200\text{A/us}$)

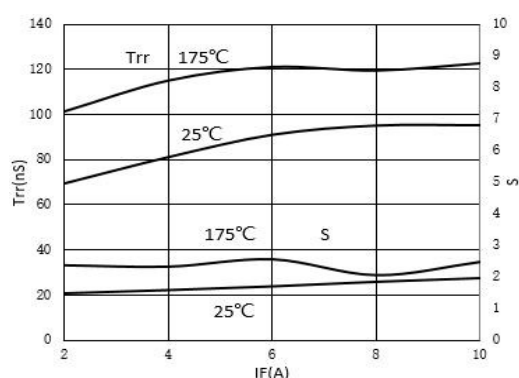


Figure 22: Diode Reverse Recovery Time and Softness Factor vs. Conduction Current
($V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $di/dt=200\text{A/us}$)

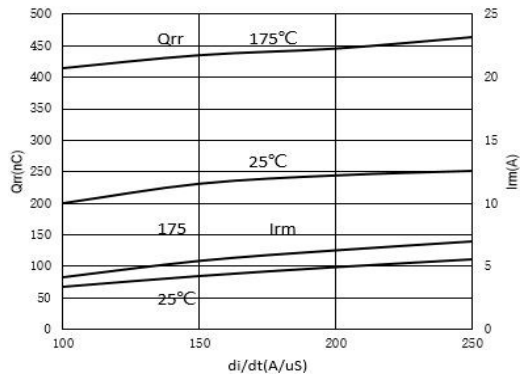


Figure 23: Diode Reverse Recovery Charge and Peak Current vs. di/dt
($V_{GE}=15V, V_{CE}=400V, di/dt=200A/us$)

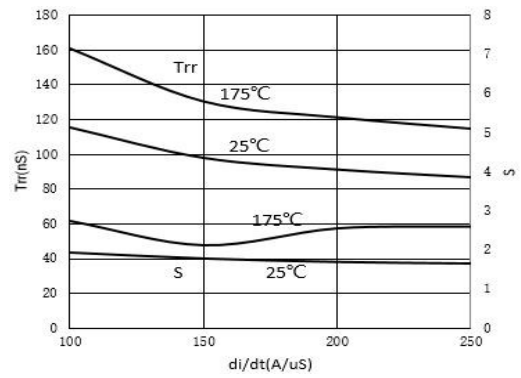


Figure 24: Diode Reverse Recovery Time and Softness Factor vs. di/dt
($V_{GE}=15V, V_{CE}=400V, di/dt=200A/us$)

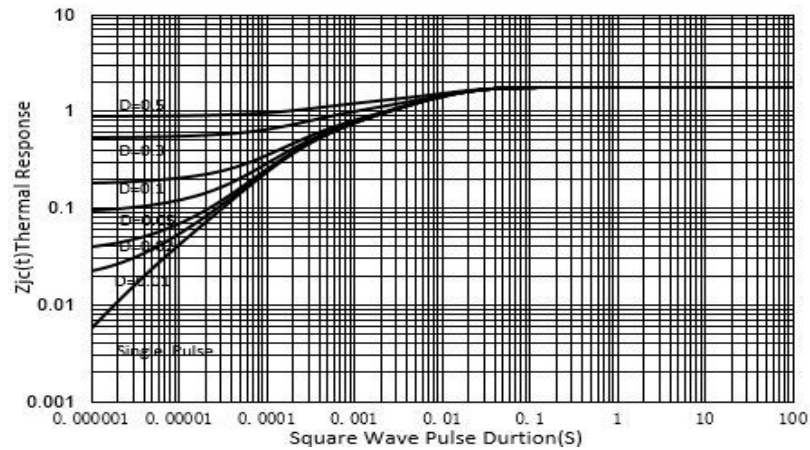


Figure 25: Normalized Maximum Transient Thermal Impedance for IGB

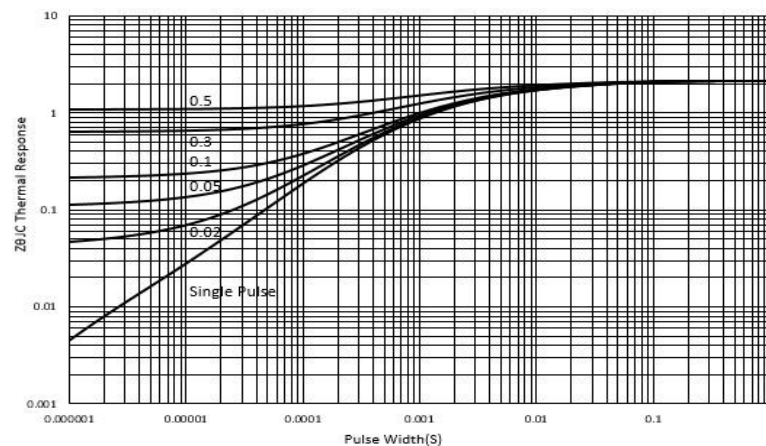
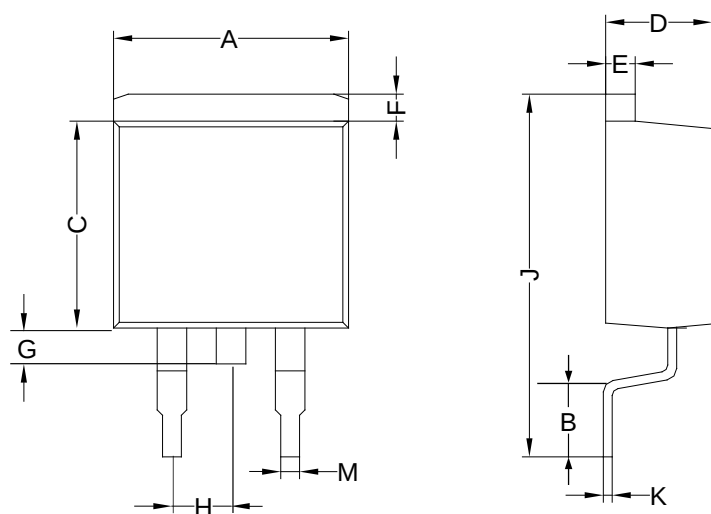


Figure 26: Normalized Maximum Transient Thermal Impedance for Diode

Package Outline



TO-263

SYMBOL	MILLIMETERS		
	MIN.	NOM.	MAX.
A	9.652	10.030	10.668
B	1.778	2.540	2.794
C	8.382	9.140	9.652
D	4.064	4.450	4.826
E	1.143	1.270	1.651
F	1.020	1.270	1.676
G	1.270	1.520	1.778
H	2.440	2.540	2.640
J	14.605	15.240	15.875
K	0.331	0.500	0.737
M	0.508	0.810	0.991