DGW50N65CTL0

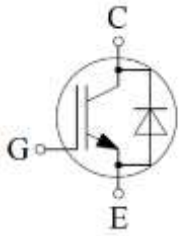
RoHS COMPLIANT



IGBT Discrete

V_{CE}	650	V
I_C	50	A
$V_{CE(SAT)}$ I_C=50A	1.70	V

Circuit



Applications

- Solar converters
- Uninterruptible power supplies
- Welding converters

Features

- Low switching losses
- Maximum junction temperature 175℃
- Positive temperature coefficient
- High ruggedness, temperature stable

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	80 50	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C value limited by bondwire T_C= 100°C	I_F	80 50	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}	214	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=1mA	4.7	5.5	6.3	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		1.70 1.90 2.00	2.10	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j= 25°C, T_j=150°C			0.25 4.00	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V_{GE}= ± 20V			100	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f = 1MHz	-	2.18	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.03	-	
Gate Charge	Q_G	V_{CC}=300V,I_C=50A, V_{GE}=15V	-	0.25	-	uC

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		2.40 2.20 2.10	3.20	V

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}= -5V ~15V, Rg=20Ω	-	20	-	ns
Rise Time	t_r		-	67	-	ns
Turn-on Energy	E_{on}		-	1.57	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	131	-	ns
Fall Time	t_f		-	49	-	ns
Turn-off Energy	E_{off}		-	0.58	-	mJ
Dynamic , at T_j= 125℃						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=300V, I_C=50A, V_{GE}= -5V ~15V, Rg=20Ω	-	19	-	ns
Rise Time	t_r		-	65	-	ns
Turn-on Energy	E_{on}		-	1.59	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	139	-	ns
Fall Time	t_f		-	81	-	ns
Turn-off Energy	E_{off}		-	0.67	-	mJ
Dynamic , at T_j= 150℃						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=300V, I_C=50A, V_{GE}= -5V ~15V, Rg=20Ω	-	19	-	ns
Rise Time	t_r		-	63	-	ns
Turn-on Energy	E_{on}		-	1.61	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	142	-	ns
Fall Time	t_f		-	93	-	ns
Turn-off Energy	E_{off}		-	0.72	-	mJ

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=400V -di/dt=420A/μs,	-	13	-	A
Reverse Recovery Charge	Q_{rr}		-	0.88	-	uC
Diode reverse recovery time	trr		-	68	-	ns
Reverse Recovery Energy	Erec		-	0.14	-	mJ
Dynamic , at Tj= 125℃						
Reverse Recovery Current	I_{rr}	I_F=50A,V_R=400V -di/dt=420A/μs,	-	18	-	A
Reverse Recovery Charge	Q_{rr}		-	1.44	-	uC
Diode reverse recovery time	trr		-	113	-	ns
Reverse Recovery Energy	Erec		-	0.35	-	mJ
Dynamic , at Tj= 150℃						
Reverse Recovery Current	I_{rr}	I_F=50A,V_R=400V -di/dt=420A/μs,	-	22	-	A
Reverse Recovery Charge	Q_{rr}		-	1.87	-	uC
Diode reverse recovery time	trr		-	135	-	ns
Reverse Recovery Energy	Erec		-	0.46	-	mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R_{th}(j-c)	0.70	K/W
Diode Thermal Resistance, Junction - Case	R_{th}(j-c)	1.05	K/W
Thermal Resistance, Junction - Ambient	R_{th}(j-a)	40	K/W

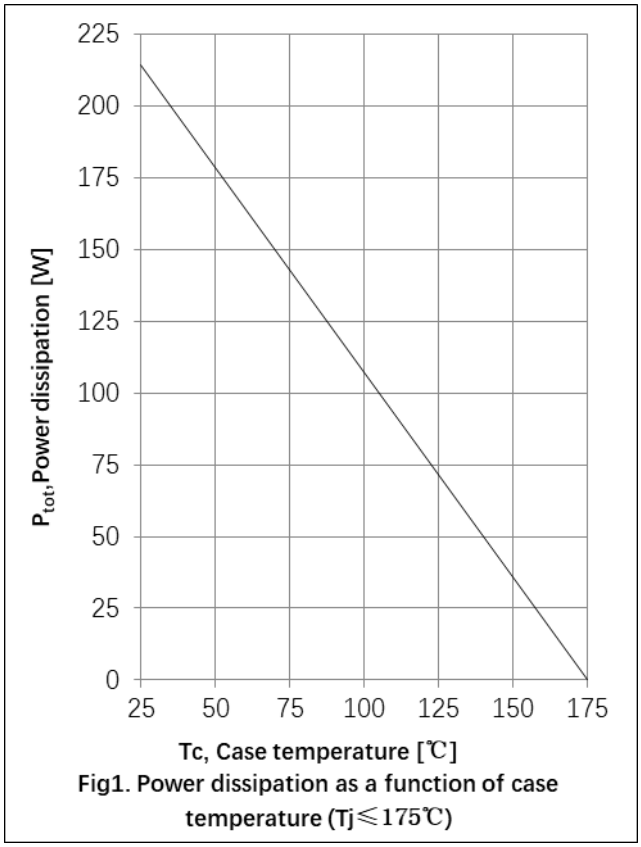


Fig1. Power dissipation as a function of case temperature (Tj≤175℃)

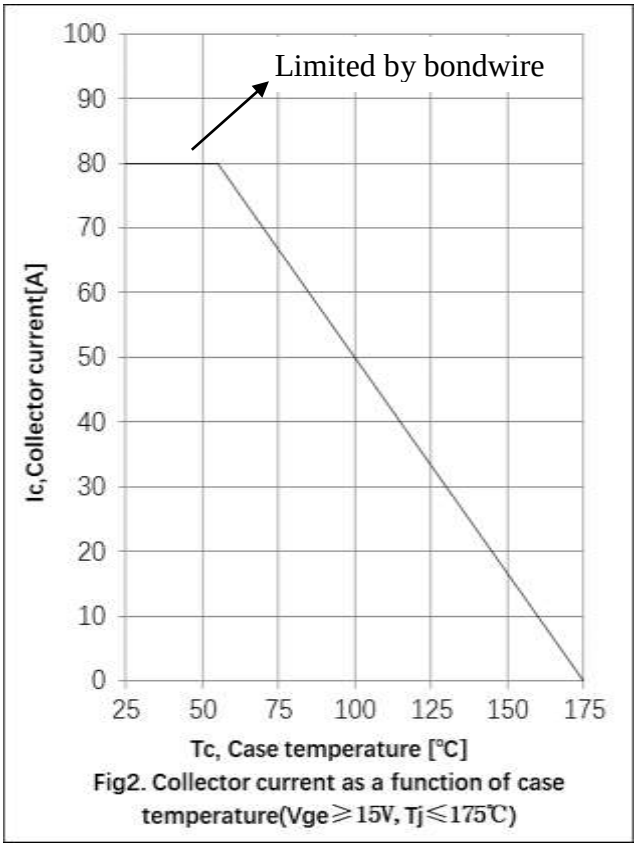


Fig2. Collector current as a function of case temperature(Vge≥15V, Tj≤175℃)

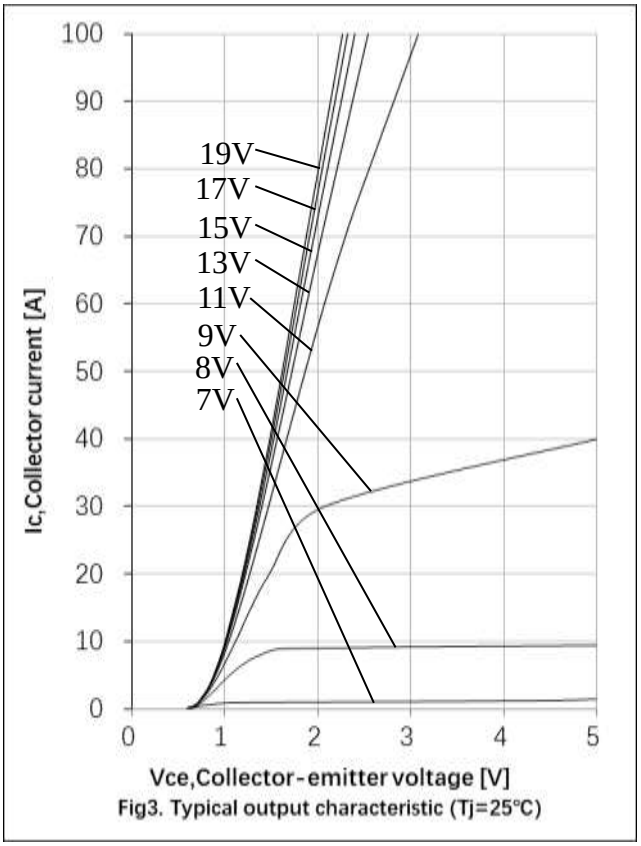


Fig3. Typical output characteristic (Tj=25℃)

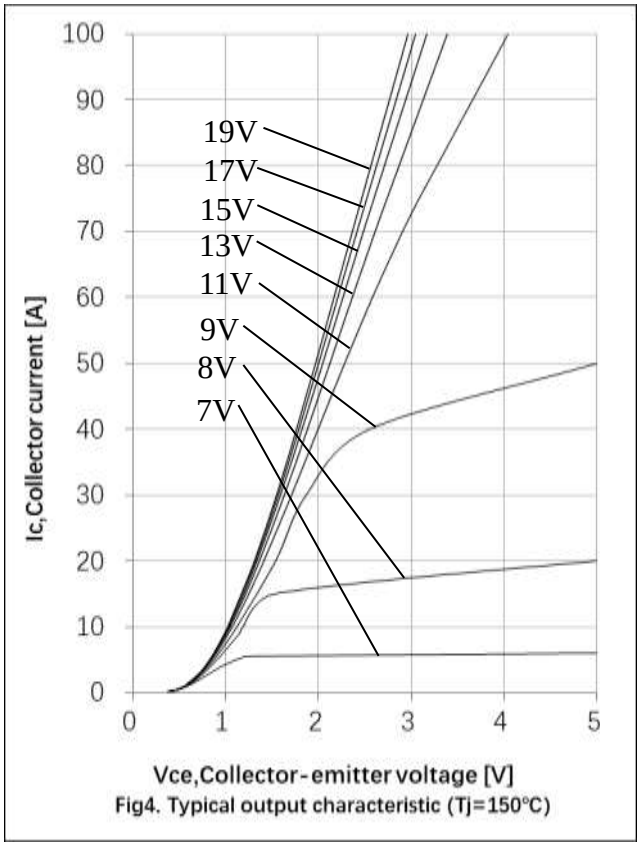


Fig4. Typical output characteristic (Tj=150℃)

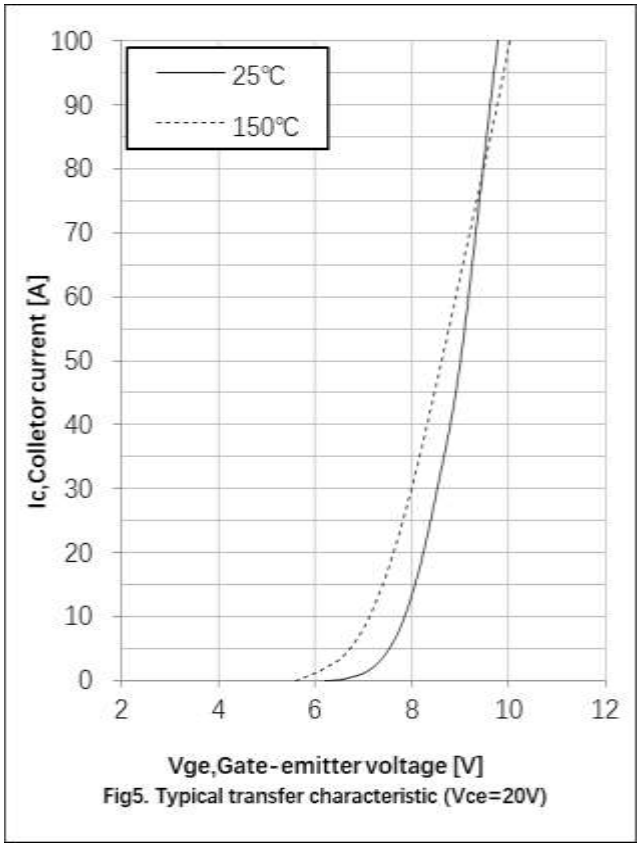


Fig5. Typical transfer characteristic (Vce=20V)

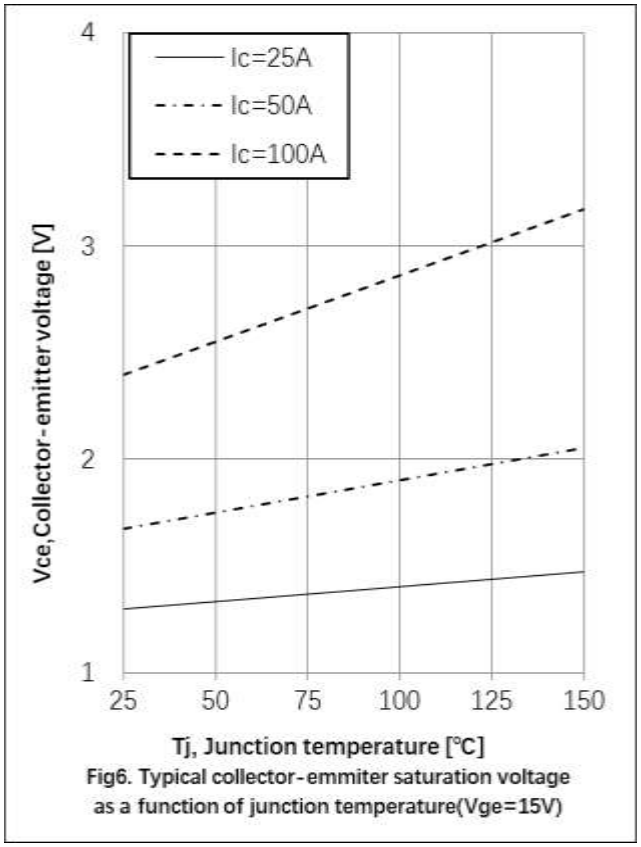


Fig6. Typical collector-emmiter saturation voltage as a function of junction temperature(Vge=15V)

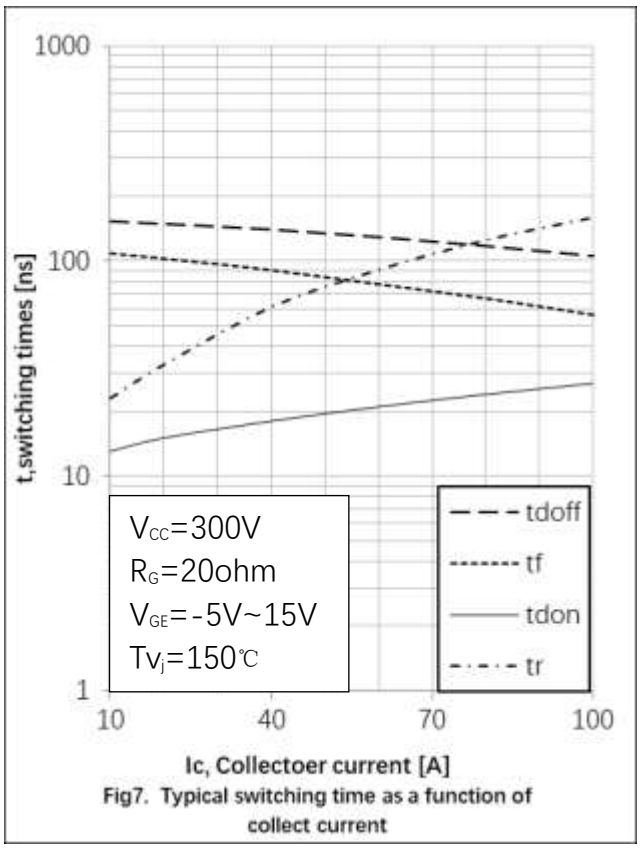


Fig7. Typical switching time as a function of collect current

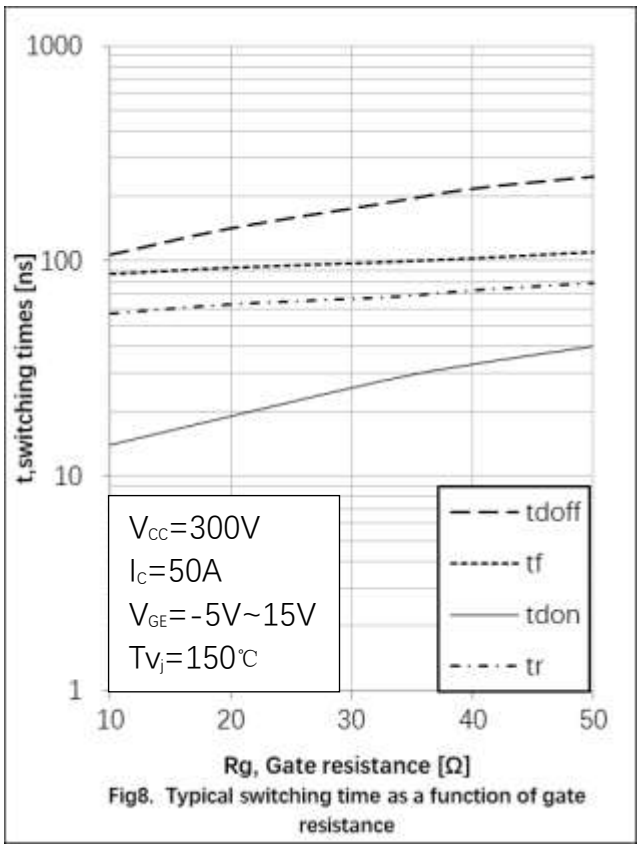


Fig8. Typical switching time as a function of gate resistance

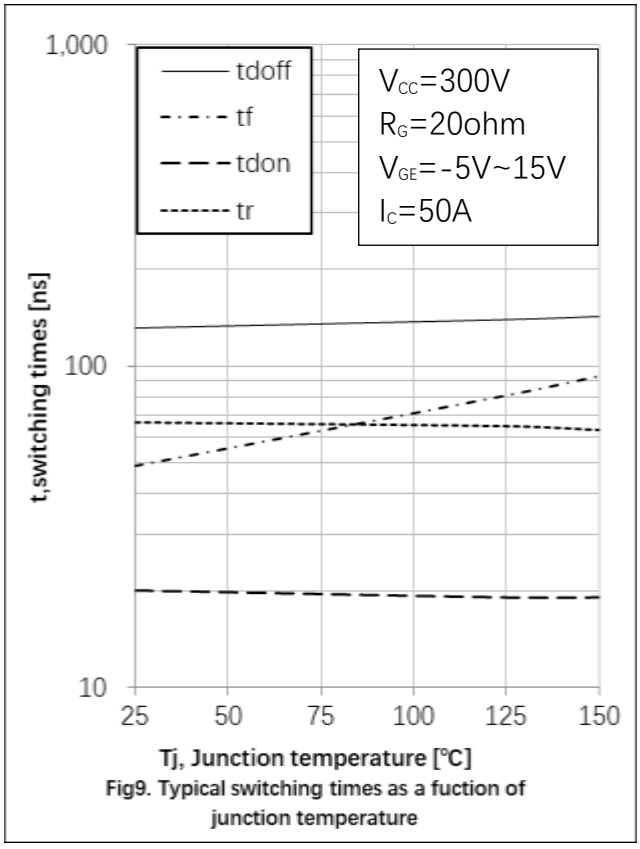


Fig9. Typical switching times as a fuction of junction temperature

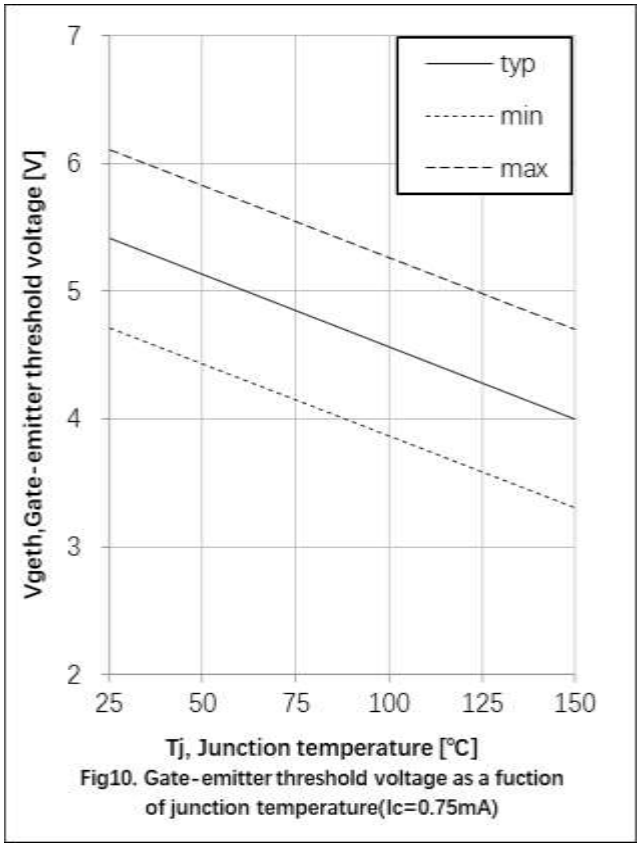


Fig10. Gate-emitter threshold voltage as a fuction of junction temperature(Ic=0.75mA)

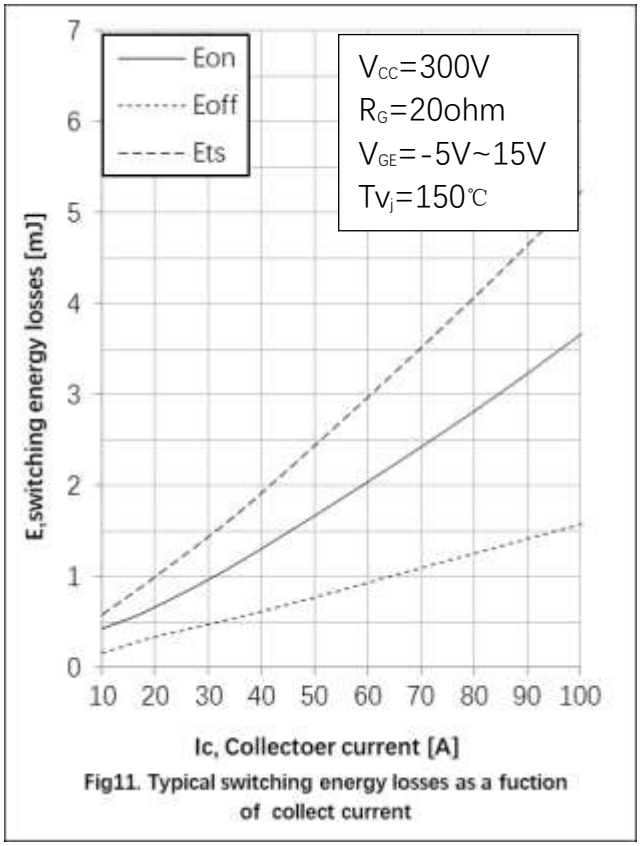


Fig11. Typical switching energy losses as a fuction of collect current

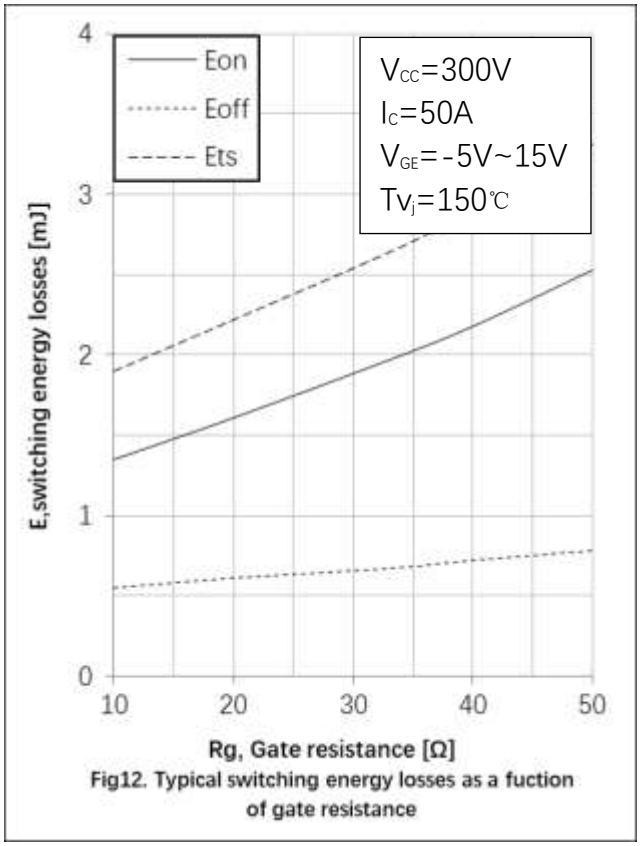


Fig12. Typical switching energy losses as a fuction of gate resistance

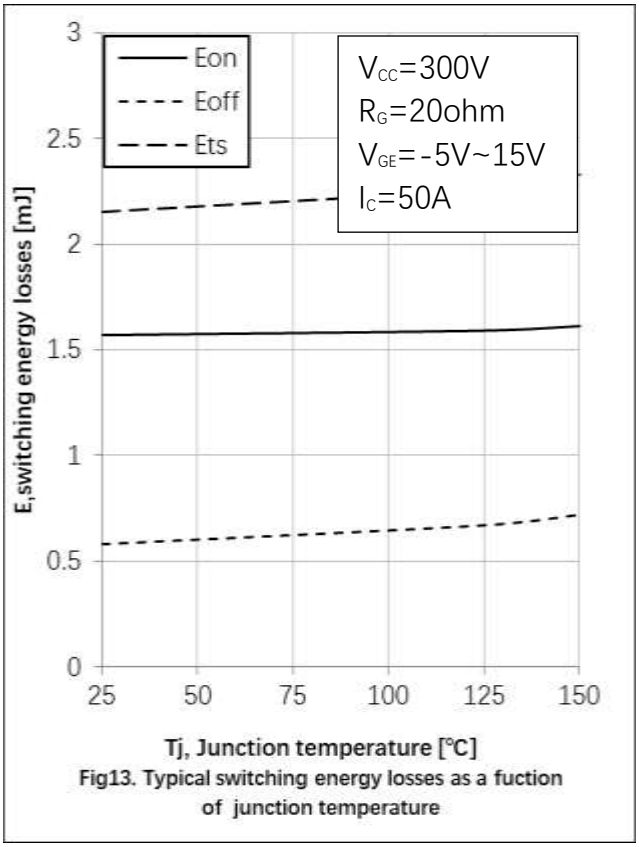


Fig13. Typical switching energy losses as a fuction of junction temperature

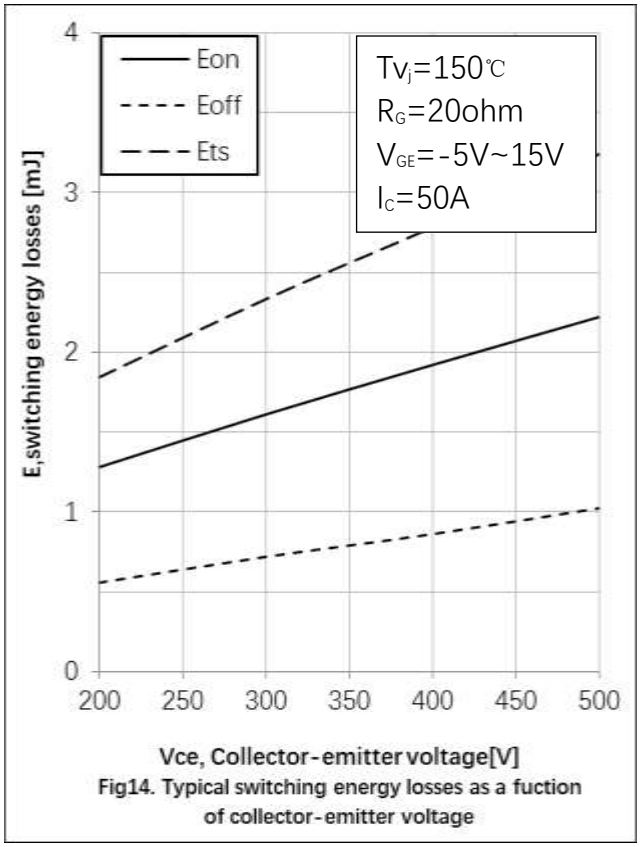


Fig14. Typical switching energy losses as a fuction of collector-emitter voltage

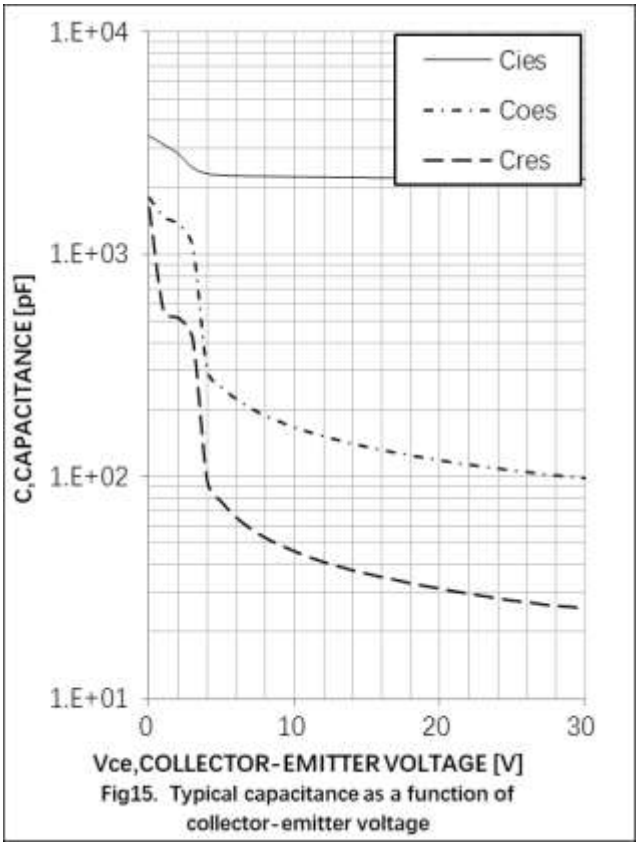
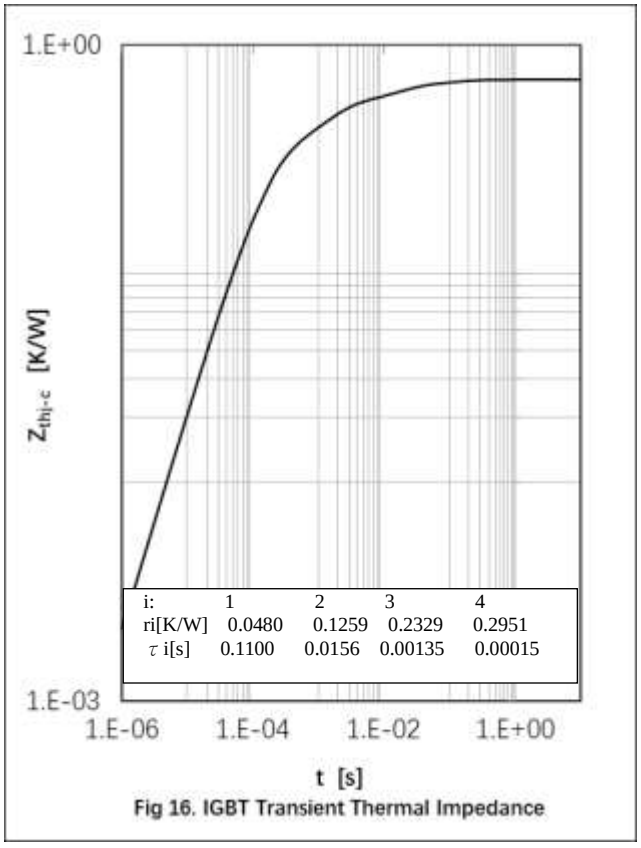


Fig15. Typical capacitance as a function of collector-emitter voltage



i:	1	2	3	4
ri[K/W]	0.0480	0.1259	0.2329	0.2951
τ i[s]	0.1100	0.0156	0.00135	0.00015

Fig 16. IGBT Transient Thermal Impedance

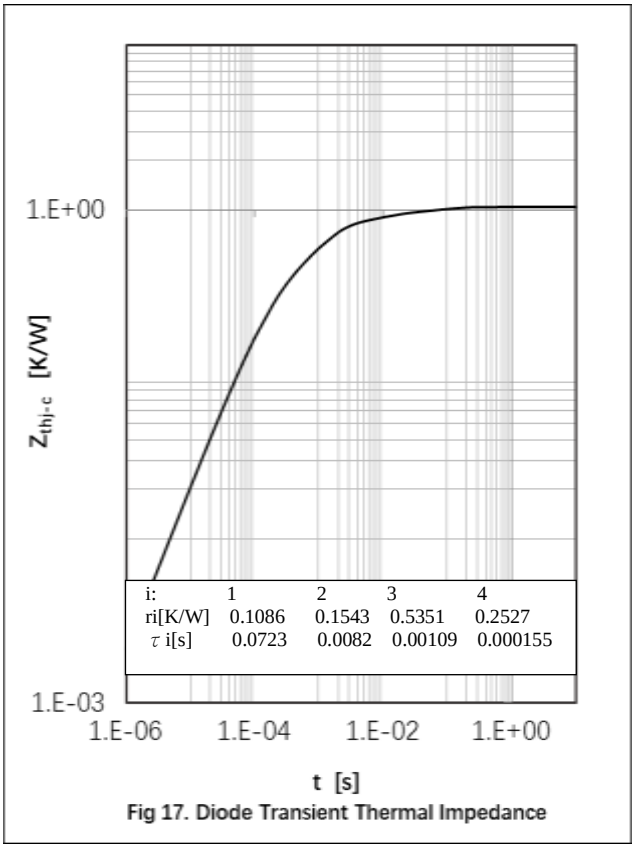


Fig 17. Diode Transient Thermal Impedance

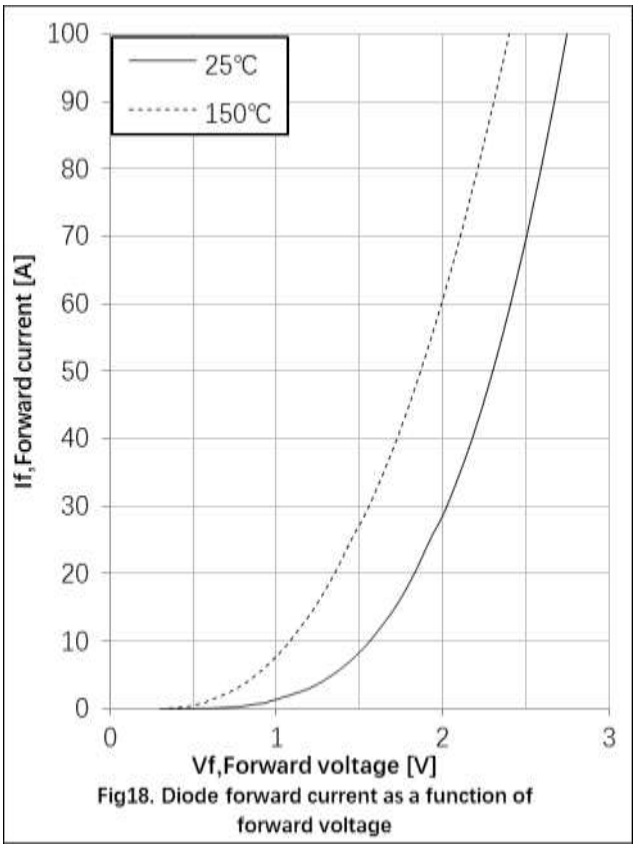
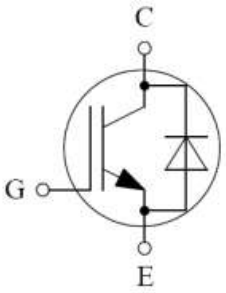


Fig18. Diode forward current as a function of forward voltage

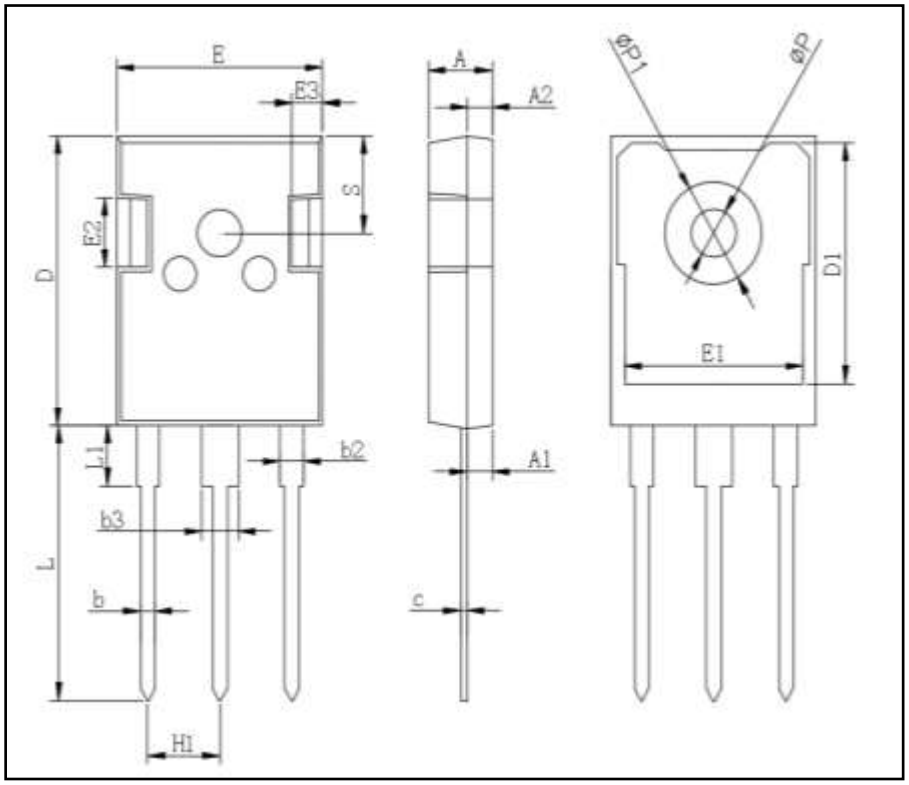
Circuit Diagram





Package Outline Information

CASE: TO 247



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
ΦP	3.40	3.80
ΦP1	-	7.30
S	6.15TYP	
H1	5.44TYP	
b3	2.80	3.20

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