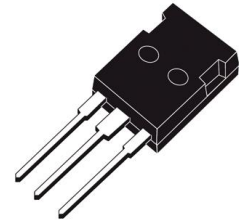


IGBT

Features

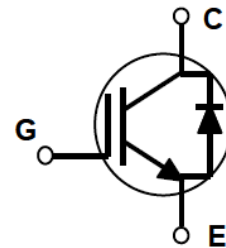
- 1200V,75A
- $V_{CE(sat)(typ.)} = 1.9V @ V_{GE} = 15V, I_C = 75A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms



TO-247-3L Plus

General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as induction heating, UPS, AC & DC motor controls and general purpose inverter .



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25^\circ C$)	115	A
	Continuous Collector Current ($T_C=100^\circ C$)	75	A
I_{CM}	Pulsed Collector Current (Note 1)	230	A
I_F	Diode Continuous Forward Current ($T_C=100^\circ C$)	75	A
I_{FM}	Diode Maximum Forward Current (Note 1)	250	A
t_{sc}	Short Circuit Withstand Time $V_{GE}=15V, V_{CC} \leq 960V, T_J \leq 150^\circ C$	10	us
P_D	Maximum Power Dissipation ($T_C=25^\circ C$)	625	W
	Maximum Power Dissipation ($T_C=100^\circ C$)	250	W
T_J	Operating Junction Temperature Range	-40 to +150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max.	Units
R_{thj-c}	Thermal Resistance, Junction to case for IGBT	0.2	$^\circ C / W$
R_{thj-c}	Thermal Resistance, Junction to case for Diode	0.4	$^\circ C / W$
R_{thj-a}	Thermal Resistance, Junction to Ambient	40	$^\circ C / W$

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	1200	-	-	V	
I_{CES}	Collector-Emitter Leakage Current	$V_{CE}=1200V, V_{GE}=0V$	-	-	100	μA	
I_{GES}	Gate Leakage Current, Forward	$V_{GE}=30V, V_{CE}=0V$	-	-	100	nA	
	Gate Leakage Current, Reverse	$V_{GE}=-30V, V_{CE}=0V$	-	-	-100	nA	
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.5	V	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=75A$	-	1.9	2.5	V	
		$V_{GE}=15V, I_C=75A$ $T_C=125^\circ\text{C}$		2.3			
		$V_{GE}=15V, I_C=75A$ $T_C=150^\circ\text{C}$		2.6			
		$V_{GE}=15V, I_C=115A$		2.2			
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V$ $V_{GE}=15V$ $I_C=75A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ\text{C}$	-	205	-	ns	
t_r	Turn-on Rise Time		-	470	-	ns	
$t_{d(off)}$	Turn-off Delay Time		-	130	-	ns	
t_f	Turn-off Fall Time		-	295	-	ns	
E_{on}	Turn-on Switching Loss		-	19.1	-	mJ	
E_{off}	Turn-off Switching Loss		-	6	-	mJ	
E_{ts}	Total Switching Loss		-	25.1	-	mJ	
$t_{d(on)}$	Turn-on Delay Time		$V_{CC}=600V$ $V_{GE}=15V$ $I_C=75A$ $R_G=10\Omega$ Inductive Load $T_C=125^\circ\text{C}$	-	190	-	ns
t_r	Turn-on Rise Time				365	-	ns
$t_{d(off)}$	Turn-off Delay Time			-	170	-	ns
t_f	Turn-off Fall Time	-		345	-	ns	
E_{on}	Turn-on Switching Loss	-		15.7	-	mJ	
E_{off}	Turn-off Switching Loss	-		7.4	-	mJ	
E_{ts}	Total Switching Loss	-		23.1	-	mJ	
C_{ies}	Input Capacitance	$V_{CE}=30V$		-	7348	-	pF
C_{oes}	Output Capacitance	$V_{GE}=0V$	-	312	-	pF	
C_{res}	Reverse Transfer Capacitance	$f=1\text{MHz}$	-	38	-	pF	
Q_g	Total Gate Charge	$V_{CC}=600V$ $V_{GE}=15V$ $I_C=75A$	-	270		nC	
Q_{ge}	Gate-Emitter Charge		-	105		nC	
Q_{gc}	Gate-Collector Charge		-	140		nC	

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Electrical Characteristics of Diode ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=75\text{A}$	-	2.1	3.2	V
t_{rr}	Diode Reverse Recovery Time	$V_{CE} = 400\text{V}$	-	530		ns
I_{rr}	Diode peak Reverse Recovery Current	$I_F=75\text{A}$	-	8.5		A
Q_{rr}	Diode Reverse Recovery Charge	$dI_F/dt = 200\text{A/us}$	-	1890		nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

$T_c=25^\circ\text{C}$

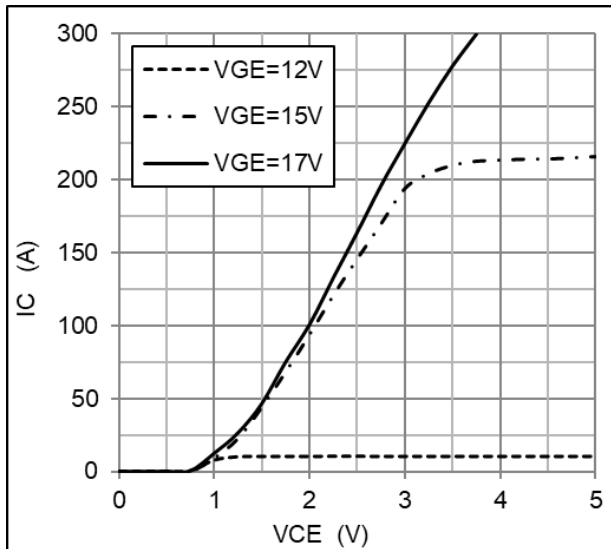


Figure 2. Typical Saturation Voltage Characteristics $V_G=15\text{V}$

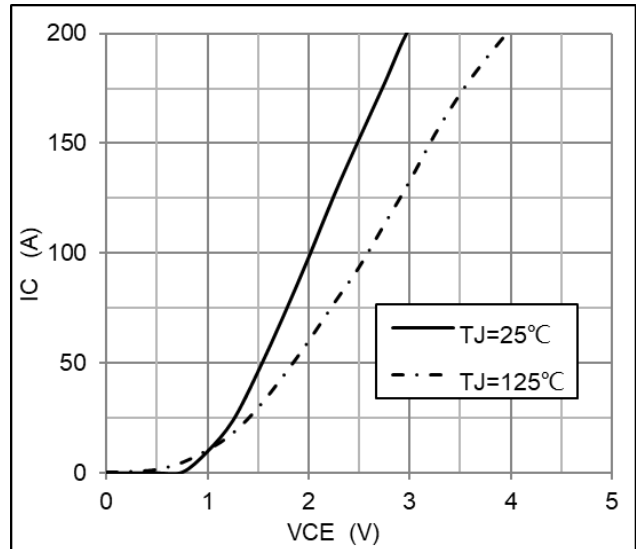


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

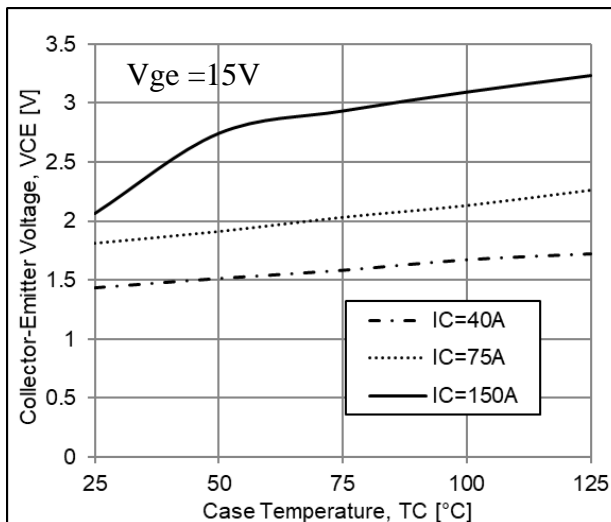


Figure 4. Forward Characteristics

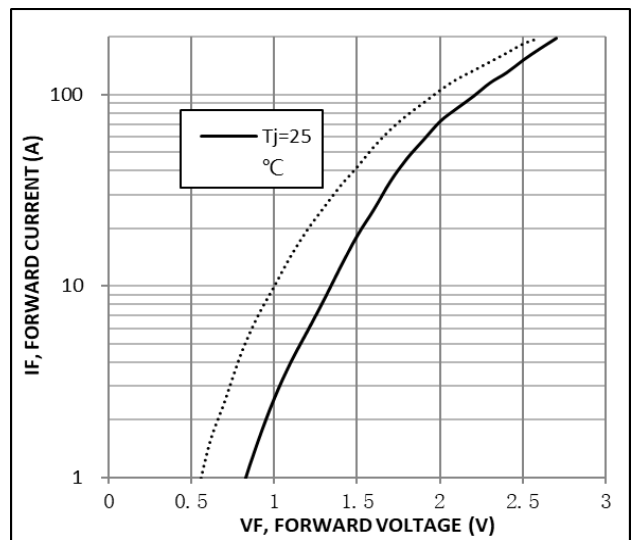


Figure 5. Saturation Voltage vs. VGE

Tc=25C

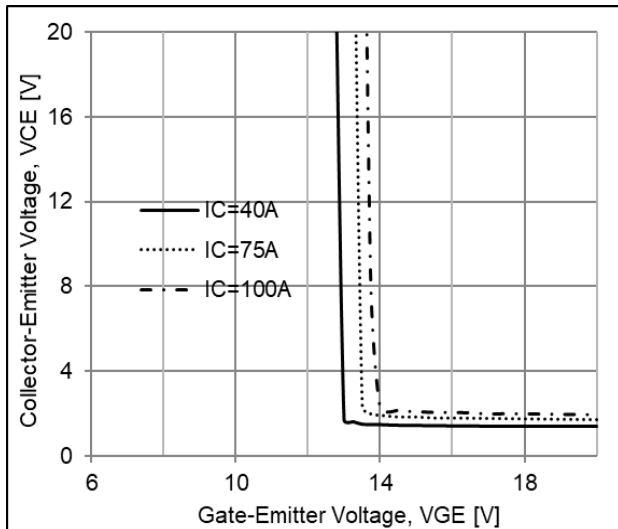


Figure 6. Saturation Voltage vs. VGE

Tc=125C

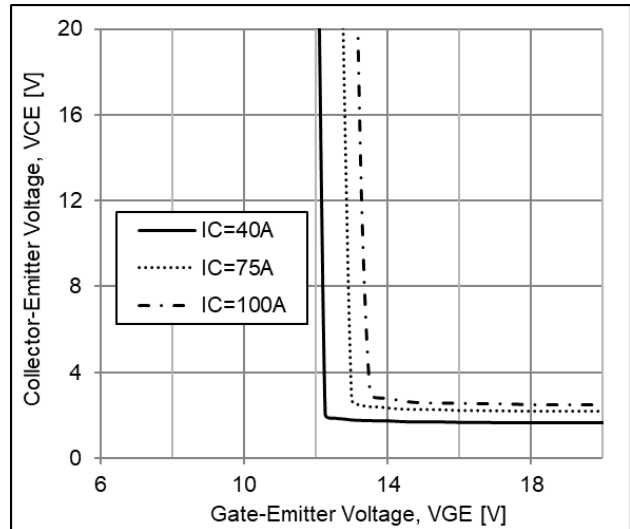


Figure 7. Switching Loss vs. Gate Resistance

(VCC=600V, VGE= ±15V, IC=75A,)

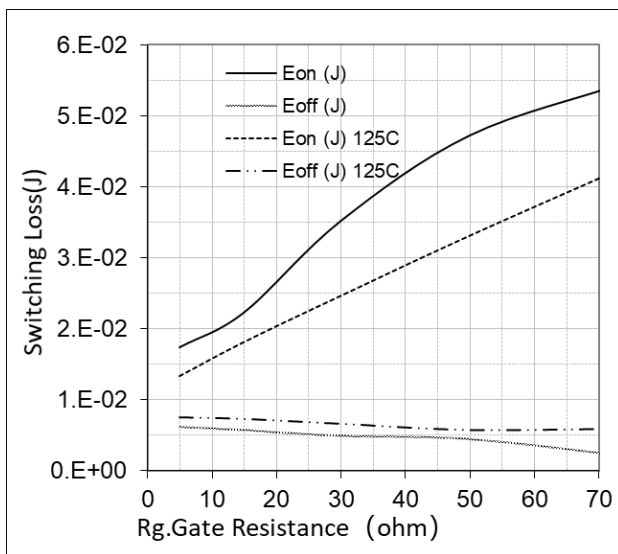


Figure 8. Turn-On Characteristics vs. Gate Resistance

(VCC=600V, VGE= ±15V, IC=75A)

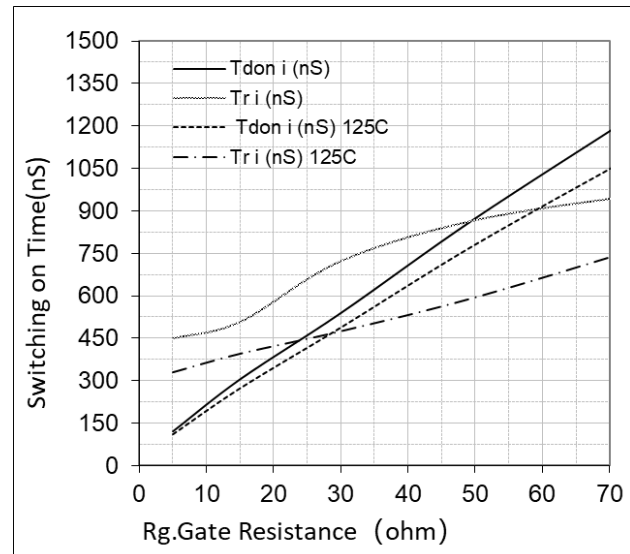


Figure 9. Turn-Off Characteristics vs. Gate Resistance (VCC=600V, VGE=±15V, IC=75A)

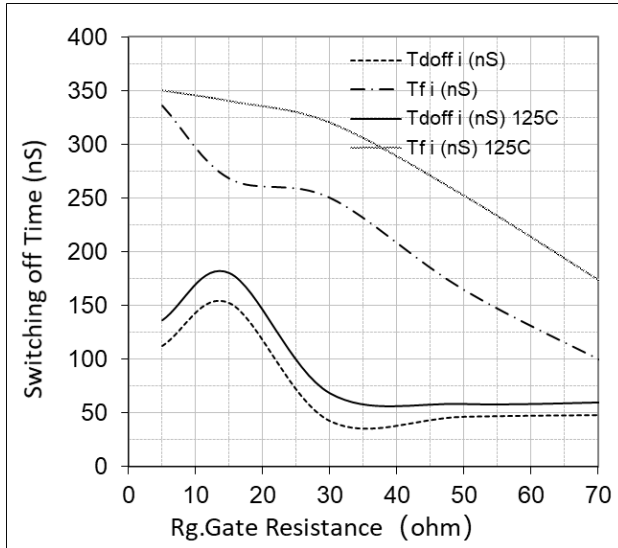


Figure 10. Switching Loss vs. Collector Current (VGE=±15V, RG= 10 ohm, VCC=600V)

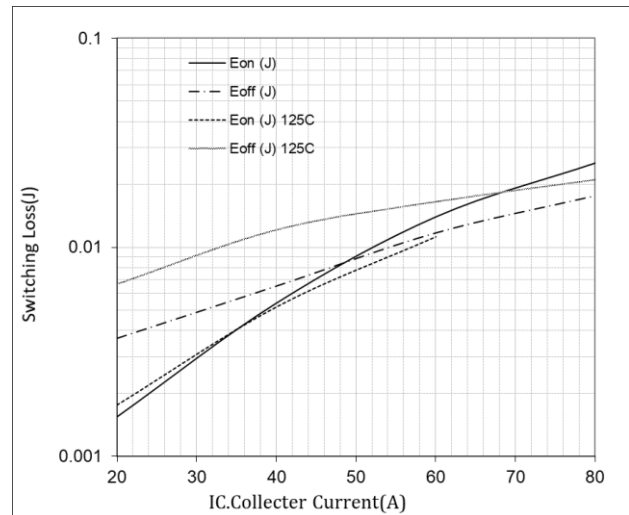


Figure 11. Turn-On Characteristics vs. Collector Current (VGE=±15V, RG=5 OHM, VCC=600V)

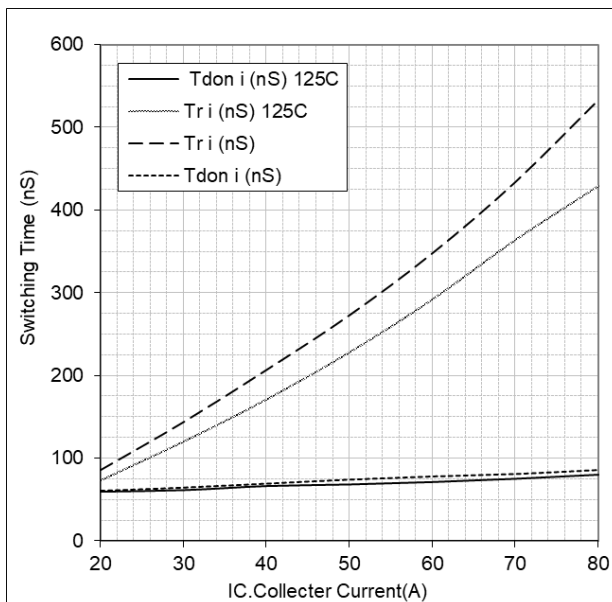


Figure 12. Turn-Off Characteristics vs. Collector Current (VGE=±15V, RG=5 OHM, VCC=600V)

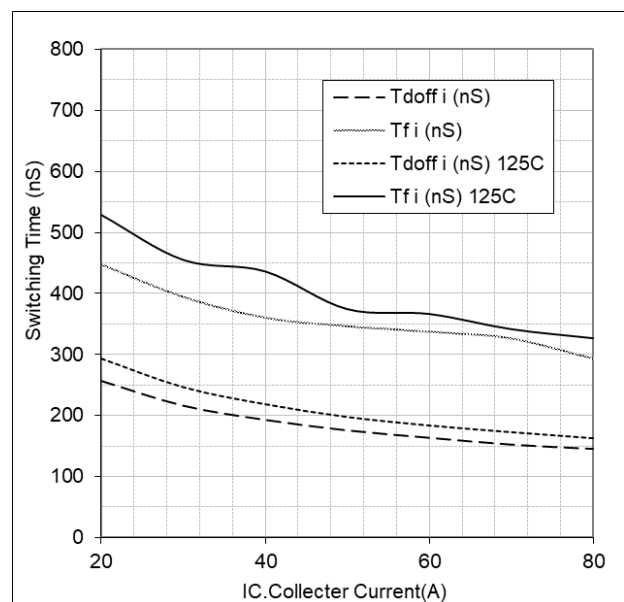


Figure 13. Gate Charge Characteristics

RL=10 ohm TC=25C ,Vcc=600, 400V 200V

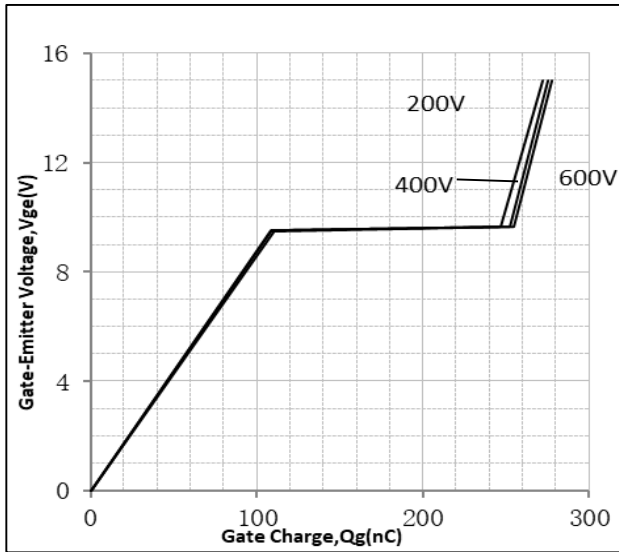


Figure 14. Reverse Recovery Current

VCC=400V, RG=10 ohm, VG=±15V IL=500uH

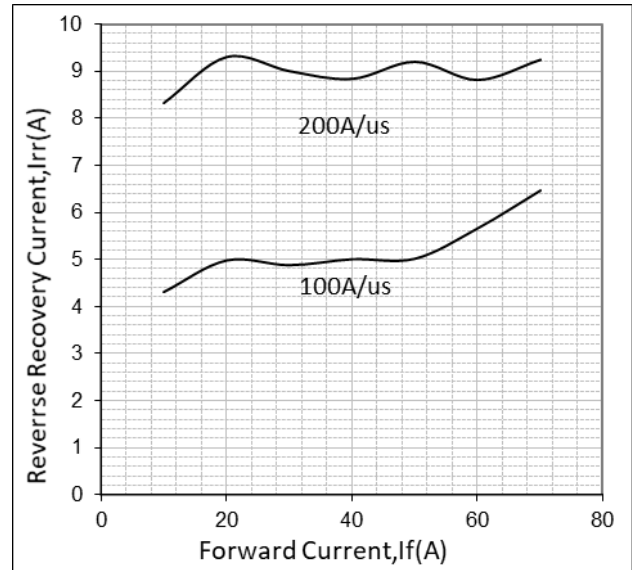


Figure 15. Stored Charge

VCC=600V, RG= 10 ohm, VG=±15V IL=500uH

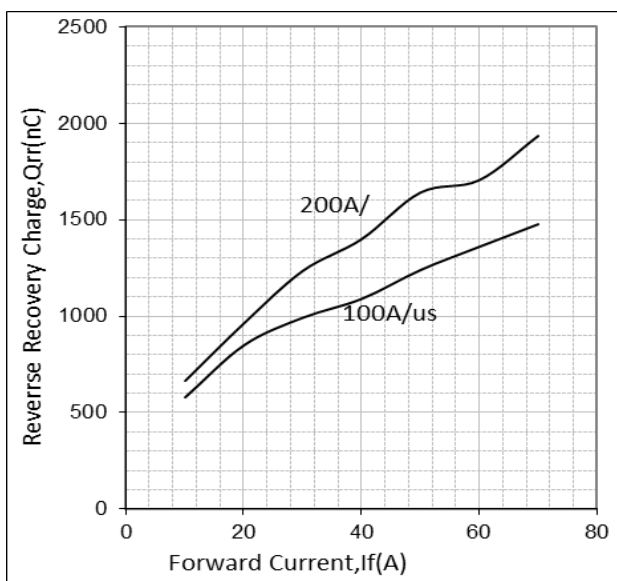


Figure 16. Reverse Recovery Time

VCC=400V, RG=10 ohm, VG=±15V IL=500uH

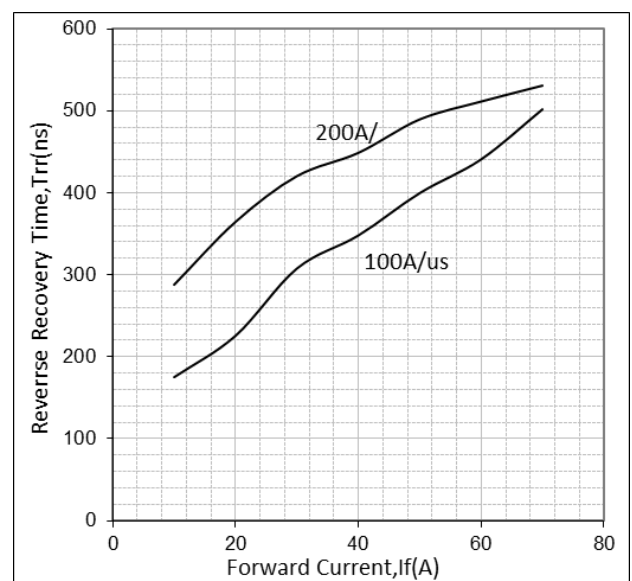


Figure 17. SOA Characteristics

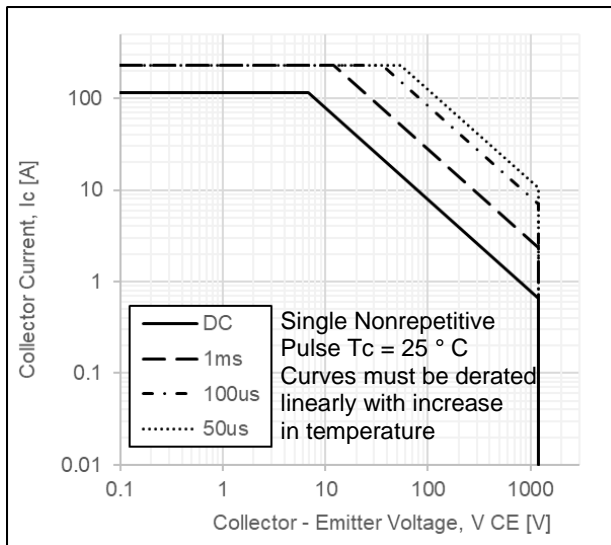


Figure 18. Turn Off SOA

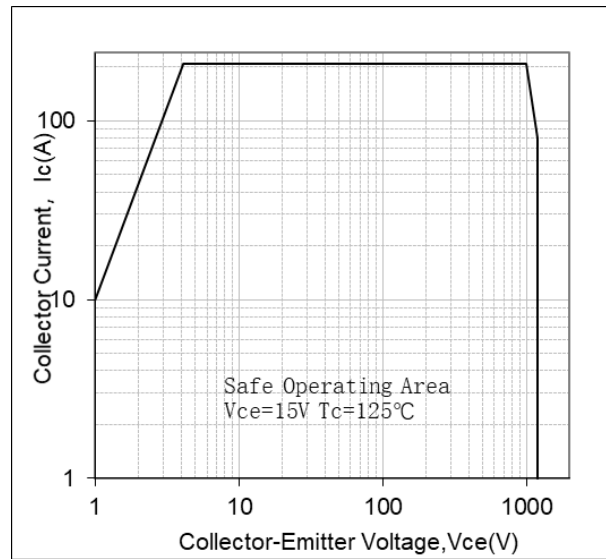


Figure 19. Capacitance Characteristics

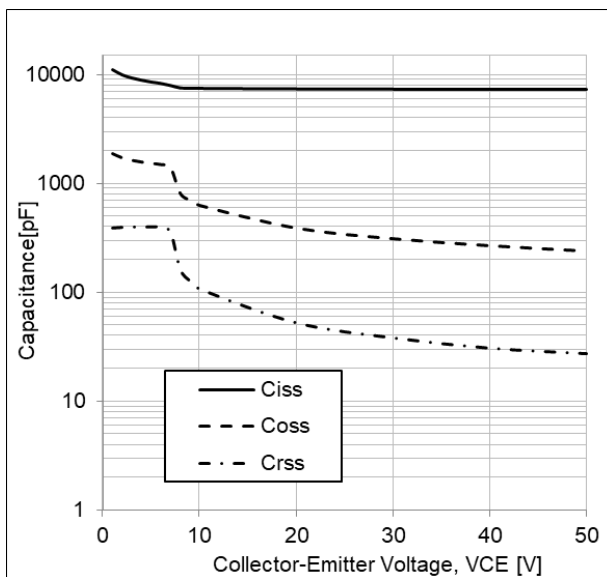
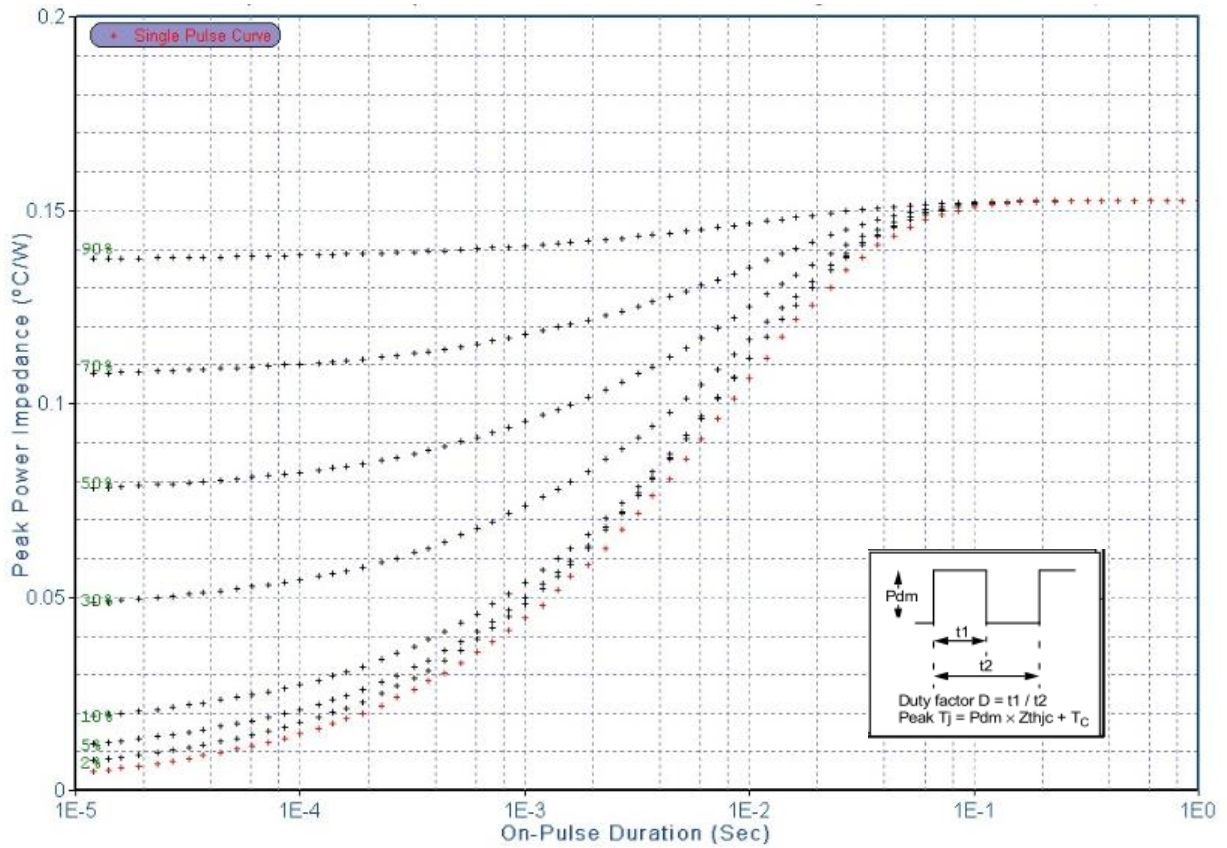
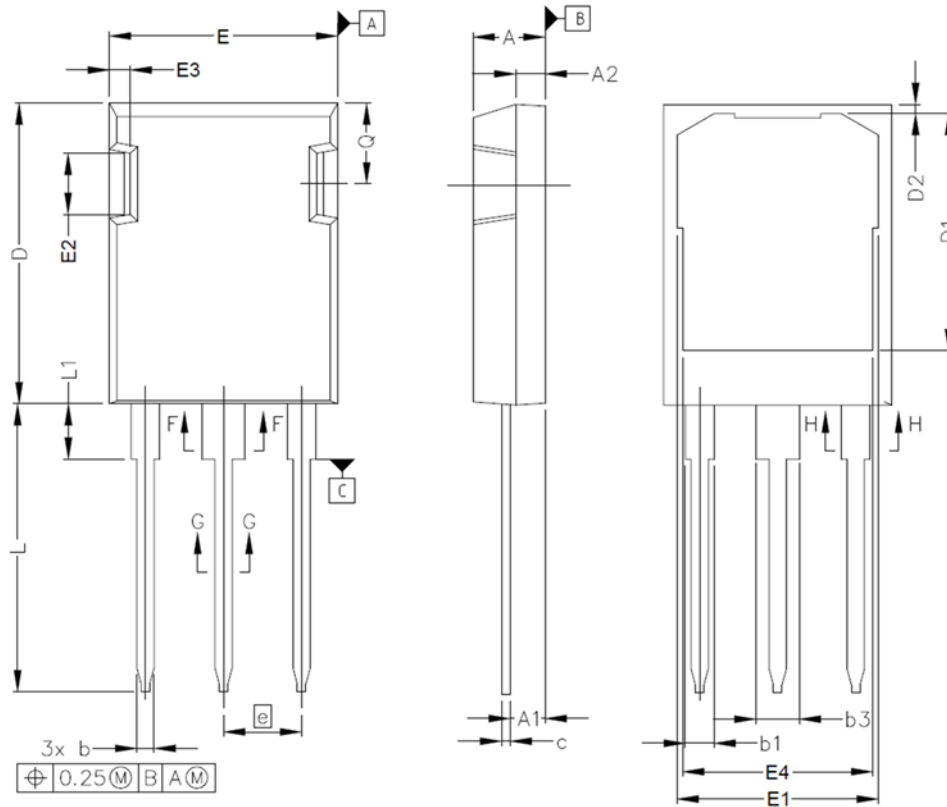


Figure 20. Transient Thermal Impedance of IGBT



Mechanical Dimensions



SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	4.83	5.21	E	15.75	16.13
A1	2.29	2.54	E1	13.10	14.15
A2	1.91	2.16	E2	3.68	5.10
b'	1.07	1.28	E3	1.00	1.90
b	1.07	1.33	E4	12.38	13.43
b1	1.91	2.41	e	5.44 BSC	
b2	1.91	2.16	N	3	
b3	2.87	3.38	L	19.81	20.32
b4	2.87	3.13	L1	3.70	4.00
c'	0.55	0.65	Q	5.49	6.00
c	0.55	0.68			
D	20.80	21.10			
D1	16.25	17.65			
D2	0.50	0.80			

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