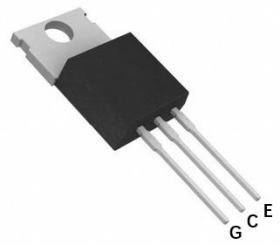
DGP15N65CTL1K

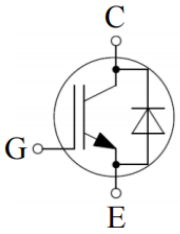
RoHS COMPLIANT



IGBT Discrete

V_{CE}	650	V
I_C	15	A
$V_{CE(SAT)}$ I_C=15A	1.65	V

Circuit



Applications

- Inverter for motor drive
- Air conditioning
- Uninterruptible power supply

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175℃
- Positive temperature coefficient
- High short circuit capability(5us)
- 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 T_C= 100°C	I_C	 30 15	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_F	 30 15	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		45	A
Pulsed Collector Current, V_{GE}=15V, tp limited by T_{jmax}	I_{CM}	45	A
Diode Pulsed Current, tp limited by T_{jmax}	I_{Fpuls}	45	A
Short Circuit Withstand Time, V_{GE}= 15V, V_{CC}=400V, V_{CEM}≤650V	T_{sc}	5	μs
Power Dissipation , Tj=175°C, Tc=25°C	P_{tot}	150	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=1mA	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=250μA	4.0	5.5	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=15A T_j=25°C, T_j=125°C T_j=150°C		1.65 1.80 1.85	2.15	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j= 25°C, T_j=150°C			0.25 5	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	-	0.74	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.02	-	
Gate Charge	Q_G	V_{CC}=400V,I_C=15A, V_{GE}=15V	-	0.08	-	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= 15A T_j= 25°C T_j= 125°C T_j= 150°C		1.60 1.50 1.45	2.10	V

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=25°C V_{CC}= 400V, I_C=15A, V_{GE}=-5V~15V, Rg=10Ω	-	10	-	ns
Rise Time	t_r		-	27	-	ns
Turn-on Energy	E_{on}		-	0.33	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	58	-	ns
Fall Time	t_f		-	64	-	ns
Turn-off Energy	E_{off}		-	0.22	-	mJ
Dynamic , at T_j= 125℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=125°C V_{CC}= 400V, I_C=15A, V_{GE}=-5V~15V, Rg=10Ω	-	10	-	ns
Rise Time	t_r		-	27	-	ns
Turn-on Energy	E_{on}		-	0.35	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	74	-	ns
Fall Time	t_f		-	105	-	ns
Turn-off Energy	E_{off}		-	0.35	-	mJ
Dynamic , at T_j= 150℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=150°C V_{CC}= 400V, I_C=15A, V_{GE}=-5V~15V, Rg=10Ω	-	9	-	ns
Rise Time	t_r		-	27	-	ns
Turn-on Energy	E_{on}		-	0.36	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	81	-	ns
Fall Time	t_f		-	122	-	ns
Turn-off Energy	E_{off}		-	0.41	-	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=15A, V_R=400V, -di/dt= 450A/μs,	-	8	-	A
Diode reverse recovery time	trr		-	78	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.36	-	uC
Reverse Recovery Energy	Erec		-	0.08	-	mJ
Dynamic , at Tj= 125℃						
Reverse Recovery Current	I_{rr}	I_F=15A, V_R=400V, -di/dt= 450A/μs,	-	12	-	A
Diode reverse recovery time	trr		-	126	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.77	-	uC
Reverse Recovery Energy	Erec		-	0.20	-	mJ
Dynamic , at Tj= 150℃						
Reverse Recovery Current	I_{rr}	I_F=15A, V_R=400V, -di/dt= 450A/μs,	-	14	-	A
Diode reverse recovery time	trr		-	146	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.94	-	uC
Reverse Recovery Energy	Erec		-	0.25	-	mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R_{th}(j-c)	1.0	K/W
Diode Thermal Resistance, Junction - Case	R_{th}(j-c)	1.5	K/W
Thermal Resistance, Junction - Ambient	R_{th}(j-a)	40	K/W

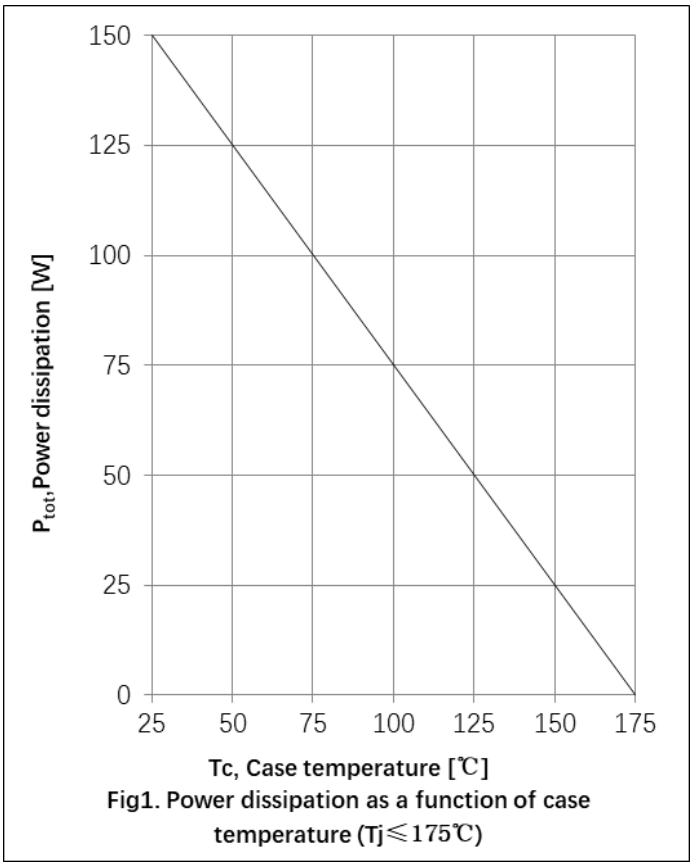


Fig1. Power dissipation as a function of case temperature (Tj≤175℃)

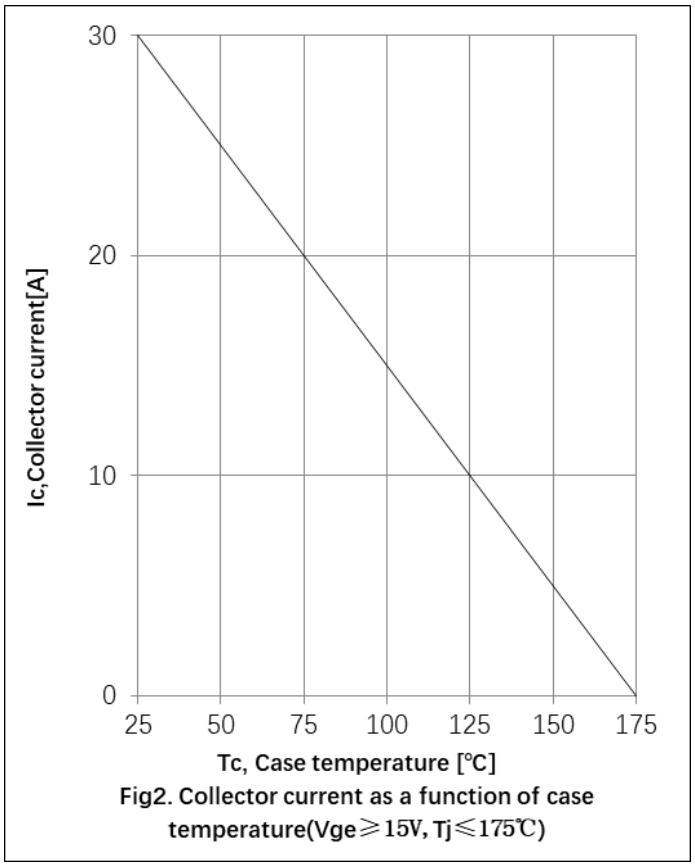


Fig2. Collector current as a function of case temperature(Vge≥15V, Tj≤175℃)

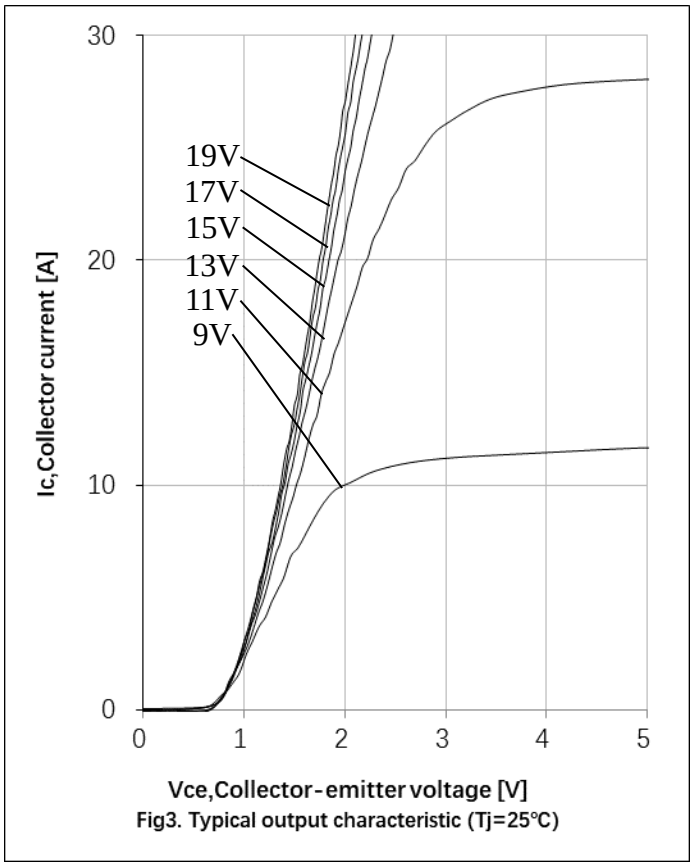


Fig3. Typical output characteristic (Tj=25℃)

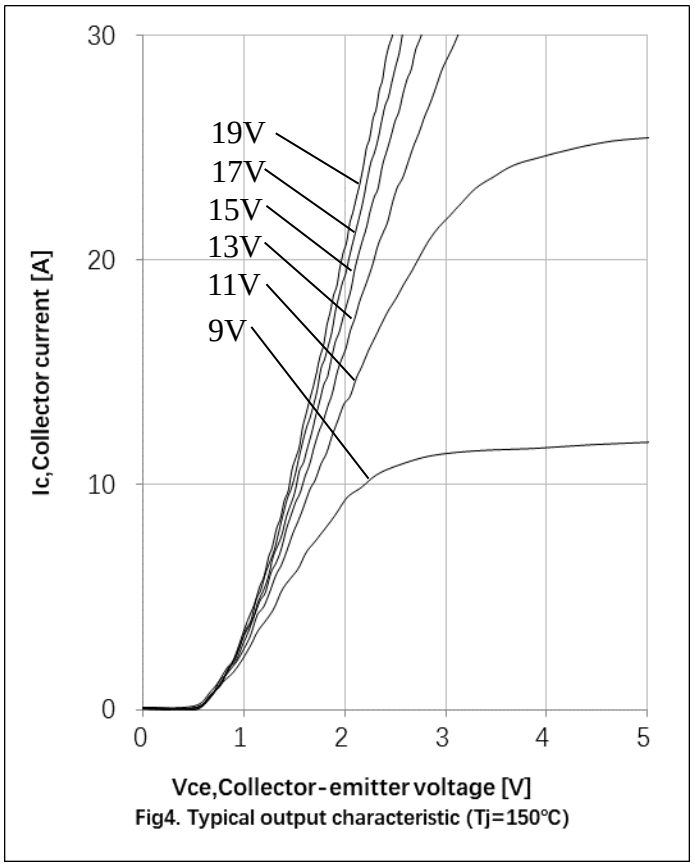


Fig4. Typical output characteristic (Tj=150℃)

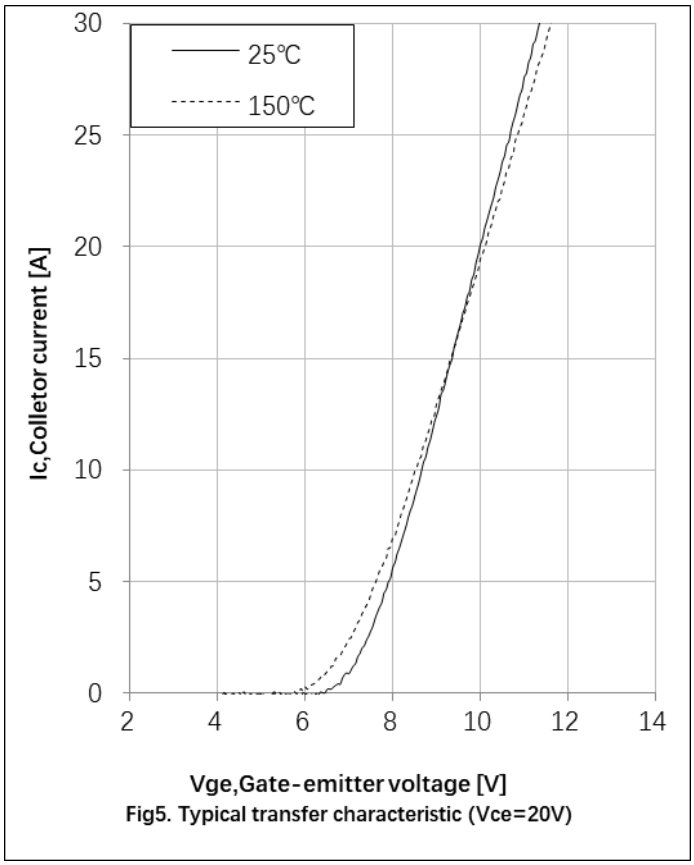


Fig5. Typical transfer characteristic (Vce=20V)

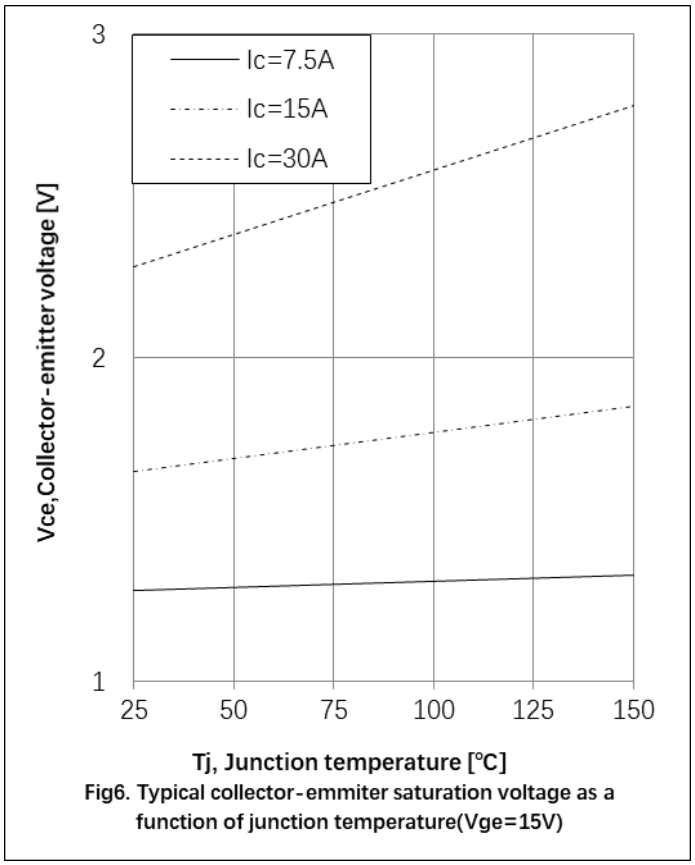


Fig6. Typical collector-emmiter saturation voltage as a function of junction temperature(Vge=15V)

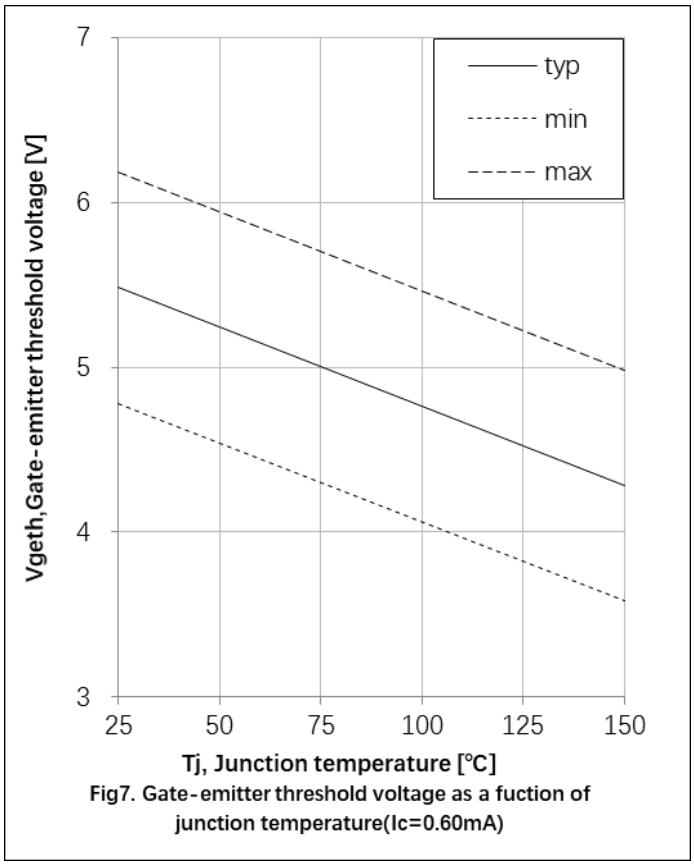


Fig7. Gate-emitter threshold voltage as a fuction of junction temperature(Ic=0.60mA)

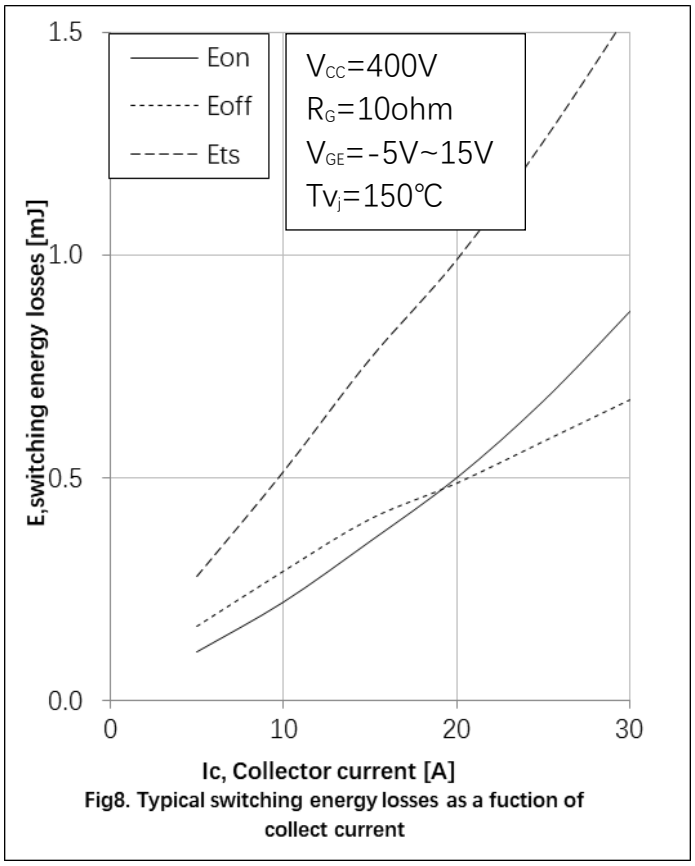


Fig8. Typical switching energy losses as a fuction of collect current

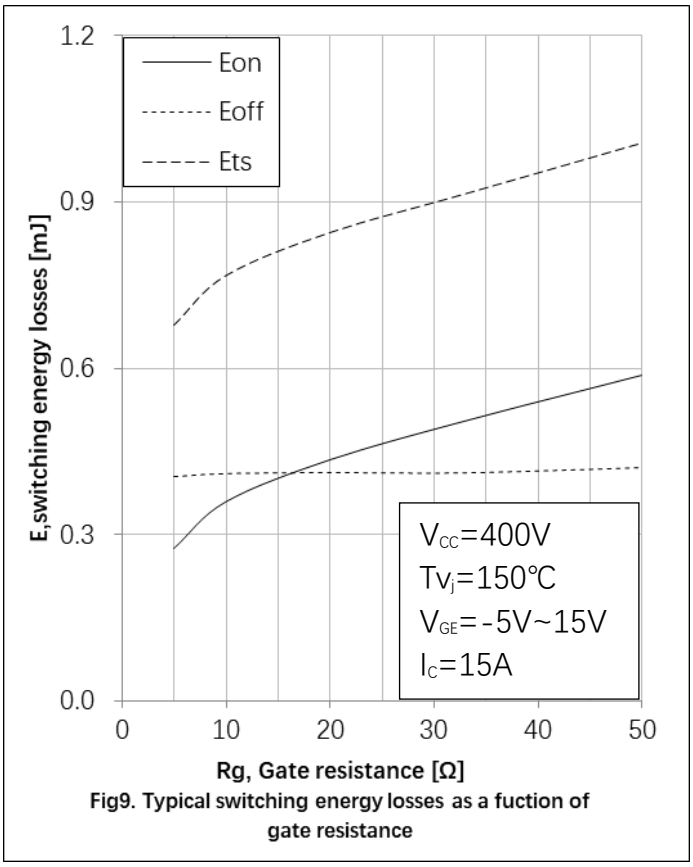


Fig9. Typical switching energy losses as a fuction of gate resistance

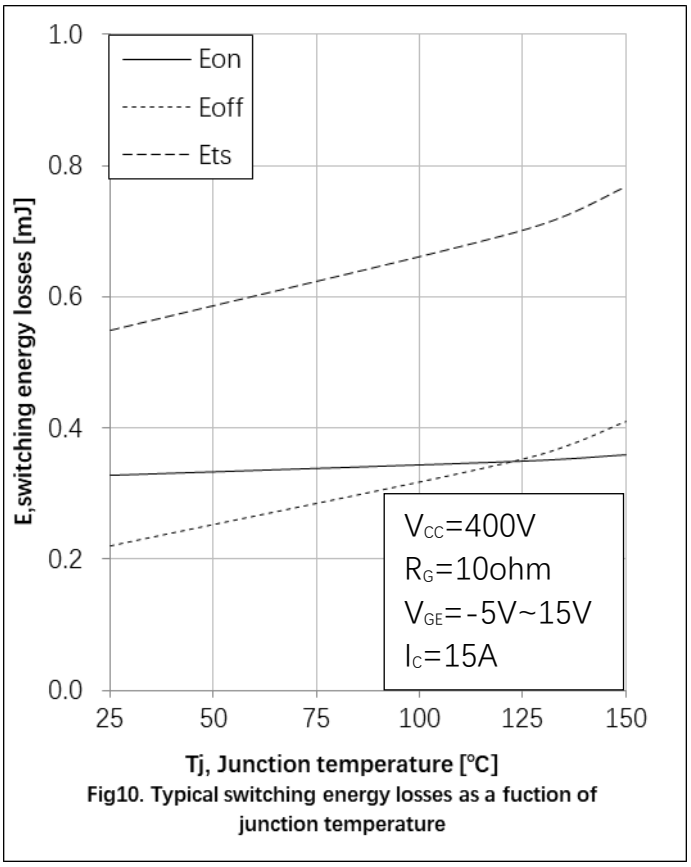


Fig10. Typical switching energy losses as a fuction of junction temperature

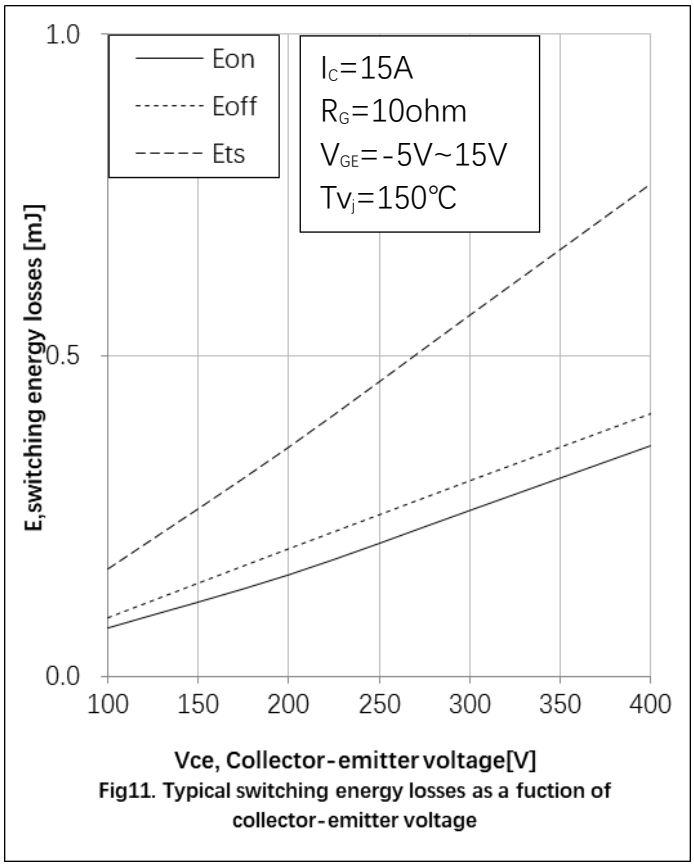


Fig11. Typical switching energy losses as a fuction of collector-emitter voltage

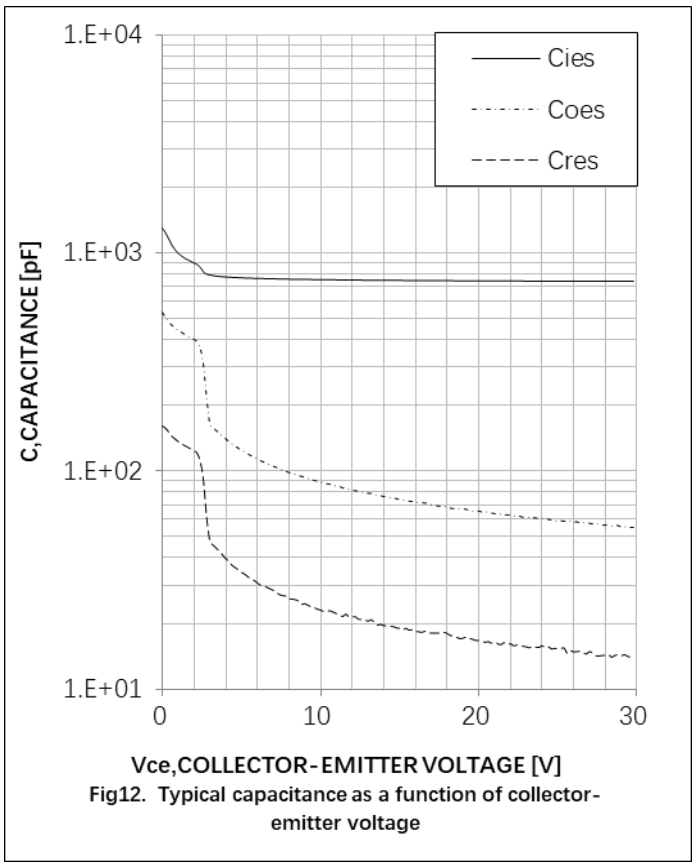


Fig12. Typical capacitance as a function of collector-emitter voltage

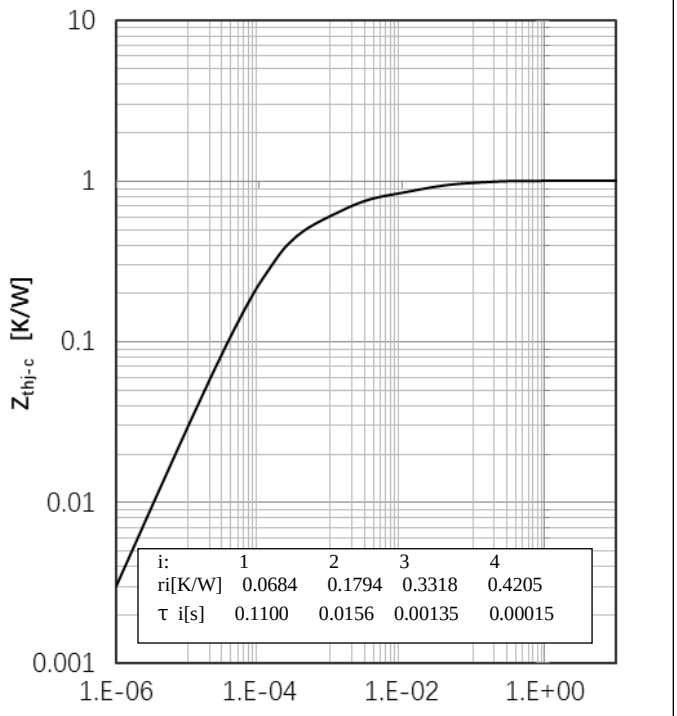


Fig 13. IGBT Transient Thermal Impedance

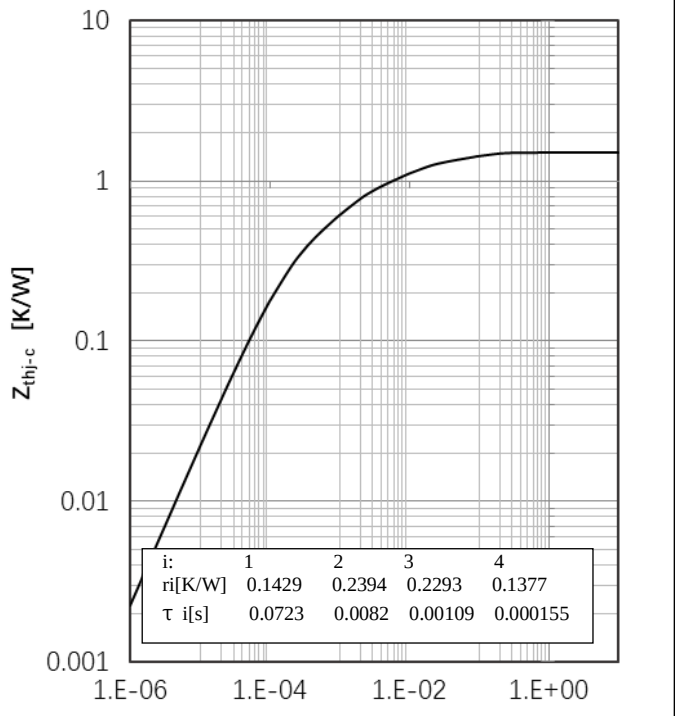


Fig 14.Diode Transient Thermal Impedance

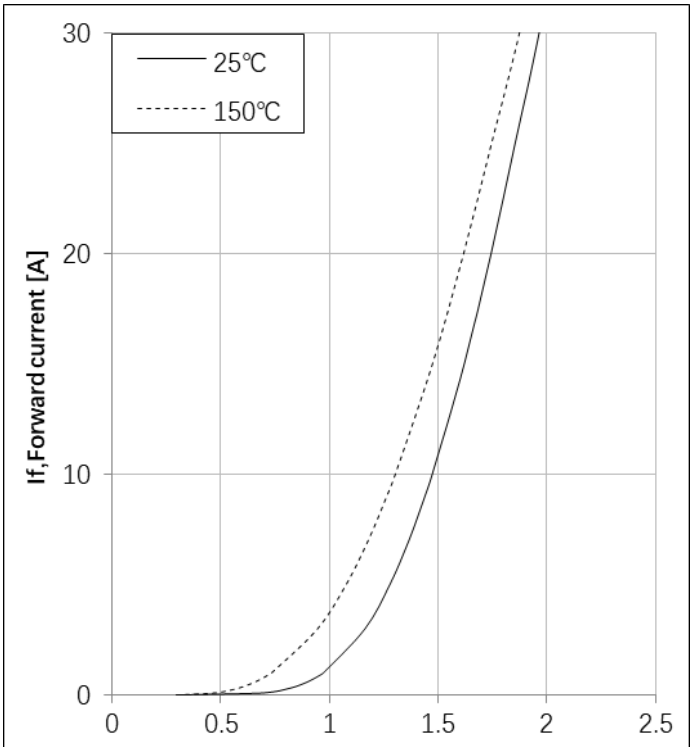


Fig15. Diode forawrd current as a function of foraward voltage

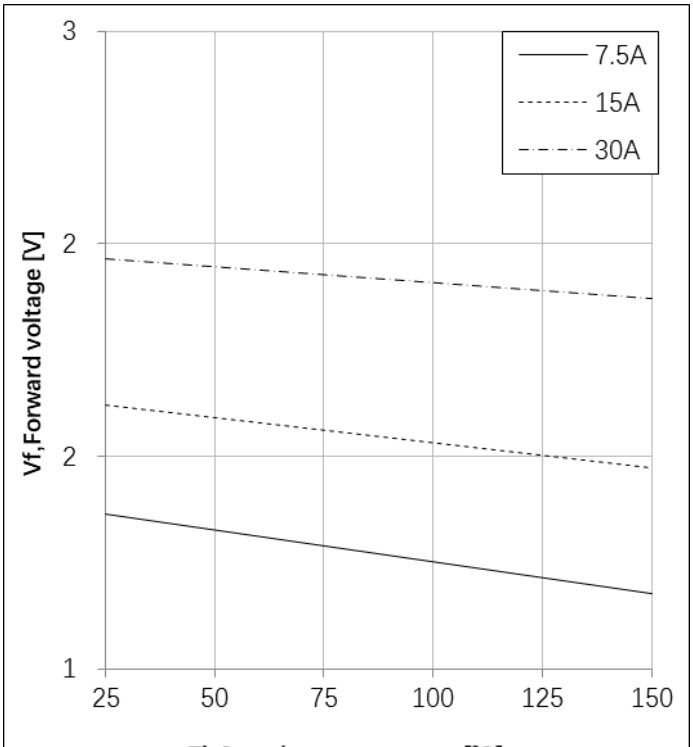
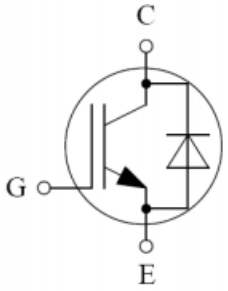


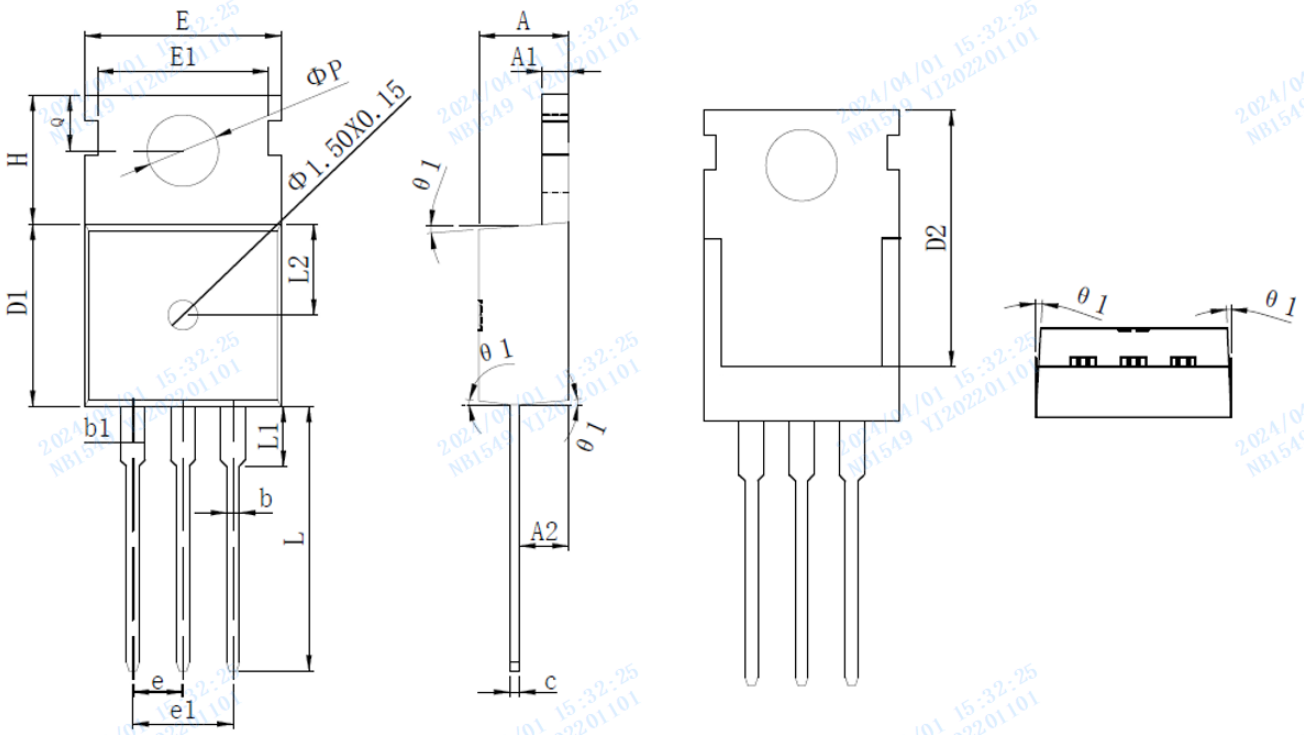
Fig16. Typical diode foraward voltage as a function of junction temperature

Circuit Diagram



Package Outline Information

CASE: TO-220 package information



SYMBOL	单位：mm			SYMBOL	单位：mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	4.40	4.50	4.60	e1	5.08REF		
A1	1.25	1.30	1.35	H	6.40	6.50	6.60
A2	2.30	2.40	2.50	L	13.00	13.28	13.45
b	0.75	0.80	0.85	L1	—	—	3.40
b1	1.25	1.33	1.42	L2	4.55	4.65	4.75
C	0.45	0.50	0.55	ΦP	3.60	3.65	3.75
D1	9.10	9.20	9.30	Q	2.70	2.80	2.90
D2	12.90	13.10	13.30	θ1	2°	—	7°
E	9.80	10.02	10.15				
E1	8.55	8.70	8.85				
e	2.50	2.54	2.58				

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