

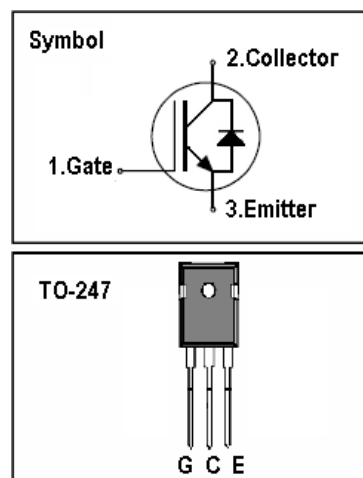
IGBT - Isolation (内绝缘 IGBT)

Features

- 650V 75A, $V_{CE(sat)}(typ.) = 1.9 V @ 75A$
- Field Stop IGBT Technology.
- 10 μ s Short Circuit Capability.
- Square RBSOA.
- Positive VCE (on) Temperature Coefficient.

Benefits

- High Efficiency for Motor Control.
- Rugged Performance.
- Excellent Current Sharing in Parallel Operation



Absolute Maximmun Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25\text{ }^{\circ}\text{C}$)	100	A
	Continuous Collector Current ($T_C=70\text{ }^{\circ}\text{C}$)	75	A
I_{CM}	Pulsed Collector Current (Note 1)	300	A
I_F	Diode Continuous Forward Current ($T_C=100\text{ }^{\circ}\text{C}$)	80	A
I_{FM}	Diode Maximum Forward Current (Note 1)	300	A
t_{sc}	Short Circuit Withstand Time	10	us
I_{sc}	Short Circuit Current	410	A
P_D	Maximum Power Dissipation ($T_C=25\text{ }^{\circ}\text{C}$)	283	W
P_D	Maximum Power Dissipation ($T_C=85\text{ }^{\circ}\text{C}$)	169	W
T_J	Operating Junction Temperature Range	-40 to +175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$
Visol	Isolation voltage RMS, $f = 50/60\text{Hz}$, $t = 1\text{min}$	2500	V

Thermal Characteristics

Symbol	Parameter	Max.	Units
R_{thj-c}	Thermal Resistance, Junction to case for IGBT	0.53	$^{\circ}\text{C}/\text{W}$
R_{thj-c}	Thermal Resistance, Junction to case for Diode	1.01	$^{\circ}\text{C}/\text{W}$
R_{thj-a}	Thermal Resistance, Junction to Ambient	65	$^{\circ}\text{C}/\text{W}$

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	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
I_{CES}	Collector-Emitter Leakage Current	$V_{CE}=650V, V_{GE}=0V$	-	-	250	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	$V_{GE}=V_{CE}, I_C=250\mu A$	4.0	-	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=75A$	-	1.9	2.2	V
Q_g	Total Gate Charge	$V_{CC}=480V$ $V_{GE}=15V$ $I_C=75A$	-	340		nC
Q_{ge}	Gate-Emitter Charge		-	50		nC
Q_{gc}	Gate-Collector Charge		-	180		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=75A$ $R_G=10\Omega$ Inductive Load $T_C=25^{\circ}\text{C}$	-	38	-	ns
t_r	Turn-on Rise Time		-	118	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	267	-	ns
t_f	Turn-off Fall Time		-	81	-	ns
E_{on}	Turn-on Switching Loss		-	4.65	-	mJ
E_{off}	Turn-off Switching Loss		-	2.45	-	mJ
C_{ies}	Input Capacitance	$V_{CE}=25V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	2850	-	pF
C_{oes}	Output Capacitance		-	410	-	pF
C_{res}	Reverse Transfer Capacitance		-	185	-	pF
R_{Gint}	Integrated gate resistor	$f=1\text{MHz}; V_{pp}=1V$		1.10		Ω

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	$I_F=75A$	-	1.50		V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=400V$ $I_F=75A$ $dI_F/dt=500A/\mu s$	-	80		ns
I_{rrm}	Diode peak Reverse Recovery Current		-	12.5		A
Q_{rr}	Diode Reverse Recovery Charge		-	580		nC

Notes:

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

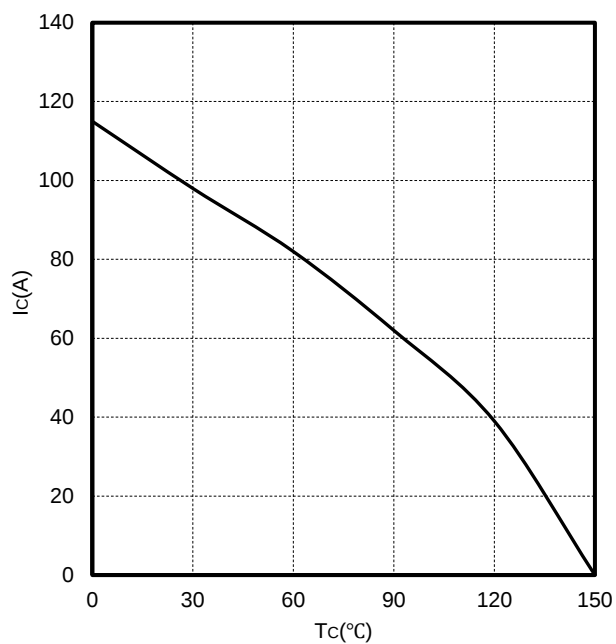


Fig 1. DC Collector current as a function of case temperature ($V_{GE} \geq 15V$, $T_j \leq 175^\circ C$)

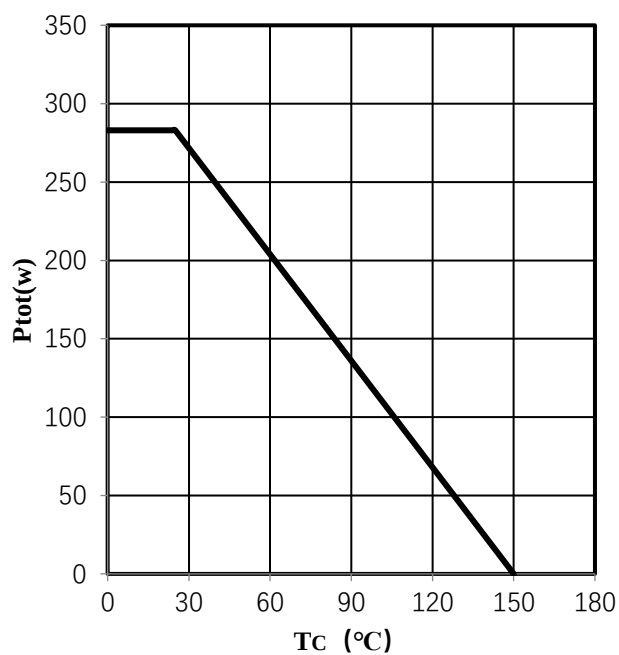


Fig 2. Power dissipation as a function of case temperature ($T_j \leq 175^\circ C$)

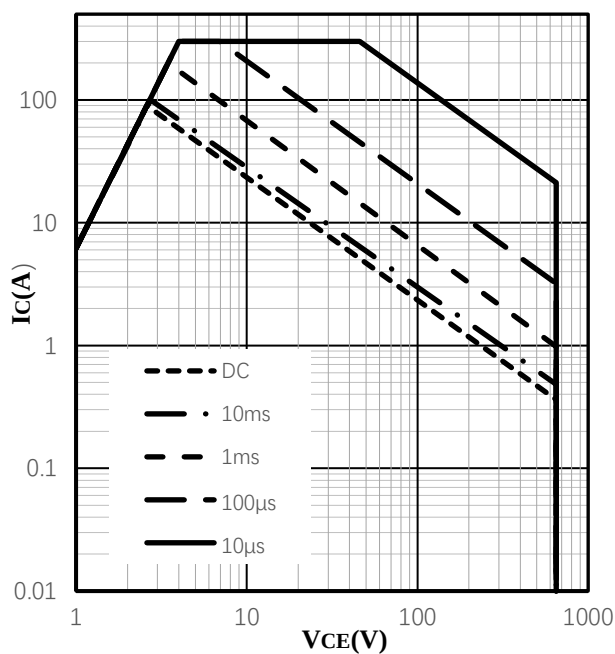


Fig 3. IGBT Forward safe operation area

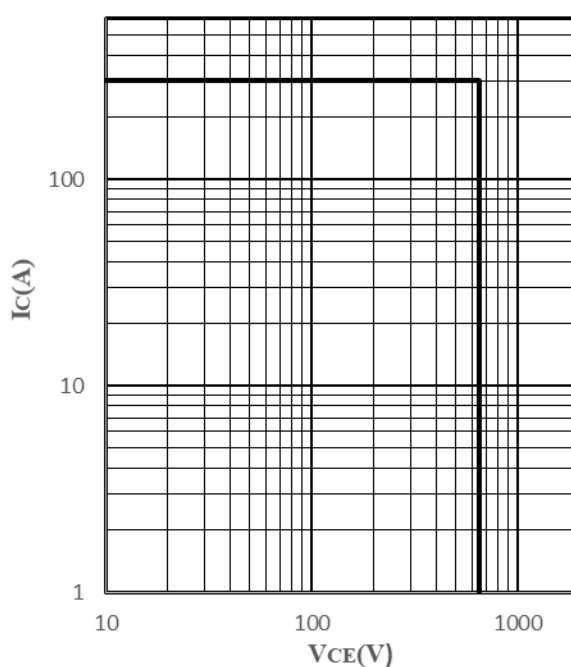


Fig 4. IGBT Reverse safe operation area

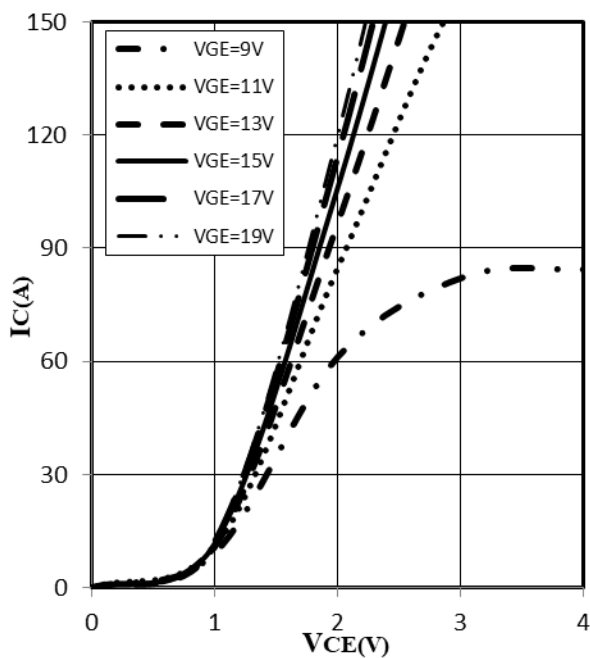


Fig 5. Typical output characteristic ($T_j=25^{\circ}\text{C}$)

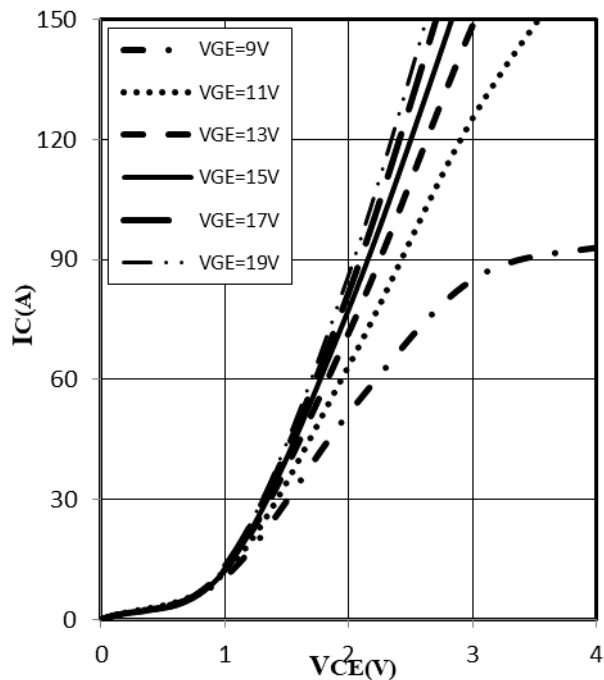


Fig 6. Typical output characteristic ($T_j=125^{\circ}\text{C}$)

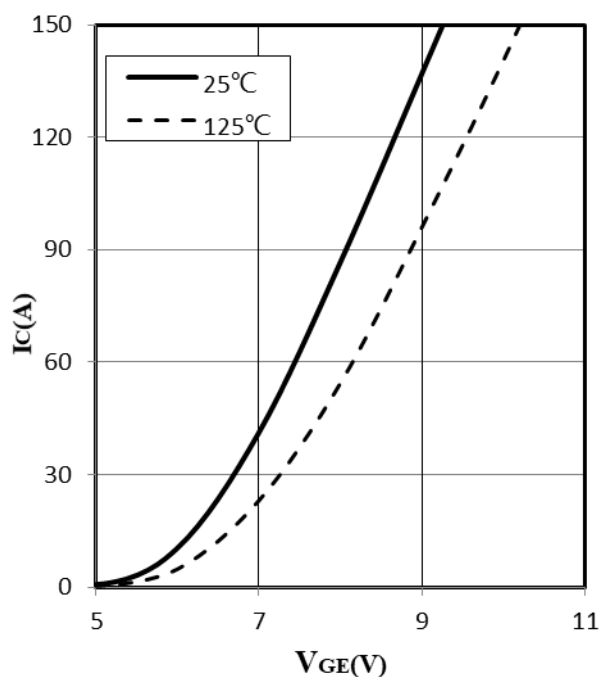


Fig 7. Typical transfer characteristic ($V_{CE}=20\text{V}$)

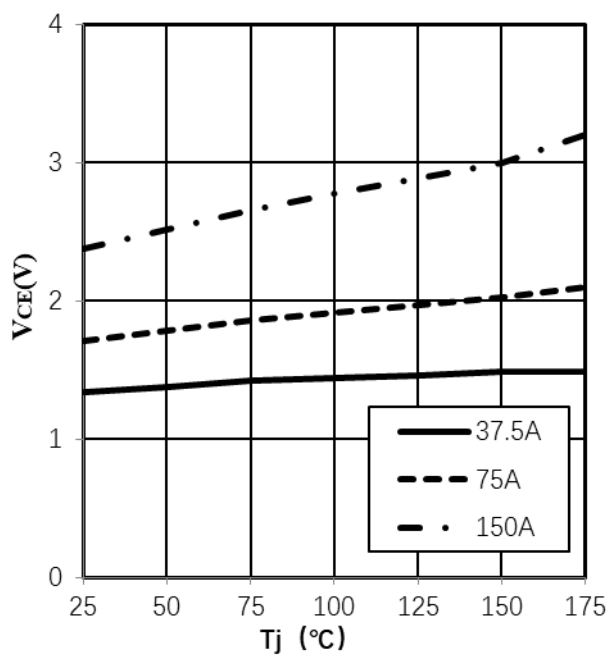


Fig 8. Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)

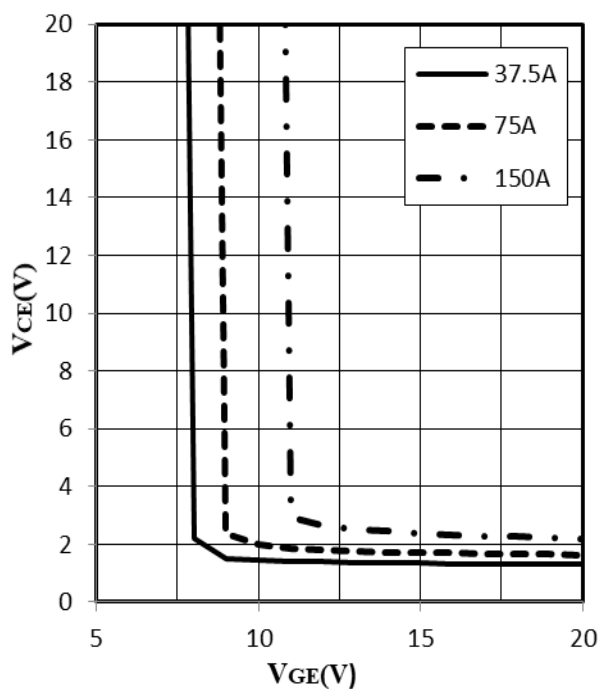


Fig 9. Typical collector-emitter saturation voltage as a function of V_{GE} ($T_j=25^\circ\text{C}$)

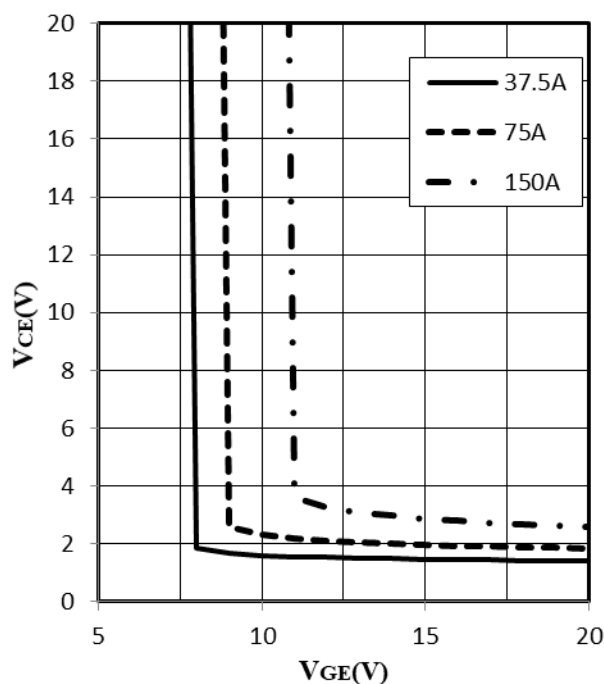


Fig 10. Typical collector-emitter saturation voltage as a function of V_{GE} ($T_j=125^\circ\text{C}$)

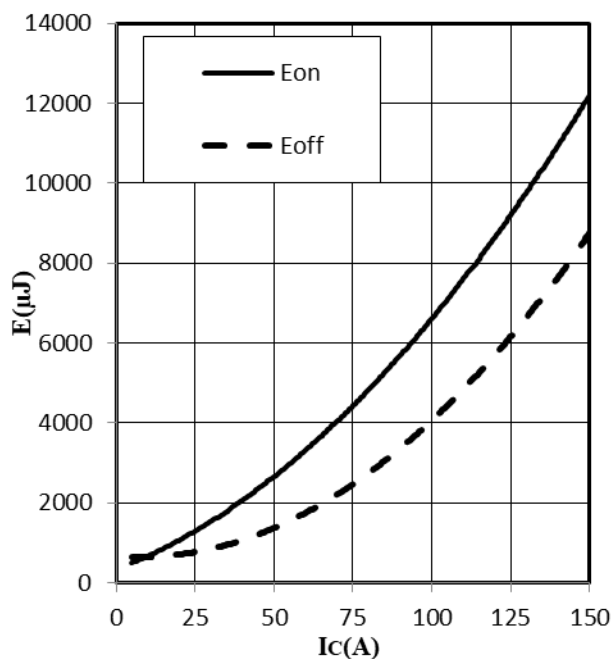


Fig 11. Typical switch energy as a function of I_c
(inductive load, $T_j=25^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_G=10\Omega$)

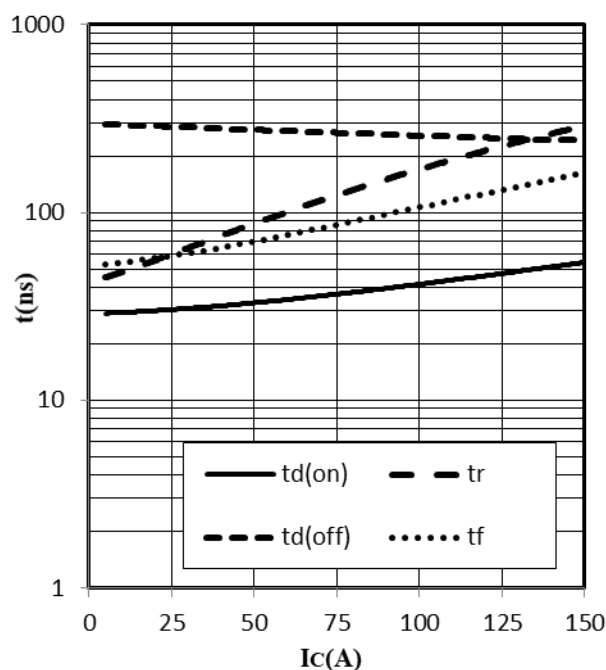


Fig 12. Typical switch time as a function of I_c
(inductive load, $T_j=25^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_G=10\Omega$)

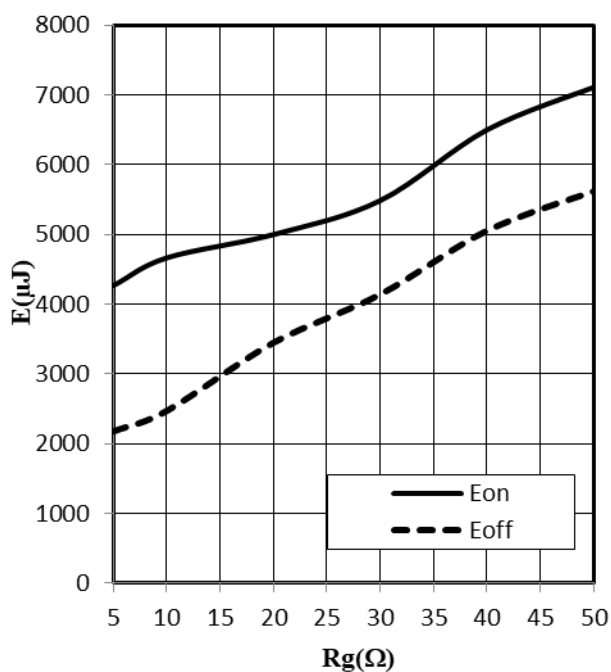


Fig 13. Typical switch energy as a function of R_G
(inductive load, $T_j=25^\circ C$, $V_{CE}=400V, V_{GE}=15V, I_c=75A$)

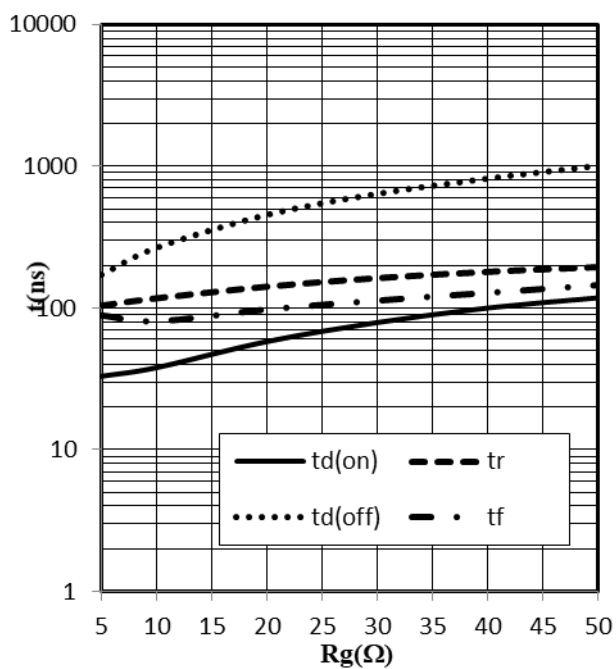


Fig 14. Typical switch time as a function of R_G
(inductive load, $T_j=25^\circ C$, $V_{CE}=400V, V_{GE}=15V, I_c=75A$)

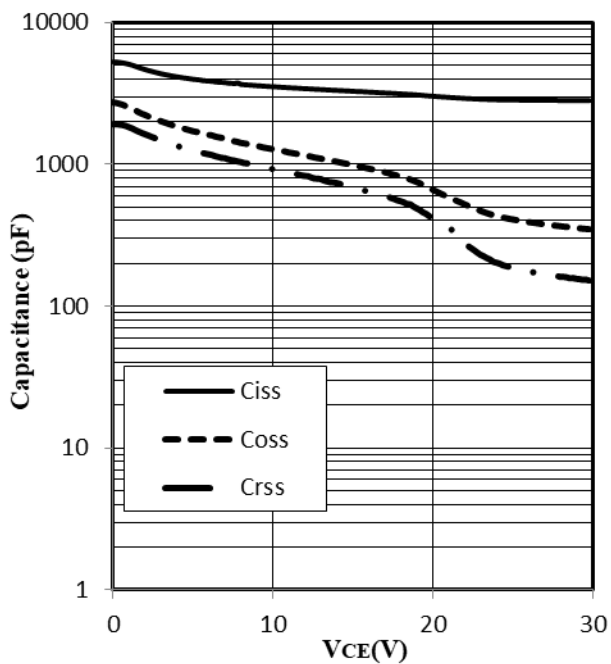


Fig 15. Typical capacitance as a function of collector-emitter voltage ($V_{GE}=0V, f=1MHz$)

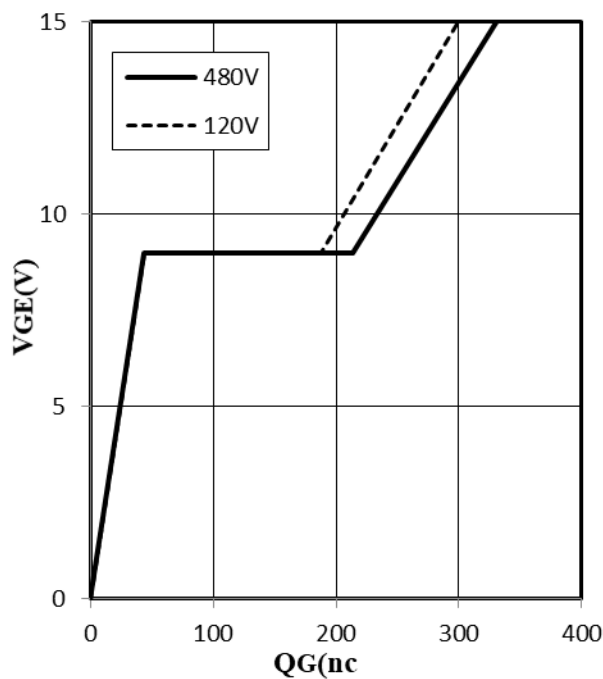


Fig 16. Typical gate charge ($I_c=75A$)

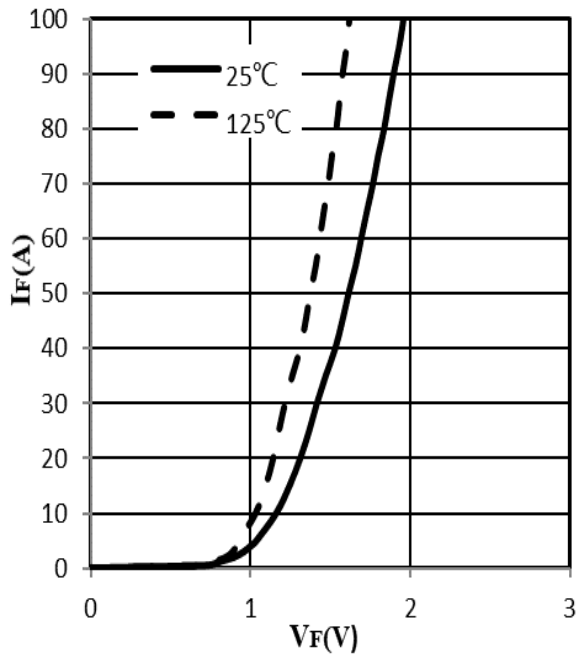


Fig 17. Typical diode forward current as a function of forward voltage

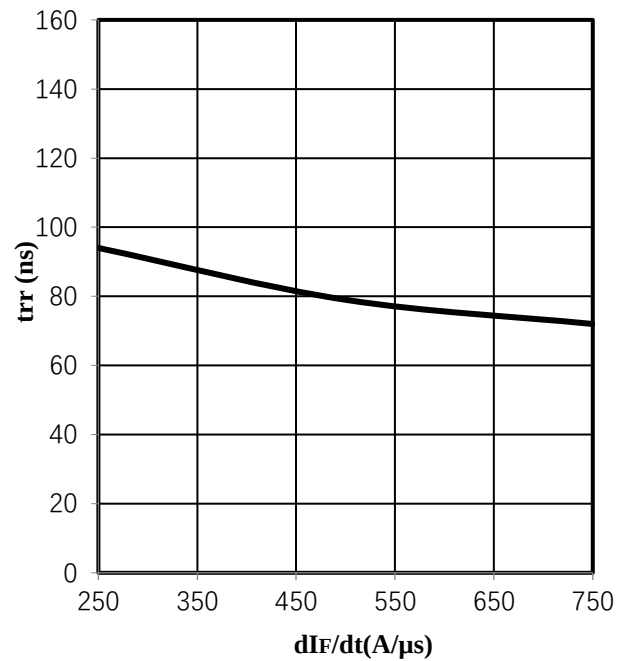


Fig 18. Typical trr as a function of dif/dt , $V_r=400V$, $I_f=75A$, $T_j=25^\circ C$

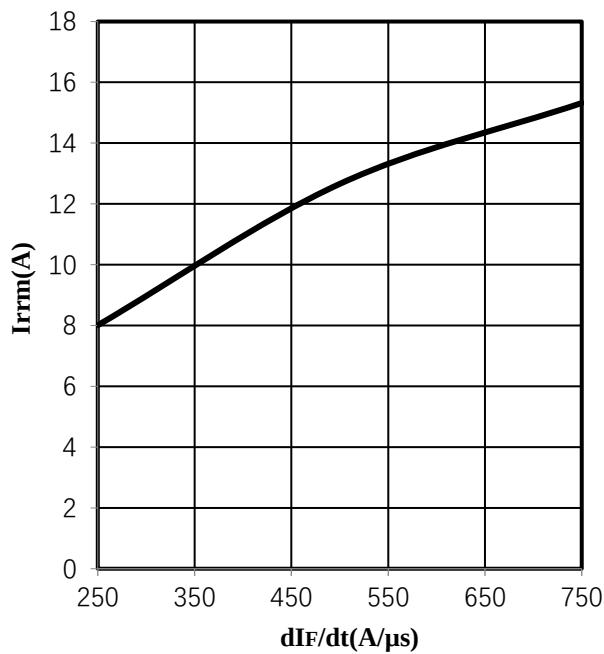


Fig 19. Typical I_{rrm} as a function of dif/dt , $V_r=400V$, $I_f=75A$, $T_j=25^\circ C$

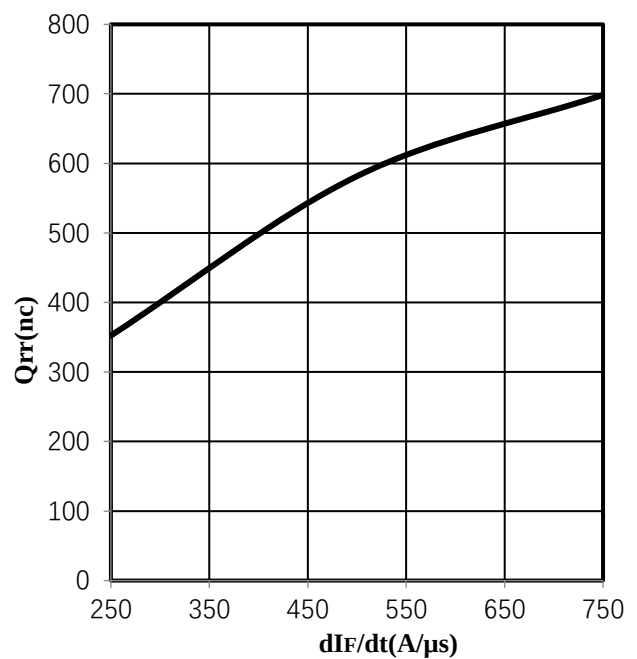


Fig 20. Typical Q_{rr} as a function of dif/dt , $V_r=400V$, $I_f=75A$, $T_j=25^\circ C$

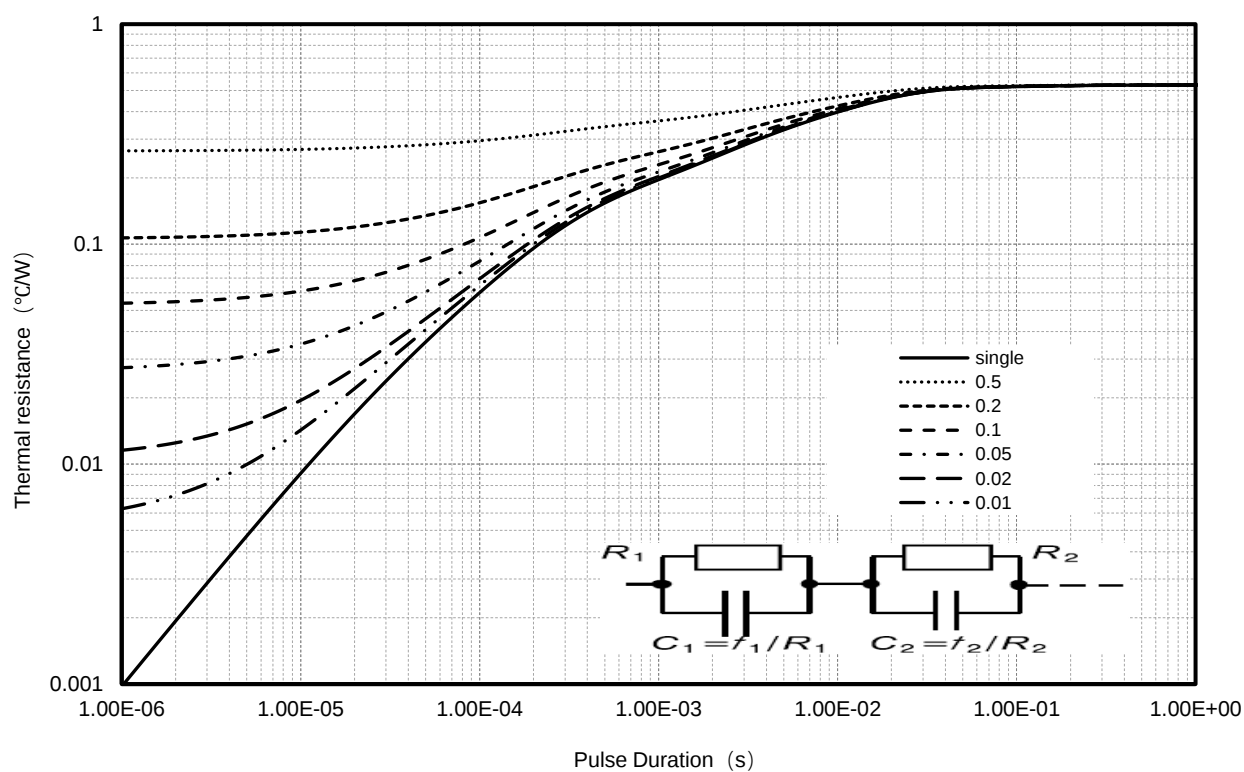
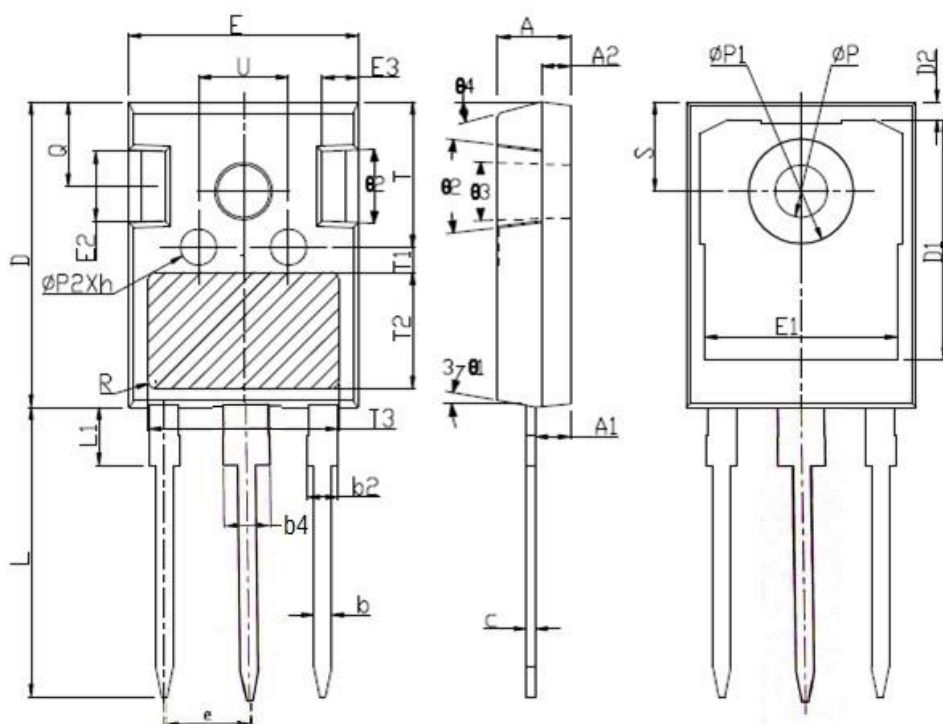


Fig 21. IGBT transient thermal impedance, $Z_{th}=f(t_p)$, $D=t_p/T$

Package Drawing



Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.9	5.0	5.1	e	5.44BSC		
A1	2.3	2.4	2.5	h	0.05	0.10	0.15
A2	1.9	2.0	2.1	L	19.6	19.9	20.2
b	1.10	1.20	1.25	L1			4.3
b2	1.90	2.00	2.25	Φ _p	3.5	3.6	3.75
b4	2.90	3.00	3.25	Φ _{p1}			7.3
c	0.50	0.60	0.70	Φ _{p2}	2.4	2.5	2.6
D	20.8	21.0	21.2	Q	5.3		5.9
D1	16.25	16.55	16.85	S	6.15BSC		
D2	1.05	1.20	1.35	T	9.8		10.2
E	15.6	15.8	16.0	T1	1.65REF		
E1	13.1	13.3	13.5	T2	8.0REF		
E2	4.9	5.0	5.1	T3	12.8REF		
E3	2.4	2.5	2.6	U	6.0		6.4
Dimensions in Millimeters							