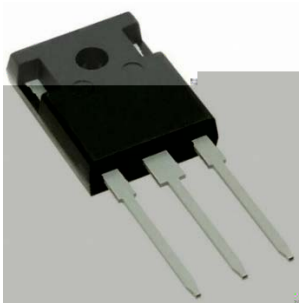
DGW50N65CTL1

RoHS COMPLIANT



IGBT Discrete

V_{CE}	650	V
I_C	50	A
VCE(SAT) IC=50A	1.60	V

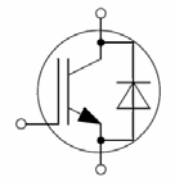
Applications

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

Circuit



■Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} T_C=25°C value limited by bondwire T_C= 100°C	I_C	 85 60	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C value limited by bondwire T_C= 100°C	I_F	 85 60	A
Continuous Gate-Emitter Voltage	V_{GE}	±20	V
Transient Gate-Emitter Voltage (tp≤10µs,D<0.010)	V_{GE}	±30	V
Turn off Safe Operating Area V_{CE}≤650V, T_j≤ 150°C		200	A
Pulsed Collector Current, V_{GE}=15V, tp limited by T_{jmax}	I_{CM}	200	A
Diode Pulsed Current, tp limited by T_{jmax}	I_{Fpuls}	200	A
Power Dissipation , Tj=175°C , Tc=25°C	P_{tot}	326	W
Operating Junction Temperature	T_j	-40...+175	°C
Storage Temperature	T_s	-55...+150	°C
Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	°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=250μA	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=50A T_j=25°C, T_j=125°C T_j=150°C	1.45	1.60 1.95 2.05	1.95	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j= 25°C, T_j=150°C			0.25 3.00	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V_{GE}= 20V			200	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f = 1MHz	-	5.92	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.23	-	
Gate Charge	Q_G	V_{CC}=300V,I_C=50A, V_{GE}=15V	-	0.45	-	uC

■Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=300V, I_C=50A, V_{GE}= 0v~15V, Rg=10Ω,Ls=60nH	-	55	-	ns
Rise Time	t_r		-	56	-	ns
Turn-on Energy	E_{on}		-	1.27	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	319	-	ns
Fall Time	t_f		-	24	-	ns
Turn-off Energy	E_{off}		-	0.65	-	mJ
Total switching energy	Ets			1.92		mJ
Dynamic , at T_j= 125						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=300V, I_C=50A, V_{GE}= 0v~15V, Rg=10Ω,Ls=60nH	-	53	-	ns
Rise Time	t_r		-	61	-	ns
Turn-on Energy	E_{on}		-	1.51	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	351	-	ns
Fall Time	t_f		-	59	-	ns
Turn-off Energy	E_{off}		-	0.80	-	mJ
Total switching energy	Ets			2.31		mJ
Dynamic , at T_j= 150						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=300V, I_C=50A, V_{GE}= 0v~15V, Rg=10Ω,Ls=60nH	-	52	-	ns
Rise Time	t_r		-	60	-	ns
Turn-on Energy	E_{on}		-	1.62	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	361	-	ns
Fall Time	t_f		-	71	-	ns
Turn-off Energy	E_{off}		-	0.85	-	mJ
Total switching energy	Ets			2.47		mJ

■Electrical Characteristics of the Diode T_j= 25 unless otherwise specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V_F	I_F= 50A T_j= 25°C, T_j= 125°C T_j= 150°C	1.30	1.45 1.29 1.23	1.80	V

■Electrical Characteristics of the DIODE

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25						
Reverse Recovery Current	I_{rr}	I_F=50A,V_R=300V -di/dt= 610A/μs,	-	13	-	A
Reverse Recovery Charge	Q_{rr}		-	0.78	-	uC
Diode reverse recovery time	trr		-	100	-	ns
Reverse Recovery Energy	Erec		-	0.1		mJ
Dynamic , at Tj= 125						
Reverse Recovery Current	I_{rr}	I_F=50A,V_R=300V -di/dt= 610A/μs,	-	35	-	A
Reverse Recovery Charge	Q_{rr}		-	2.8	-	uC
Diode reverse recovery time	trr		-	140	-	ns
Reverse Recovery Energy	Erec		-	0.38		mJ
Dynamic , at Tj= 150						
Reverse Recovery Current	I_{rr}	I_F=50A,V_R=300V -di/dt= 610A/μs,	-	40	-	A
Reverse Recovery Charge	Q_{rr}		-	3.22	-	uC
Diode reverse recovery time	trr		-	160	-	ns
Reverse Recovery Energy	Erec		-	0.43		mJ

■Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R_{th}(j-c)	0.46	K/W
Diode Thermal Resistance, Junction - Case	R_{th}(j-c)	0.51	K/W
Thermal Resistance, Junction - Ambient	R_{th}(j-a)	40	K/W

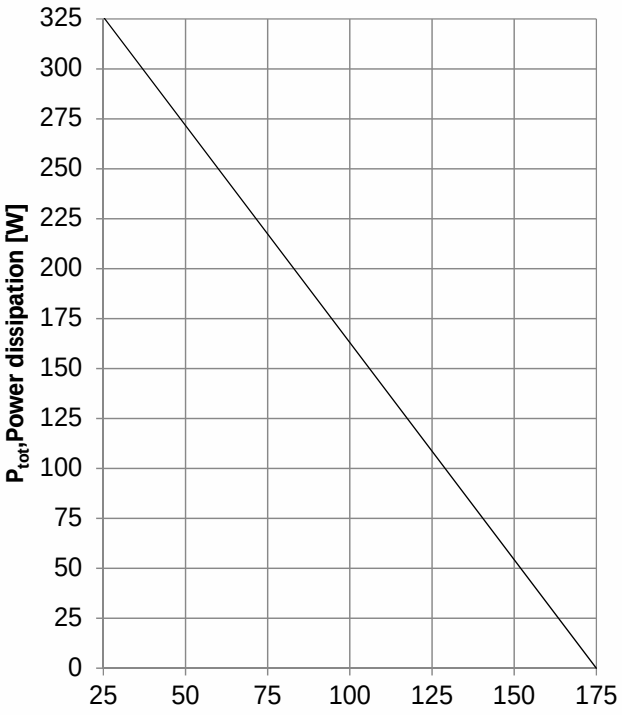


Fig1. Power dissipation as a function of case temperature (Tj)

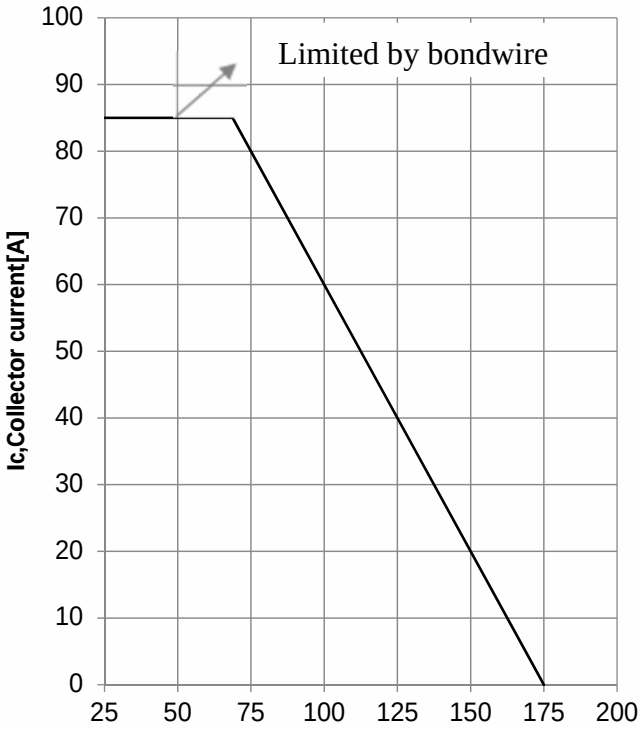


Fig2. Collector current as a function of case temperature(Vge≥15V,Tj≤175)

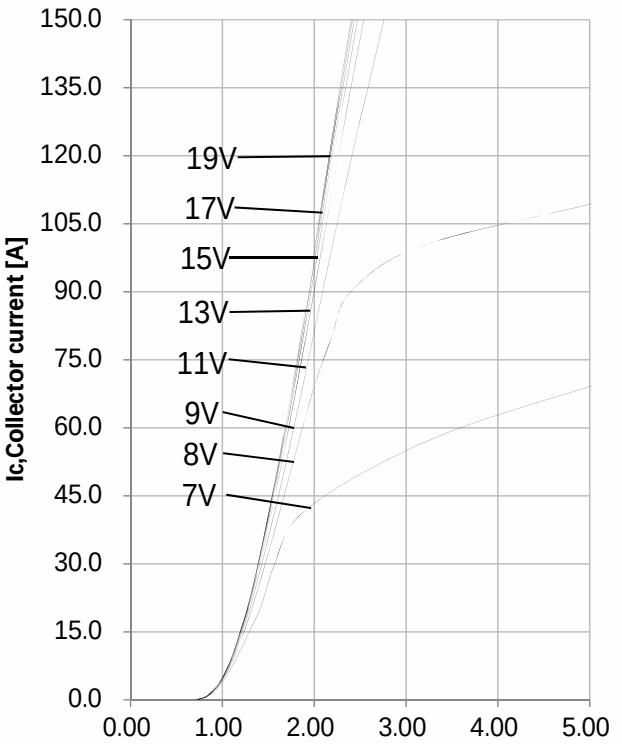


Fig3. Typical output characteristic (Tj=25)

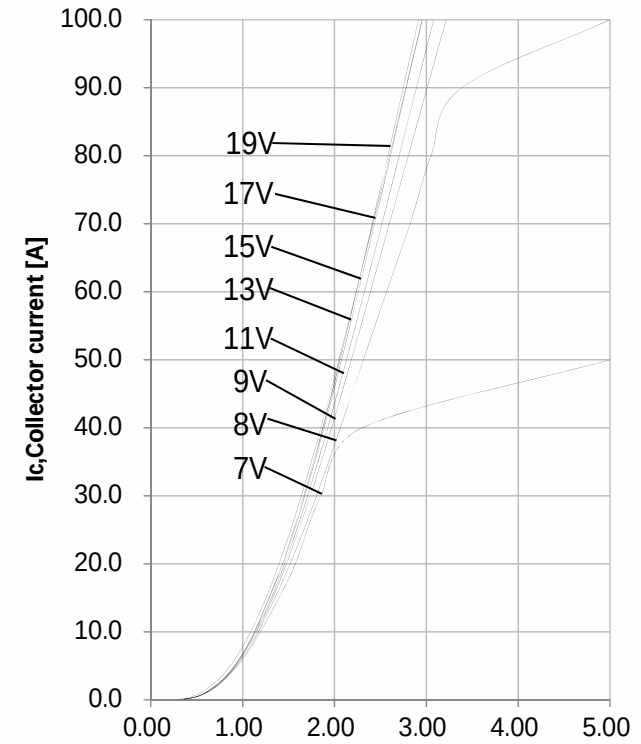


Fig4. Typical output characteristic(Tj=150)

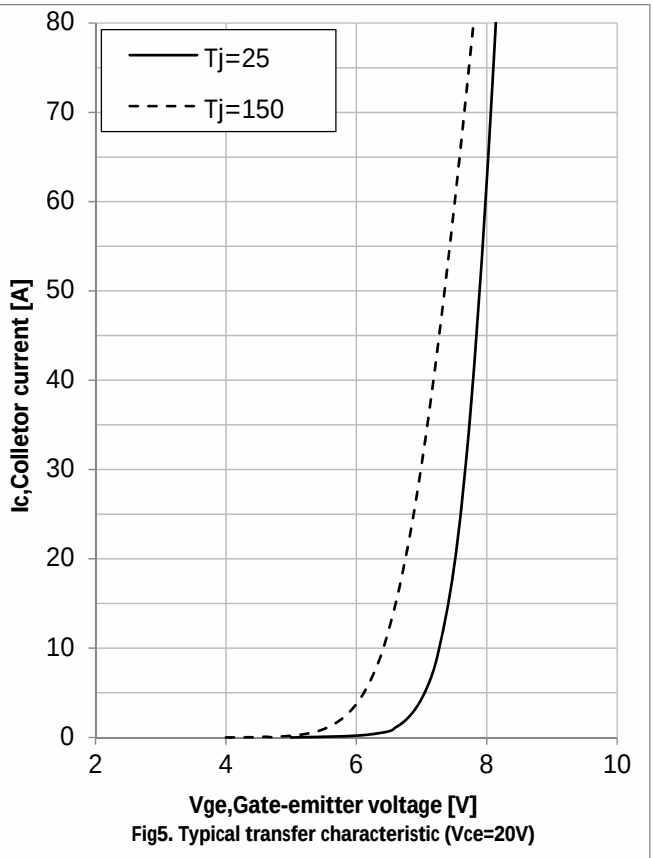


Fig5. Typical transfer characteristic (Vce=20V)

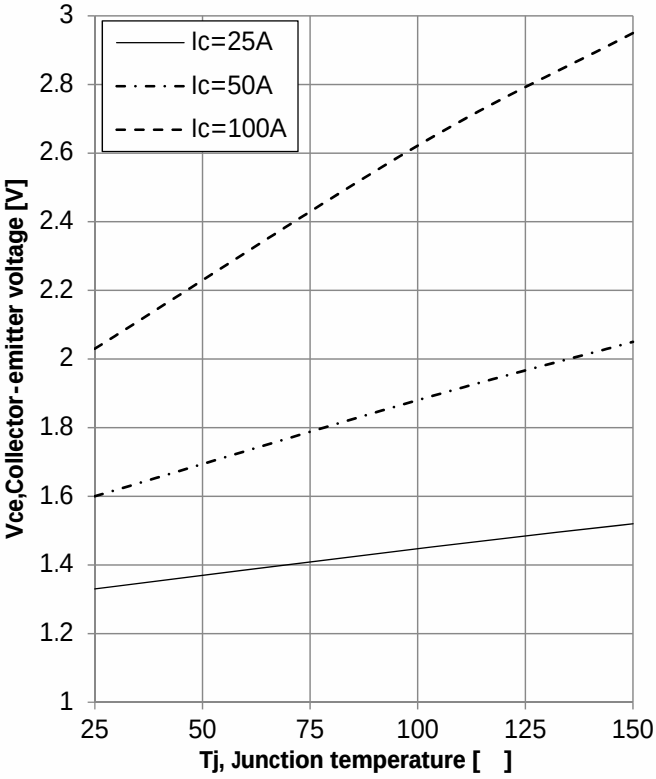


Fig6. Typical collector-emmiter saturation voltage as a function of junction temperature(Vge=15V)

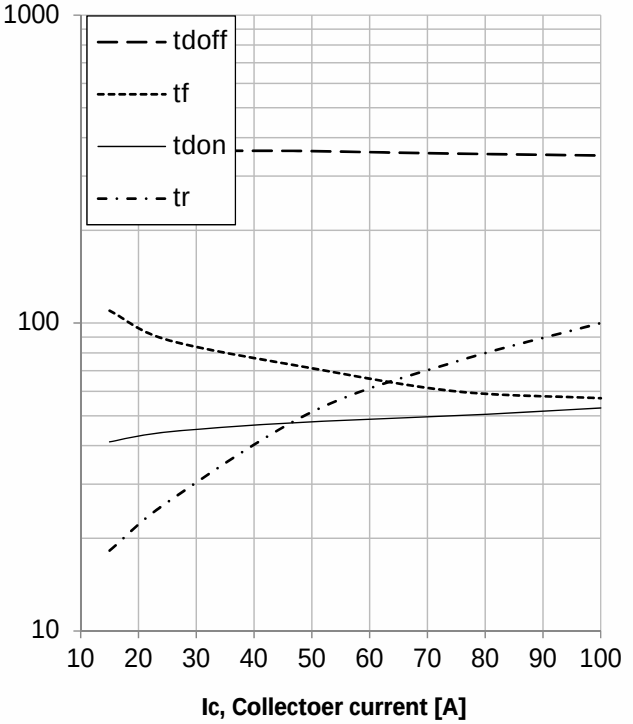


Fig7. Typical switching time as a function of collect current inductive load,Tj=150 , Vce=300V,Vge=0/15V,Rg=10Ω

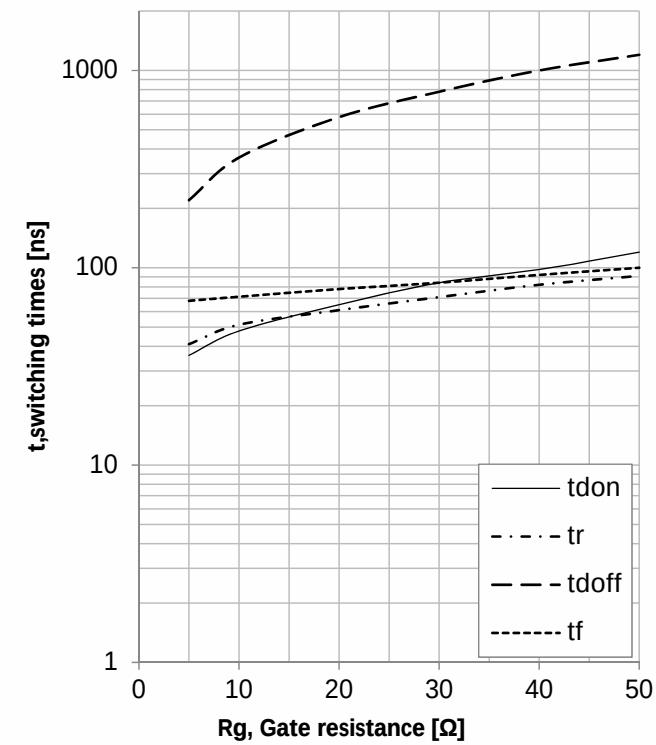
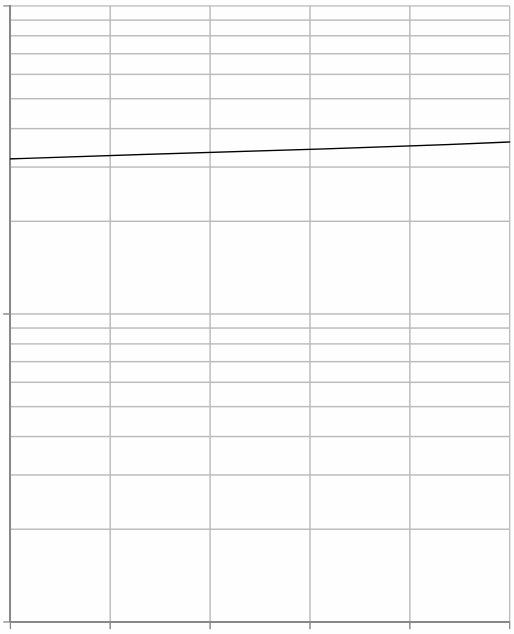
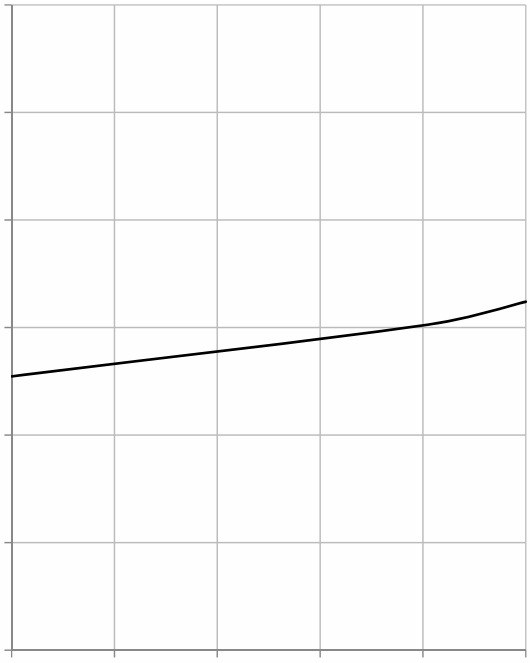


Fig8. Typical swotching times as a fuction of gate resistance inductive load,Tj=150 ,Vce=300V,Vge=0/15V,Ic=50A





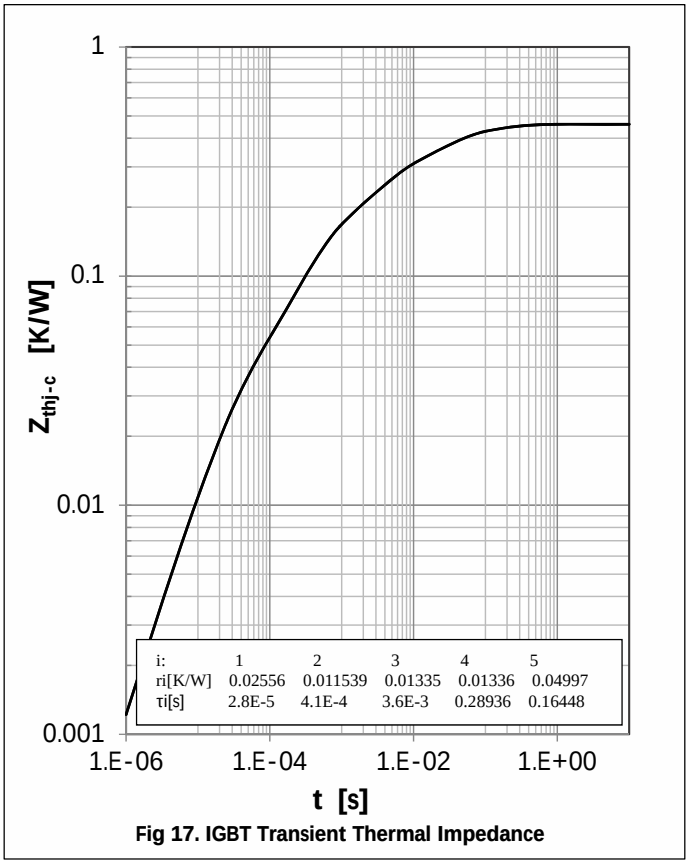


Fig 17. IGBT Transient Thermal Impedance

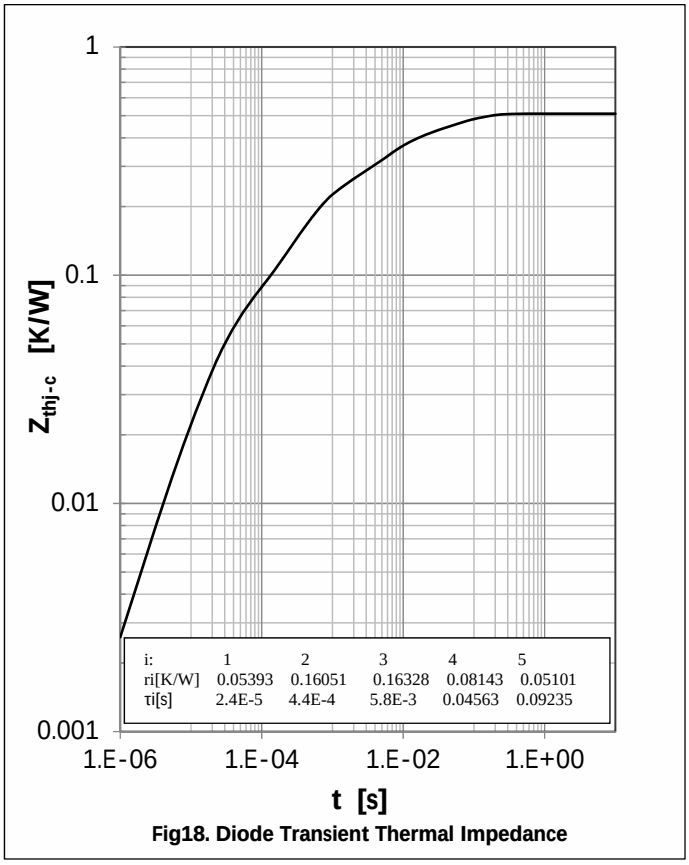


Fig18. Diode Transient Thermal Impedance

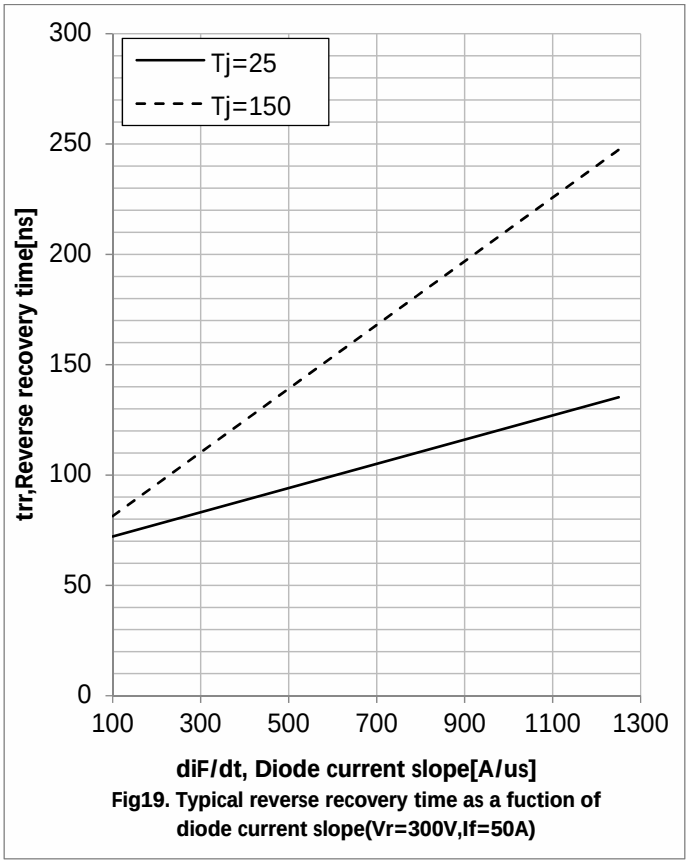


Fig19. Typical reverse recovery time as a fuction of diode current slope(Vr=300V,If=50A)

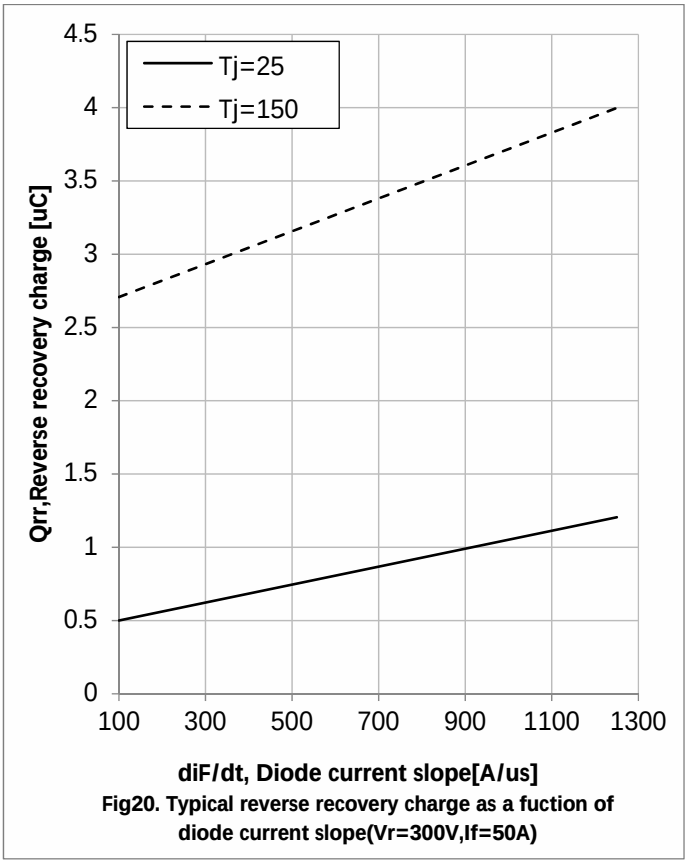


Fig20. Typical reverse recovery charge as a fuction of diode current slope(Vr=300V,If=50A)

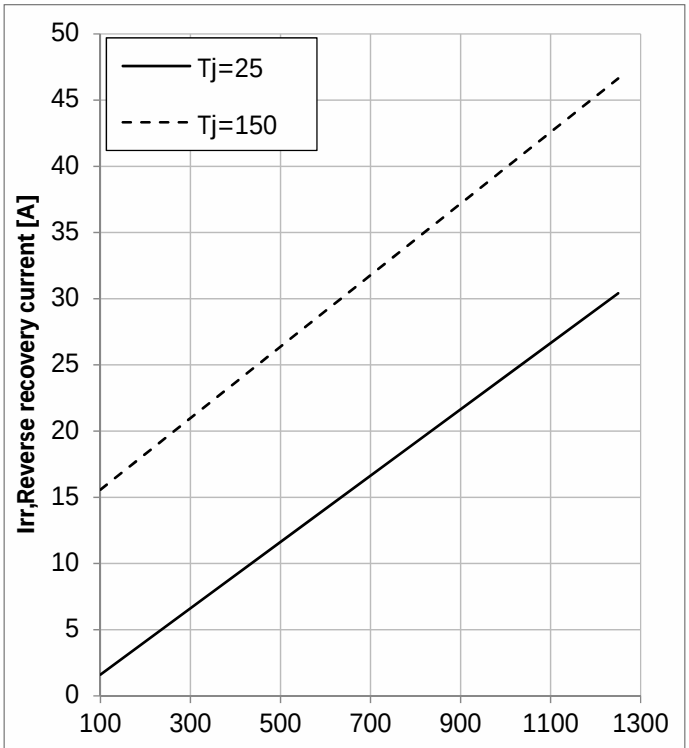


Fig21. Typical reverse recovery current as a fuction of diode current slope(Vr=300V,If=50A)

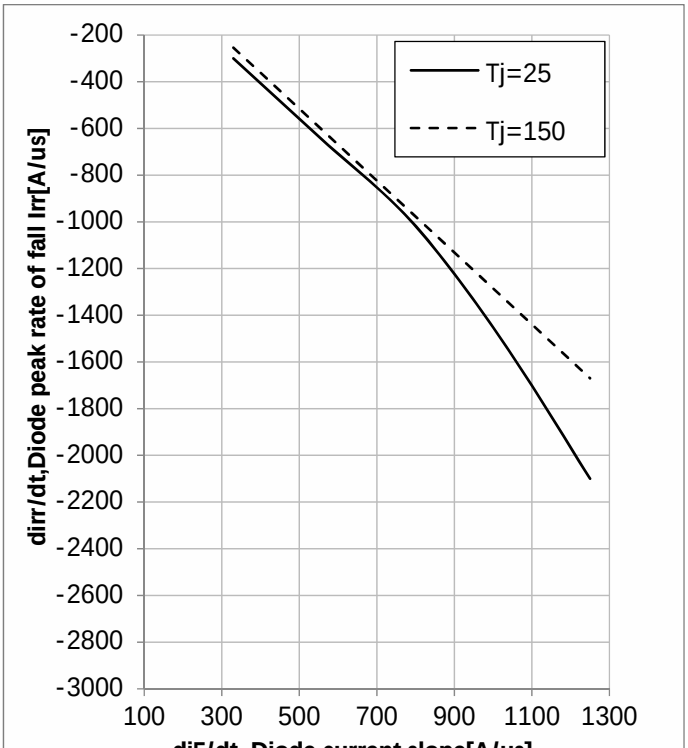


Fig22. Typical diode peak rate of fall of reverse recovery current as a fuction of diode current slope(Vr=300V,If=50A)

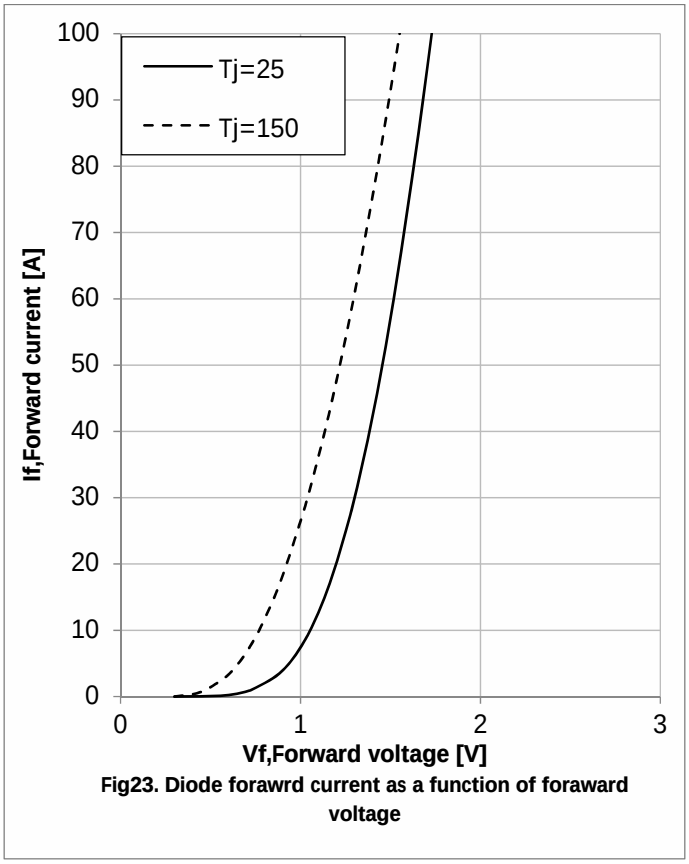
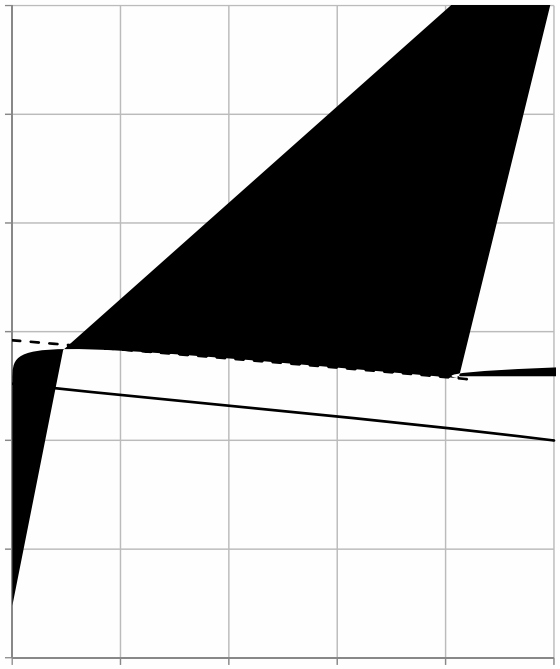
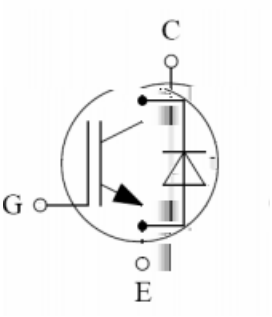


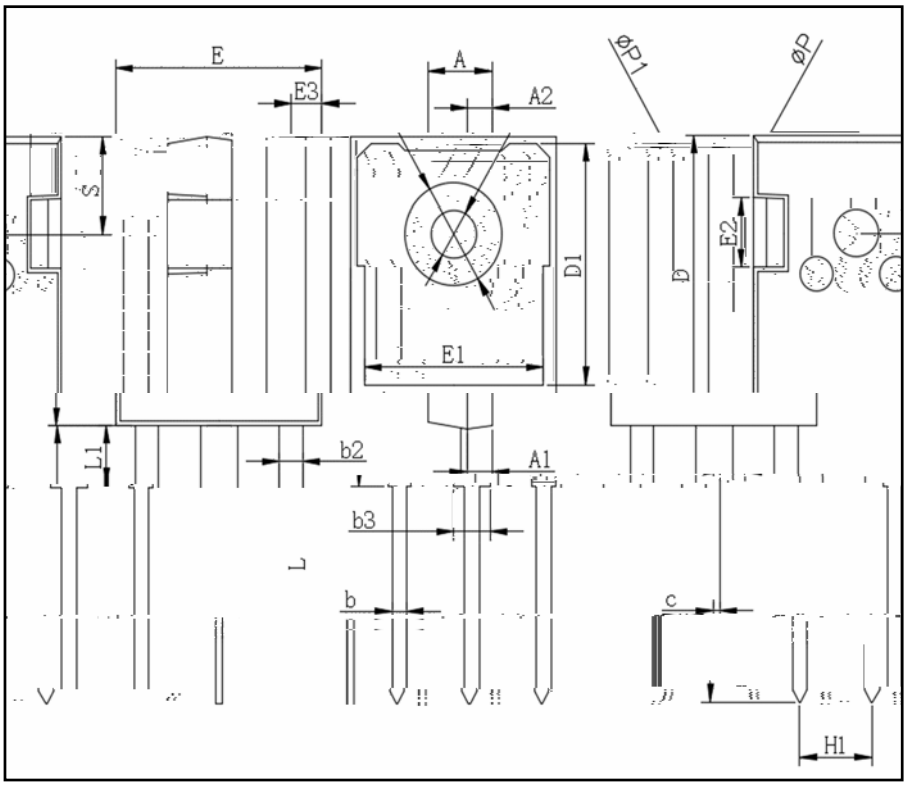
Fig23. Diode forawrd current as a function of foraward voltage



■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