

IGBT Discrete

V_{CE}	650	V
I_C	75	A
$V_{CE(SAT)}$ $I_C=75A$	1.65	V

Circuit



Applications

- High frequency switching application
- Resonant converters
- Uninterruptible power supply
- Welding converters

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175
- Positive temperature coefficient
- High ruggedness, temperature stable
- Pb-free lead plating; RoHS compliant

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} $T_C=25^\circ C$ value limited by bondwire $T_C=100^\circ C$	I_C	85 80	A
Diode Forward Current, limited by T_{jmax} $T_C=25^\circ C$ value limited by bondwire $T_C=100^\circ C$	I_F	85 80	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ($t_p=10\mu s, D<0.010$)	V_{GE}	± 30	V
Turn off Safe Operating Area $V_{CE}=650V$, $T_j=150^\circ C$		300	A
Pulsed Collector Current, $V_{GE}=15V$, t_p limited by T_{jmax}	I_{CM}	300	A
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	300	A
Power Dissipation, $T_j=175^\circ C, T_C=25^\circ C$	P_{tot}	395	W
Operating Junction Temperature	T_j	-40...+175	$^\circ C$
Storage Temperature	T_s	-55...+150	$^\circ C$
Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	$^\circ C$



Electrical Characteristics of the IGBT $T_j=25$ unless otherwise specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=0.75mA$	4.25	5.05	5.85	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A$ $T_j=25^\circ C,$ $T_j=125^\circ C,$ $T_j=150^\circ C$	1.45	1.65 2.05 2.15	1.95	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ C,$ $T_j=150^\circ C$			0.25 3.00	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$			200	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$	-	8.15	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.24	-	
Gate Charge	Q_G	$V_{CC}=300V, I_C=75A, V_{GE}=15V$	-	0.58	-	μC



Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25°C						
Turn-on Delay Time	t _{d(on)}	V _{CC} =300V, I _C =75A, V _{GE} = 0v~15V, R _g =10 ,L _s =60nH	-	75	-	ns
Rise Time	t _r		-	91	-	ns
Turn-on Energy	E _{on}		-	2.5	-	mJ
Turn-off Delay Time	t _{d(off)}		-	468	-	ns
Fall Time	t _f		-		-	
Turn-off Energy	E _{off}		-	1.3	-	mJ
Total switching energy						
Dynamic , at T_j= 125°C						
Turn-on Delay Time	t _{d(on)}	V _{CC} =300V, I _C =75A, V _{GE} = 0v~15V, R _g =10 ,L _s =60nH	-	70	-	ns
Rise Time	t _r		-	79	-	ns
Turn-on Energy	E _{on}		-	3.5	-	mJ
Turn-off Delay Time	t _{d(off)}		-	508	-	ns
Fall Time	t _f		-	48	-	ns
Turn-off Energy	E _{off}		-	1.6	-	mJ
Total switching energy	E _{ts}				5.1	
Dynamic , at T_j= 150°C						
Turn-on Delay Time	t _{d(on)}	V _{CC} =300V, I _C =75A, V _{GE} = 0v~15V, R _g =10 ,L _s =60nH	-	68	-	ns
Rise Time	t _r		-	76	-	ns
Turn-on Energy	E _{on}		-	3.7	-	mJ

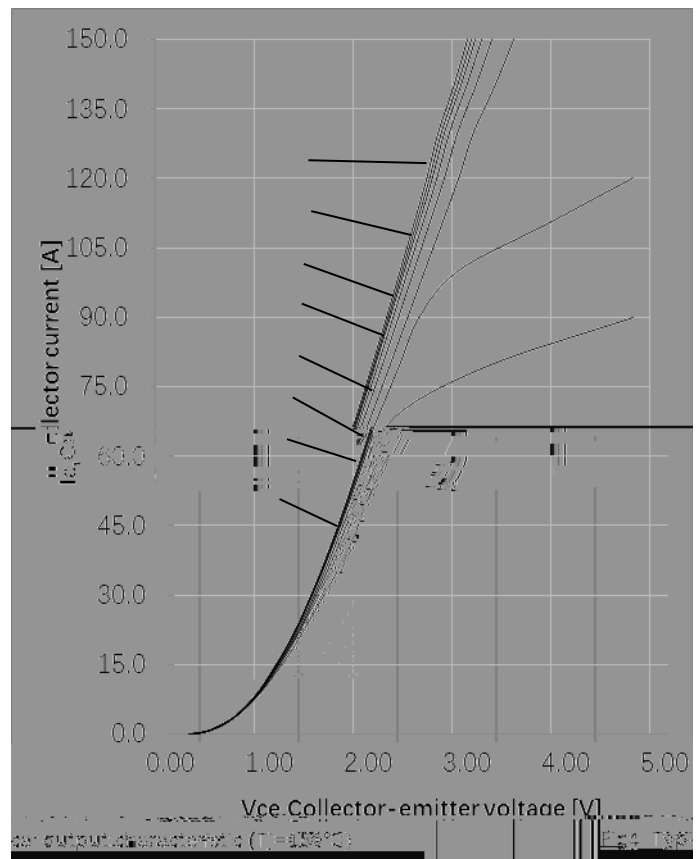
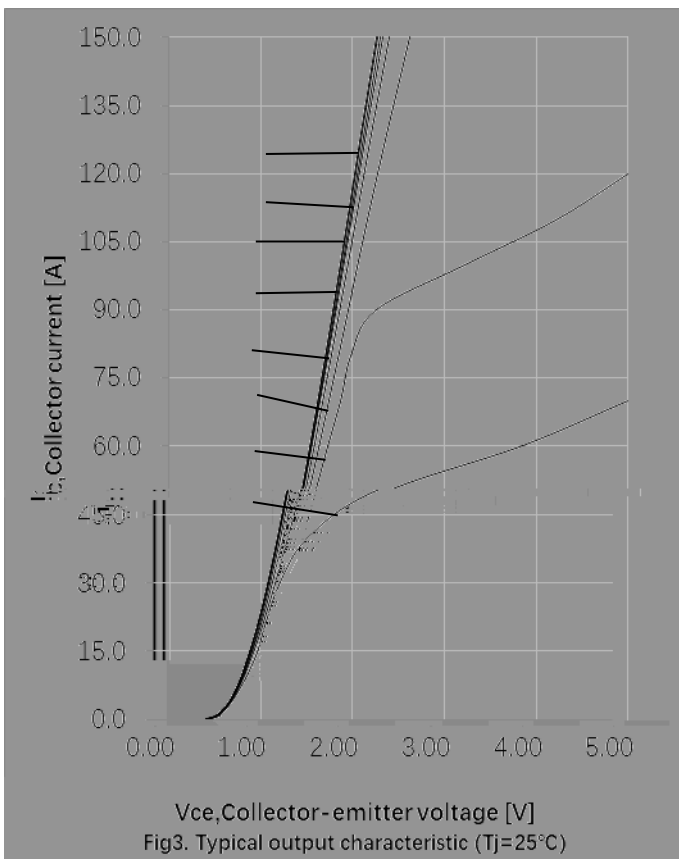
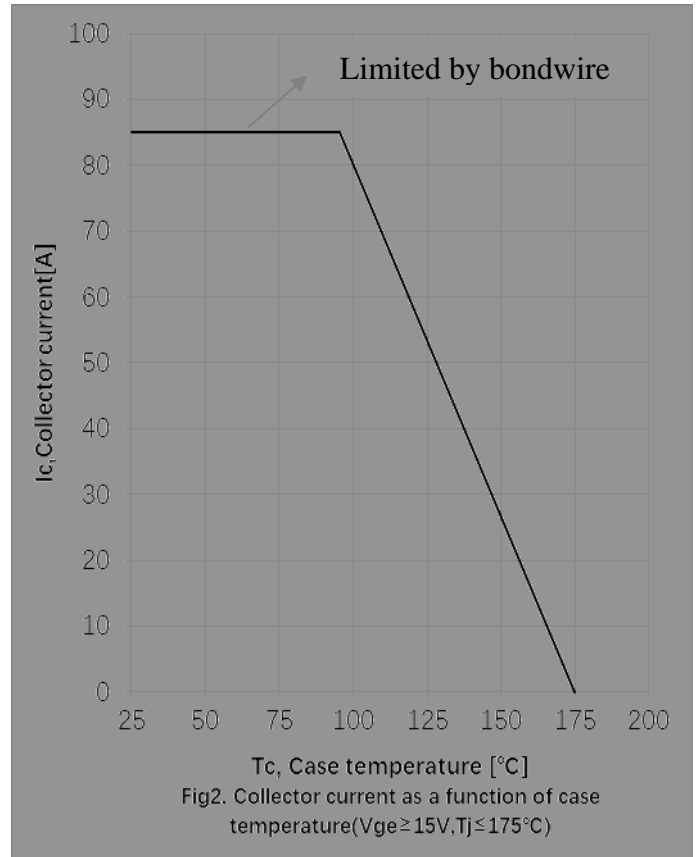
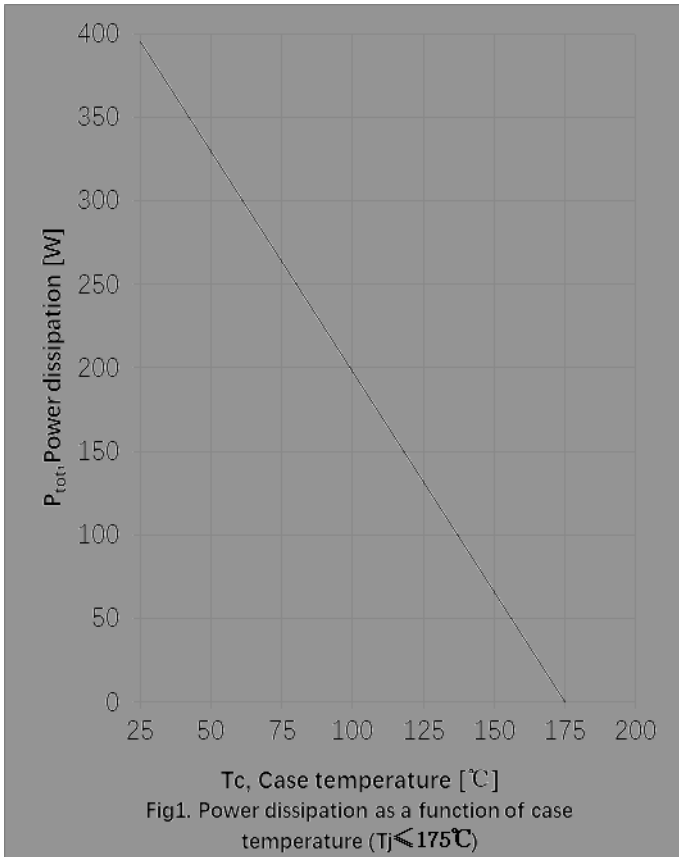


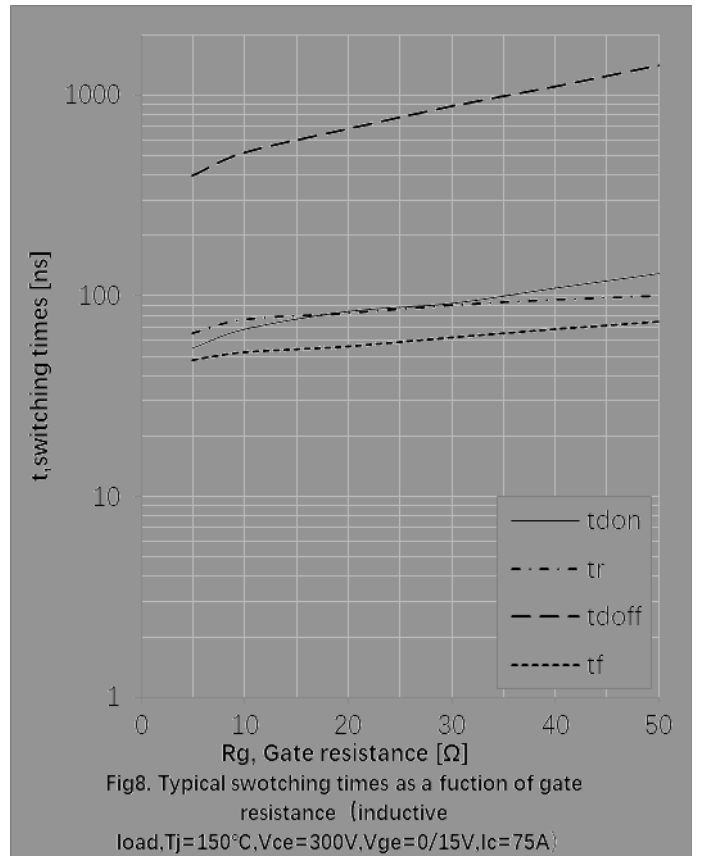
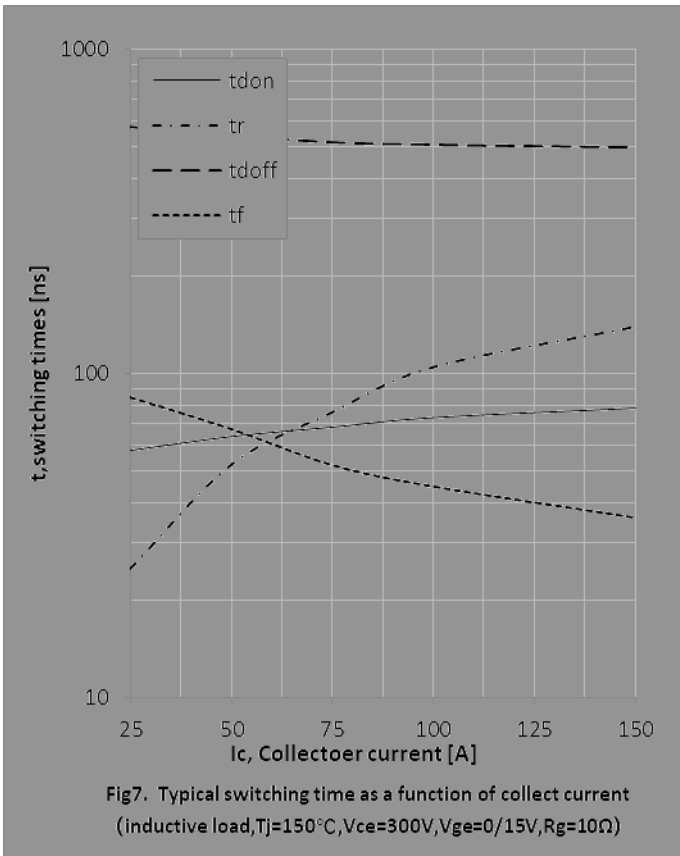
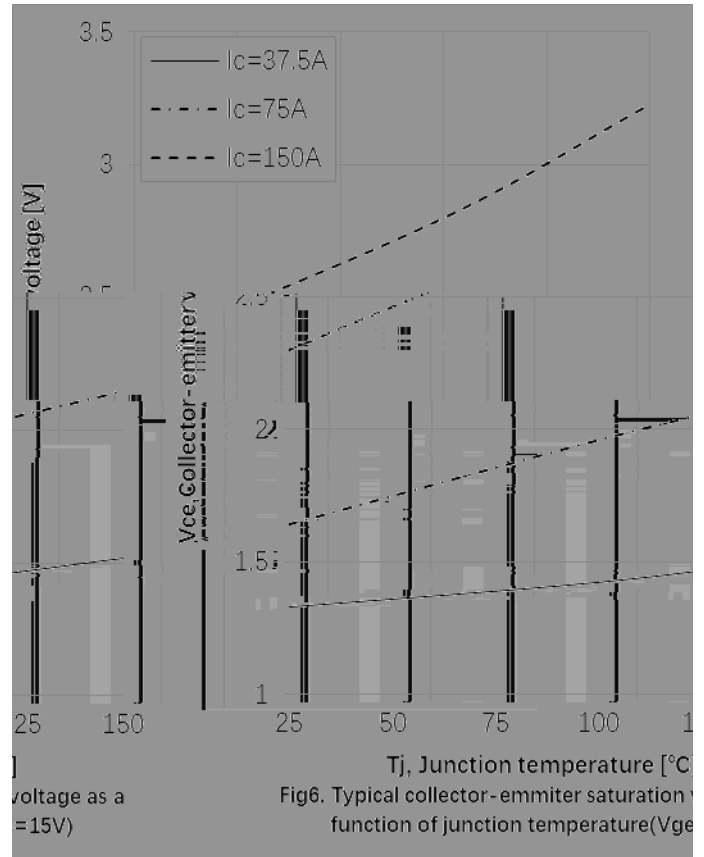
Electrical Characteristics of the Diode

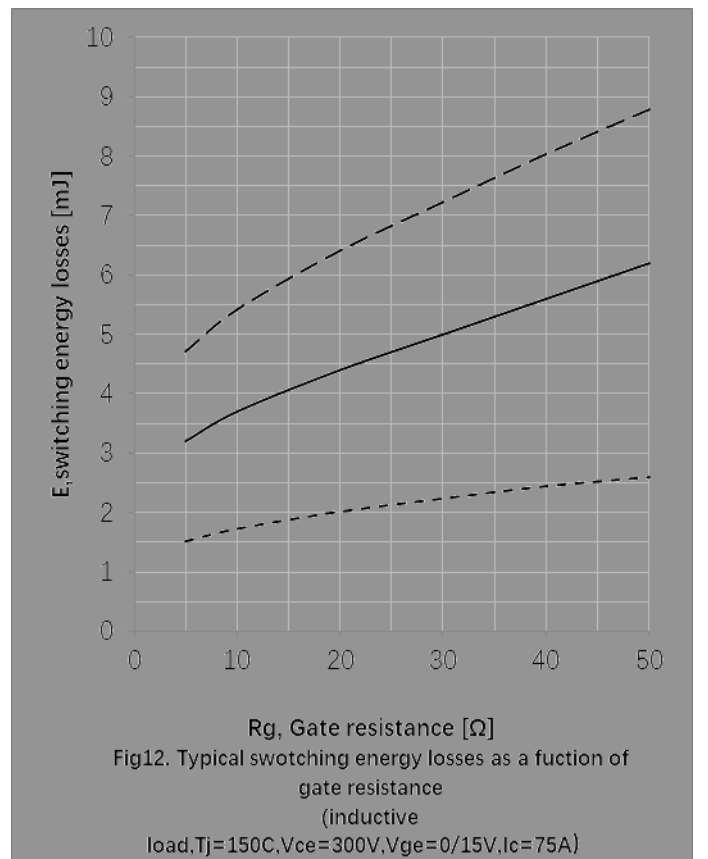
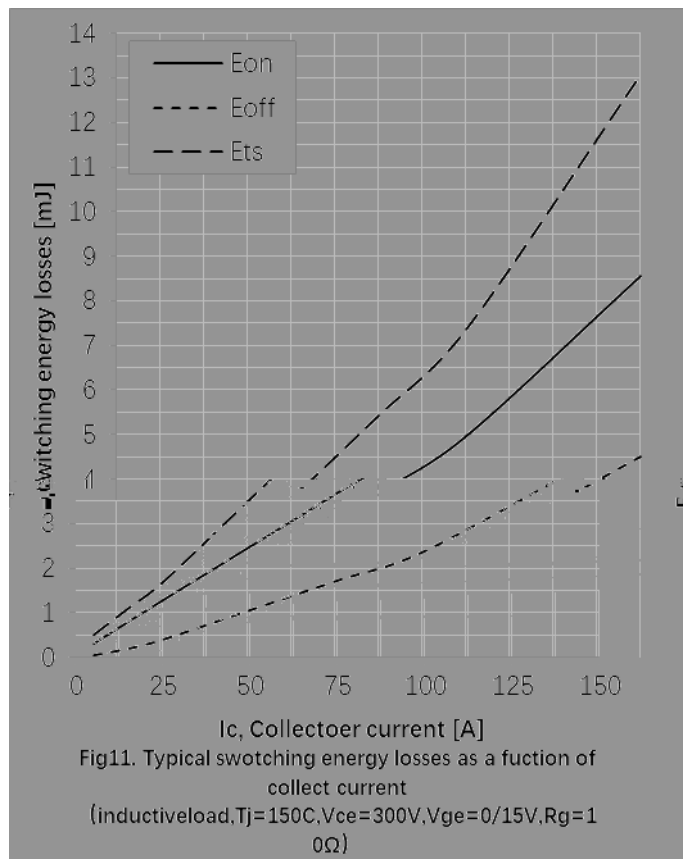
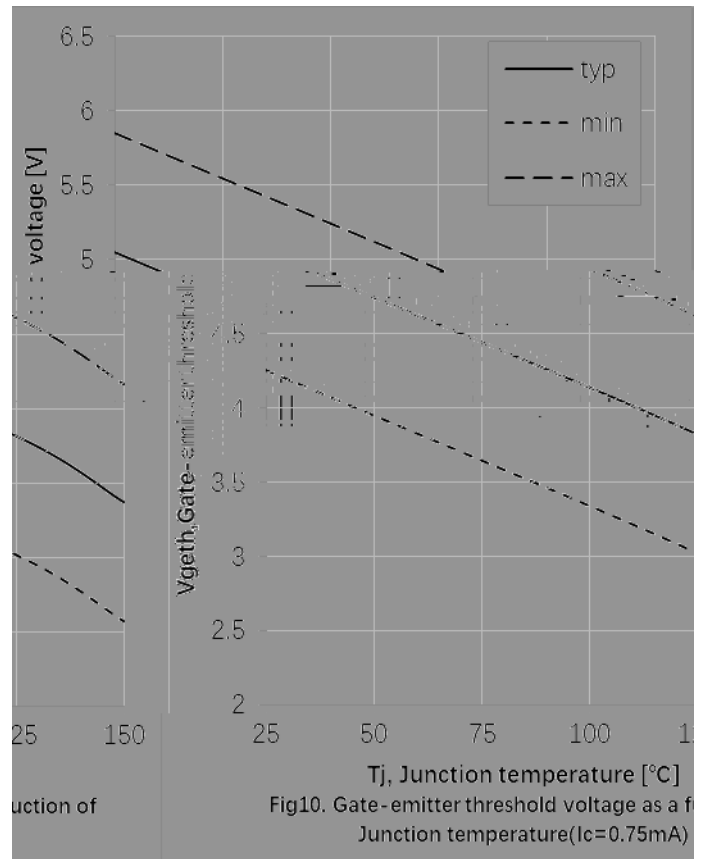
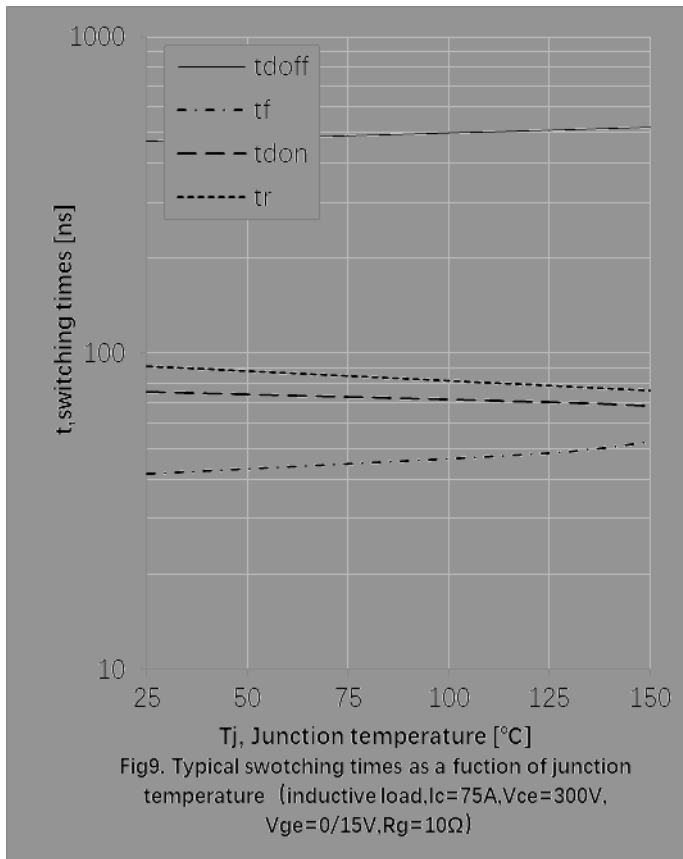
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25°C						
Reverse Recovery Current	I _{rr}	I _F =75A, V _R =300V -di/dt=550A/μs,	-	13	-	A
Reverse Recovery Charge	Q _{rr}		-	0.73	-	uC
Diode reverse recovery time	t _{rr}		-	100	-	ns
Reverse Recovery Energy	E _{rec}		-	0.12	-	mJ
Dynamic , at T_j= 125°C						
Reverse Recovery Current	I _{rr}	I _F =75A, V _R =300V -di/dt=550A/μs,	-	32	-	A
Reverse Recovery Charge	Q _{rr}		-	3.4	-	uC
Diode reverse recovery time	t _{rr}		-	140	-	ns
Reverse Recovery Energy	E _{rec}		-	0.4	-	mJ
Dynamic , at T_j= 150°C						
Reverse Recovery Current	I _{rr}	I _F =75A, V _R =300V -di/dt=550A/μs,	-	38	-	A
Reverse Recovery Charge	Q _{rr}		-	3.58	-	uC
Diode reverse recovery time	t _{rr}		-	160	-	ns
Reverse Recovery Energy	E _{rec}		-	0.49	-	mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R _{th(j-c)}	0.38	K/W
Diode Thermal Resistance, Junction - Case	R _{th(j-c)}	0.45	K/W
Thermal Resistance, Junction - Ambient	R _{th(j-a)}	40	K/W







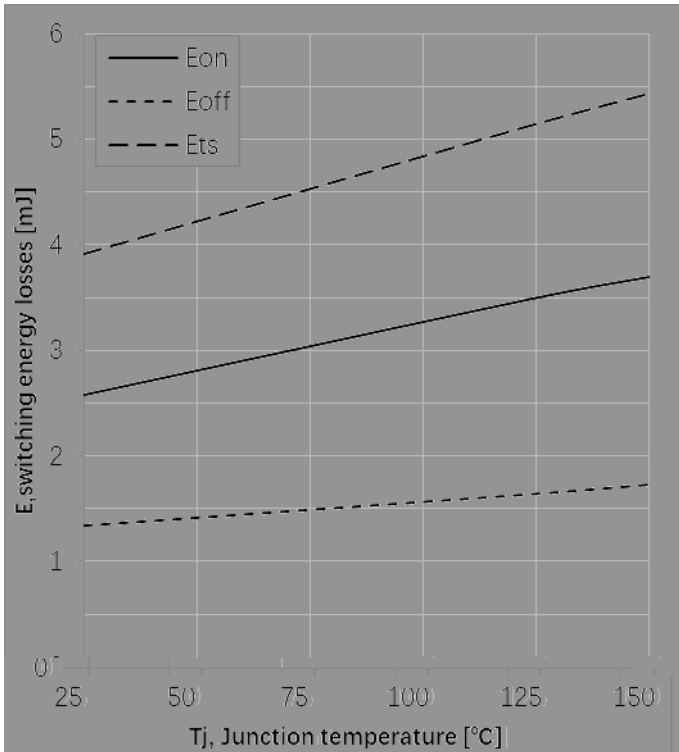


Fig13. Typical switching energy losses as a function of

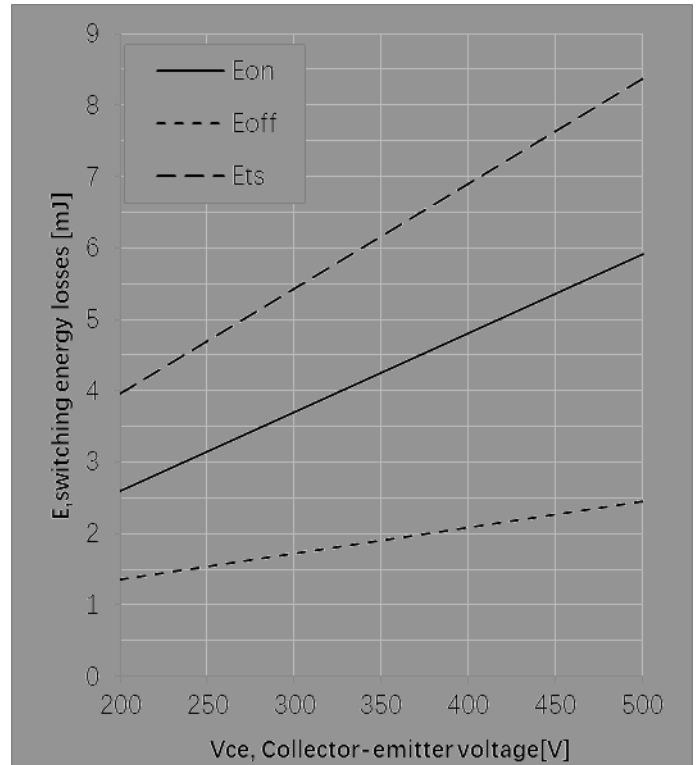


Fig14. Typical switching energy losses as a function of collector-emitter voltage (inductive load, Tj=150C, Ic=75A, Vge=0/15V, Rg=10Ω)

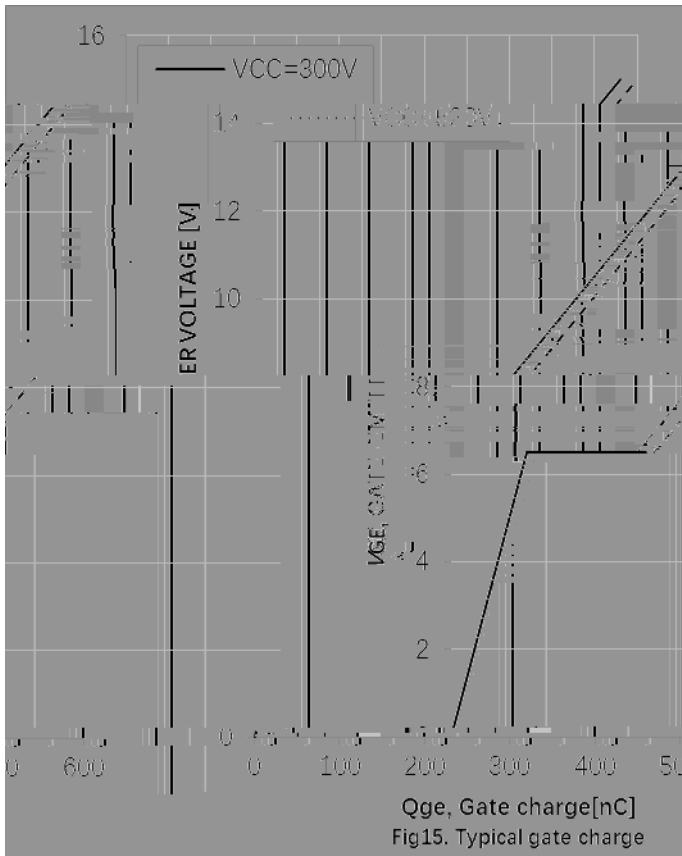


Fig15. Typical gate charge

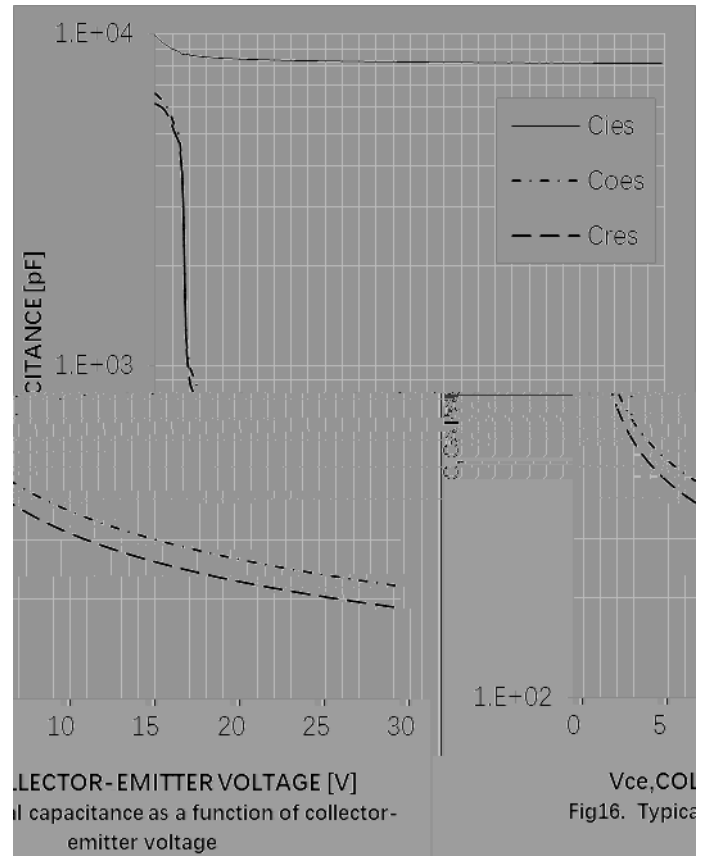


Fig16. Typical

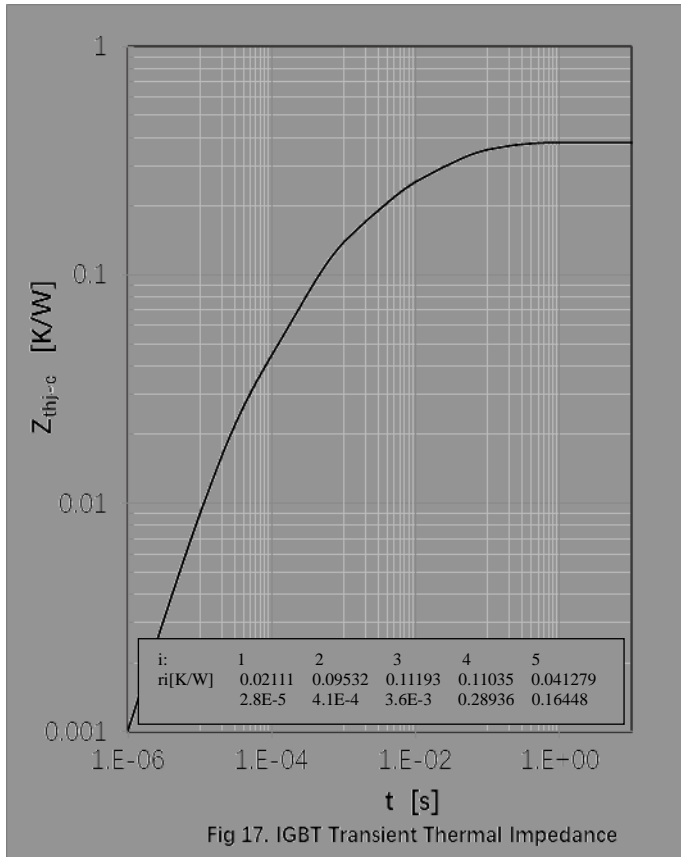


Fig 17. IGBT Transient Thermal Impedance

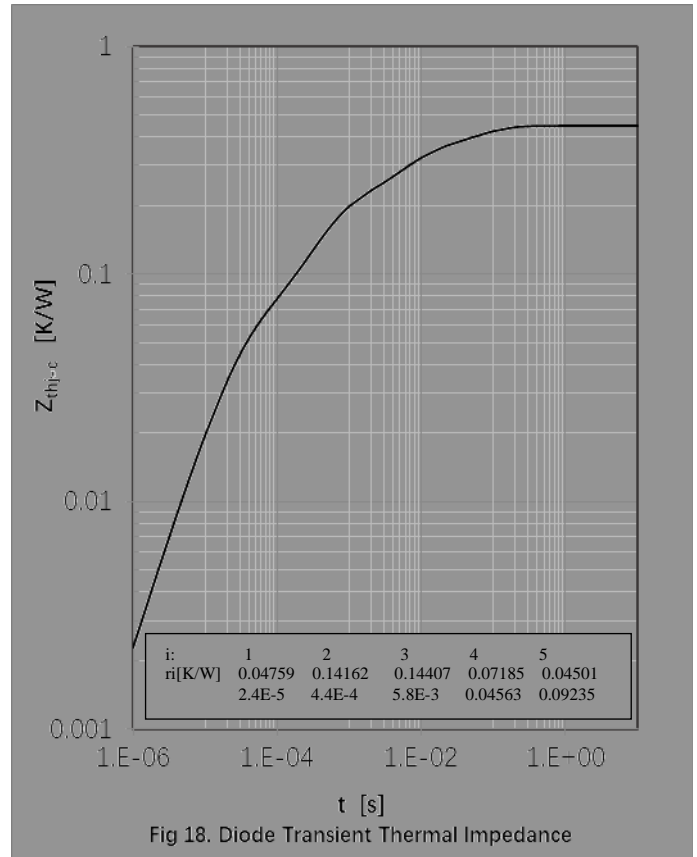


Fig 18. Diode Transient Thermal Impedance

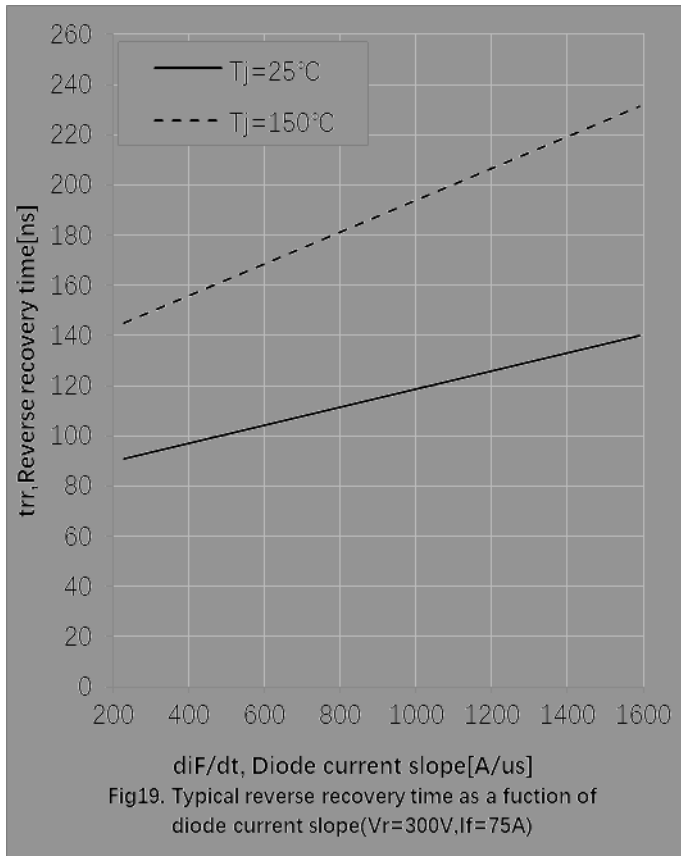


Fig19. Typical reverse recovery time as a function of diode current slope ($V_r=300V, I_f=75A$)

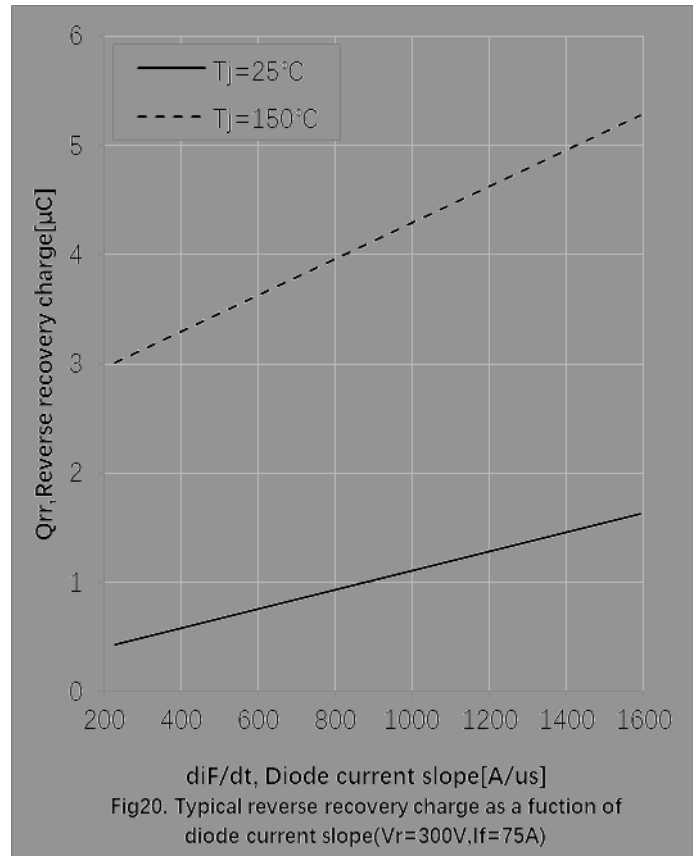
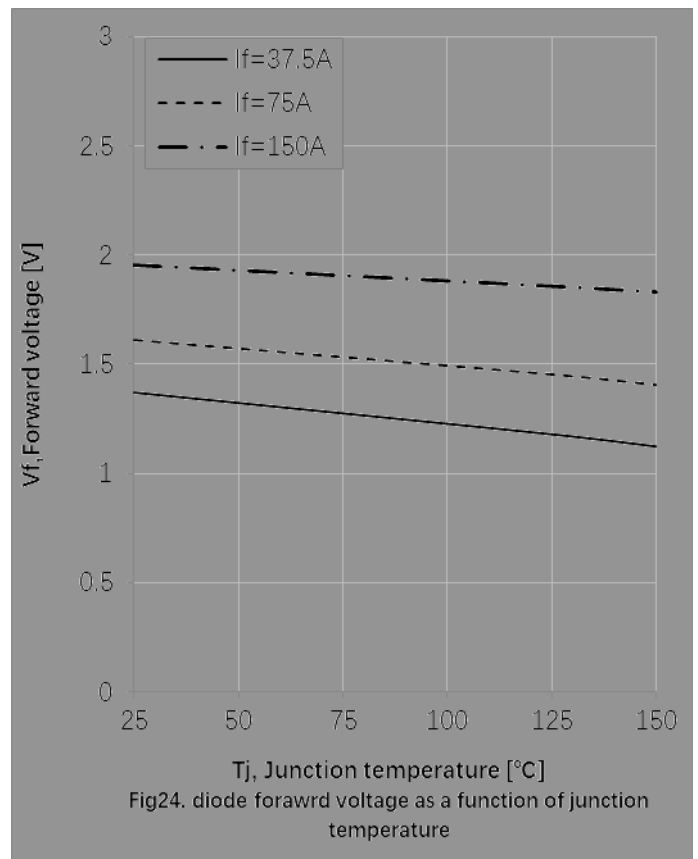
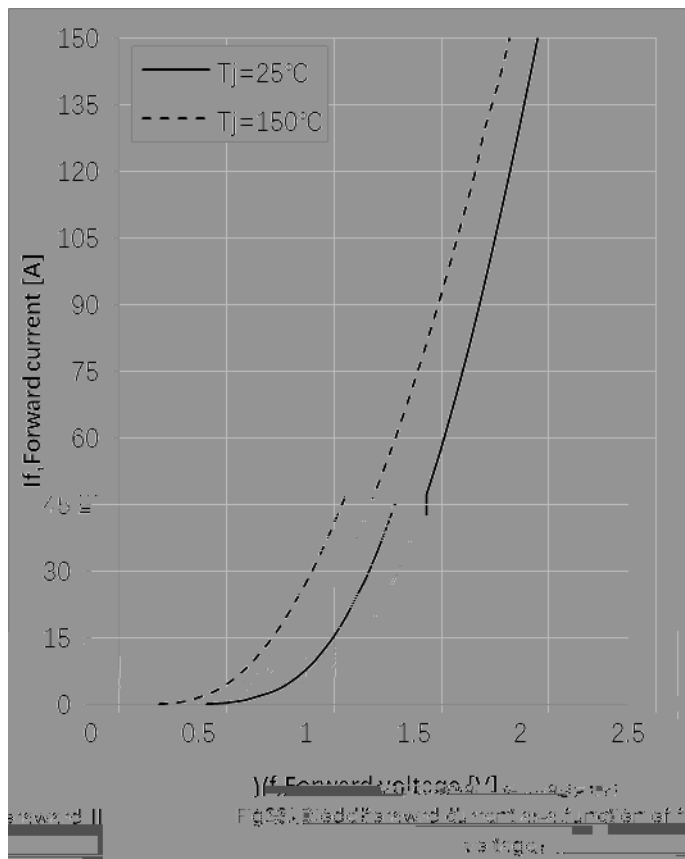
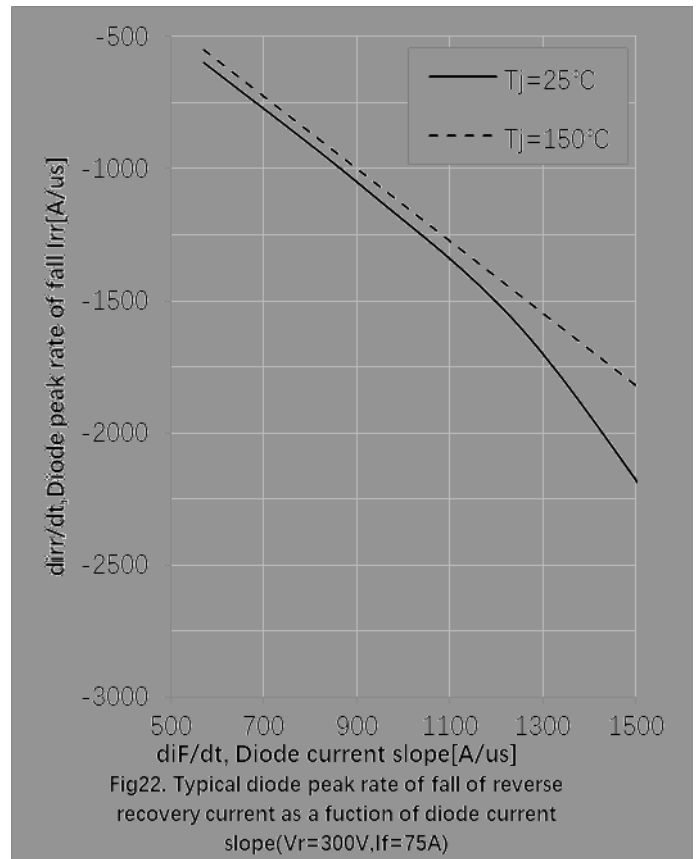
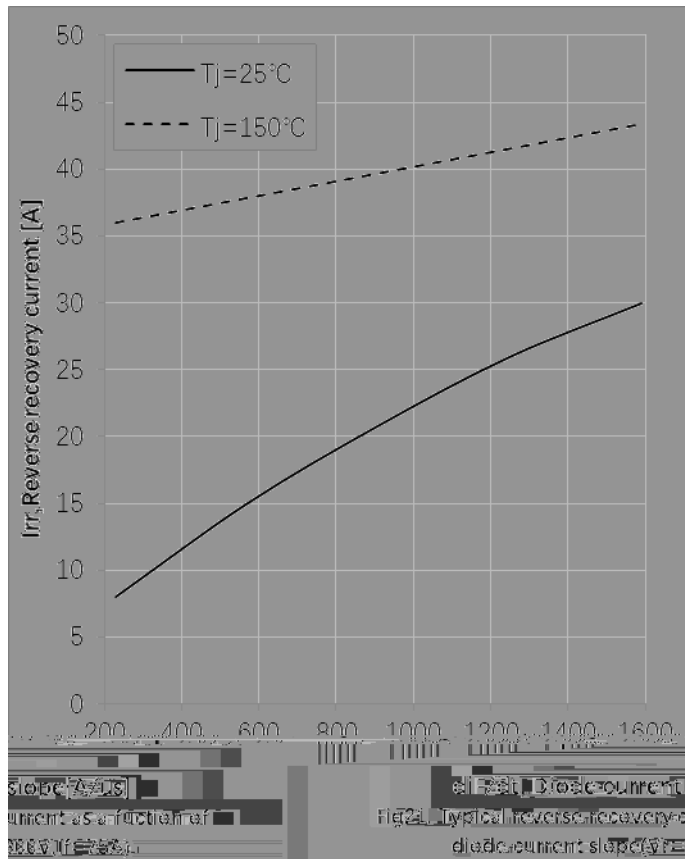
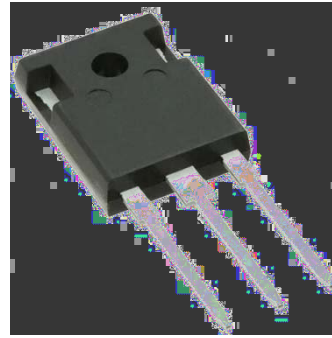
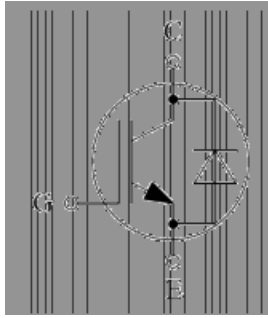


Fig20. Typical reverse recovery charge as a function of diode current slope ($V_r=300V, I_f=75A$)

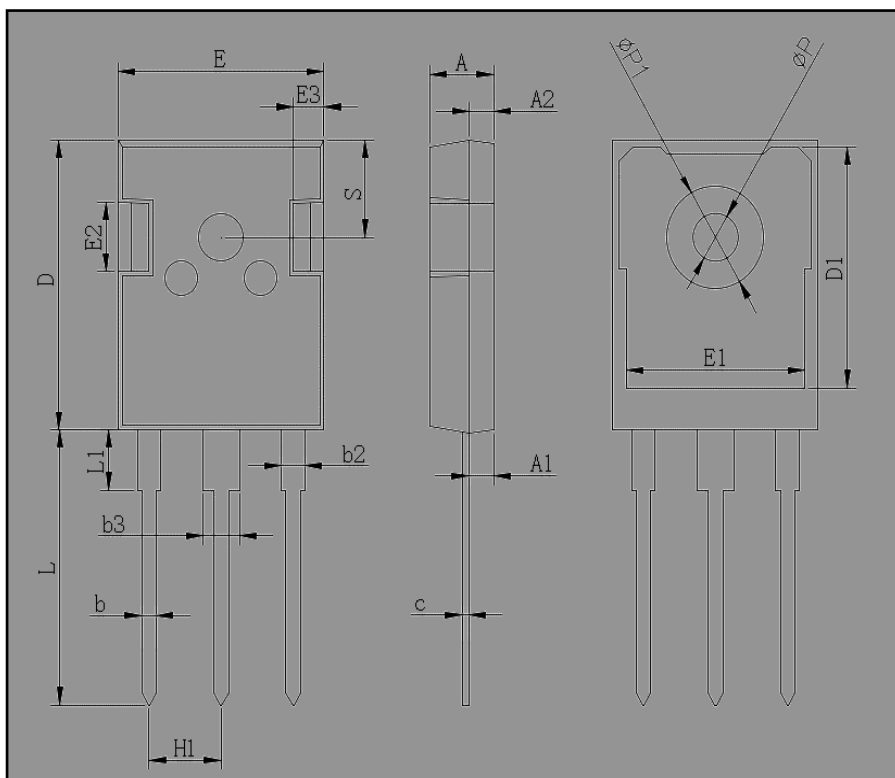




Circuit Diagram



Package Outline Information



TO-247AB		
Dim	Min	Max
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.0	1.4
b2	1.91	2.21
C	0.5	0.7
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.0	13.6
E2	4.80	5.20
E3	2.30	2.70
L	19.62	20.22
L1	-	4.30
P	3.40	3.80
P1	-	7.30
S	6.15TYP	
H1	5.44TYP	
b3	2.80	3.20