MG75P12E2A

RoHS COMPLIANT

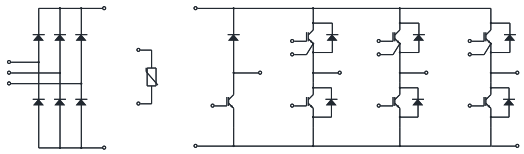
IGBT Modules

V_{CES} 1200V
I_C 75A

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)
- 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℃	75	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	150	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	470	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=3.3mA,T_{vj}=25℃	5.0	5.8	6.5	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=75A,V_{GE}=15V, T_{vj}=25℃		1.95	2.40	V
		I_C=75A,V_{GE}=15V, T_{vj}=125℃		2.20		
		I_C=75A,V_{GE}=15V, T_{vj}=150℃		2.30		
Gate Charge	Q_G			0.85		uC
Internal Gate Resistance	R_{gint}			10		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz,T_{vj}=25℃		4.20		nF
Reverse Transfer Capacitance	C_{res}			0.32		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=75A V_{CE}=600V V_{GE} =±15V R_G=2.2Ω T_{vj}=25℃		75		ns
Rise Time	t_r			40		ns
Turn-off Delay Time	$t_{d(off)}$			163		ns
Fall Time	t_f			235		ns
Energy Dissipation During Turn-on Time	E_{on}			4.71		mJ
Energy Dissipation During Turn-off Time	E_{off}			5.45		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=75A V_{CE}=600V V_{GE} =±15V R_G=2.2Ω T_{vj}=150℃		77		ns
Rise Time	t_r			47		ns
Turn-off Delay Time	$t_{d(off)}$			173		ns
Fall Time	t_f			309		ns
Energy Dissipation During Turn-on Time	E_{on}			6.73		mJ
Energy Dissipation During Turn-off Time	E_{off}			6.24		mJ
SC Data	I_{SC}	t_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=900V,V_{CEM}≤1200V		300		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		75	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	150	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=125℃	810	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	690	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=75A,T_{vj}=25℃		1.95	2.60	V
		I_F=75A,T_{vj}=125℃		1.78		
		I_F=75A,T_{vj}=150℃		1.70		
Recovered Charge	Q_{rr}	I_F=75A V_R=600V -di$_F$/dt =1700A/us T_{vj}=25℃		2.1		uC
Peak Reverse Recovery Current	I_{rr}			53		A
Reverse Recovery Energy	E_{rec}			0.35		mJ
Recovered Charge	Q_{rr}	I_F=75A V_R=600V -di$_F$/dt =1700A/us T_{vj}=150℃		5.8		uC
Peak Reverse Recovery Current	I_{rr}			56		A
Reverse Recovery Energy	E_{rec}			1.67		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℃	40	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	80	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	227	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1.2mA,T_{vj}=25℃	5.2	5.9	6.5	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=40A,V_{GE}=15V, T_{vj}=25℃		2.05		V
		I_C=40A,V_{GE}=15V, T_{vj}=125℃		2.20		
		I_C=40A,V_{GE}=15V, T_{vj}=150℃		2.40		
Gate Charge	Q_G			0.35		uC
Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25℃		2.25		nF
Reverse Transfer Capacitance	C_{res}			0.10		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=40A V_{CE}=600V V_{GE}=±15V R_G=27Ω T_{vj}=25℃		31		ns
Rise Time	t_r			44		ns
Turn-off Delay Time	$t_{d(off)}$			151		ns
Fall Time	t_f			245		ns
Energy Dissipation During Turn-on Time	E_{on}			3.97		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.64		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=40A V_{CE}=600V V_{GE}=±15V R_G=27Ω T_{vj}=150℃		34		ns
Rise Time	t_r			50		ns
Turn-off Delay Time	$t_{d(off)}$			163		ns
Fall Time	t_f			319		ns
Energy Dissipation During Turn-on Time	E_{on}			5.01		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.95		mJ
SC Data	I_{SC}	t_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=900V,V_{CEM}≤1200V		200		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		35	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	70	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=125℃	240	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	220	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max	
Forward Voltage	V_F	I_F=35A,T_{vj}=25℃		1.95		V
		I_F=35A,T_{vj}=125℃		1.78		
		I_F=35A,T_{vj}=150℃		1.69		
Recovered Charge	Q_{rr}	I_F=35A V_R=600V -di$_F$/dt =1600A/us T_{vj}=25℃		2.35		uC
Peak Reverse Recovery Current	I_{rr}			21		A
Reverse Recovery Energy	E_{rec}			0.67		mJ
Recovered Charge	Q_{rr}	I_F=35A V_R=600V -di$_F$/dt =1600A/us T_{vj}=150℃		3.81		uC
Peak Reverse Recovery Current	I_{rr}			25		A
Reverse Recovery Energy	E_{rec}			1.13		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℃	80	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_C=100℃	120	A
Surge Forward Current	I_{FSM}	V_R=0V,t_p=10ms,T_{vj}=25℃	1200	A
		V_R=0V,t_p=10ms,T_{vj}=150℃	1000	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=25℃	7200	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	5000	A^2s

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=50A,T_{vj}=125℃		0.98		V
Reverse Current	I_R	T_{vj}=125℃,V_R=1600V			2.0	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	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\ K))]$		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}			60		nH
Comparative Tracking Index	CTI		200			
Module Lead Resistance, Terminals-chip	$R_{CC'+EE'}$	T_C=25℃, per switch		4.0		mΩ
	$R_{AA'+CC'}$			3.0		
Thermal Resistance Junction to Case	$R_{\theta JC}$	per IGBT-inverter		0.315		K/W
		per Diode-inverter		0.619		
		per IGBT-brake-chopper		0.660		
		per Diode-chopper		1.266		
		per Diode-rectifier		0.635		
Thermal Resistance Case to Sink	$R_{\theta CS}$	per IGBT-inverter		0.121		K/W
		per Diode-inverter		0.221		
		per IGBT-brake-chopper		0.180		
		per Diode-chopper		0.452		
		per Diode-rectifier		0.227		
		per Module		0.009		
Module-to-Sink Torque	Ms		3.0		6.0	N·m
Weight of Module	G			300		g

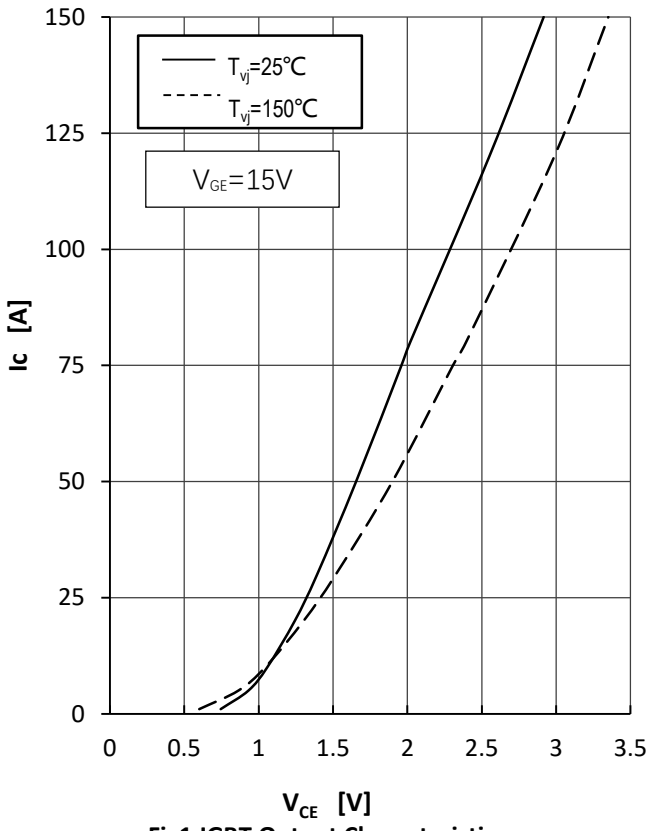


Fig1.IGBT Output Characteristics

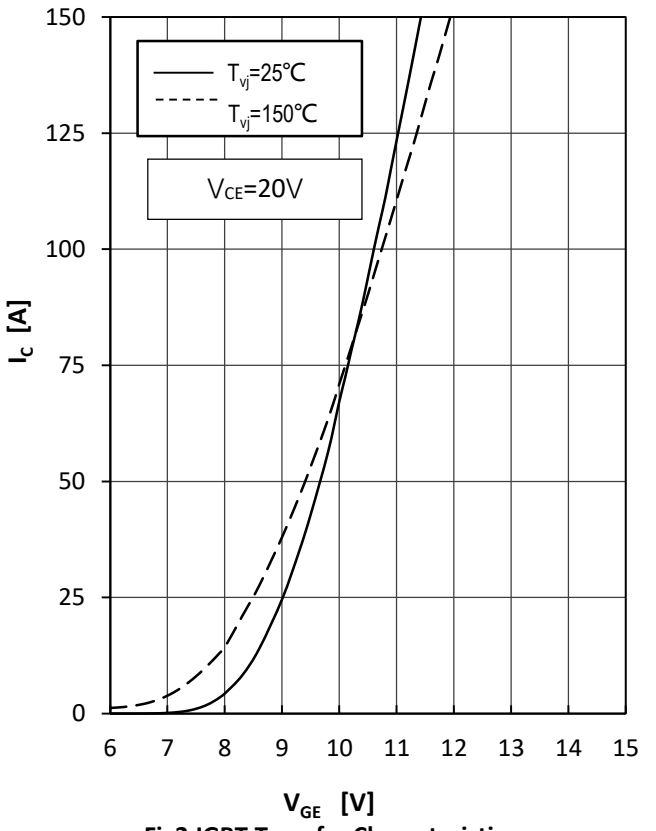


Fig2.IGBT Transfer Characteristics

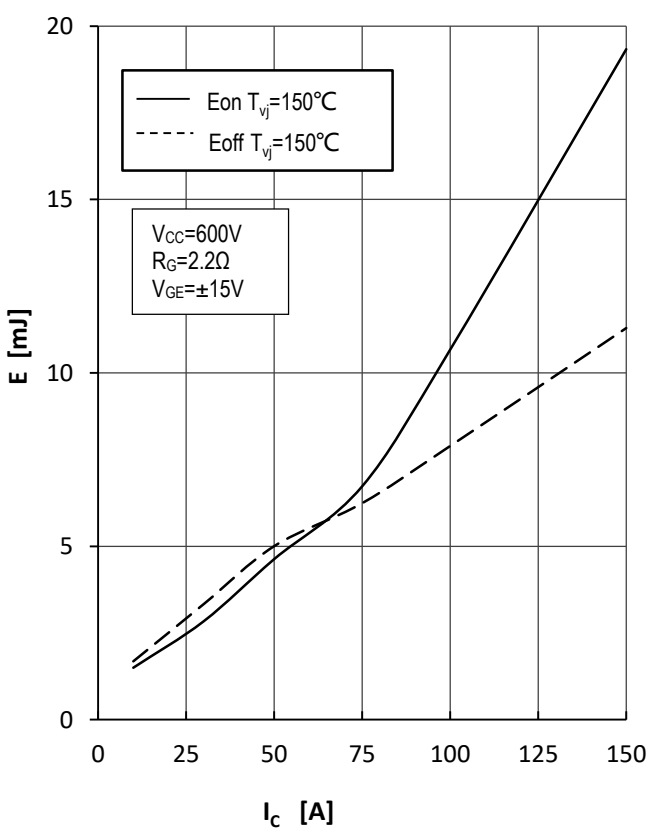


Fig3.IGBT Switching Loss vs.Ic

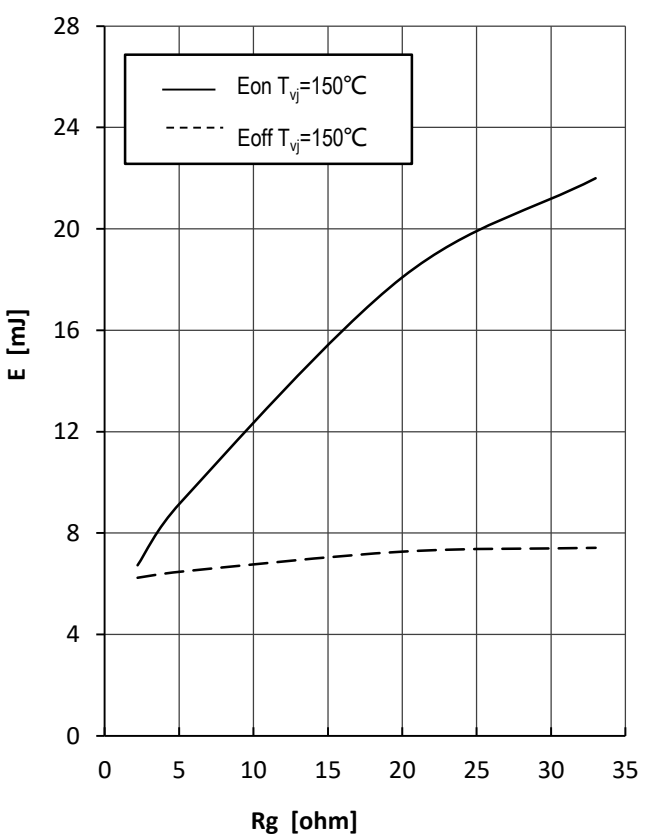


Fig4.IGBT Switching Loss vs.Rg

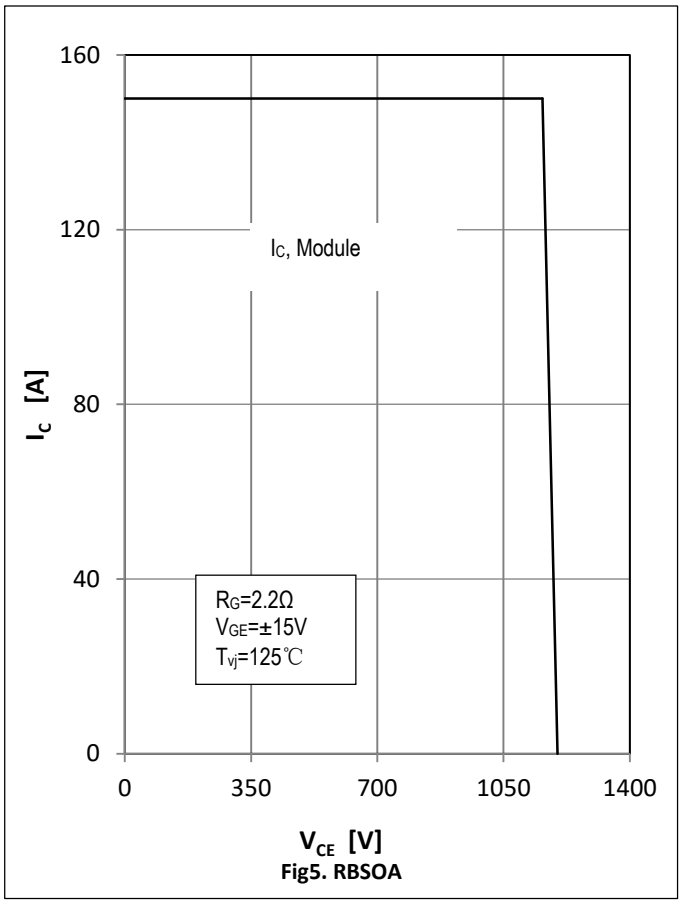


Fig5. RBSOA

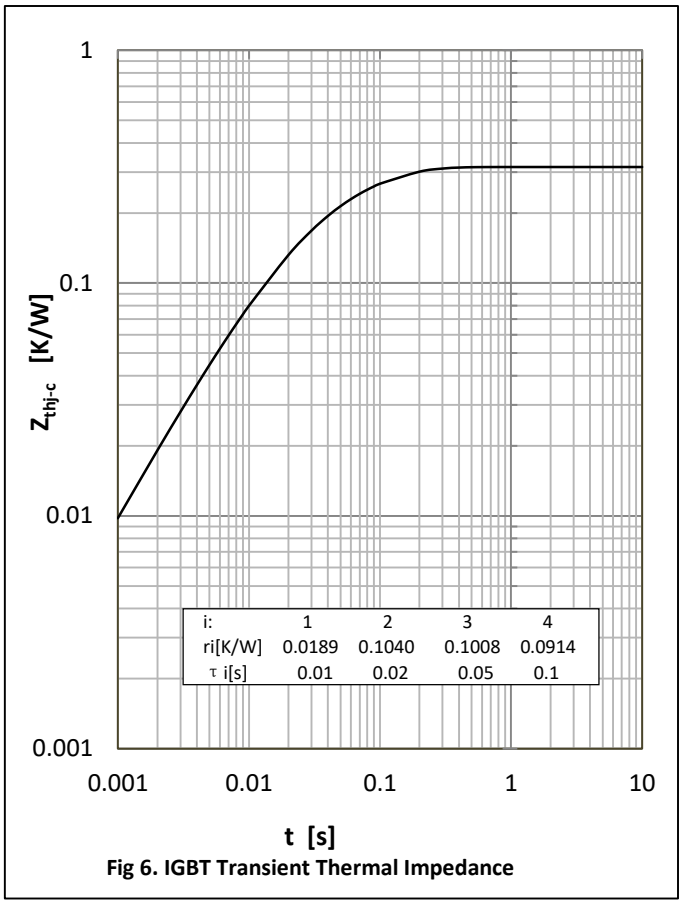


Fig 6. IGBT Transient Thermal Impedance

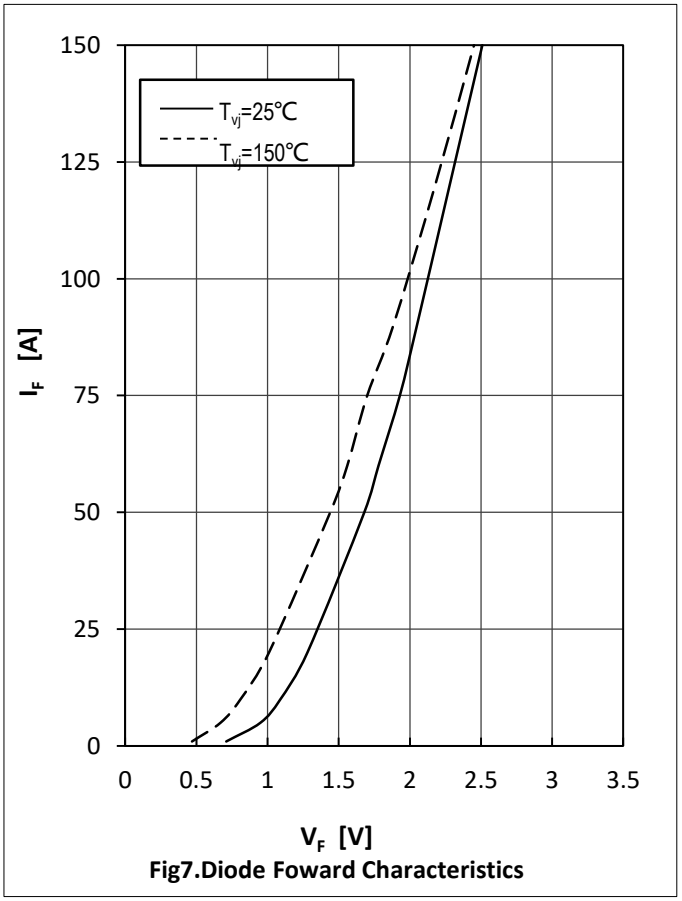


Fig7.Diode Foward Characteristics

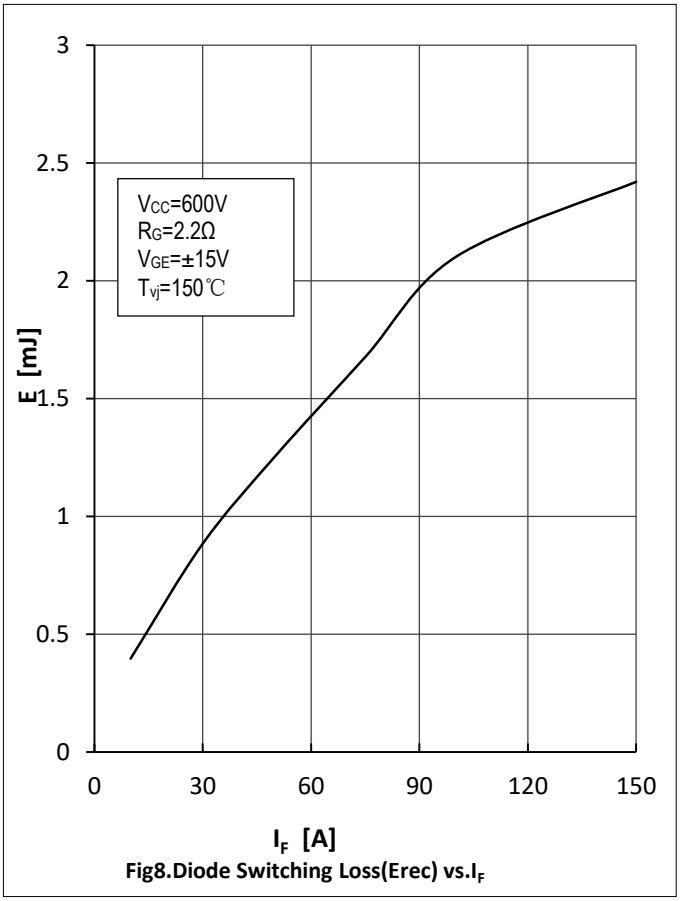


Fig8.Diode Switching Loss(Erec) vs.I_F

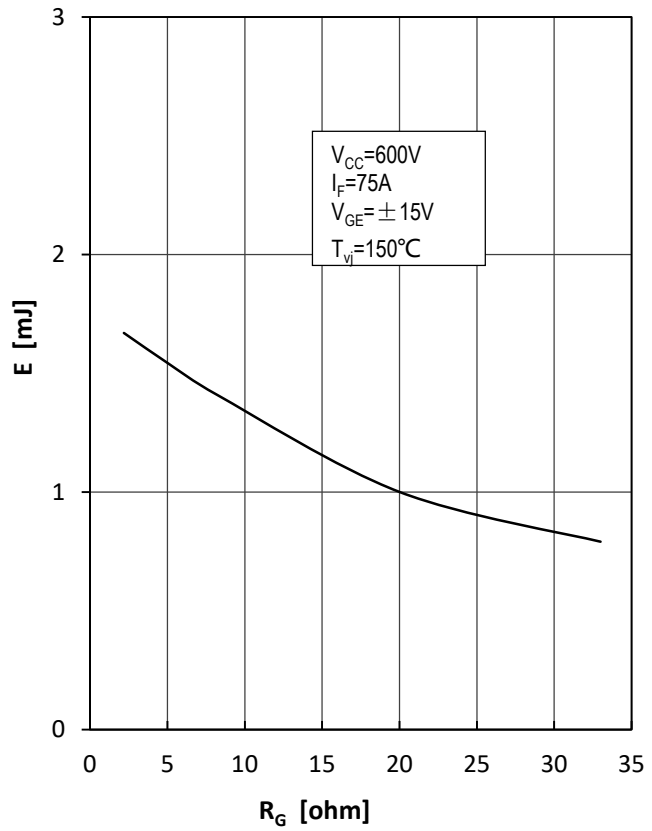


Fig9.Diode Switching Loss(Erec) vs.Rg

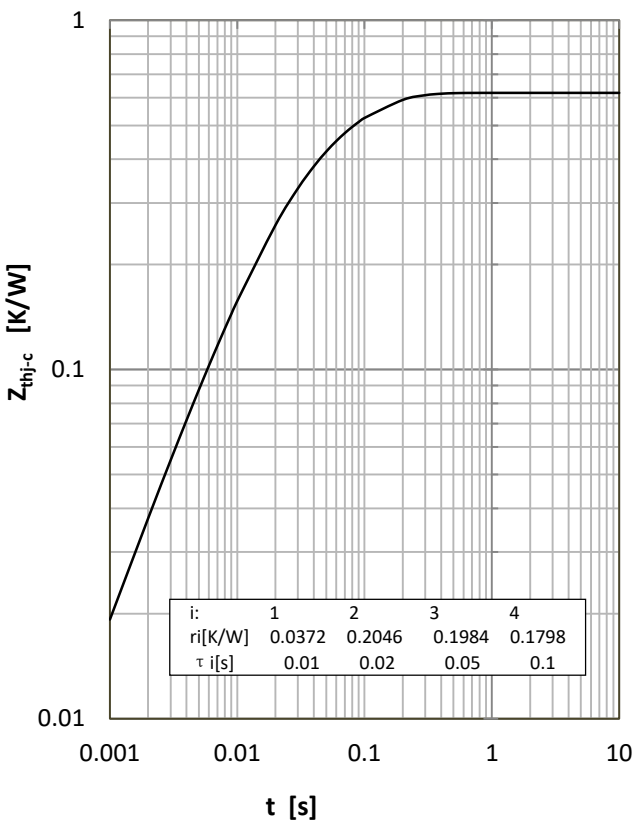


Fig10.Diode Transient Thermal Impedance

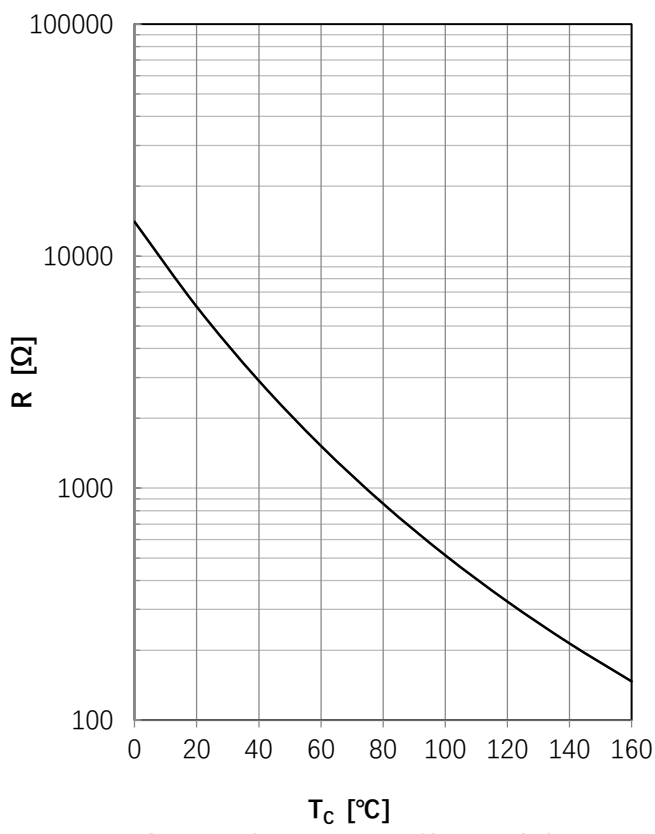


Fig 11. NTC Temperature Characteristic

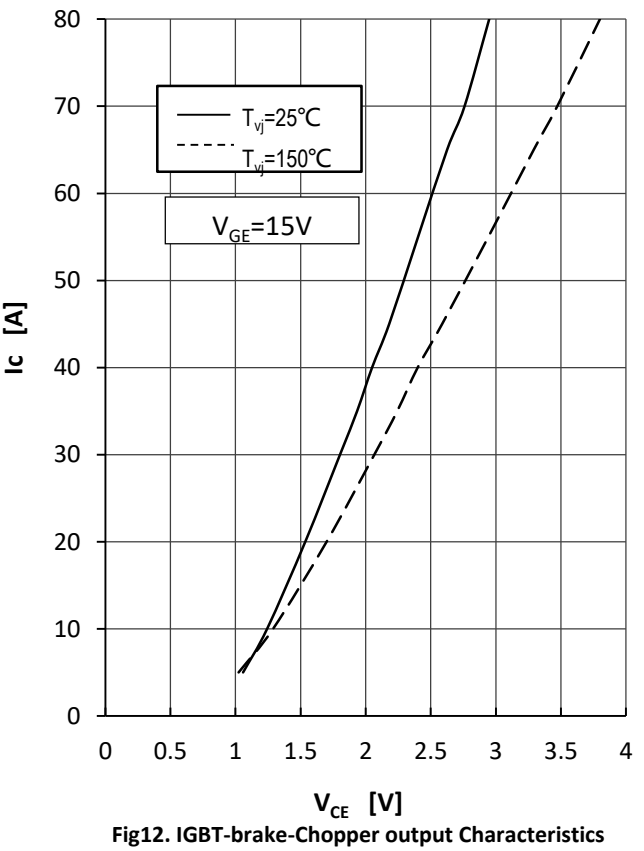


Fig12. IGBT-brake-Chopper output Characteristics

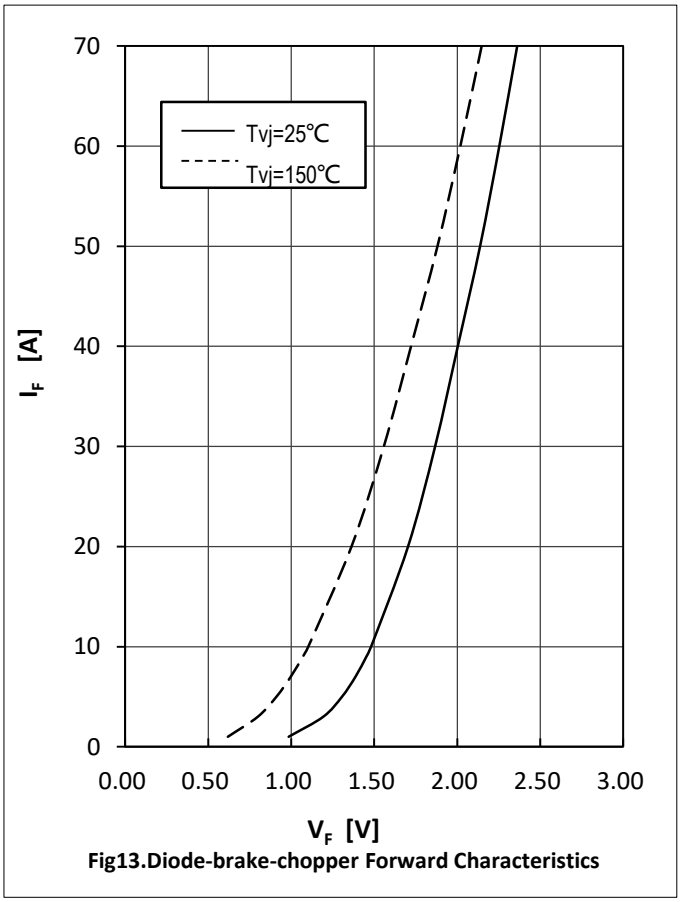
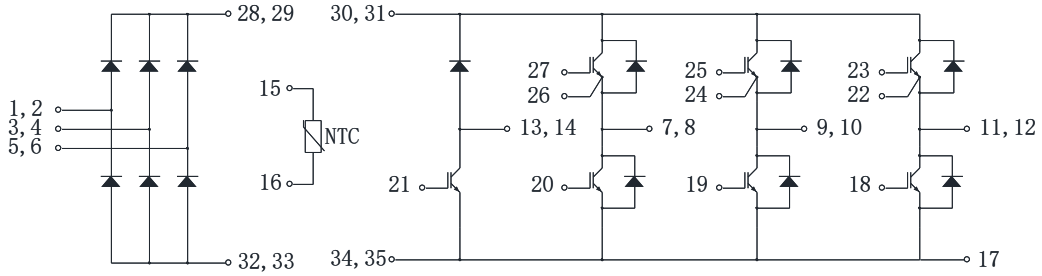
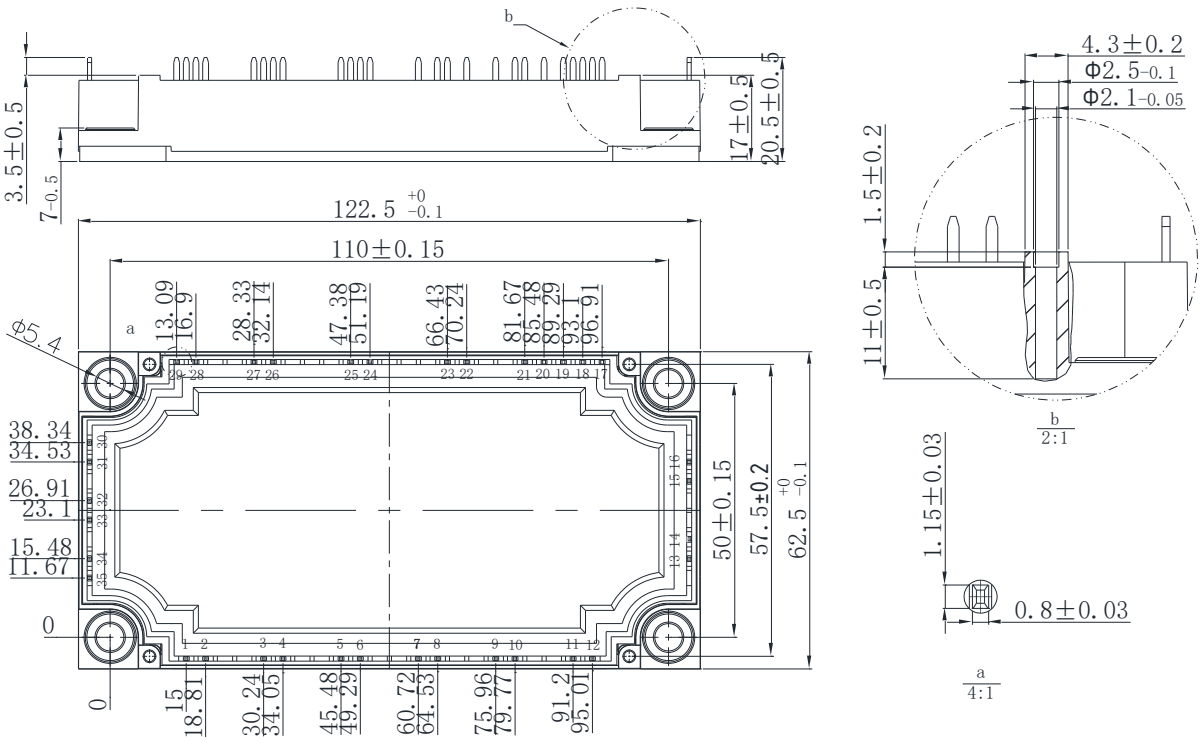


Fig13.Diode-brake-chopper Forward Characteristics

Circuit Diagram



Package Outline Information



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