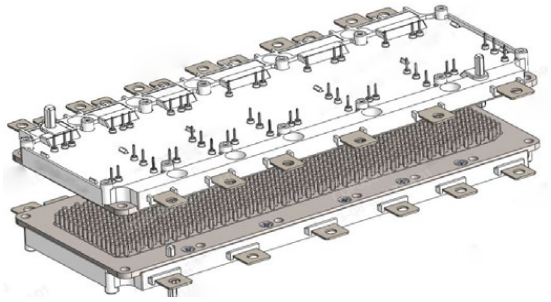
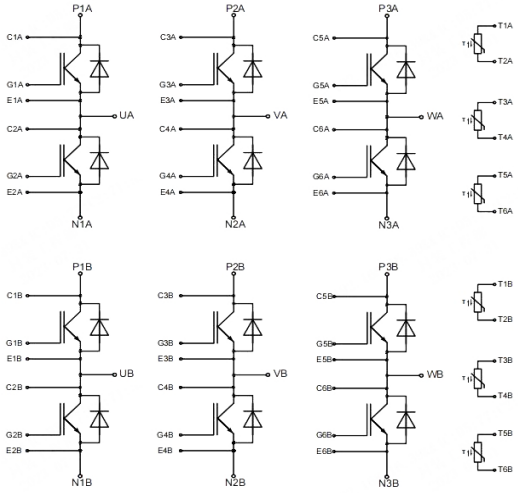
A:V_{CES}=750V，$I_{C\ nom}$=550A / I_{CRM}=1100A

B:V_{CES}=750V，$I_{C\ nom}$=820A / I_{CRM}=1640A



L1



Equivalent Circuit

Features：

- 750V Trench / Field Stop process
- Low switching losses
- Vcesat has a positive temperature coefficient
- Integrated NTC temperature sensor

Applications：

- Hybrid Electrical Vehicles(H)EV
- Motor Drives
- Automotive Applications

IGBT, A

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	Tvj=25℃	V_{CES}	750	V
Implemented forward current		I_{CN}	550	A
Continuous DC forward current			250	A
Repetitive peak collector current	T_P=1ms	I_{CRM}	1100	A
Total power dissipation	T_F = 75°C, $T_{vj\ max}$ = 175°C	P_{tot}	760	W
Gate emitter voltage	Tvj=25℃	V_{GE}	±20	V

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Collector-Emitter saturation voltage	V_{GE}=15V, I_C=550A V_{GE}=15V, I_C=550A V_{GE}=15V, I_C=550A	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	V_{CEsat}		1.45 1.60 1.75	2.00	V
Gate−Emitter Threshold Voltage	I_C=8.5mA, V_{GE}= V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	5.10	5.70	6.30	
Total Gate charge	V_{CE} = 400 V, I_C = 300 A, V_{GE} = ±15 V		Q_G		1580		nC
Internal gate resistor	Tvj = 25°C		RGint		1.0		Ω
Input capacitance	f=100KHz, V_{CE}=25 V, V_{GE}=0 V T_{vj}=25°C		Cies		30.0		nF
Output capacitance			Coes		2.00		
Reverse transfer capacitance			Cres		0.54		
Collector-emitter cut-off current	V_{CE}=750V , V_{GE}= 0 V	T_{vj}=25°C T_{vj}=175°C	I_{CES}		4.5	1.0	mA
Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V	T_{vj}=25°C	I_{GES}			300	nA
Turn-on delay time	I_C=300A, V_{CE}=400 V V_{GE}=±15 V, R_G=4Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	$t_{d\ on}$		125 122 126		ns

Rise time	I_C=300A, V_{CE}=400 V V_{GE}=±15 V, R_G=4Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	t_r		77 77 80		ns
Turn-off delay time	I_C=300A, V_{CE}=400 V V_{GE}=±15 V, R_G=4Ω (电感负载) / (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	$t_{d\ off}$		265 297 315		ns
Fall time	I_C=300A, V_{CE}=400 V V_{GE}=±15 V, R_G=4Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	t_f		275 346 300		ns
Turn-on energy loss per pulse	I_C=300A, V_{CE}=400 V V_{GE}=±15 V, R_G=4Ω di/dt=3200A/us(T_{vj}=150°C) (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	E_{on}		8.05 10.1 11.5		mJ
Turn-off energy loss per pulse	I_C=300A, V_{CE}=400 V V_{GE}=±15 V, R_G=4Ω dv/dt=3900V/us(T_{vj}=150°C) (inductive load)	T T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	E_{off}		17.0 21.0 22.5		mJ
Thermal resistance, junction to case	per IGBT		R_{thJC}		0.134		K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		175	°C

Diode，A

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25°C	V_{RRM}	750	V
Implemented forward current		I_{FN}	550	A
Continuous DC forward current		IF	230	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	1100	A

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=550A, V_{GE}=0V I_F=550A, V_{GE}=0V I_F=550A, V_{GE}=0V	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	V_F		1.81 1.95 1.98	2.20	V

Peak reverse recovery current	I_F =300A, -diF/dt=3200A/μs((T_{vj}=150°C) V_R =400V, V_{GE}=-15 V	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	I_{RM}		135 190 300		A
Reverse Recovery Time	IF=300A, -diF/dt=3200A/μs((T_{vj}=150°C) V_R =400V, V_{GE}=-15 V	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	Trr		110 225 255		ns
Recovered charge	IF=300A, -diF/dt=3200A/μs((T_{vj}=150°C) V_R =400V, V_{GE}=-15 V	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	Q_{rr}		8.38 20.1 22.7		μC
Reverse recovered energy	IF=300A, -diF/dt=3200A/μs((T_{vj}=150°C) V_R =400V, V_{GE}=-15 V	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	E_{rec}		1.87 5.63 6.03		mJ
Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}		0.178		K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		175	°C

IGBT, B

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	Tvj=25℃	V_{CES}	750	V
Implemented forward current		I_{CN}	820	A
Continuous DC forward current	T_F = 80°C, $T_{vj\ max}$ = 175°C	IC nom	450	A
Repetitive peak collector current	T_P=1ms	I_{CRM}	1640	A
Total power dissipation	T_F = 75°C, $T_{vj\ max}$ = 175°C	P_{tot}	760	W
Gate emitter voltage	Tvj=25℃	V_{GE}	±20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	

Collector-Emitter saturation voltage	V_{GE}=15V, I_C=820A V_{GE}=15V, I_C=820A V_{GE}=15V, I_C=820A	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	V_{CEsat}		1.45 1.60 1.75	2.00	V
Gate−Emitter Threshold Voltage	I_C=9.6mA, V_{GE}= V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	5.15	5.75	6.35	
Total Gate charge	V_{CE} = 400 V, I_C = 450 A, V_{GE} = ±15 V		Q_G		2300		nC
Internal gate resistor	Tvj=25℃		Rgint		0.7		Ω
Input capacitance	f=100KHz, V_{CE}=25 V, V_{GE}=0 V T_{vj}=25°C		Cies		44.1		nF
Output capacitance			Coes		3.03		
Reverse transfer capacitance			Cres		0.80		
Collector-emitter cut-off current	V_{CE}=750V_{GE}= 0 V	T_{vj}=25°C T_{vj}=175°C	I_{CES}		10	1.0	mA
Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V	T_{vj}=25°C	I_{GES}			400	nA
Turn-on delay time	I_C=450A, V_{CE}=400 V V_{GE}=±15 V, R_G=5Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	$t_{d\ on}$		180 184 170		ns
Rise time	I_C=450A, V_{CE}=400 V V_{GE}=±15 V, R_G=5Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	t_r		114 115 118		ns
Turn-off delay time	I_C=450A, V_{CE}=400 V V_{GE}=±15 V, R_G=5Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	$t_{d\ off}$		382 418 426		ns
Fall time	I_C=450A, V_{CE}=400 V V_{GE}=±15 V, R_G=5Ω (inductive load)	T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	t_f		215 321 358		ns
Turn-on energy loss per pulse	I_C=450A, V_{CE}=400 V V_{GE}=±15 V, R_G=5Ω di/dt=3100A/us(T_{vj}=150°C) (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{on}		16.3 22.4 23.0		mJ
Turn-off energy loss per pulse	I_C=450A, V_{CE}=400 V V_{GE}=±15 V, R_G=5Ω dv/dt=3000V/us(T_{vj}=150°C) (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{off}		26.5 34.5 35.8		mJ
Thermal resistance, junction to case	per IGBT		R_{thJC}		0.134		K/W

Temperature under switching conditions		$T_{vj\ op}$	-40		175	°C

Diode，B

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25°C	V_{RRM}	750	V
Implemented forward current		I_{FN}	820	A
Continuous DC forward current		IF	450	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	1640	A

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	I_F=820A, V_{GE}=0V T_{vj}=25°C I_F=820A, V_{GE}=0V T_{vj}=150°C I_F=820A, V_{GE}=0V T_{vj}=175°C	V_F		1.85 1.98 2.05	2.20	V
Peak reverse recovery current	IF=450A, -diF/dt=3100A/μs VR=400V, V_{GE}=-15 V T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	I_{RM}		135 190 300		A
Reverse Recovery Time	IF=450A, -diF/dt=3100A/μs VR=400V, V_{GE}=-15 V T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	Trr		115 230 292		ns
Recovered charge	IF=450A, -diF/dt=3100A/μs VR=400V, V_{GE}=-15 V T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	Q_{rr}		8.38 20.0 22.7		μC
Reverse recovered energy	IF=450A, -diF/dt=3100A/μs VR=400V, V_{GE}=-15 V T_{vj}=25°C T_{vj}=150°C T_{vj}=175°C	E_{rec}		2.38 7.42 8.76		mJ
Thermal resistance, junction to case	per diode	R_{thJC}		0.178		K/W
Temperature under switching conditions		$T_{vj\ op}$	-40		175	°C

NTC-Thermistor

Characteristic Values

Parameter	Conditions	Value			Unit
R25	T=25℃		5.00		KΩ
△R/R	Tc=100℃, R100=493.3Ω	−5		5	%
B−value	B (25/50), tolerance ±3%		3380		K
B−value	B (25/85), tolerance ±3%		3476		K
B−value	B (25/100), tolerance ±3%		3485		K

Module

Parameter	Conditions	Symbol	Value			Unit
Isolation test voltage	RMS, f=0Hz, t=1sec	V_{ISOL}	4.2			kV
Internal isolation			Al_2O_3			
Storage temperature		Tstg	-40		125	°C
Creepage distance	terminal to heatsink terminal to terminal	dCreep	9.0 9.0			mm
Clearance	terminal to heatsink terminal to terminal	dClear	4.5 4.5			mm
Comperative tracking index		CTI	> 200			
			Min.	**Typ.**	**Max.**	
Mounting torque for modul mounting	Screw M4 baseplate to heatsink Screw EJOT Delta PCB to frame	M	1.8 0.45		2.2 0.55	Nm
Weight		G		1270		g

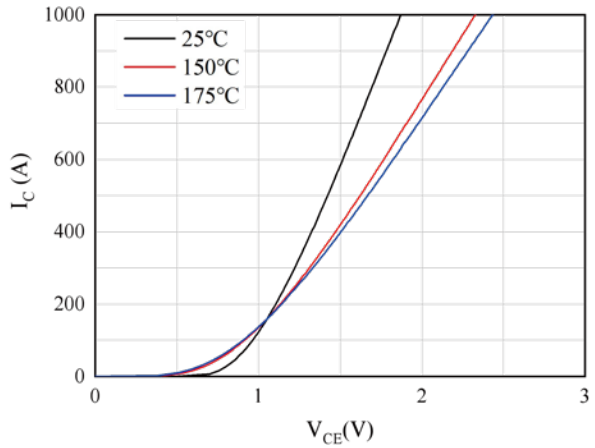


Fig 1.Typical output characteristics (V_{GE}=15V)

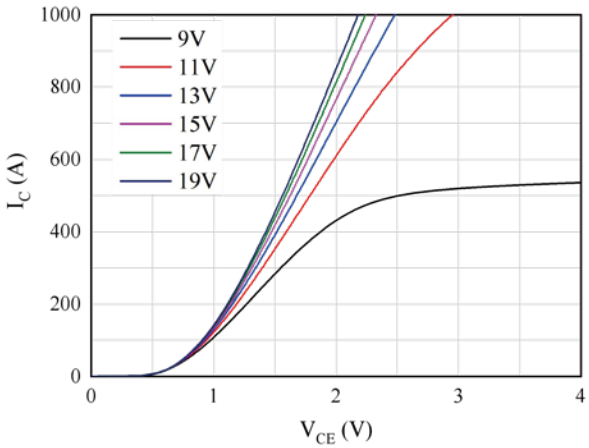


Fig 2.Typical output characteristics (T_{vj}=150℃)

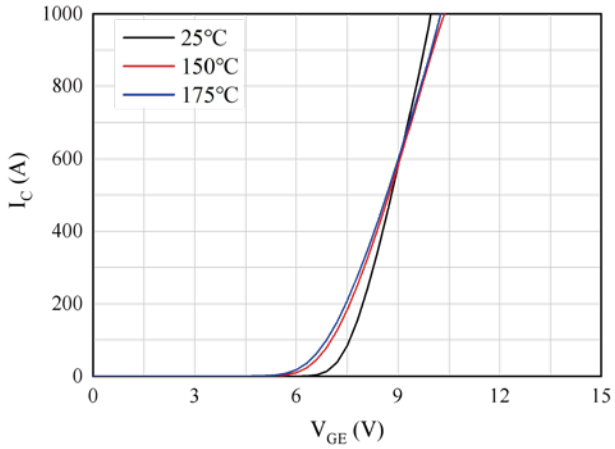


Fig 3.Typical transfer characteristic(V_{CE}=20V)

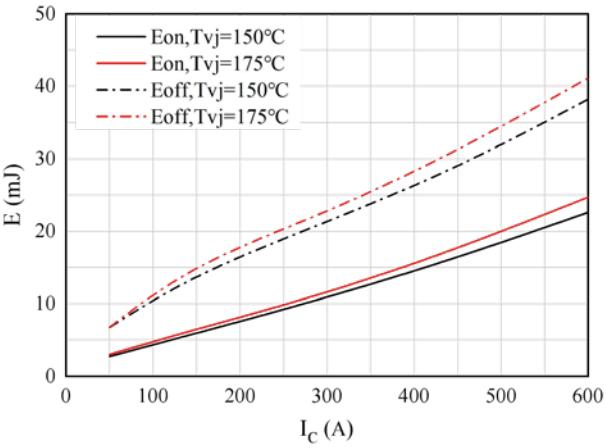


Fig 4. Switching losses of IGBT

V_{GE}=±15V, R_G=4Ω, V_{CE}=400V

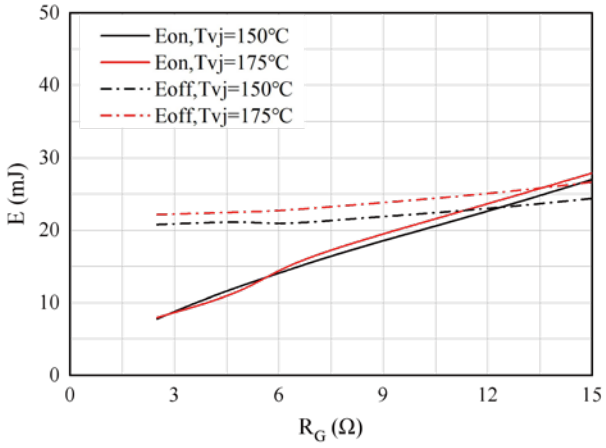


Fig 5. Switching losses of IGBT

V_{GE}=±15V, I_C=300A, V_{CE}=400V

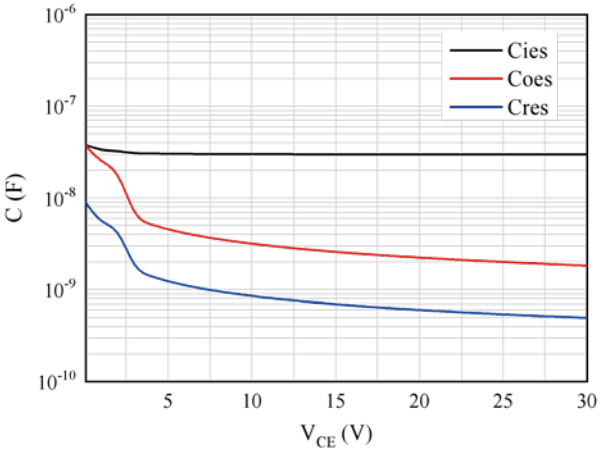


Fig 6. Capacitance characteristic

f=100 kHz, V_{GE}=0 V, Tvj=25 °C

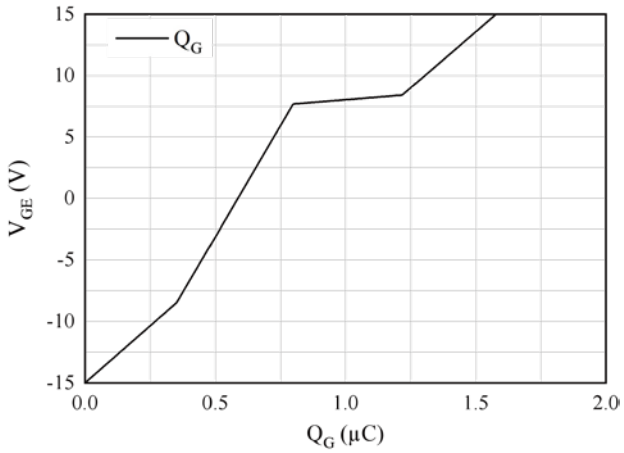


Fig 7. Gate charge characteristic of IGBT

V_{CE}= 400 V, I =300A, Tvj = 25°C

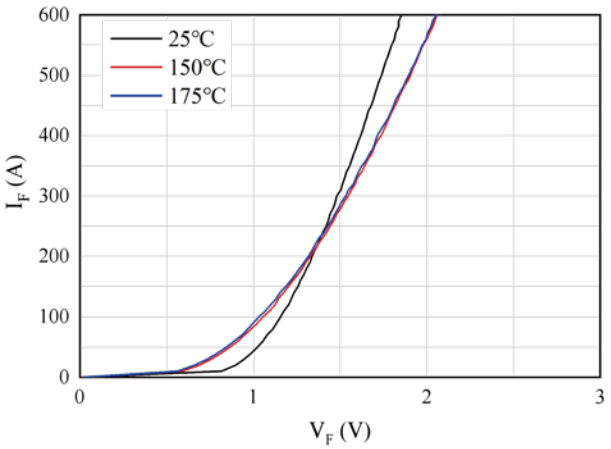


Fig 8. Forward characteristic of Diode

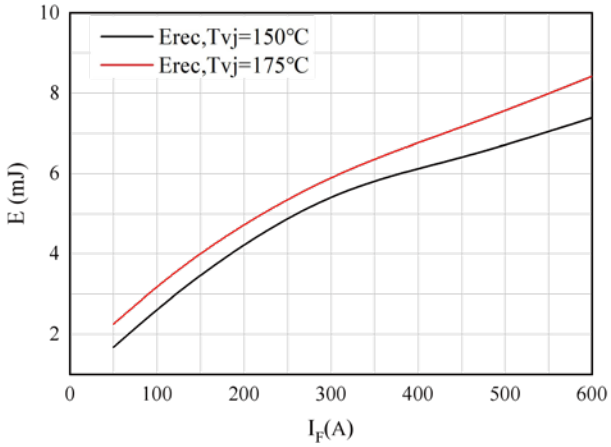


Fig9. Switching losses of Diode

R_G=4Ω，V_{CE}=400V

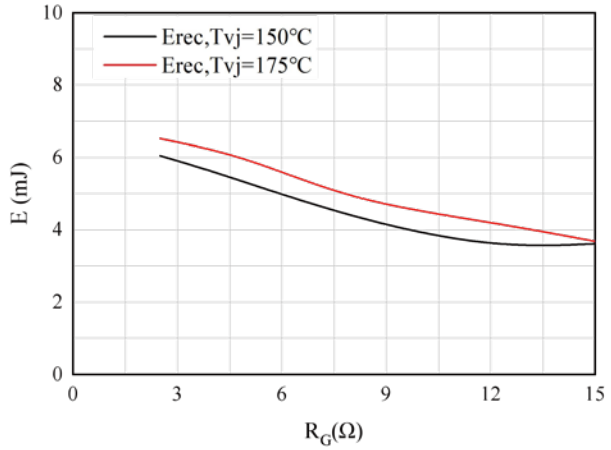


Fig 10. Switching losses of Diode

I_C=300A，V_{CE}=400V

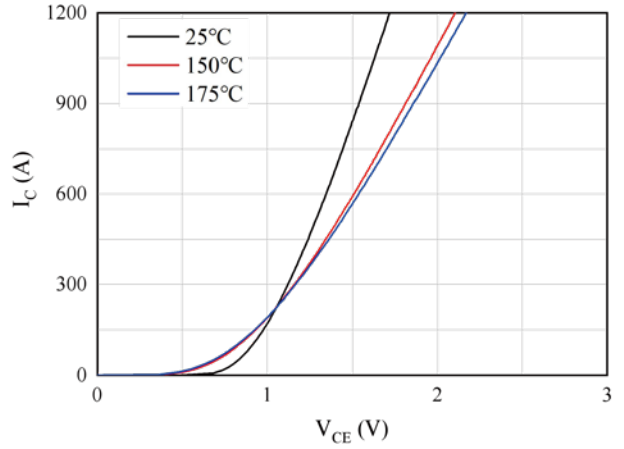


Fig 11.Typical output characteristics (V_{GE}=15V)

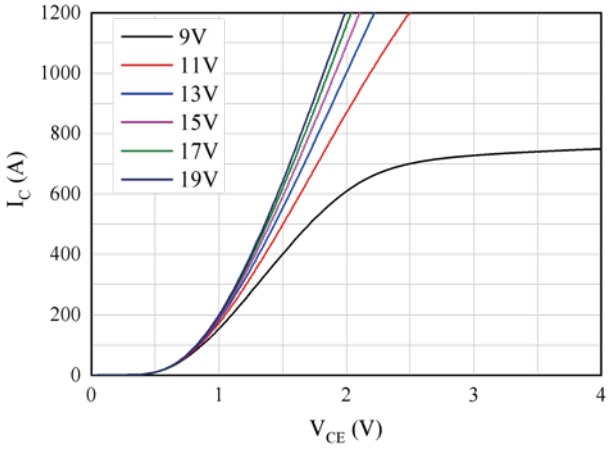


Fig 12.Typical output characteristics (T_{vj}=150℃)

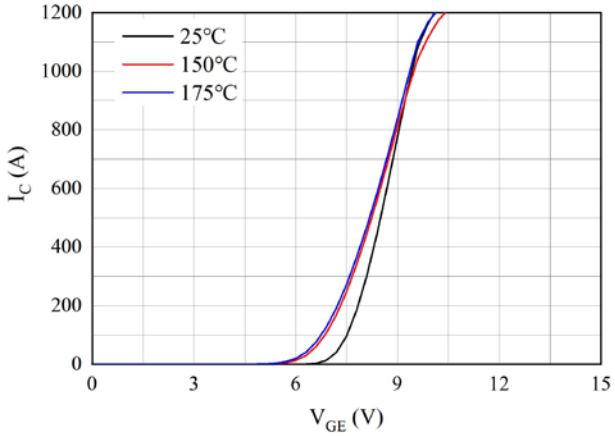


Fig 13.Typical transfer characteristic(V_{CE}=20V)

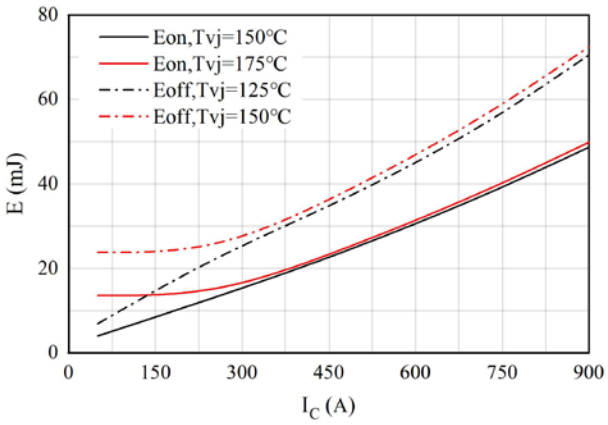


Fig 14. Switching losses of IGBT

V_{GE} =±15V, R =5 Ω , V_{CE}=400V

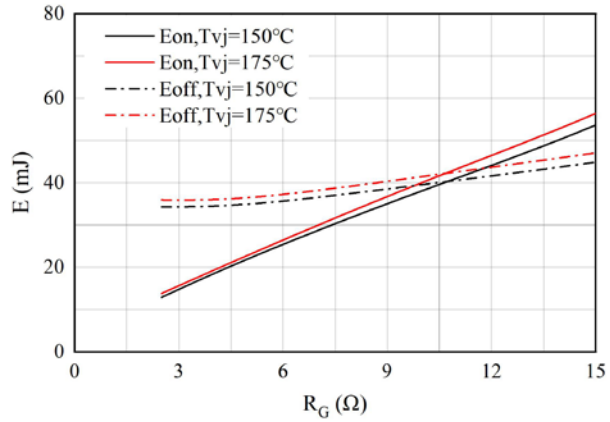


Fig 15. Switching losses of IGBT

V_{GE}=±15V, IC=450A, V_{CE}=400V

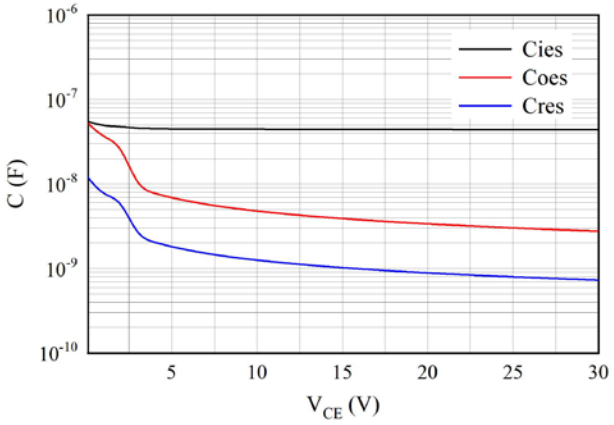


Fig 16. Capacitance characteristic

f=100 kHz,V_G =0 V,Tvj=25 °C

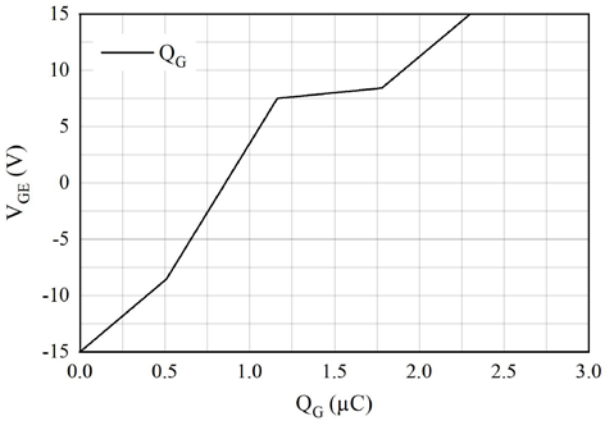


Fig 17. Gate charge characteristic of IGBT

V_{CE}=400 V, I_C=300A, Tvj=25°C

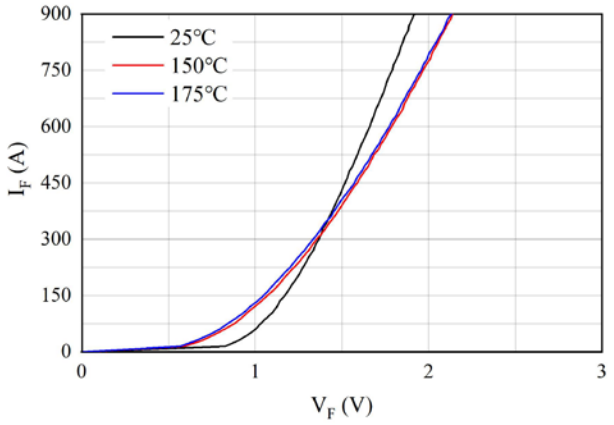


Fig 18. Forward characteristic of Diode

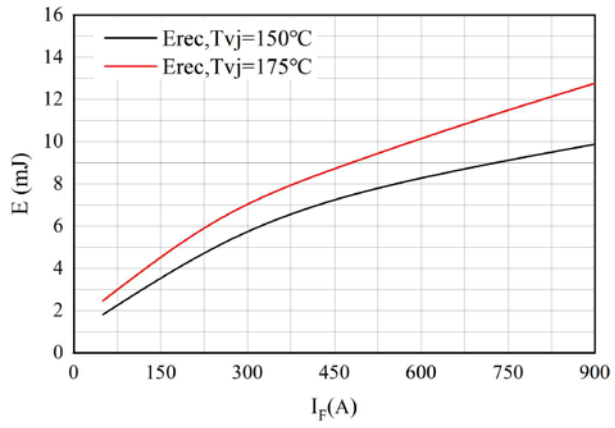


Fig 19. Switching losses of Diode

R_G =5Ω, V_{CE}=400V

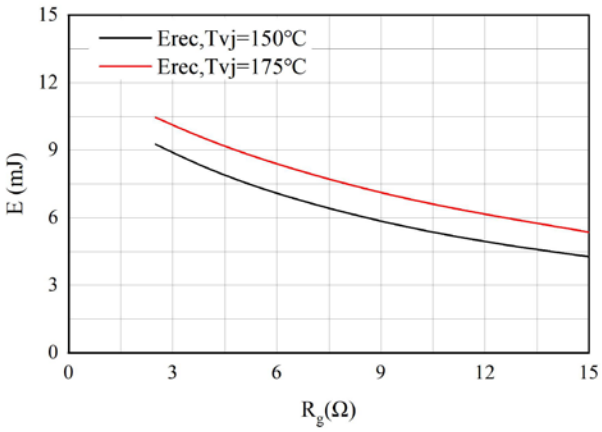


Fig 20. Switching losses of Diode

I_C=450A, V_{CE}=400V

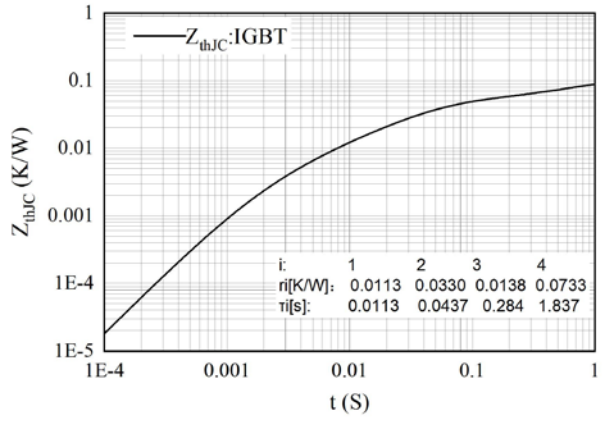


Fig 21. Transient thermal impedance IGBT, Inverter

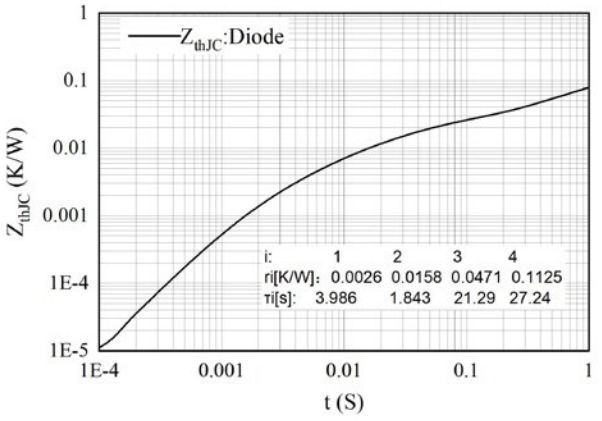


Fig 22. Transient thermal impedance Diode

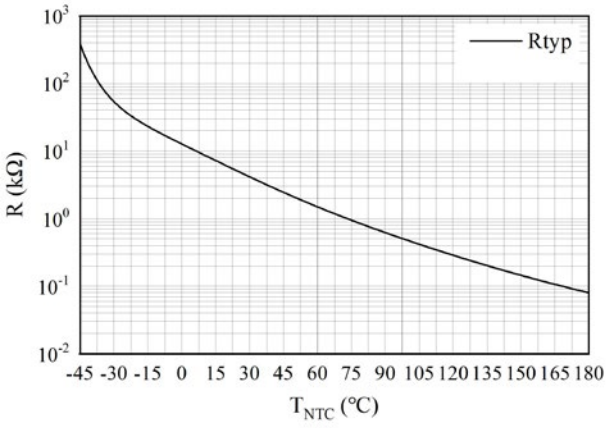
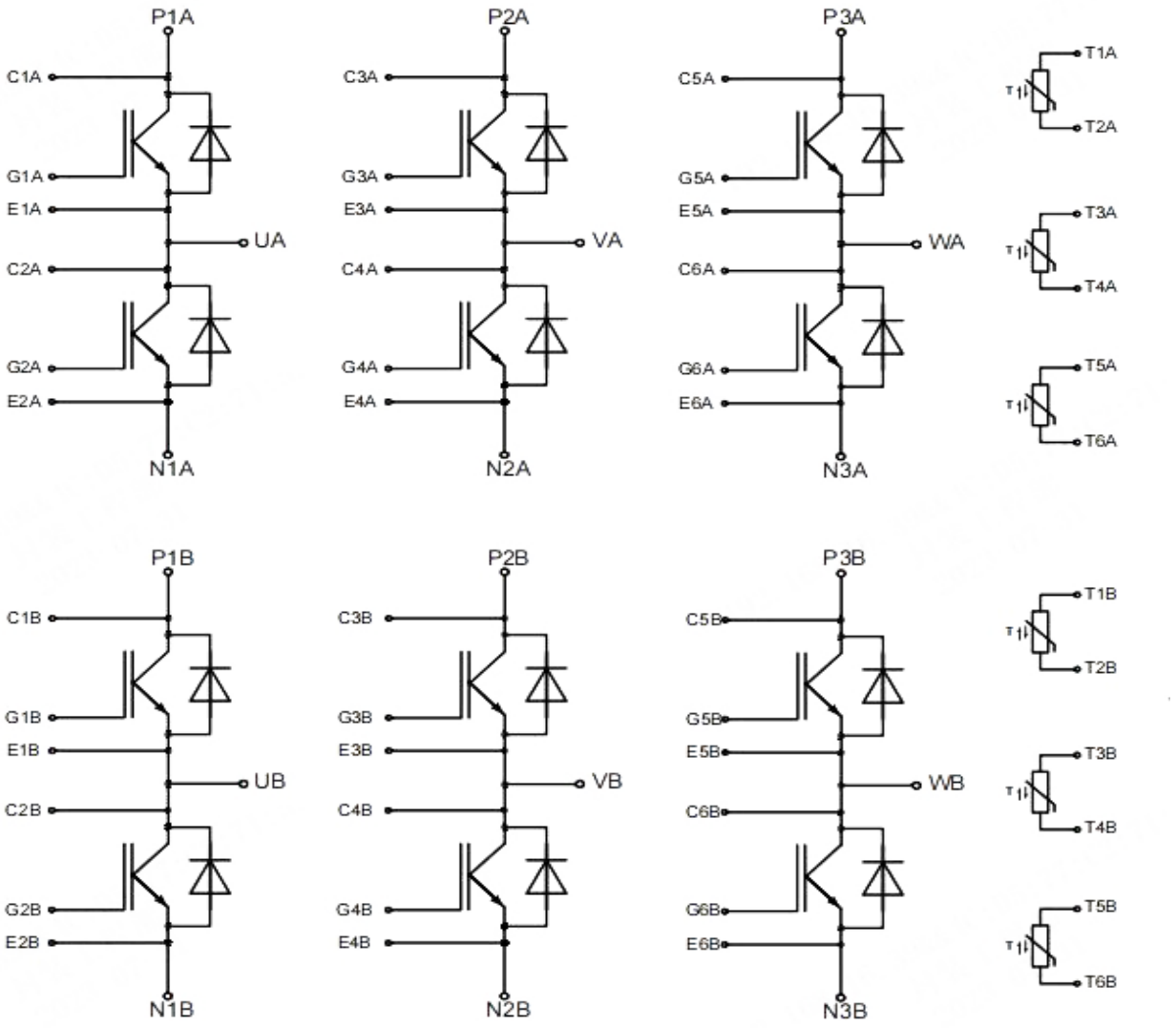


Fig 23. NTC-Themistor-temperature characteristic

Circuit diagram



Package outlines