STARSEA

MG75P12MLE2A

RoHS COMPLIAN



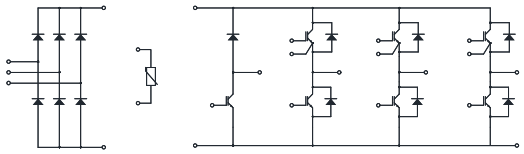
IGBT Modules

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(8us)
- 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℃	341	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=2.8mA,T_{vj}=25℃	5.0	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=75A,V_{GE}=15V, T_{vj}=25℃		1.60		V
		I_C=75A,V_{GE}=15V, T_{vj}=125℃		1.85		
		I_C=75A,V_{GE}=15V, T_{vj}=150℃		1.90		
Gate Charge	Q_G			0.79		uC
Internal Gate Resistance	R_{gint}			2.73		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz,T_{vj}=25℃		9.9		nF
Reverse Transfer Capacitance	C_{res}			0.1		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=5.6Ω T_{vj}=25℃		95		ns
Rise Time	t_r			31		ns
Turn-off Delay Time	$t_{d(off)}$			240		ns
Fall Time	t_f			255		ns
Energy Dissipation During Turn-on Time	E_{on}			3.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			5.8		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=75A V_{CE}=600 V V_{GE} =±15V R_G=5.6Ω T_{vj}=150℃		102		ns
Rise Time	t_r			36		ns
Turn-off Delay Time	$t_{d(off)}$			289		ns
Fall Time	t_f			423		ns
Energy Dissipation During Turn-on Time	E_{on}			5.7		mJ
Energy Dissipation During Turn-off Time	E_{off}			8.4		mJ
SC Data	I_{SC}	t_p≤8us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=600V,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

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=75A,T_{vj}=25℃		2.25	2.80	V
		I_F=75A,T_{vj}=125℃		1.90		
		I_F=75A,T_{vj}=150℃		1.80		
Recovered Charge	Q_{rr}	I_F=75A V_R=600V -di_F/dt =1800A/us T_{vj}=25℃		2.99		uC
Peak Reverse Recovery Current	I_{rr}			43		A
Reverse Recovery Energy	E_{rec}			0.97		mJ
Recovered Charge	Q_{rr}	I_F=75A V_R=600V -di_F/dt =1800A/us T_{vj}=150℃		8.07		uC
Peak Reverse Recovery Current	I_{rr}			65		A
Reverse Recovery Energy	E_{rec}			2.8		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℃	50	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	100	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	250	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1.7mA,T_{vj}=25℃	5.0	5.7	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=50A,V_{GE}=15V, T_{vj}=25℃		1.75		V
		I_C=50A,V_{GE}=15V, T_{vj}=125℃		1.90		
		I_C=50A,V_{GE}=15V, T_{vj}=150℃		1.95		
Gate Charge	Q_G			0.47		uC
Internal Gate Resistance	R_{gint}			2.2		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz, T_{vj}=25℃		6.1		nF
Reverse Transfer Capacitance	C_{res}			0.08		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=50A V_{CE}= 600V V_{GE}=±15V R_G=5.8Ω T_{vj}=25℃		38		ns
Rise Time	t_r			61		ns
Turn-off Delay Time	$t_{d(off)}$			132		ns
Fall Time	t_f			269		ns
Energy Dissipation During Turn-on Time	E_{on}			3.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			3.3		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.8Ω T_{vj}=150℃		37		ns
Rise Time	t_r			58		ns
Turn-off Delay Time	$t_{d(off)}$			166		ns
Fall Time	t_f			435		ns
Energy Dissipation During Turn-on Time	E_{on}			5.0		mJ
Energy Dissipation During Turn-off Time	E_{off}			5.1		mJ
SC Data	I_{SC}	t_p≤8us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=600V,V_{CEM}≤1200V		220		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		25	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	50	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max	
Forward Voltage	V_F	I_F=25A,T_{vj}=25℃		1.85	2.80	V
		I_F=25A,T_{vj}=125℃		1.65		
		I_F=25A,T_{vj}=150℃		1.60		
Recovered Charge	Q_{rr}	I_F=25A V_R=600V -di$_F$/dt =1600A/us T_{vj}=25℃		0.65		uC
Peak Reverse Recovery Current	I_{rr}			20		A
Reverse Recovery Energy	E_{rec}			0.71		mJ
Recovered Charge	Q_{rr}	I_F=25A V_R=600V -di$_F$/dt =1600A/us T_{vj}=150℃		2.98		uC
Peak Reverse Recovery Current	I_{rr}			21		A
Reverse Recovery Energy	E_{rec}			1.25		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℃	75	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_C=100℃	115	A
Surge Forward Current	I_{FSM}	V_R=0V,t_p=10ms,T_{vj}=25℃	780	A
		V_R=0V,t_p=10ms,T_{vj}=150℃	650	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=25℃	3000	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	2100	A^2s

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=75A,T_{vj}=150℃		1.1		V
Reverse Current	I_R	T_{vj}=150℃,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			0.44	K/W
		per Diode-inverter			0.72	
		per IGBT-brake-chopper			0.60	
		per Diode-brake-chopper			1.2	
		per Diode-rectifier			0.6	
Thermal Resistance Case to Sink	$R_{\theta CS}$	per Module		0.009		K/W
Module-to-Sink Torque	Ms		3.0		6.0	N·m
Weight of Module	G			300		g

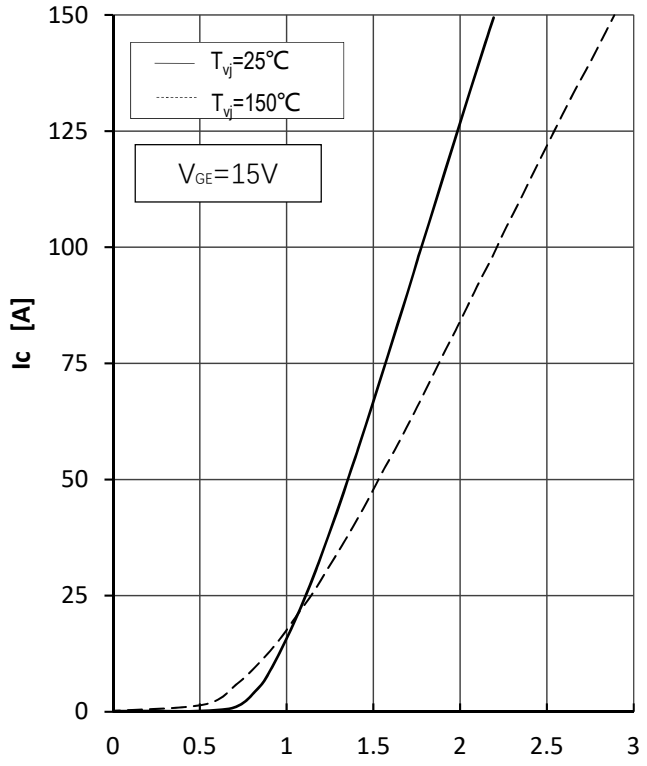


Fig1.IGBT Output Characteristics

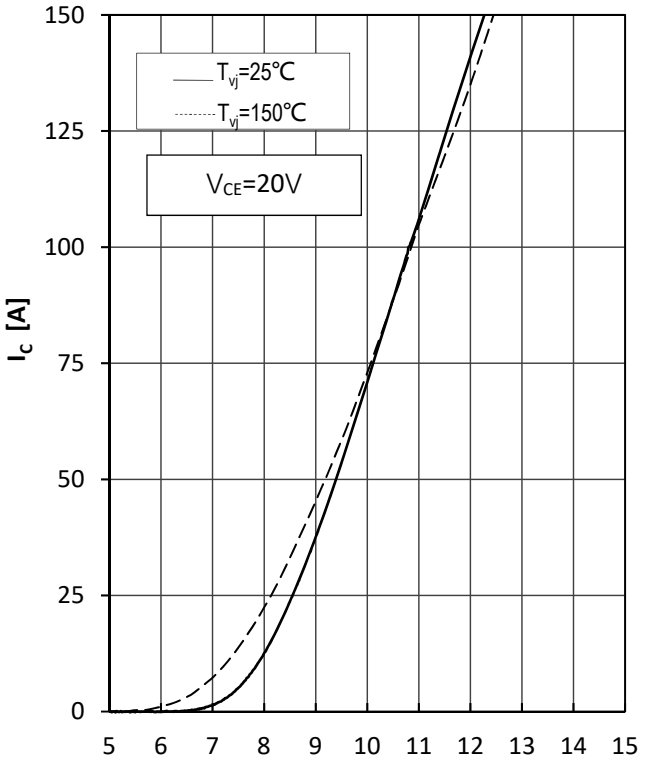


Fig2.IGBT Transfer Characteristics

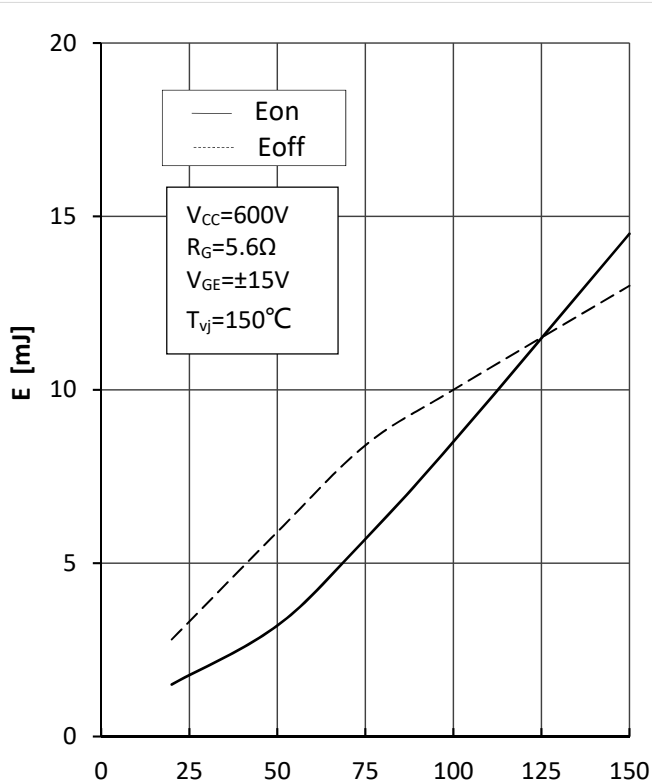


Fig3.IGBT Switching Loss vs.Ic

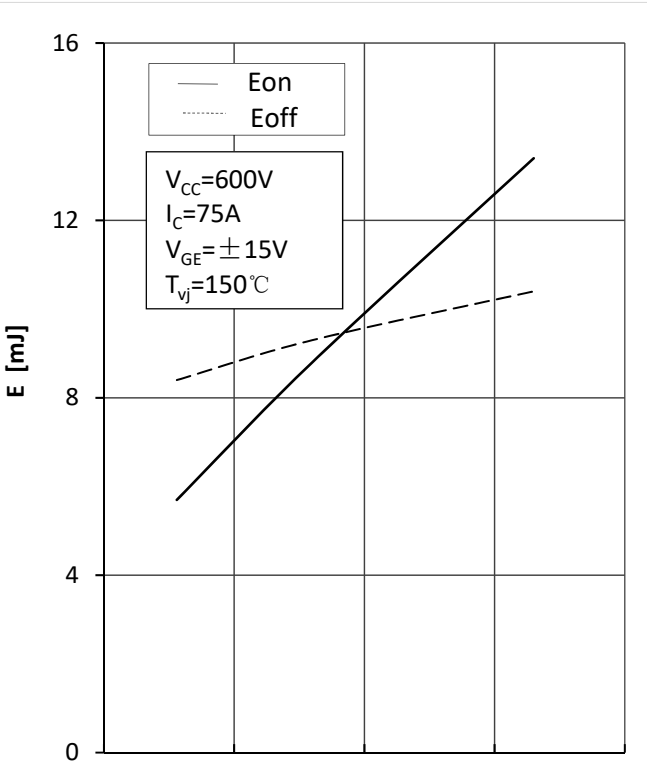


Fig4.IGBT Switching Loss vs.Rg

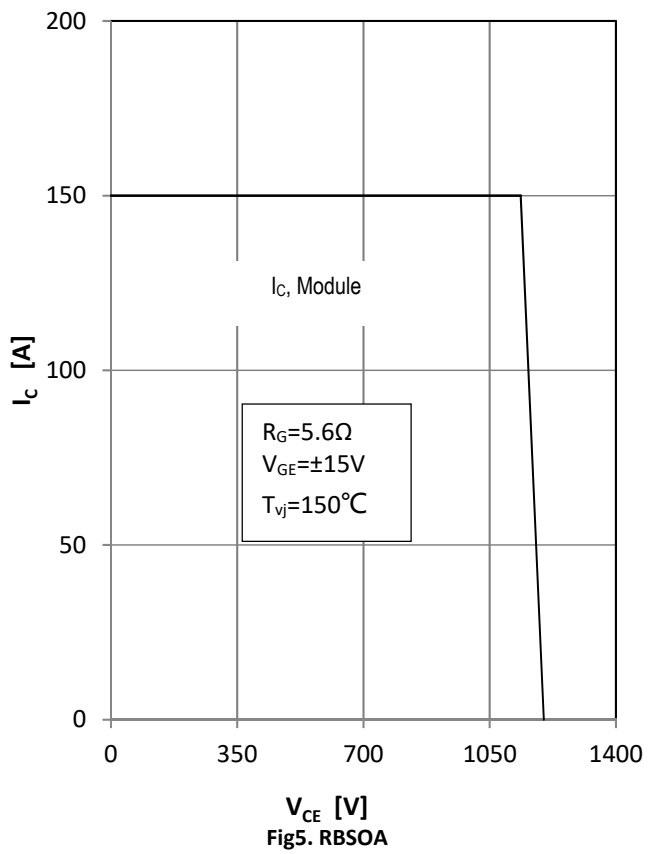


Fig5. RBSOA

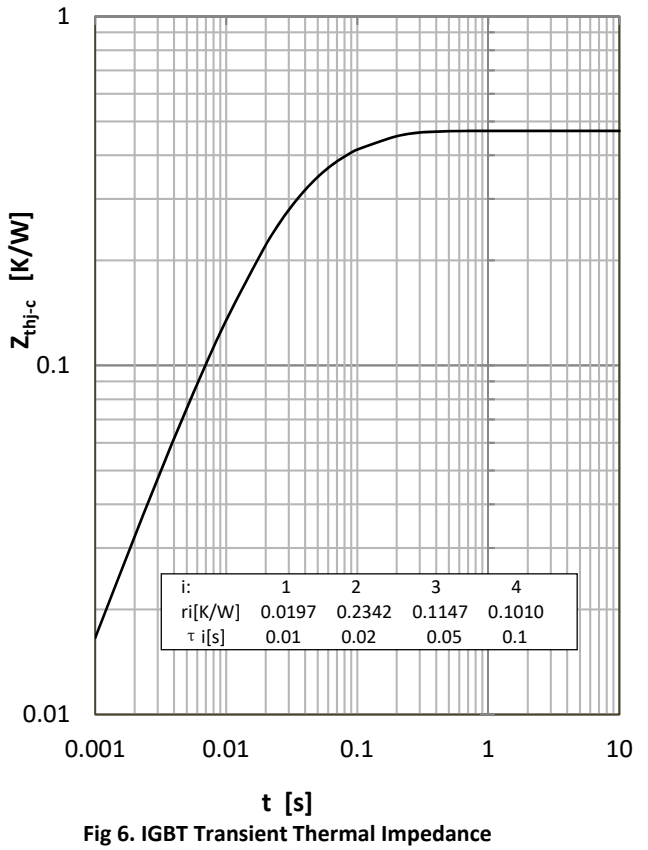


Fig 6. IGBT Transient Thermal Impedance

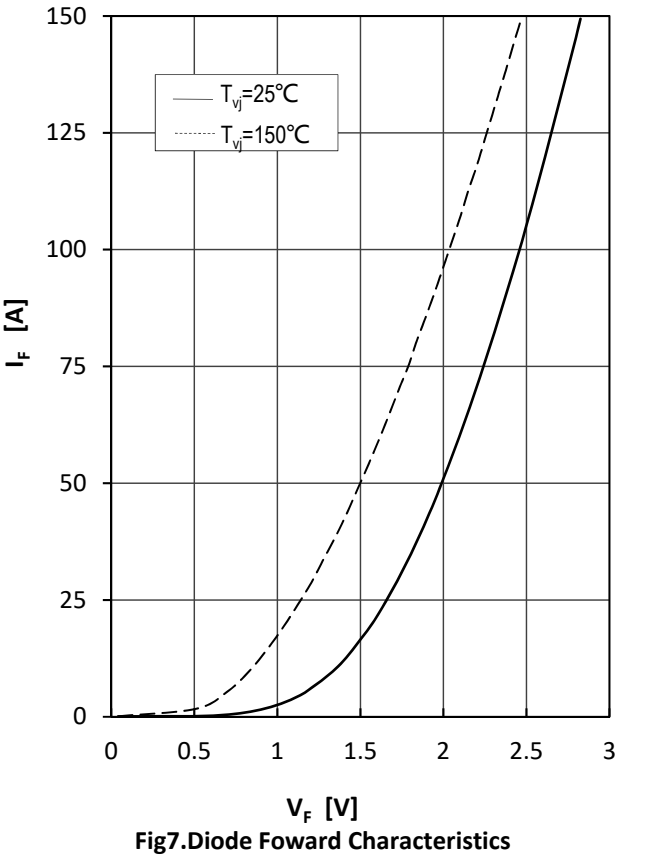


Fig7.Diode Foward Characteristics

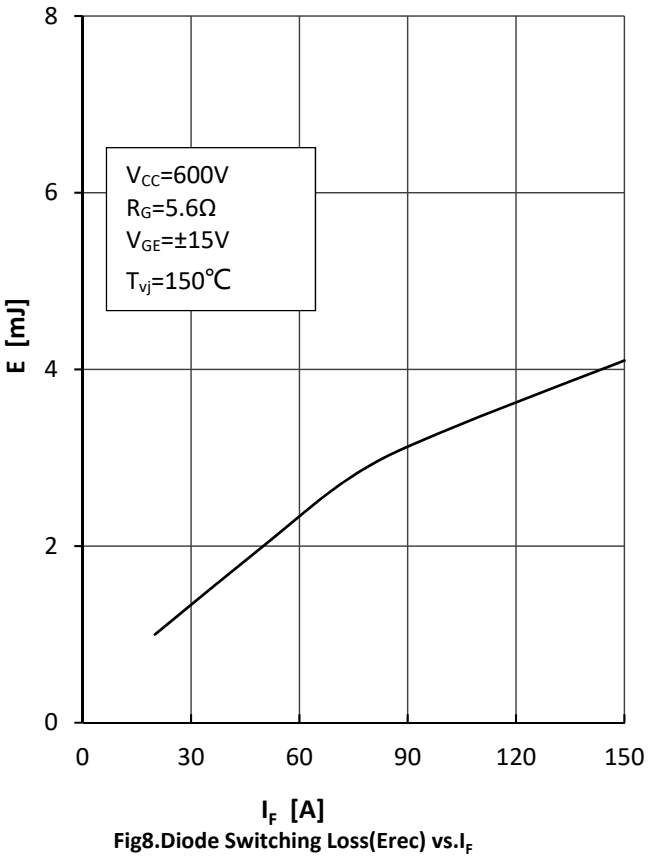


Fig8.Diode Switching Loss(Erec) vs.I_F

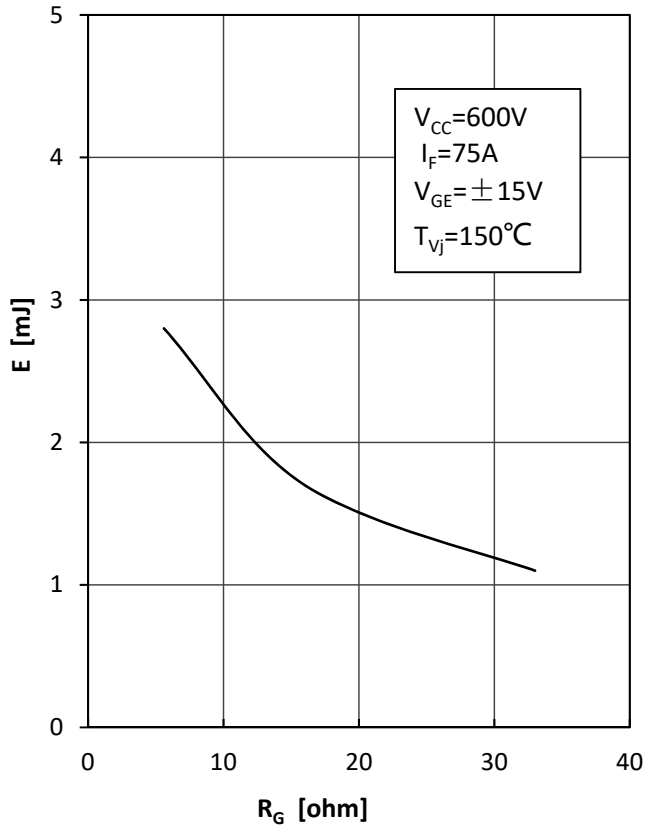


Fig9.Diode Switching Loss(Erec) vs.Rg

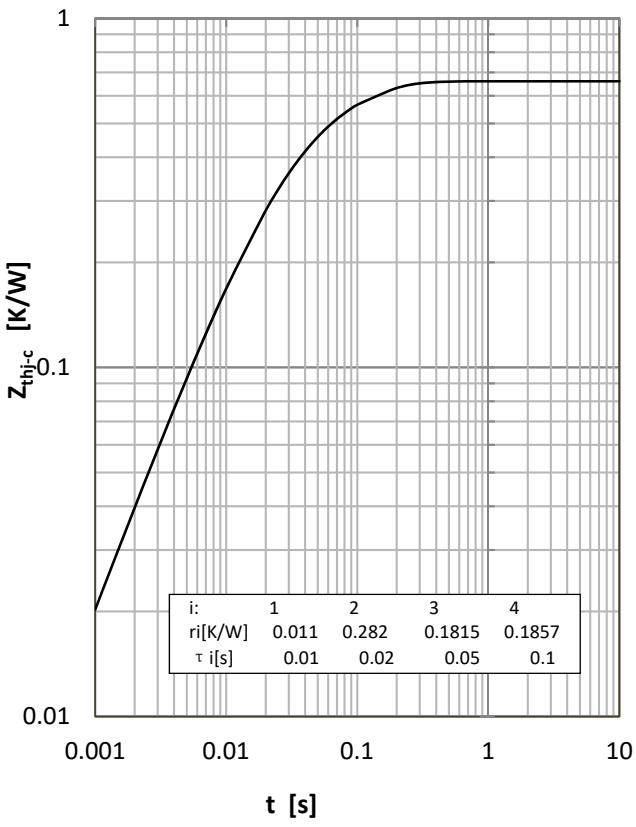


Fig10.Diode Transient Thermal Impedance

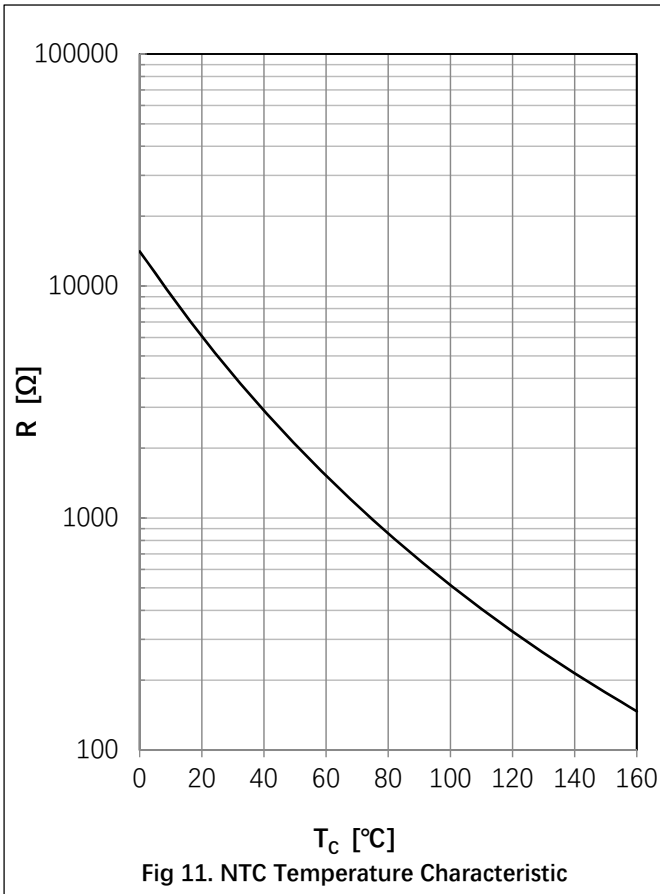


Fig 11. NTC Temperature Characteristic

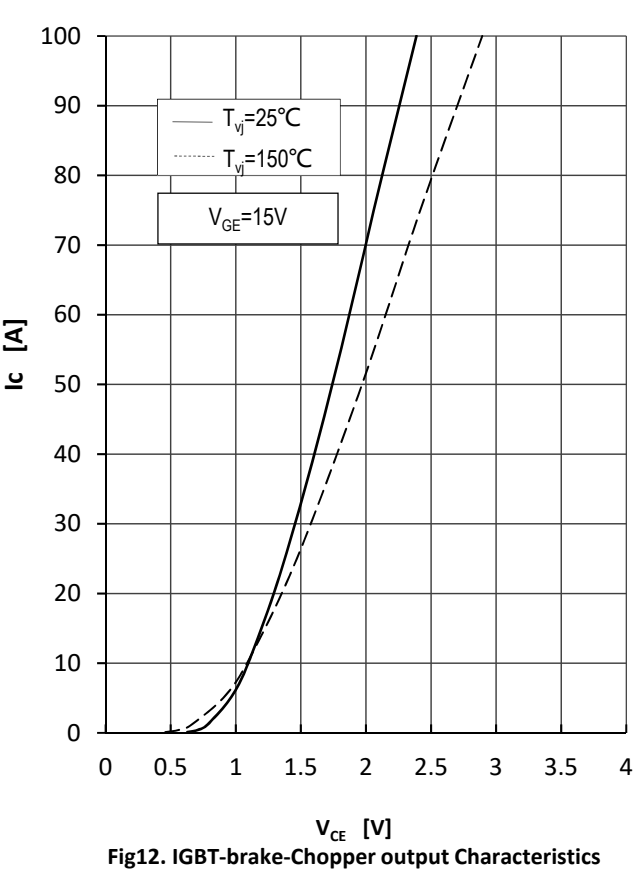


Fig12. IGBT-brake-Chopper output Characteristics

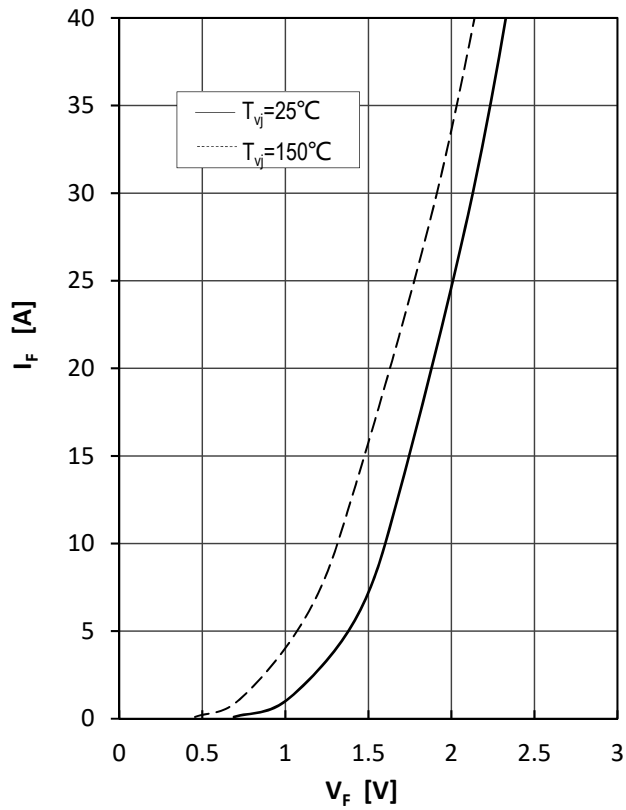
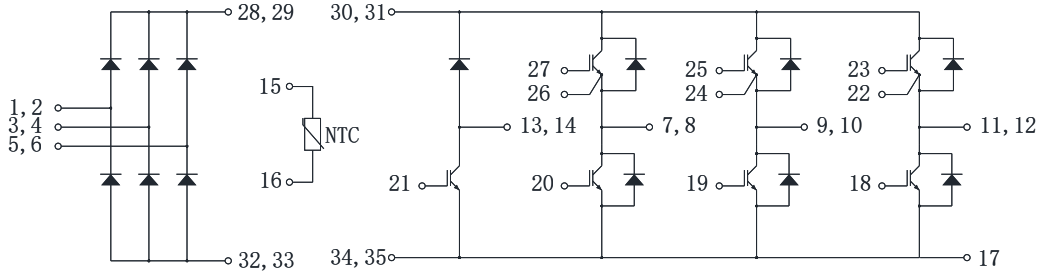
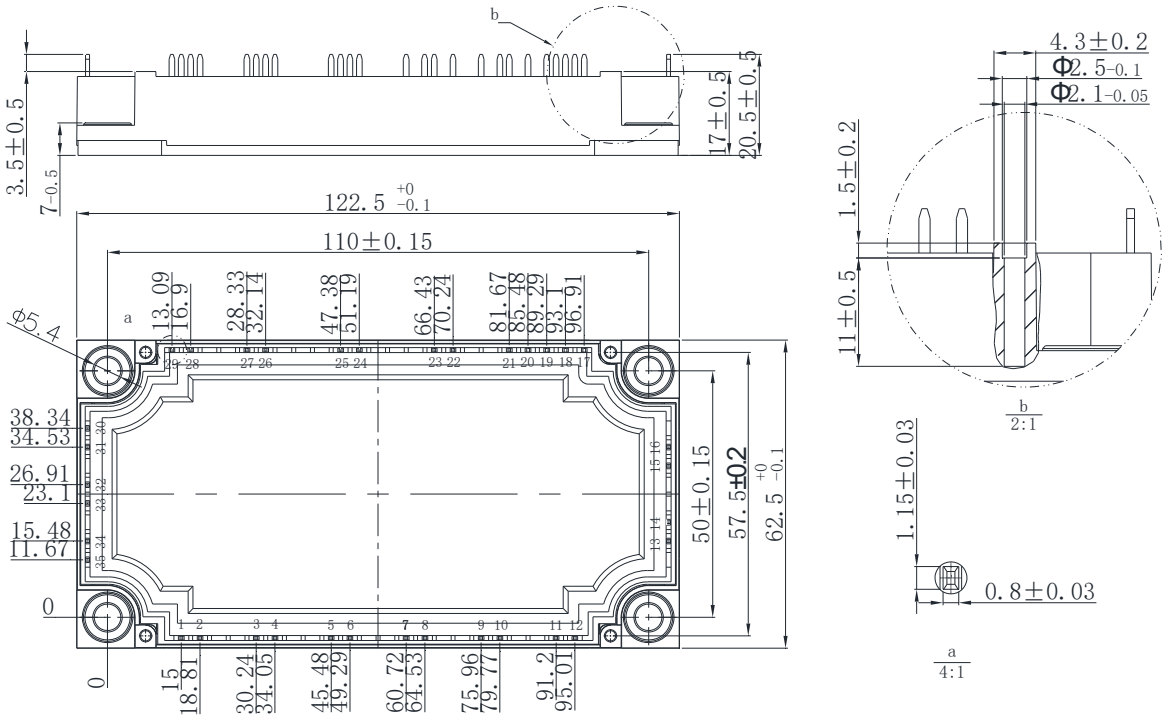


Fig13.Diode-brake-chopper Forward Characteristics

- Circuit Diagram



- **Package Outline Information**



Notice

All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in STARSEA's terms and conditions of sale for such products, STARSEA assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of STARSEA products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.