STARSEA

MG150P12MLE2

RoHS COMPLIANT



IGBT Modules

V_{CES}	1200V
I_C	150A

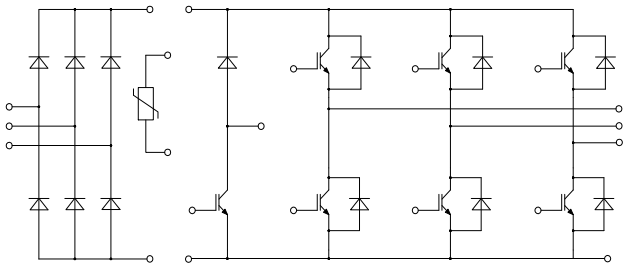
Applications

- Motor Drivers
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)

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℃

Circuit



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℃	150	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	300	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	652	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=5mA,T_{vj}=25℃	5.0	5.90	6.6	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=150A,V_{GE}=15V, T_{vj}=25℃		1.80		V
		I_C=150A,V_{GE}=15V, T_{vj}=150℃		2.20		
		I_C=150A,V_{GE}=15V, T_{vj}=175℃		2.30		
Gate Charge	Q_G			2.3		uC
Internal Gate Resistance	R_{gint}			2.10		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz, T_{vj}=25℃		24.39		nF
Reverse Transfer Capacitance	C_{res}			5.74		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=150A V_{CE}=600V V_{GE}=±15V R_G=3.6Ω T_{vj}=25℃		125.8		ns
Rise Time	t_r			52.8		ns
Turn-off Delay Time	$t_{d(off)}$			258.2		ns
Fall Time	t_f			169.9		ns
Energy Dissipation During Turn-on Time	E_{on}			13.68		mJ
Energy Dissipation During Turn-off Time	E_{off}			11.64		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=150A V_{CE}=600V V_{GE}=±15V R_G=3.6Ω T_{vj}=150℃		131.2		ns
Rise Time	t_r			58.6		ns
Turn-off Delay Time	$t_{d(off)}$			310.7		ns
Fall Time	t_f			268.8		ns
Energy Dissipation During Turn-on Time	E_{on}			22.35		mJ
Energy Dissipation During Turn-off Time	E_{off}			16.18		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=150A V_{CE}=600V V_{GE}=±15V R_G=3.6Ω T_{vj}=175℃		137.0		ns
Rise Time	t_r			60.5		ns
Turn-off Delay Time	$t_{d(off)}$			322.9		ns
Fall Time	t_f			296.3		ns
Energy Dissipation During Turn-on Time	E_{on}			25.00		mJ
Energy Dissipation During Turn-off Time	E_{off}			17.37		mJ
SC Data	I_{sc}	t_p≤10us,V_{GE}=15V,T_{vj}=175℃, V_{CC}=600V,V_{CEM}≤1200V		549		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		150	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	300	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=150A,T_{vj}=25℃		2.10	2.80	V
		I_F=150A,T_{vj}=150℃		1.75		
		I_F=150A,T_{vj}=175℃		1.70		
Recovered Charge	Q_{rr}	I_F=150A V_R=600V -di_F/dt =2300A/us T_{vj}=25℃		9.23		uC
Peak Reverse Recovery Current	I_{rr}			49.9		A
Reverse Recovery Energy	E_{rec}			3.45		mJ
Recovered Charge	Q_{rr}	I_F=150A V_R=600V -di_F/dt =2300A/us T_{vj}=150℃		25.57		uC
Peak Reverse Recovery Current	I_{rr}			79.5		A
Reverse Recovery Energy	E_{rec}			9.65		mJ
Recovered Charge	Q_{rr}	I_F=150A V_R=600V -di_F/dt =2300A/us T_{vj}=175℃		31.16		uC
Peak Reverse Recovery Current	I_{rr}			85.4		A
Reverse Recovery Energy	E_{rec}			11.82		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℃	100	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	200	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	416	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=3mA,T_{vj}=25℃	5.0	5.85	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=100A,V_{GE}=15V, T_{vj}=25℃		1.60		V
		I_C=100A,V_{GE}=15V, T_{vj}=150℃		1.85		
		I_C=100A,V_{GE}=15V, T_{vj}=175℃		1.90		
Gate Charge	Q_G			1.01		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz, T_{vj}=25℃		8.9		nF
Reverse Transfer Capacitance	C_{res}			0.21		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=100A V_{CE}=600V V_{GE}=±15V R_G =3.9Ω T_{vj}=25℃		164		ns
Rise Time	t_r			44		ns
Turn-off Delay Time	$t_{d(off)}$			282		ns
Fall Time	t_f			179		ns
Energy Dissipation During Turn-on Time	E_{on}			7.09		mJ
Energy Dissipation During Turn-off Time	E_{off}			7.24		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C=100A V_{CE}=600V V_{GE}=±15V R_G =3.9Ω T_{vj}=150℃		174		ns
Rise Time	t_r			49		ns
Turn-off Delay Time	$t_{d(off)}$			352		ns
Fall Time	t_f			301		ns
Energy Dissipation During Turn-on Time	E_{on}			11.7		mJ
Energy Dissipation During Turn-off Time	E_{off}			10.5		mJ
SC Data	I_{sc}	t_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=600V,V_{CEM}≤1200V		400		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		60	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	120	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=60A,T_{vj}=25℃		2.30	2.80	V
		I_F=60A,T_{vj}=150℃		2.05		
		I_F=60A,T_{vj}=175℃		2.00		
Recovered Charge	Q_{rr}	I_F=60A V_R=600V -di_F/dt =1500A/us T_{vj}=25℃		5.6		uC
Peak Reverse Recovery Current	I_{rr}			53		A
Reverse Recovery Energy	E_{rec}			1.83		mJ
Recovered Charge	Q_{rr}	I_F=60A V_R=600V -di_F/dt =1500A/us T_{vj}=150℃		9.5		uC
Peak Reverse Recovery Current	I_{rr}			57		A
Reverse Recovery Energy	E_{rec}			3.31		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℃	150	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_C=100℃	150	A
Surge Forward Current	I_{FSM}	V_R=0V,t_p=10ms,T_{vj}=25℃	1500	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=25℃	11200	A^2s

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=150A,T_{vj}=150℃		1.20		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
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			0.23	K/W
		per Diode-inverter			0.34	
		per IGBT-brake-copper			0.36	
		per Diode-brake-chopper			0.66	
		per Diode-rectifier			0.37	
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

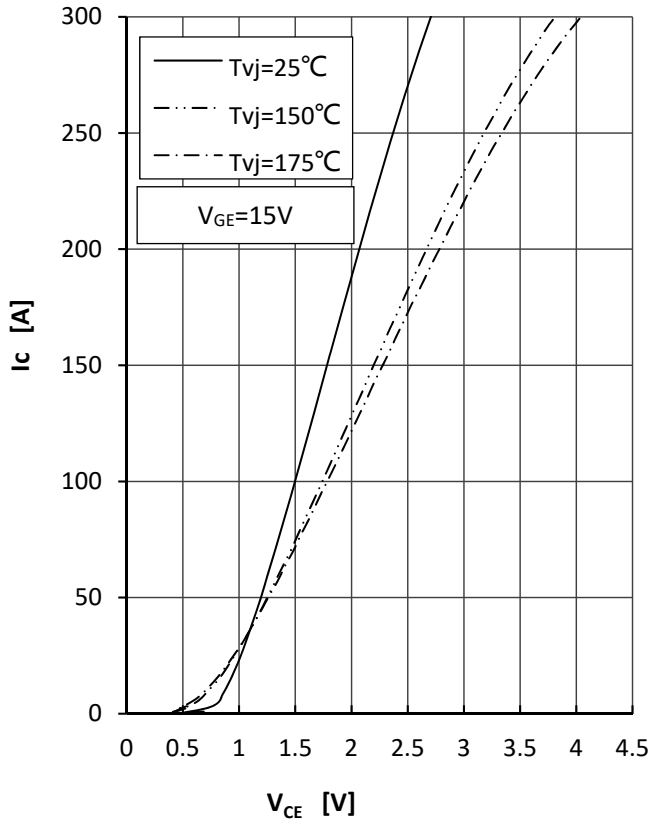


Fig1.IGBT Output Characteristics

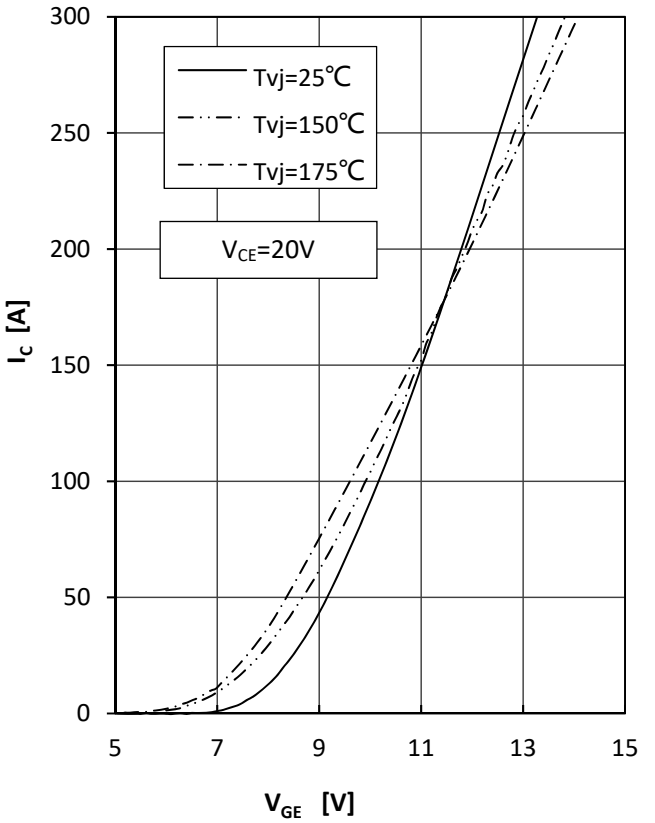


Fig2.IGBT Transfer Characteristics

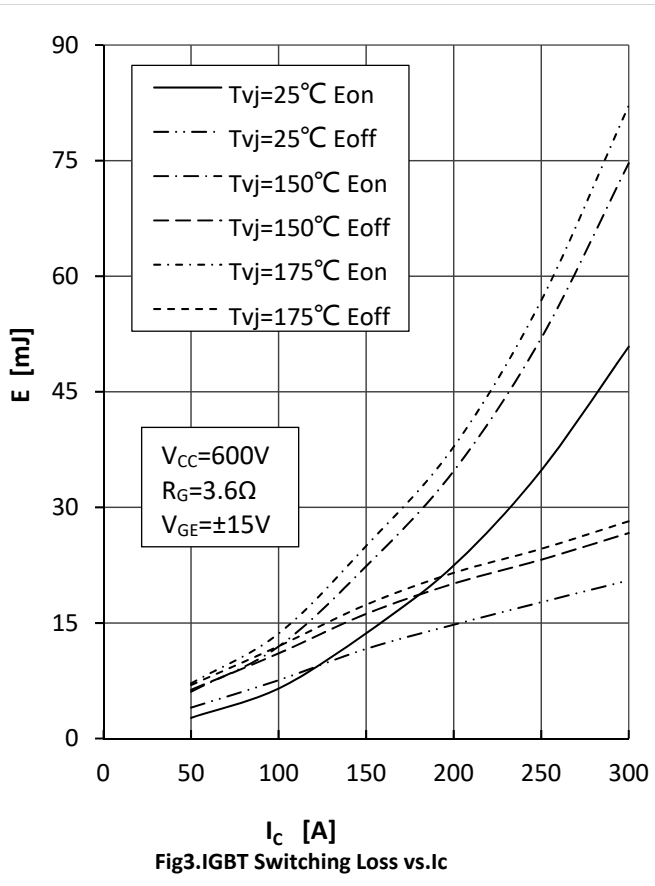


Fig3.IGBT Switching Loss vs.Ic

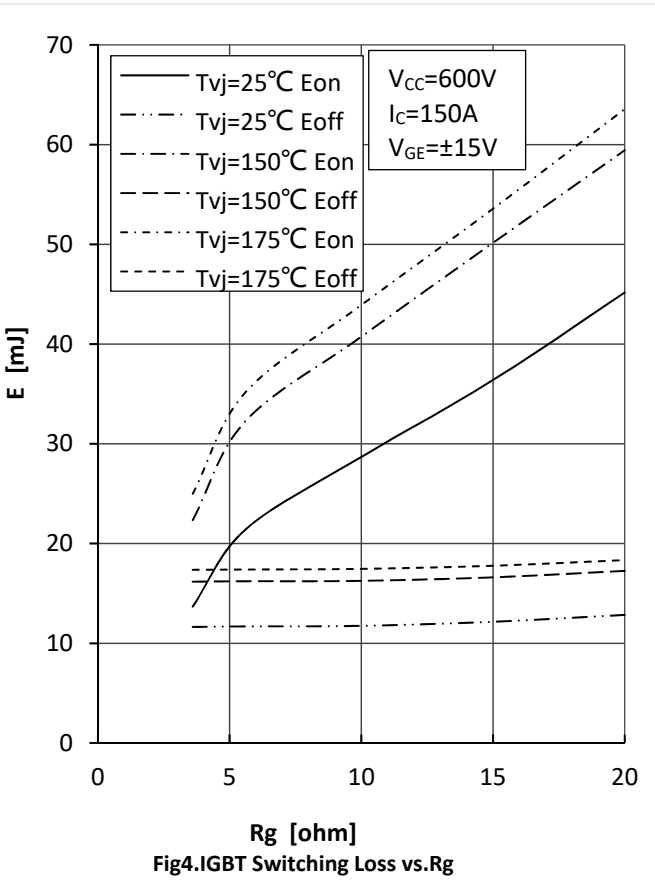


Fig4.IGBT Switching Loss vs.Rg

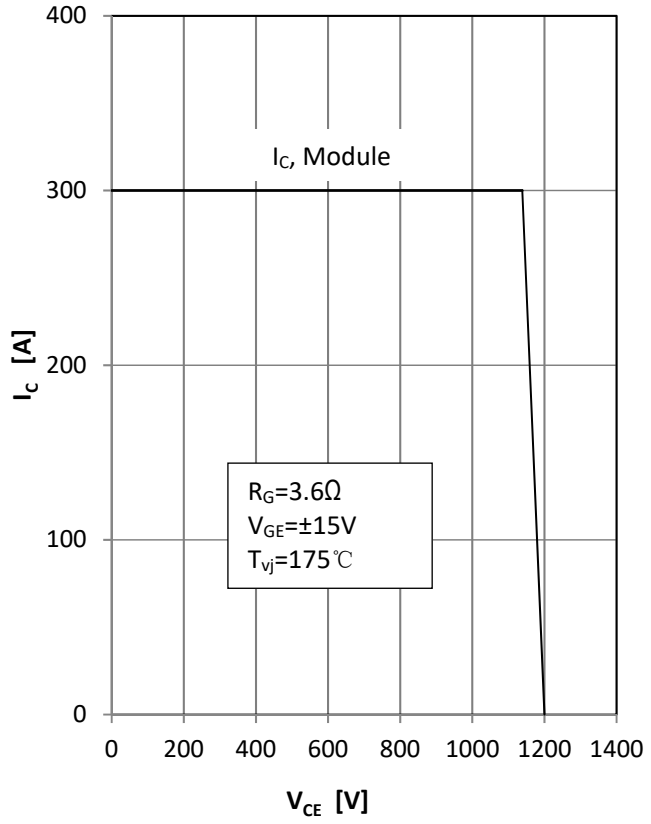


Fig5. RBSOA

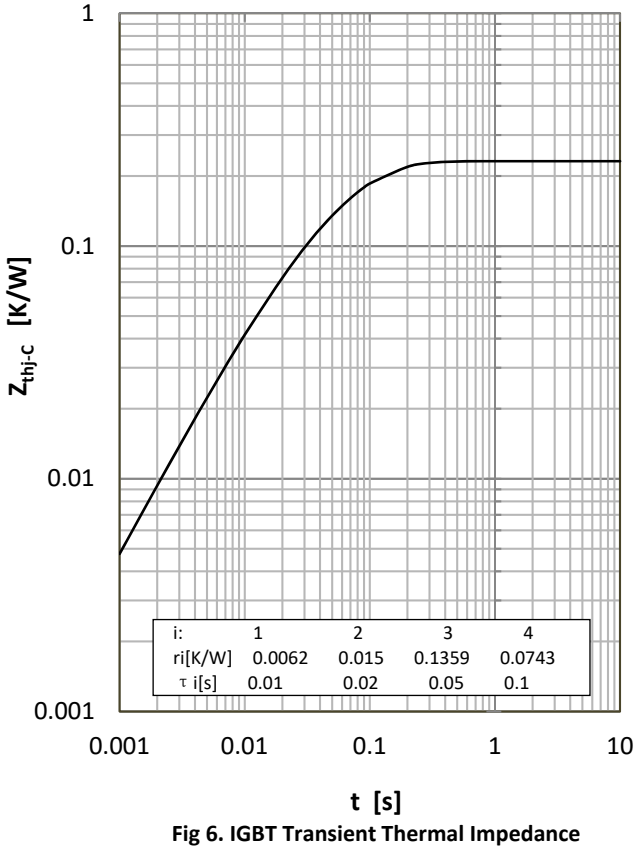


Fig 6. IGBT Transient Thermal Impedance

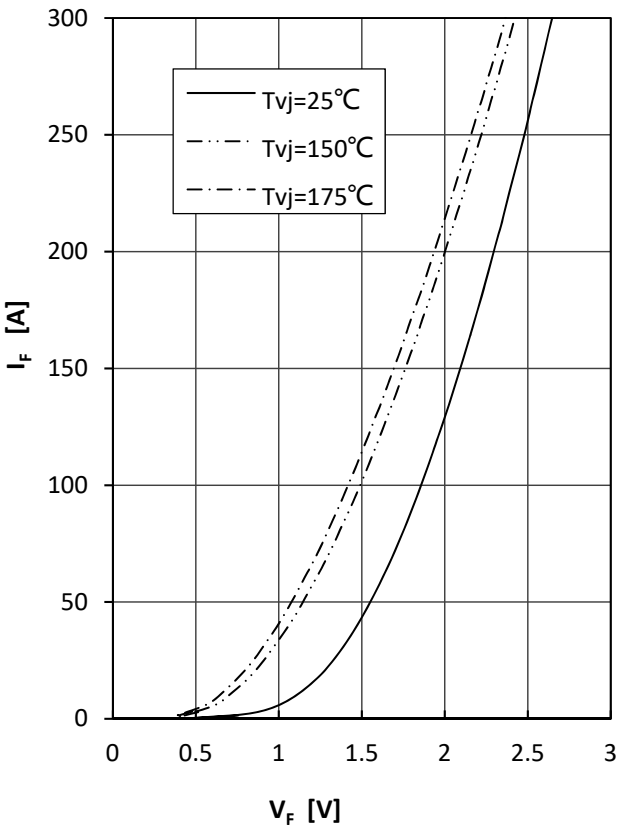


Fig7.Diode Foward Characteristics

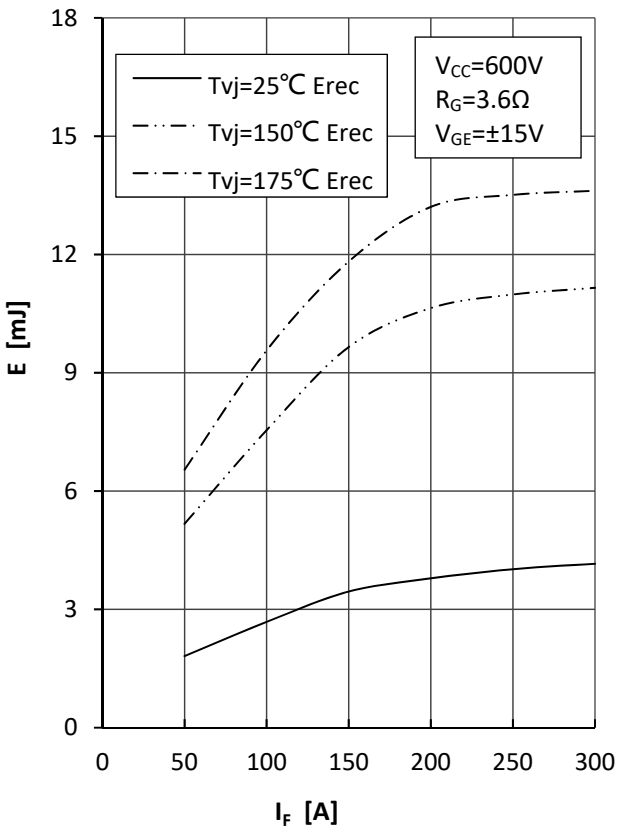


Fig8.Diode Switching Loss vs.I_F

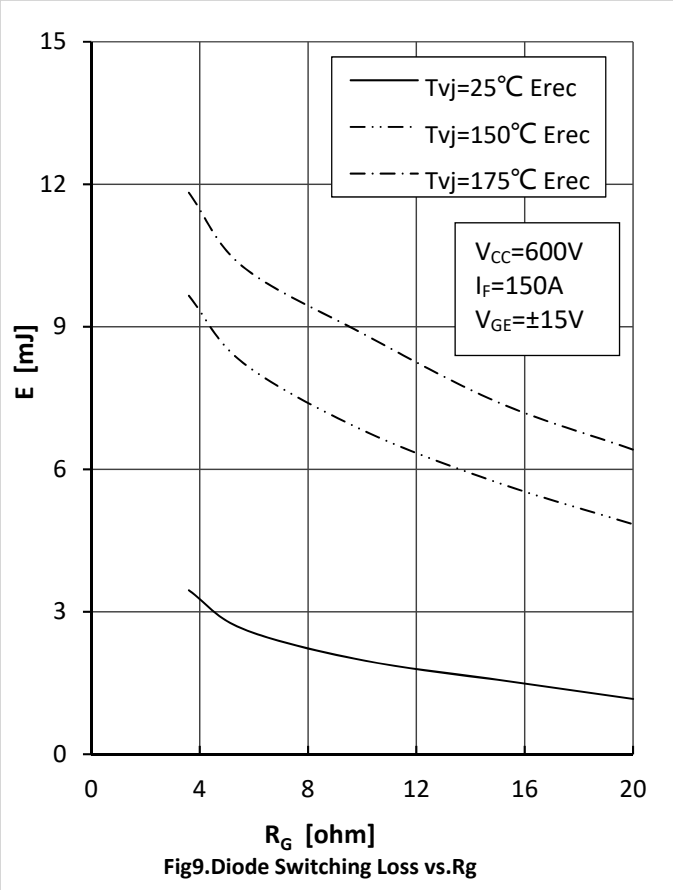


Fig9.Diode Switching Loss vs.Rg

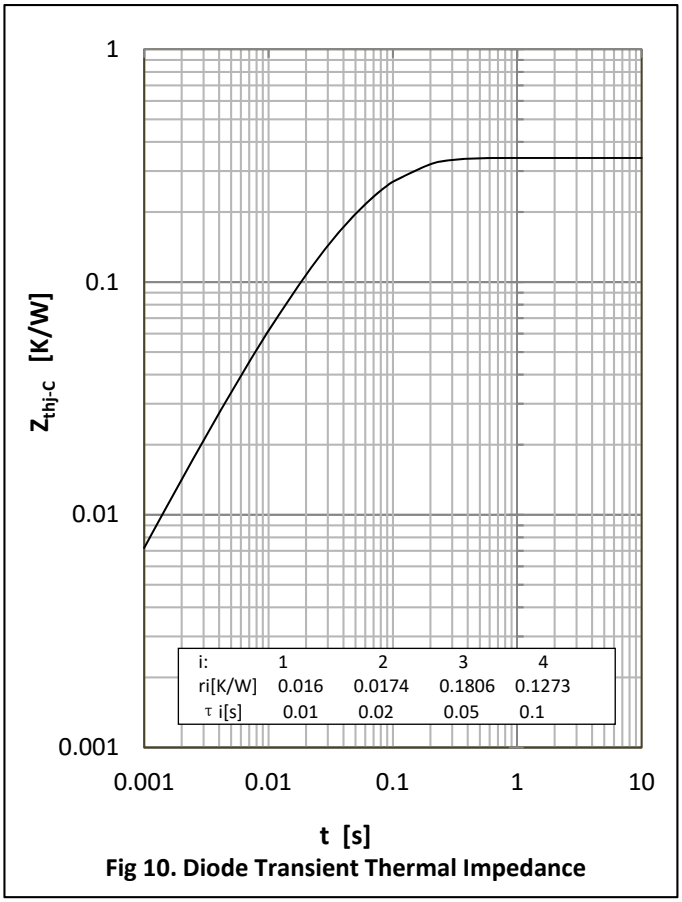


Fig 10. Diode Transient Thermal Impedance

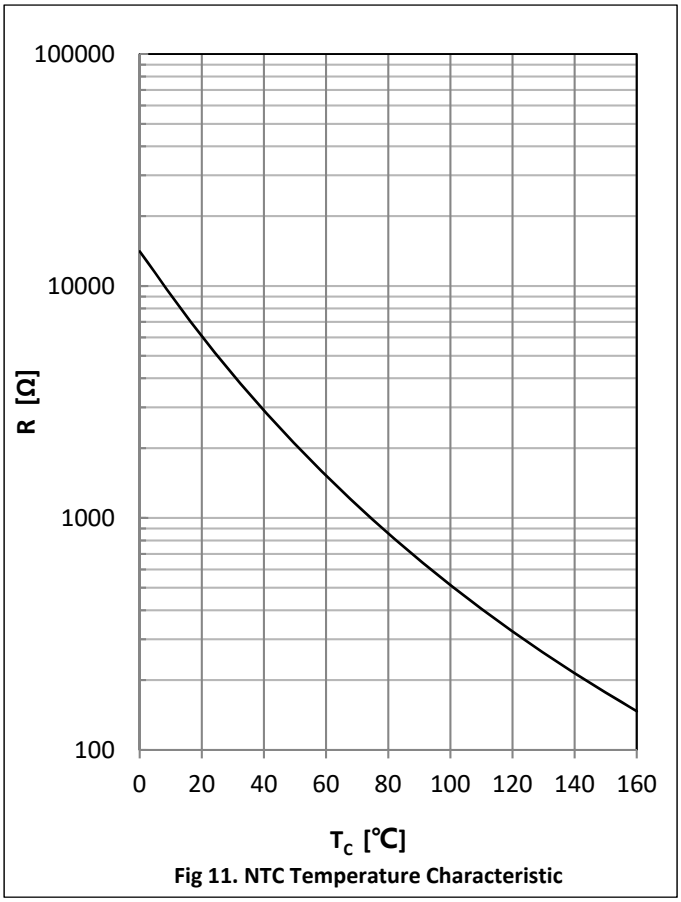


Fig 11. NTC Temperature Characteristic

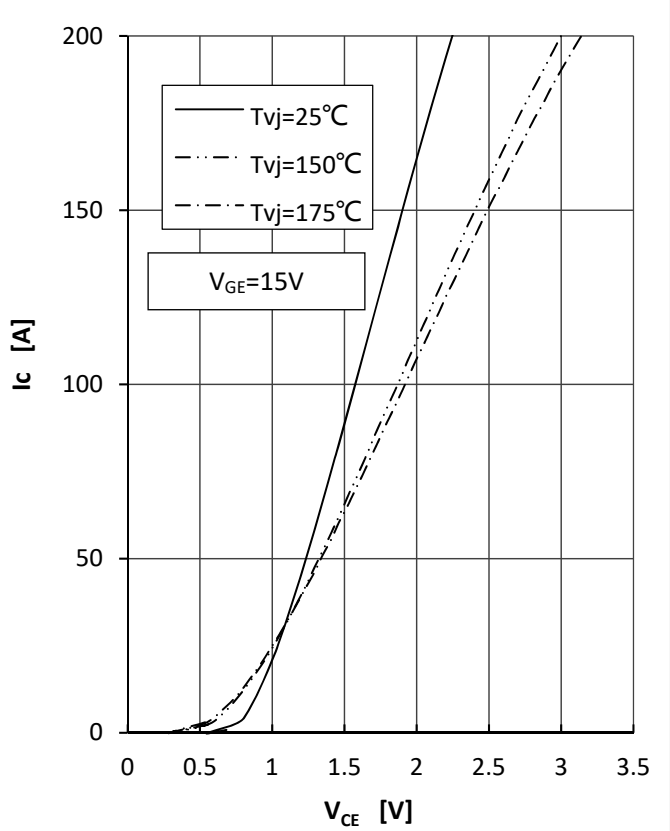


Fig12. IGBT-Brake-Chopper output Characteristics

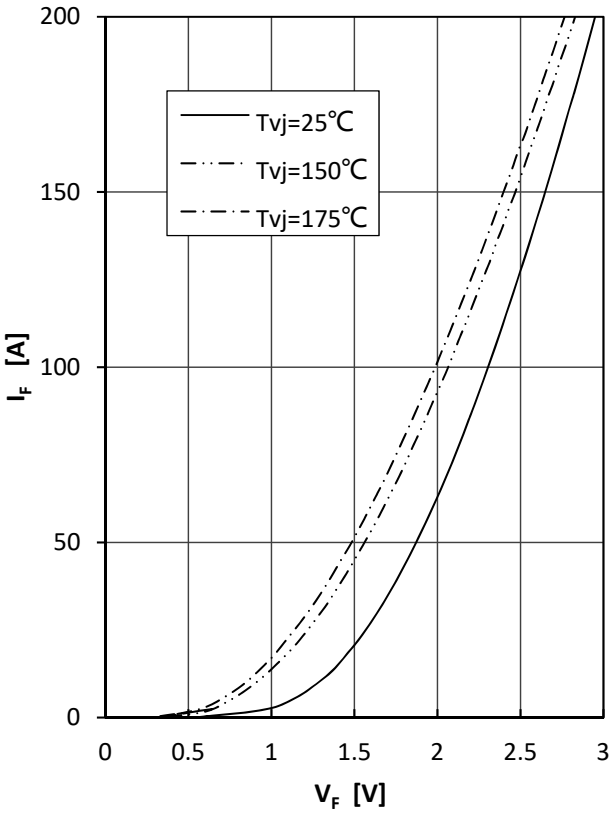


Fig13.Diode-Brake-Chopper Foward Characteristics

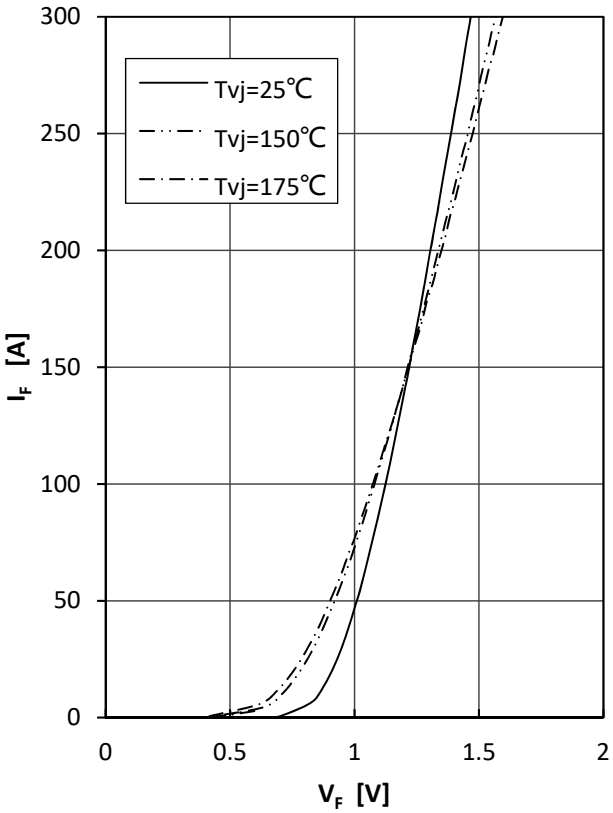
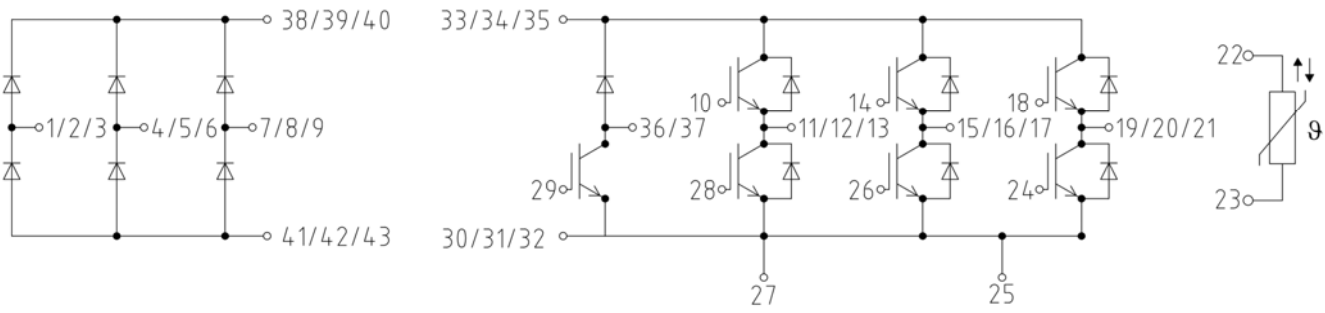
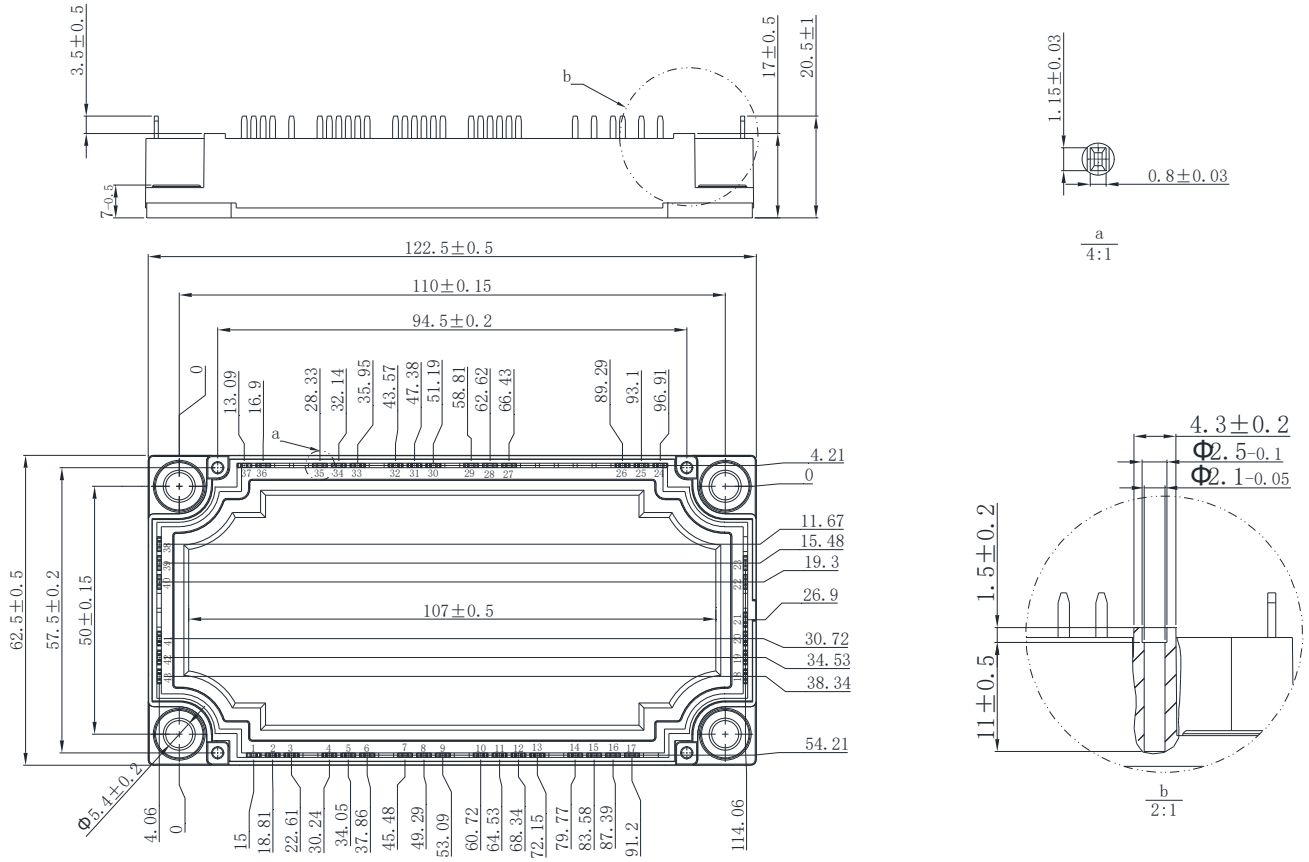


Fig14.Diode-Rectifier Foward Characteristics

- Circuit Diagram



- **Package Outline Information**



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