STARSEA

MG10P12P3

RoHS COMPLIANT



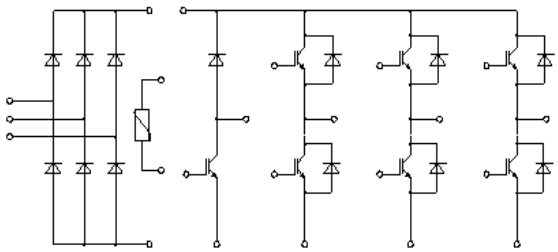
IGBT Modules

V_{CES}	1200V
I_C	10A

Applications

- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Circuit



Features

- Low switching losses
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Isolated heatsink using DBC technology
- Maximum junction temperature 175℃

● IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C =1mA, T_{vj}=25℃	1200	V
Continuous Collector Current	I_C	T_C=100℃, T_{vjmax}=175℃	10	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	20	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	140	W

IGBT- inverter

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE},I_C =0.5mA,T_{vj}=25℃	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=10A,V_{GE}=15V, T_{vj}=25℃		1.85	2.50	V
		I_C=10A,V_{GE}=15V, T_{vj}=125℃		2.15		
		I_C=10A,V_{GE}=15V, T_{vj}=150℃		2.25		
Gate Charge	Q_G			0.13		uC
Internal Gate Resistor	R_{Gint}			0.0		Ω
Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25℃		1.0		nF
Reverse Transfer Capacitance	C_{res}			0.03		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V, T_{vj} =25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C=10A V_{CE}=600 V V_{GE}=±15V R_G=51Ω T_{vj}=25℃		87		ns
Rise Time	t_r			55		ns
Turn-off Delay Time	$t_{d(off)}$			262		ns
Fall Time	t_f			145		ns
Energy Dissipation During Turn-on Time	E_{on}			1.02		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.52		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=10A V_{CE}=600 V V_{GE}=±15V R_G=51Ω T_{vj}=125℃		92		ns
Rise Time	t_r			58		ns
Turn-off Delay Time	$t_{d(off)}$			283		ns
Fall Time	t_f			153		ns
Energy Dissipation During Turn-on Time	E_{on}			1.38		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.96		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=10A V_{CE}=600 V V_{GE}=±15V R_G=51Ω T_{vj}=150℃		98		ns
Rise Time	t_r			61		ns
Turn-off Delay Time	$t_{d(off)}$			285		ns
Fall Time	t_f			155		ns
Energy Dissipation During Turn-on Time	E_{on}			1.41		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.02		mJ
SC Data	I_{SC}	t_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=900V,V_{CEM}≤1200V		70		A

Diode-inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	1200	V
Continuous DC Forward Current	I_F		10	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	20	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=125℃	16.0	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	14.0	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=10A,T_{vj}=25℃		2.0		V
		I_F=10A,T_{vj}=125℃		2.1		
		I_F=10A,T_{vj}=150℃		2.15		
Recovered Charge	Q_{rr}	I_F =10A V_R=600V -di_F/dt =600A/us T_{vj}=25℃		1. 0		uC
Peak Reverse Recovery Current	I_{rr}			12.5		A
Reverse Recovery Energy	E_{rec}			0.26		mJ
Recovered Charge	Q_{rr}	I_F =10 A V_R=600V -di_F/dt =600A/us T_{vj}=125℃		1.70		uC
Peak Reverse Recovery Current	I_{rr}			10.6		A
Reverse Recovery Energy	E_{rec}			0.53		mJ
Recovered Charge	Q_{rr}	I_F =10 A V_R=600V -di_F/dt =600A/us T_{vj}=150℃		1.86		uC
Peak Reverse Recovery Current	I_{rr}			12.0		A
Reverse Recovery Energy	E_{rec}			0.61		mJ

IGBT-brake-chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C =1mA, T_{vj}=25℃	1200	V
Continuous Collector Current	I_C	T_C=100℃, T_{vjmax}=175℃	10	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	20	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃, T_{vjmax}=175℃	140	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C =0.5mA,T_{vj}=25℃	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=10A,V_{GE}=15V, T_{vj}=25℃		1.85	2.25	V
		I_C=10A,V_{GE}=15V, T_{vj}=125℃		2.15		
		I_C=10A,V_{GE}=15V, T_{vj}=150℃		2.25		
Gate Charge	Q_G			0.09		uC
Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25℃		1.0		nF
Reverse Transfer Capacitance	C_{res}			0.03		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V,T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C=10A V_{CE}=600V V_{GE}=±15V R_G=51Ω T_{vj}=25℃		46		ns
Rise Time	t_r			45		ns
Turn-off Delay Time	$t_{d(off)}$			182		ns
Fall Time	t_f			168		ns
Energy Dissipation During Turn-on Time	E_{on}			0.92		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.56		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C=10A V_{CE}=600 V V_{GE} =±15V R_G=51Ω T_{vj}=125℃		46		ns
Rise Time	t_r			63		ns
Turn-off Delay Time	$t_{d(off)}$			248		ns
Fall Time	t_f			220		ns
Energy Dissipation During Turn-on Time	E_{on}			1.37		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.81		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=10A V_{CE}=600 V V_{GE}=±15V R_G=51Ω T_{vj}=150℃		48		ns
Rise Time	t_r			68		ns
Turn-off Delay Time	$t_{d(off)}$			252		ns
Fall Time	t_f			223		ns
Energy Dissipation During Turn-on Time	E_{on}			1.60		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.89		mJ
SC Data	I_{SC}	t_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=900V,V_{CEM}≤1200V		70		A

Diode-brake-chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	1200	V
Continuous DC Forward Current	I_F		10	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	20	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=125℃	16.0	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	14.0	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=10A,T_{vj}=25℃		2.0	2.5	V
		I_F=10A,T_{vj}=125℃		2.1		
		I_F=10A,T_{vj}=150℃		2.15		
Recovered Charge	Q_{rr}	I_F =10 A V_R=600V -di_F/dt =500A/us T_{vj}=25℃		0.88		uC
Peak Reverse Recovery Current	I_{rr}			12.5		A
Reverse Recovery Energy	E_{rec}			0.25		mJ
Recovered Charge	Q_{rr}	I_F =10 A V_R=600V -di_F/dt =500A/us T_{vj}=125℃		1.71		uC
Peak Reverse Recovery Current	I_{rr}			10.4		A
Reverse Recovery Energy	E_{rec}			0.50		mJ
Recovered Charge	Q_{rr}	I_F =10 A V_R=600V -di_F/dt =500A/us T_{vj}=150℃		1.92		uC
Peak Reverse Recovery Current	I_{rr}			10.4		A
Reverse Recovery Energy	E_{rec}			0.58		mJ

Diode-rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	1600	V
Average output Current 50/60Hz, sine wave	$I_{F(AV)}$	T_C=100℃	10	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_C=100℃	20	A
Surge Forward Current	I_{FSM}	V_R=0V,t_p=10ms,T_{vj}=45℃	150	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=45℃	110	A^2s

CharacteristicValues

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=10A,T_{vj}=150℃		1.0		V
Reverse Current	I_R	T_{vj}=150℃,V_R=1600V			1.0	mA

NTC-Thermistor

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		kΩ
Deviation of R100	ΔR/R	T_C=100,R_{100}=493.3Ω	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K

Module Characteristics

T_C=25°C unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation voltage	V_{isol}	t=1min,f=50Hz	2500			V
Maximum Junction Temperature	T_{jmax}				175	℃
Operating Junction Temperature	$T_{vj\ op}$		-40		150	℃
Storage Temperature	T_{stg}		-40		125	℃
Stray-inductance-module	L_{SCE}			30		nH
Comparative Tracking Index	CTI			>200		
Module lead resistance, terminals-chip	$R_{CC'+EE'}$	T_C=25℃, per switch		5.00		mΩ
	$R_{AA'+CC'}$			6.00		
Thermal Resistance Junction-to Case	$R_{\theta JC}$	per IGBT-inverter		1.25	1.40	K/W
		per Diode-inverter		1.75	1.90	
		per IGBT-brake-chopper		1.25	1.40	
		per Diode-chopper		1.75	1.90	
		per Diode-rectifier		2.05	2.10	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	per IGBT-inverter		1.15		K/W
		per Diode-inverter		1.30		
		per IGBT-brake-chopper		1.15		
		per Diode-chopper		1.30		
		per Diode-rectifier		1.25		
		per Module		0.05		
Mounting Force Per Clamp	F		30		80	N
Weight of Module	G			45		g

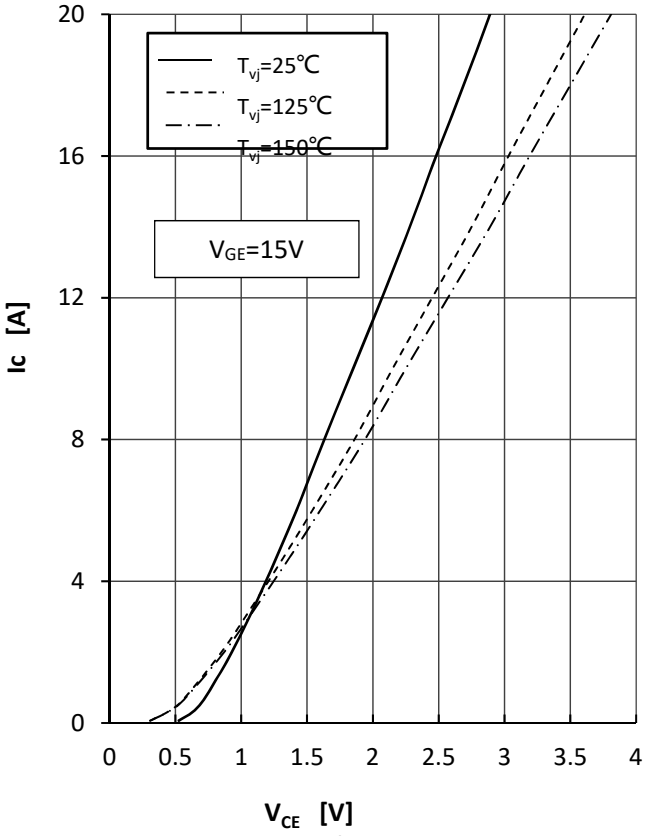


Fig1.IGBT Output Characteristics

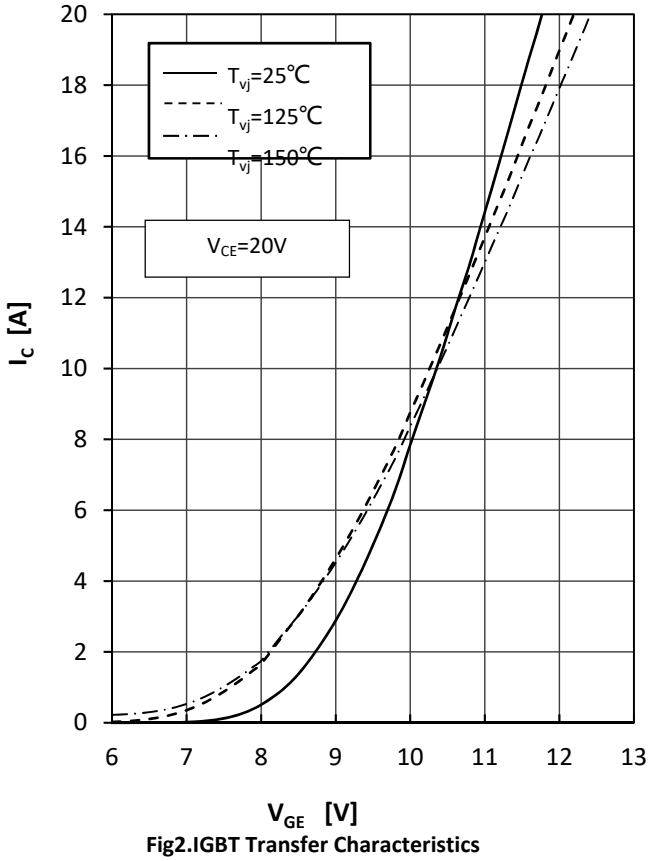


Fig2.IGBT Transfer Characteristics

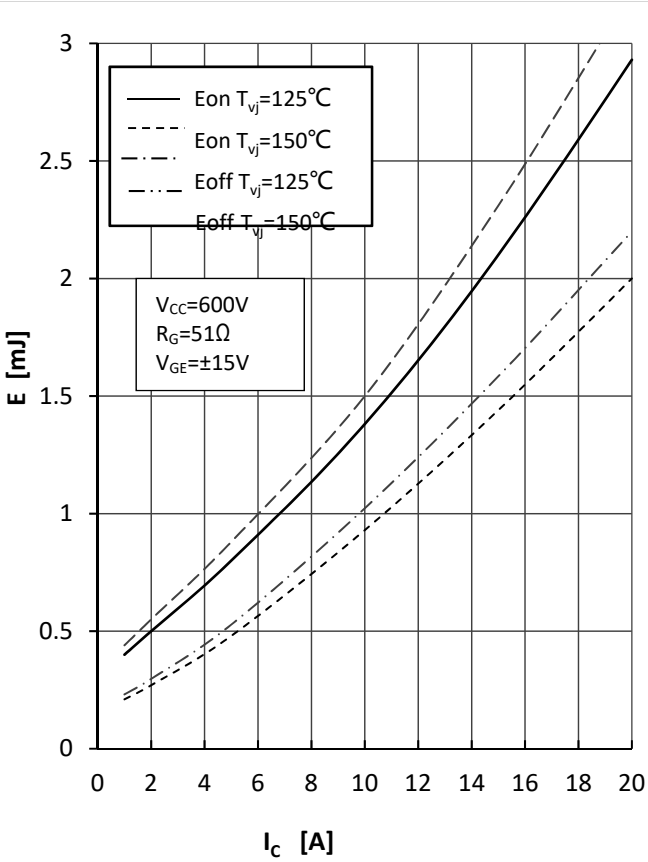


Fig3.IGBT Switching Loss vs.Ic

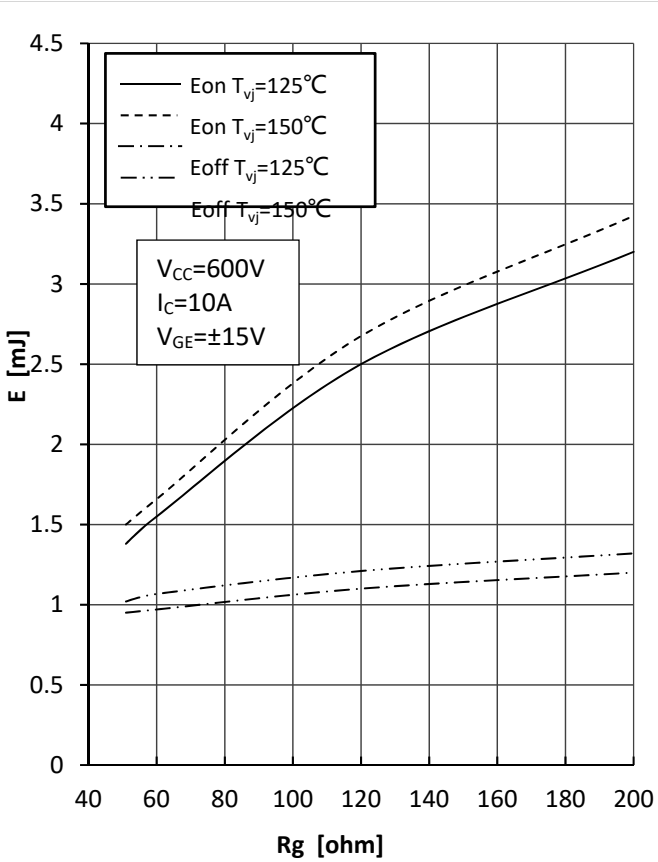


Fig4.IGBT Switching Loss vs.Rg

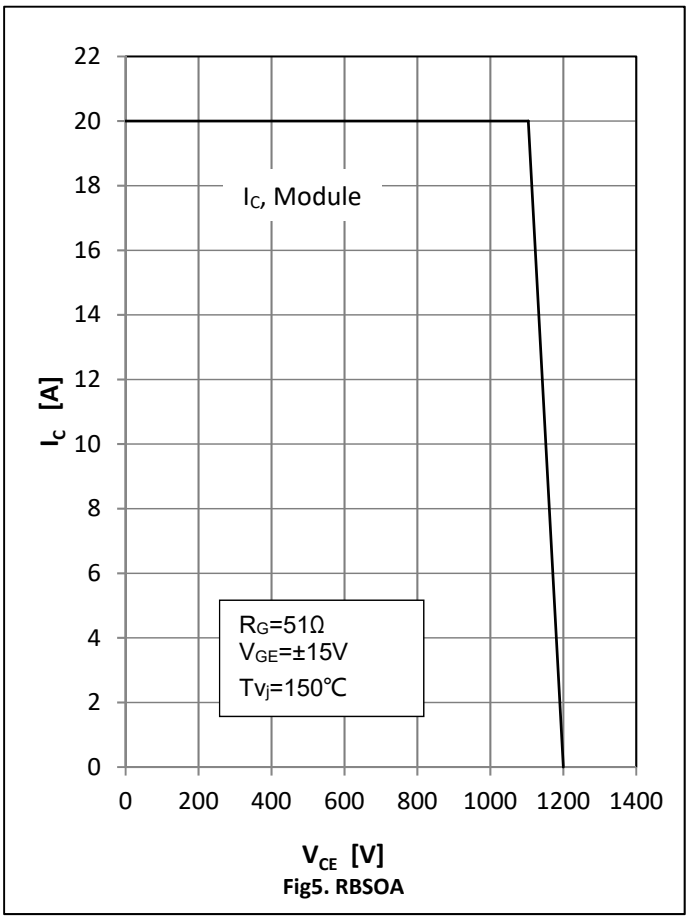


Fig5. RBSOA

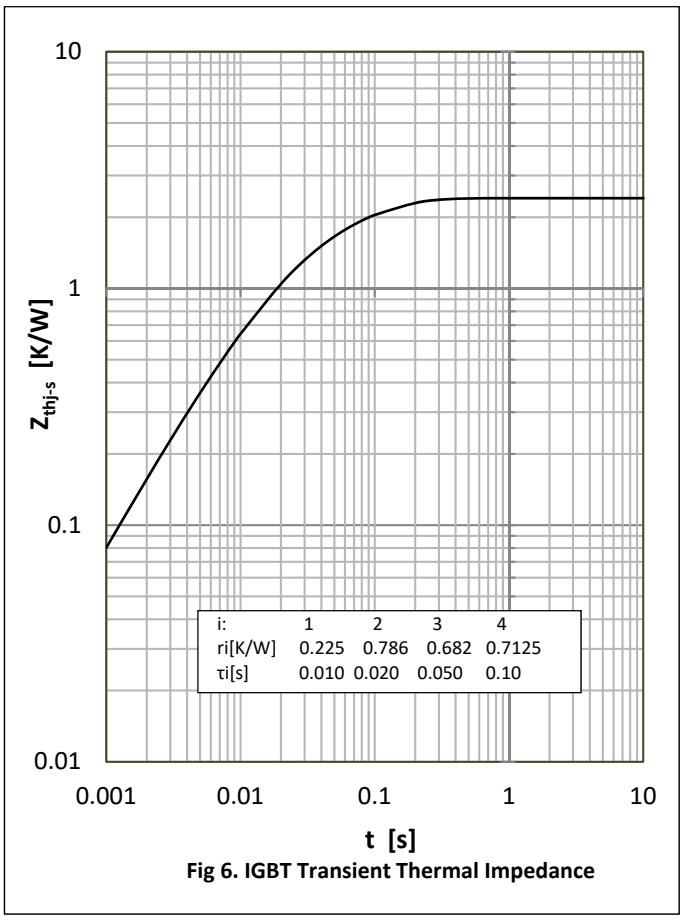


Fig 6. IGBT Transient Thermal Impedance

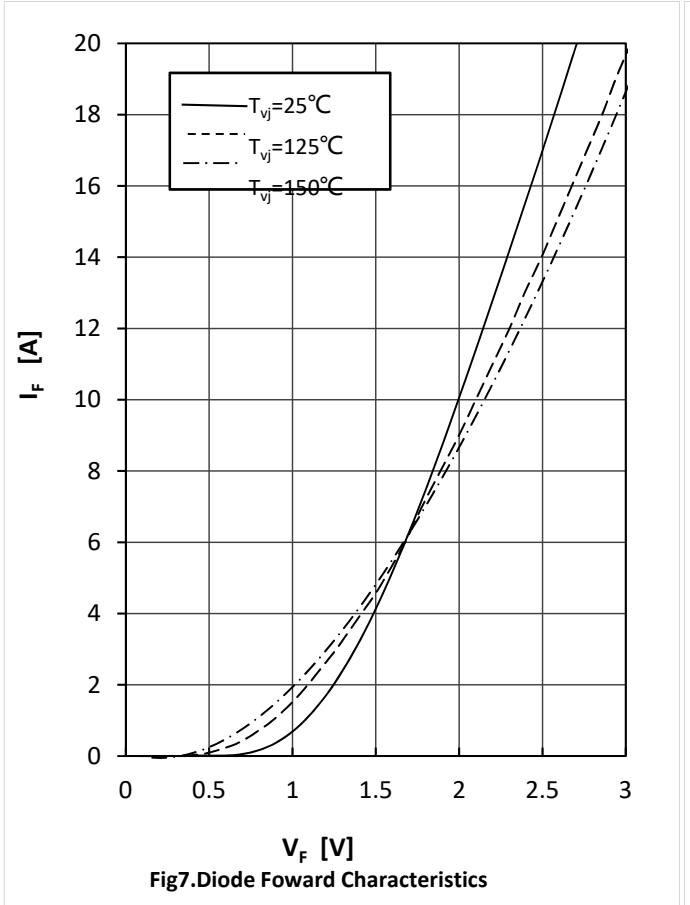


Fig7.Diode Foward Characteristics

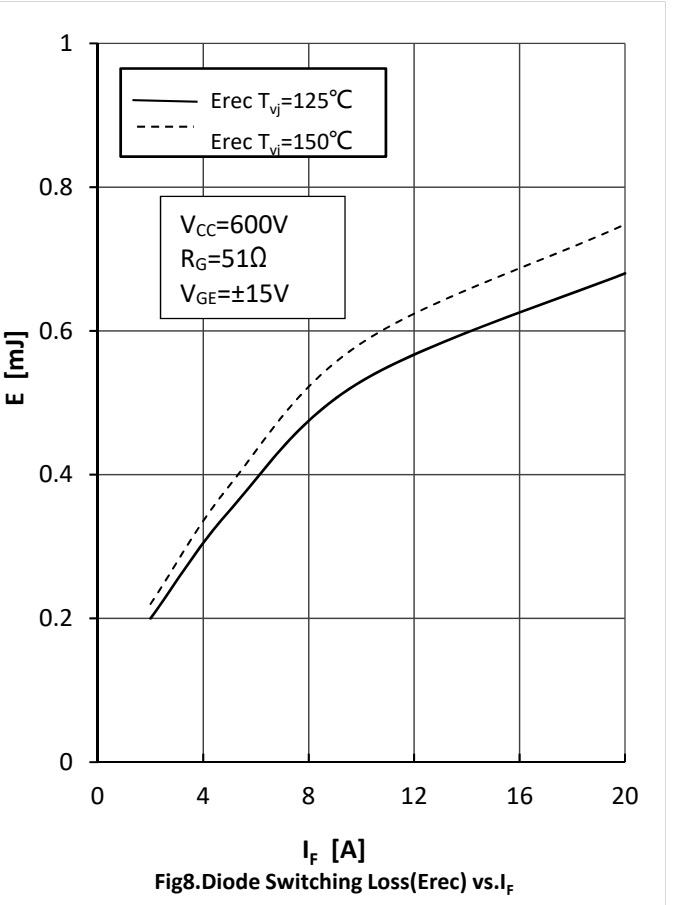


Fig8.Diode Switching Loss(Erec) vs.I_F

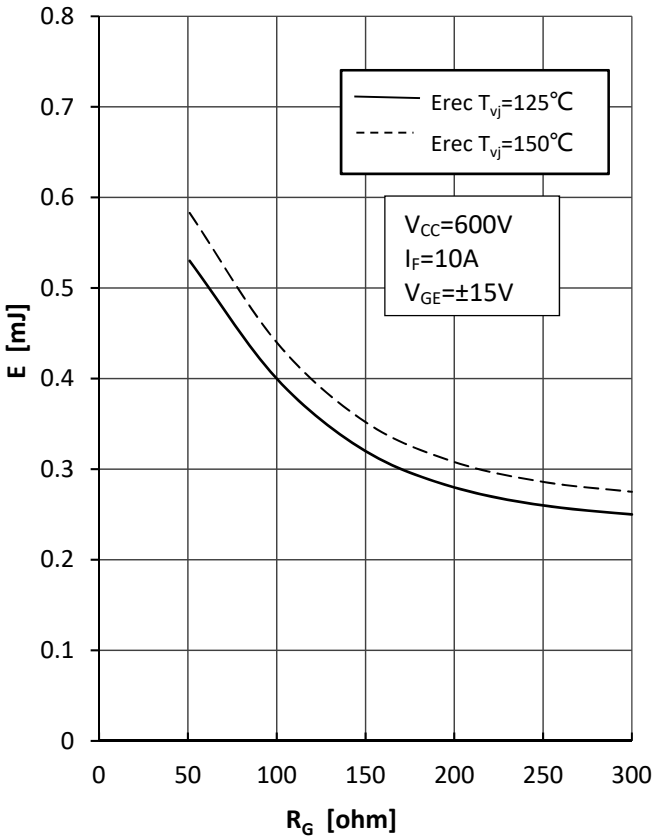


Fig9.Diode Switching Loss(Erec) vs.Rg

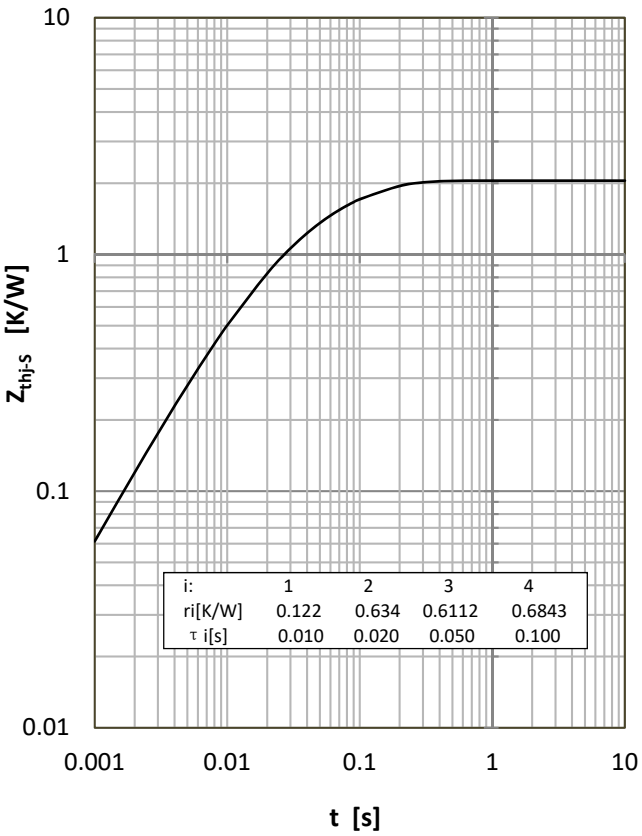


Fig10.Diode Transient Thermal Impedance

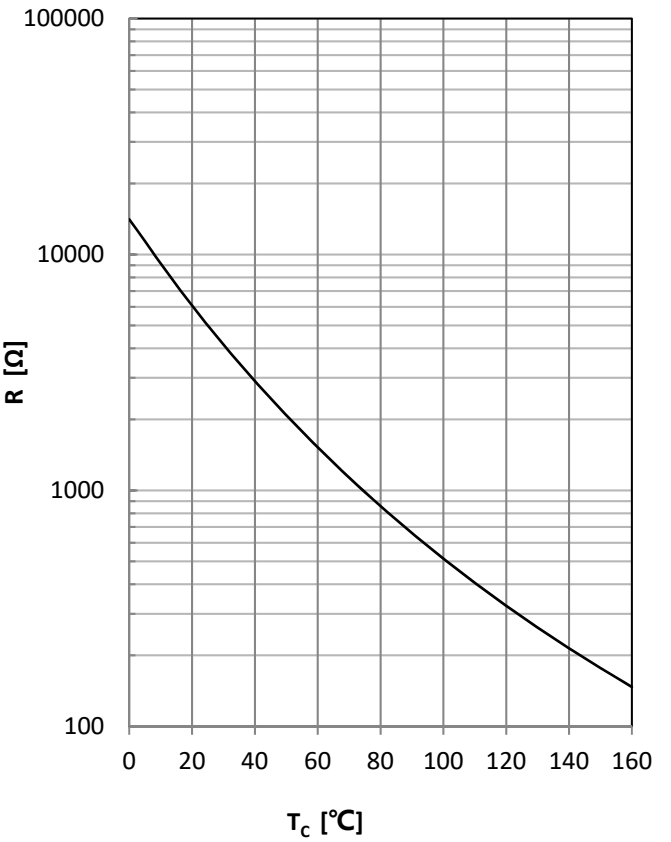


Fig 11. NTC Temperature Characteristic

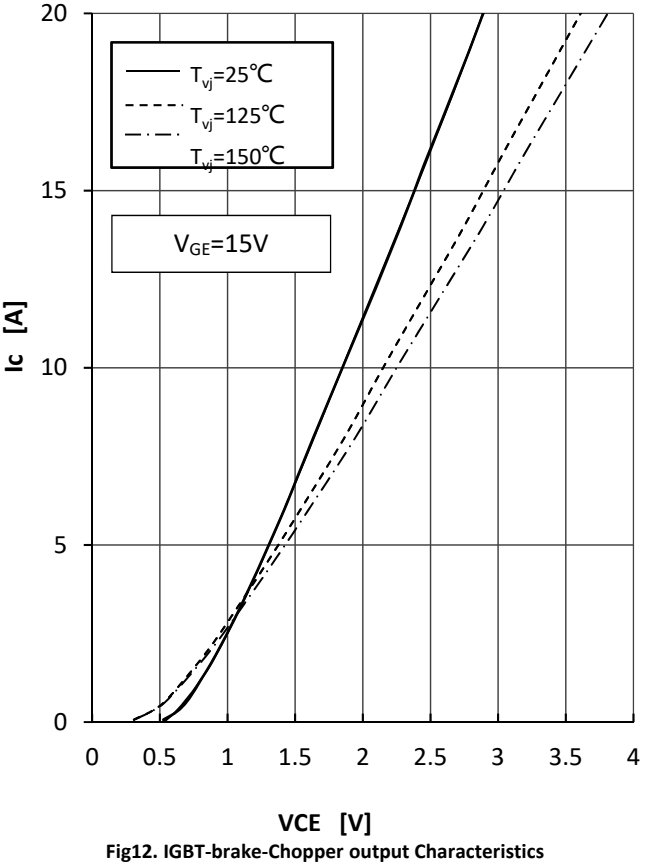


Fig12. IGBT-brake-Chopper output Characteristics

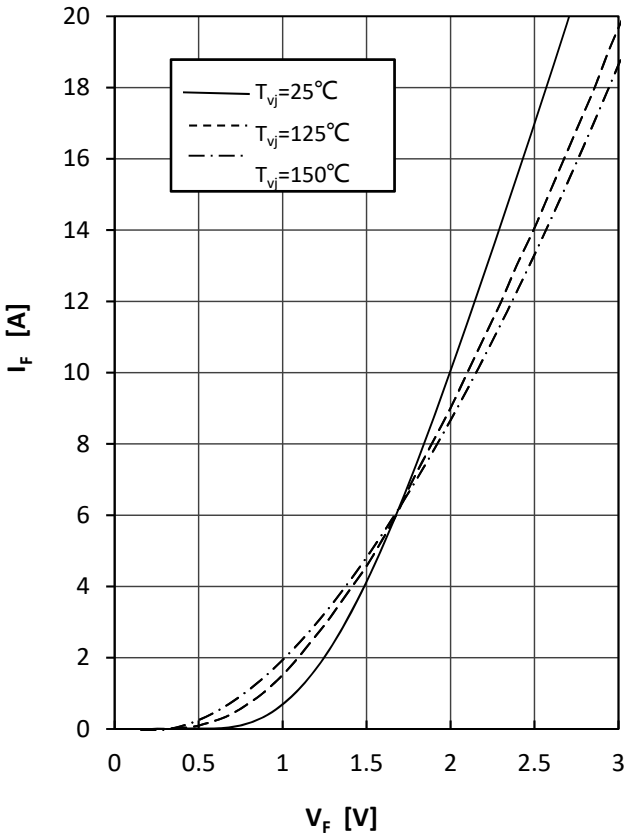
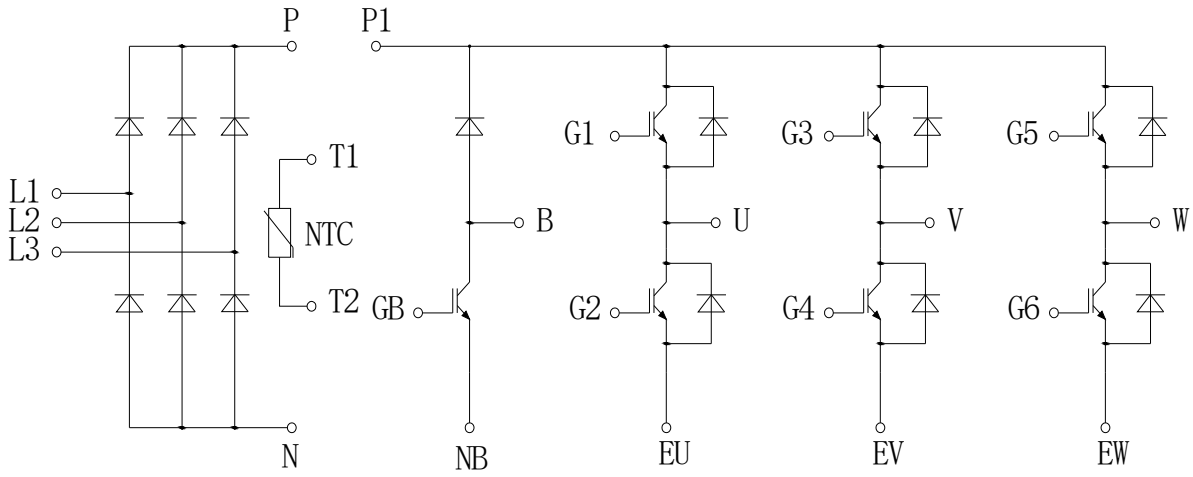
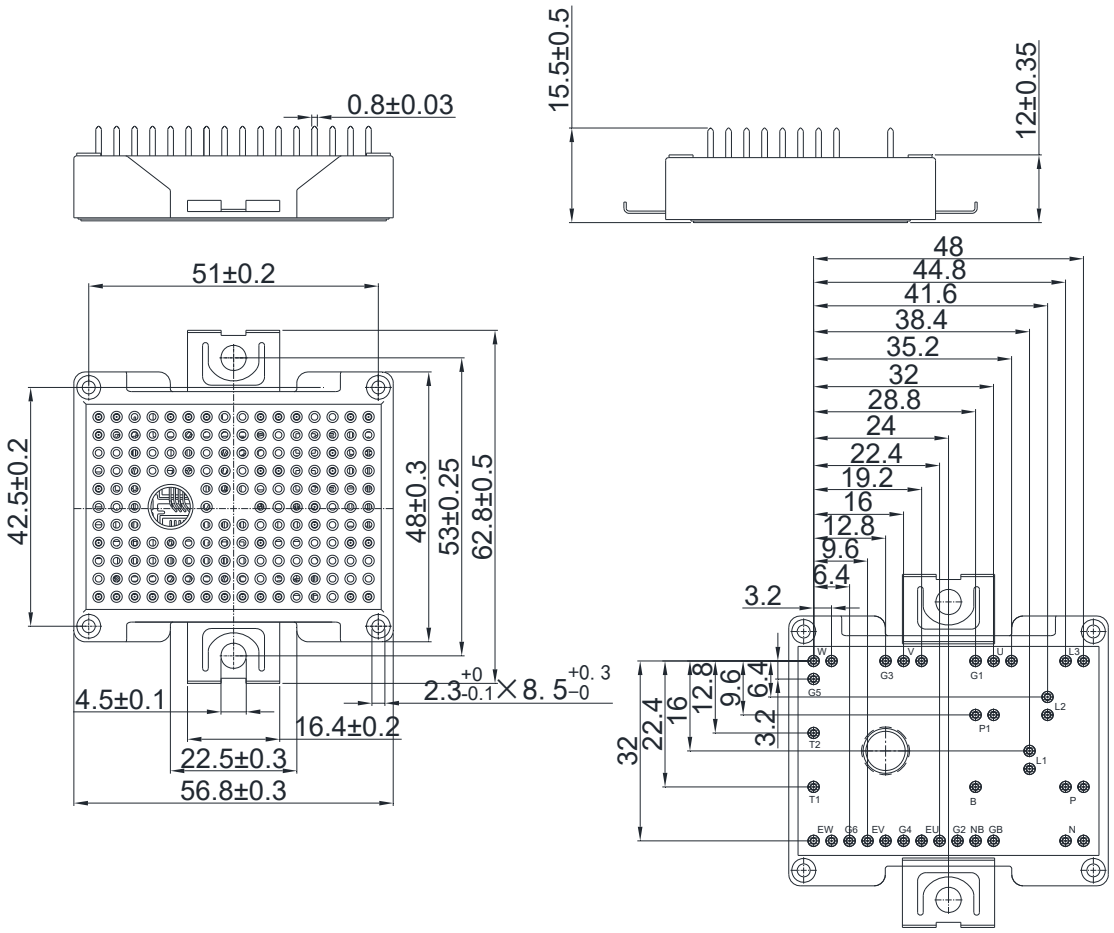


Fig13.Diode-brake-chopper Foward Characteristics

Circuit Diagram



- Package Dimensions



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