MG75P12E2

RoHS COMPLIANT

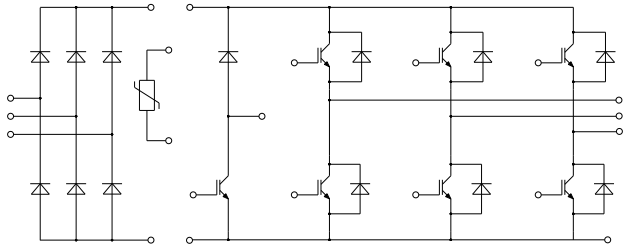
IGBT Modules

VCES 1200V
IC 75A

Applications

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

Circuit



Features

- Low $V_{ce(sat)}$ with Trench technology
- 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}	tp=1ms	150	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_c=25℃,T_{vjmax}=175℃	476	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C =2.6mA,T_{vj}=25℃	5.8	6.5	7.2	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic=75A,V_{GE}=15V, T_{vj}=25℃		1.85	2.15	V
		Ic=75A,V_{GE}=15V, T_{vj}=125℃		2.05		
		Ic=75A,V_{GE}=15V, T_{vj}=150℃		2.10		
Gate Charge	Q_G			0.78		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		4.00		nF
Reverse Transfer Capacitance	C_{res}			0.30		nF
Internal Gate Resistance	R_{gint}			2.5		Ω
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20 V,T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C =75 A V_{CE} = 600 V V_{GE} = ±15V R_G =5.1Ω T_{vj}=25℃		100		ns
Rise Time	t_r			78		ns
Turn-off Delay Time	$t_{d(off)}$			380		ns
Fall Time	t_f			32		ns
Energy Dissipation During Turn-on Time	E_{on}			5.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			3.6		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C =75 A V_{CE} = 600 V V_{GE} = ±15V R_G =5.1Ω T_{vj}=125℃		110		ns
Rise Time	t_r			85		ns
Turn-off Delay Time	$t_{d(off)}$			450		ns
Fall Time	t_f			36		ns
Energy Dissipation During Turn-on Time	E_{on}			8.8		mJ
Energy Dissipation During Turn-off Time	E_{off}			6.4		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{cc}=900V,V_{CEM}≤1200V		400		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}	tp=1ms	150	A

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=75A,T_{vj}=25℃		2.00	2.30	V
		I_F=75A,T_{vj}=125℃		2.10		
		I_F=75A,T_{vj}=150℃		2.15		
Recovered Charge	Q_{rr}	I_F =75 A V_R=600V -di$_F$/dt =900A/us T_{vj}=25℃		4.2		uC
Peak Reverse Recovery Current	I_{rr}			75		A
Reverse Recovery Energy	E_{rec}			2.06		mJ
Recovered Charge	Q_{rr}	I_F =75 A V_R=600V -di$_F$/dt =900A/us T_{vj}=125℃		9.6		uC
Peak Reverse Recovery Current	I_{rr}			92		A
Reverse Recovery Energy	E_{rec}			4.34		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}	tp=1ms	80	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_c=25℃, T_{vjmax}=175℃	300	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℃	5.8	6.7	7.2	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic=40A,V_{GE}=15V, T_{vj}=25℃		1.95	2.35	V
		Ic=40A,V_{GE}=15V, T_{vj}=125℃		2.30		
		Ic=40A,V_{GE}=15V, T_{vj}=150℃		2.40		
Gate Charge	Q_G			0.27		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		2.00		nF
Reverse Transfer Capacitance	C_{res}			0.07		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20 V,T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C =40 A V_{CE} = 600 V V_{GE} = ±15V R_G = 12Ω T_{vj}=25℃		28		ns
Rise Time	t_r			16		ns
Turn-off Delay Time	$t_{d(off)}$			26		ns
Fall Time	t_f			125		ns
Energy Dissipation During Turn-on Time	E_{on}			2.40		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.25		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C =40 A V_{CE} = 600 V V_{GE} = ±15V R_G = 12Ω T_{vj}=125℃		28		ns
Rise Time	t_r			18		ns
Turn-off Delay Time	$t_{d(off)}$			310		ns
Fall Time	t_f			190		ns
Energy Dissipation During Turn-on Time	E_{on}			3.60		mJ
Energy Dissipation During Turn-off Time	E_{off}			3.20		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{cc}=900V,V_{CEM}≤1200V		130		A

● Diode-Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_j=25℃	1200	V
Continuous DC Forward Current	I_F		40	A
Repetitive Peak Forward Current	I_{FRM}	tp=1ms	80	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_j=125℃	240	A^2s
		V_R=0,t_p=10ms,T_j=150℃	220	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=40A,T_{vj}=25℃		1.75	2.25	V
		I_F=40A,T_{vj}=125℃		1.75		
		I_F=40A,T_{vj}=150℃		1.75		
Recovered Charge	Q_{rr}	I_F =40 A V_R=600V -di$_F$/dt =1600A/us T_{vj}=25℃		4.15		uC
Peak Reverse Recovery Current	I_{rr}			42		A
Reverse Recovery Energy	E_{rec}			1.30		mJ

Recovered Charge	Q_{rr}	I_F =40 A V_R=600V -di_F/dt =1600A/us T_{vj}=125℃		8.00		uC
Peak Reverse Recovery Current	I_{rr}			46		A
Reverse Recovery Energy	E_{rec}			2.38		mJ

● Diode-Rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_j=25℃	1600	V
Average On-state Current 50/60Hz, sine wave	$I_{F(AV)}$	T_c=80℃	80	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_c=80℃	120	A
Surge Forward Current	I_{FSM}	V_R=0,t_p=10ms,T_j=45℃	1100	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_j=45℃	6050	A^2s

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=50A,T_j=150℃		0.98		V
Reverse Current	I_R	T_j=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}=493.3 Ω	-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}	Inverter, brake			175	℃
		rectifier			150	
Operating Junction Temperature	$T_{vj\ op}$		-40		150	℃
Storage Temperature	T_{stg}		-40		125	℃
Stray Inductance	L_{CE}			60		nH
Module Lead Resistance ,Terminal to Chip	$R_{cc'+EE'}$	T_C=25℃, per switch		4.0		m Ω
	$R_{AA'+CC'}$			2.0		
Thermal Resistance Junction-to Case	$R_{\theta jc}$	per IGBT-inverter			0.315	K/W
		per Diode-inverter			0.620	
		per IGBT-brake-copper			0.500	
		per Diode-chopper			1.266	
		per Diode-rectifier			0.548	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	per IGBT-inverter		0.118		K/W
		per Diode-inverter		0.205		
		per IGBT-brake-copper		0.180		
		per Diode-chopper		0.452		
		per Diode-rectifier		0.236		
		per Module		0.009		
Module-to-Sink Torque	M_s		3.0		6.0	N·m
Weight of Module	G			300		g

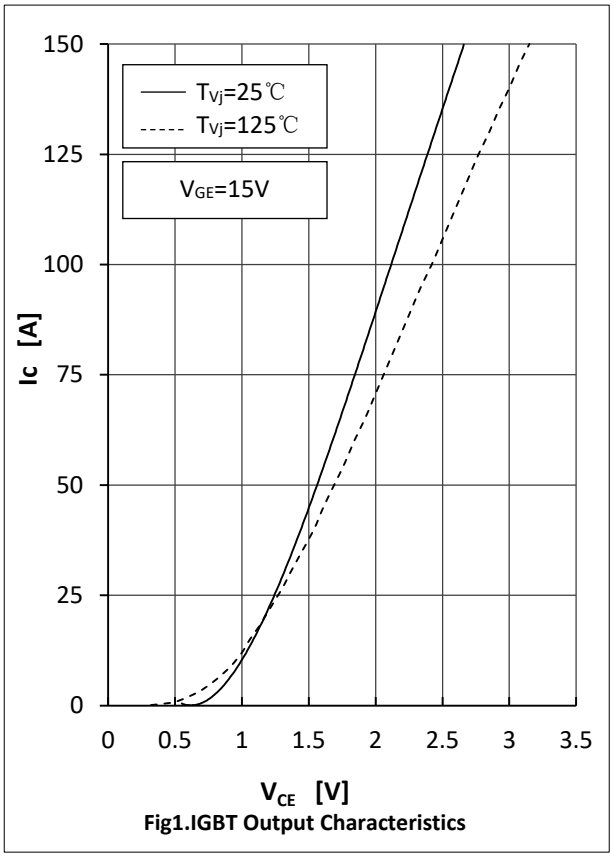


Fig1.IGBT Output Characteristics

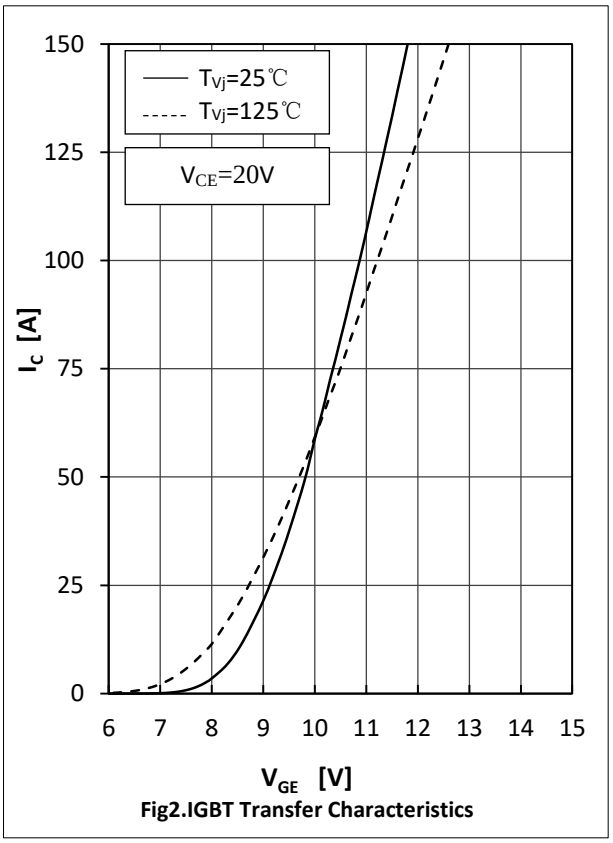


Fig2.IGBT Transfer Characteristics

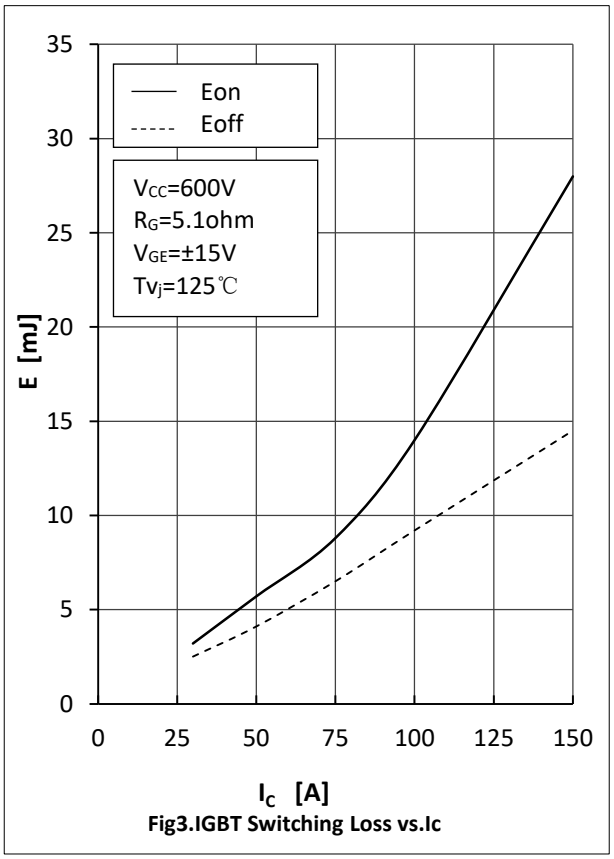


Fig3.IGBT Switching Loss vs.Ic

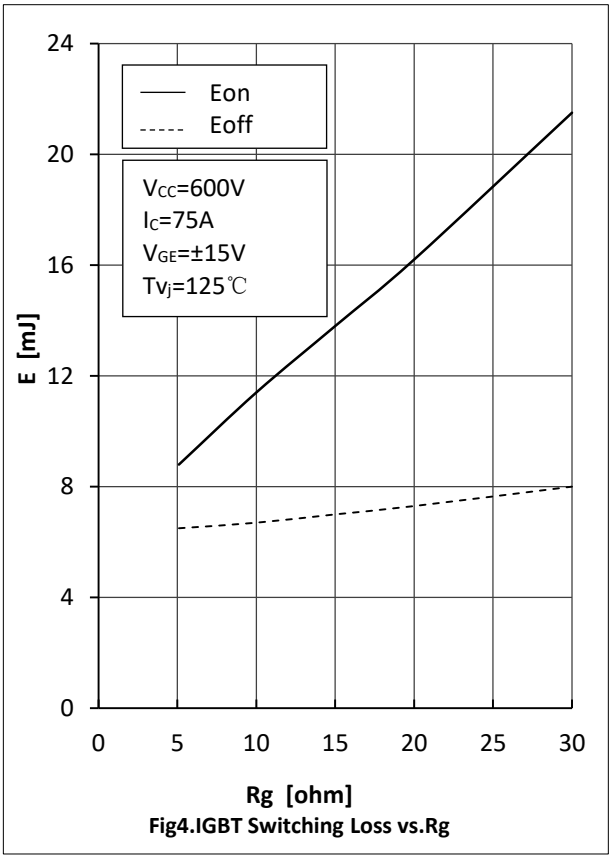


Fig4.IGBT Switching Loss vs.Rg

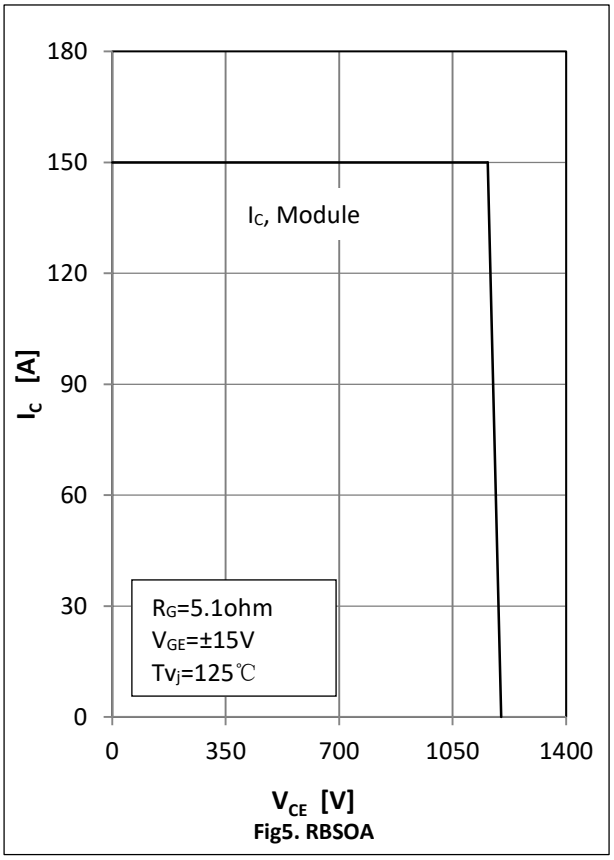


Fig5. RBSOA

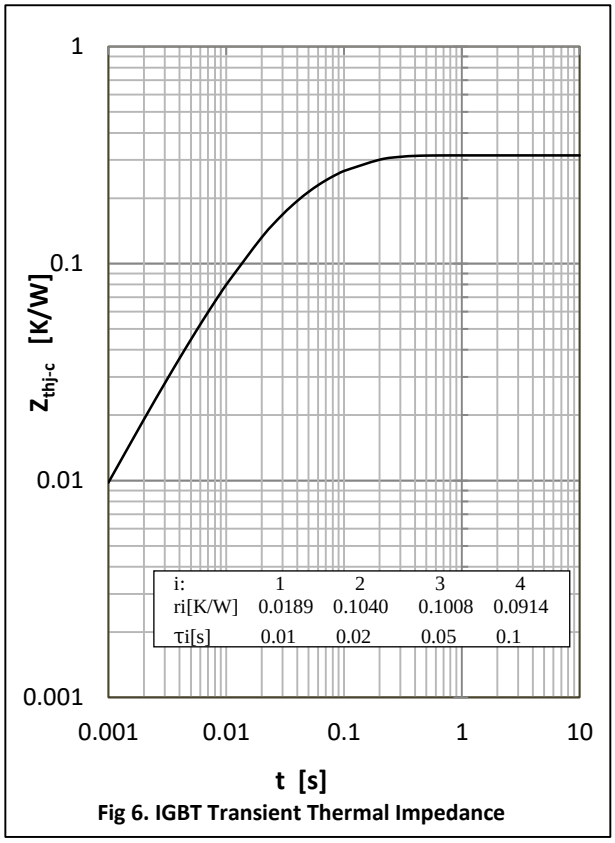


Fig 6. IGBT Transient Thermal Impedance

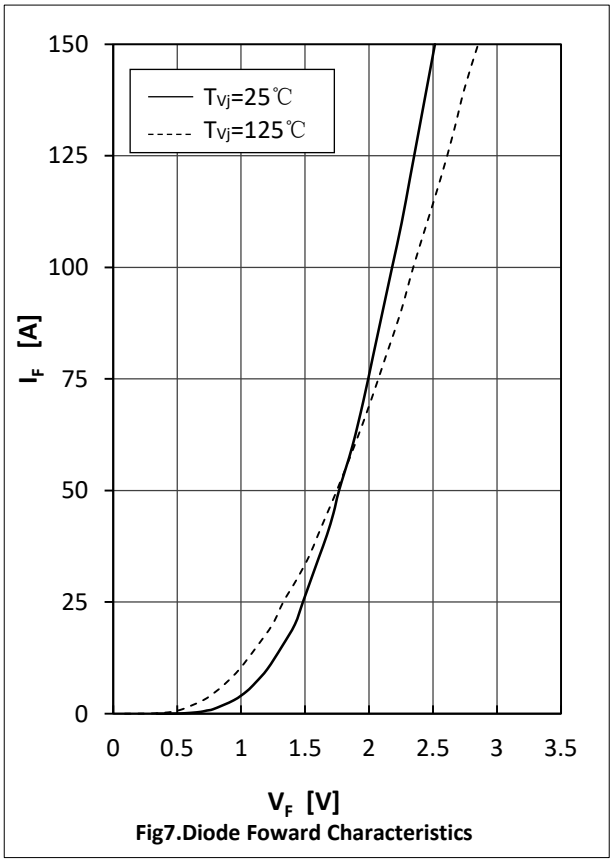


Fig7.Diode Foward Characteristics

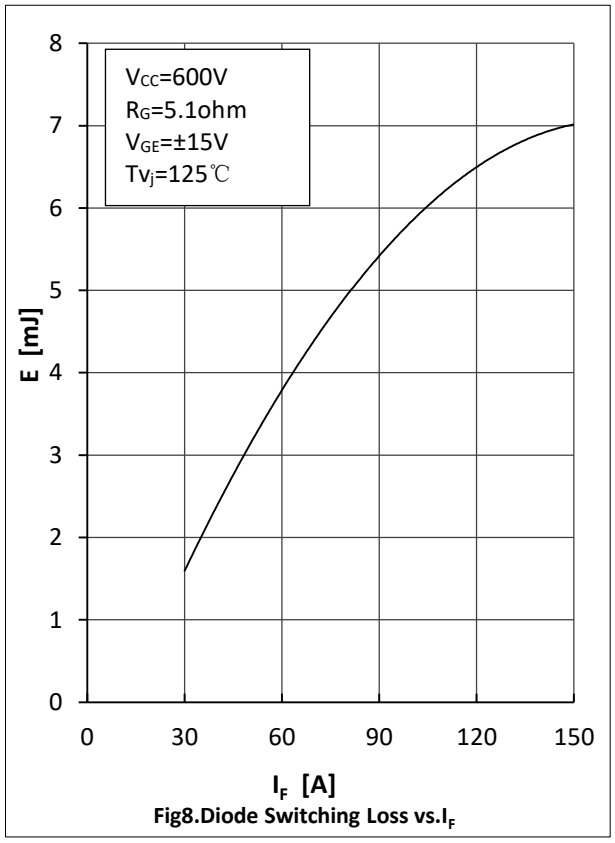


Fig8.Diode Switching Loss vs.I_F

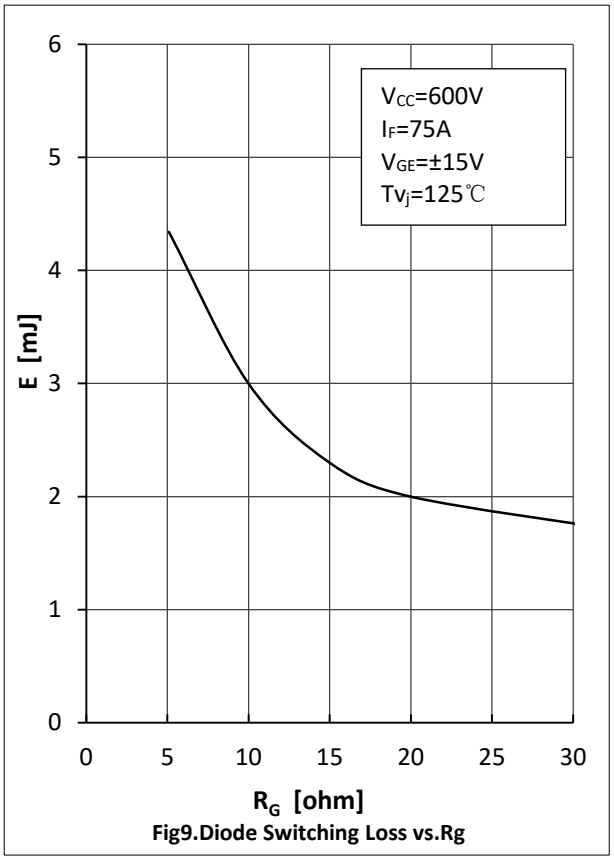


Fig9.Diode Switching Loss vs.Rg

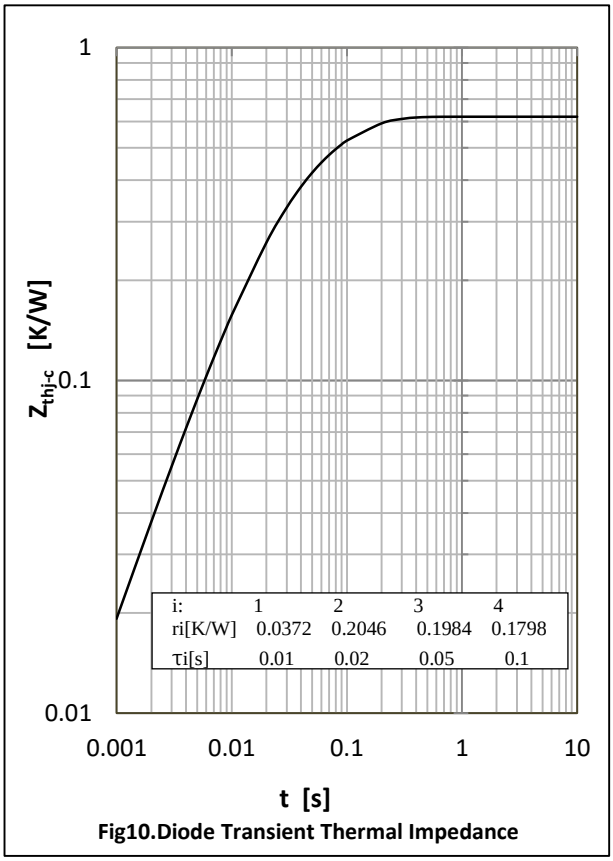


Fig10.Diode Transient Thermal Impedance

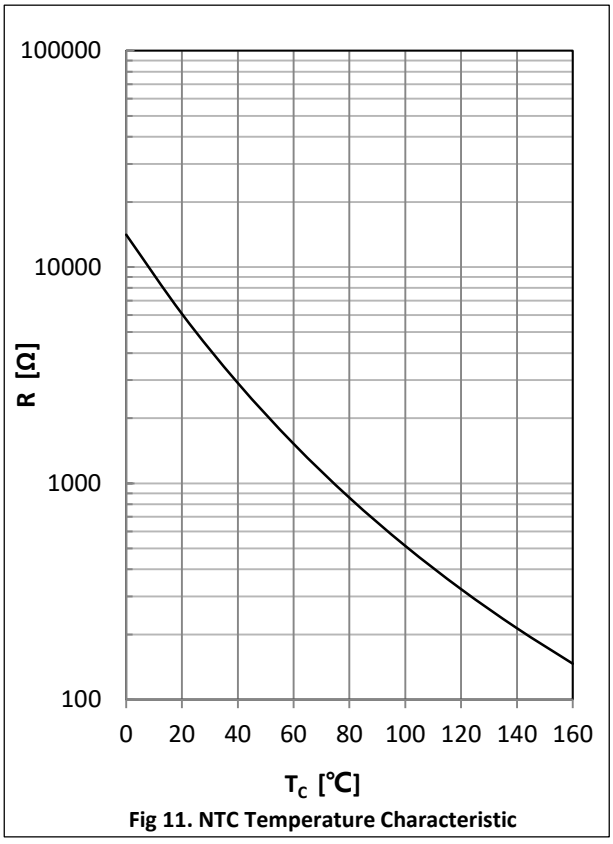


Fig 11. NTC Temperature Characteristic

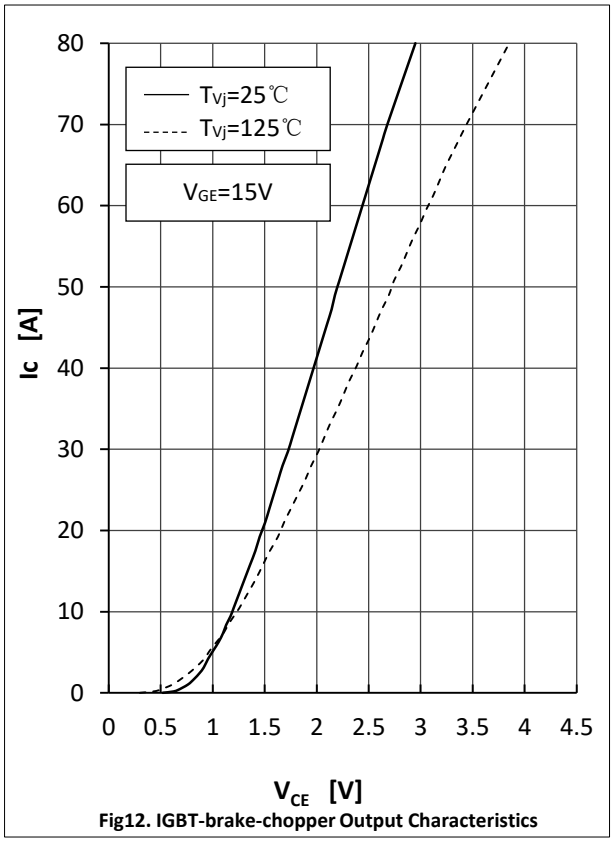


Fig12. IGBT-brake-chopper Output Characteristics

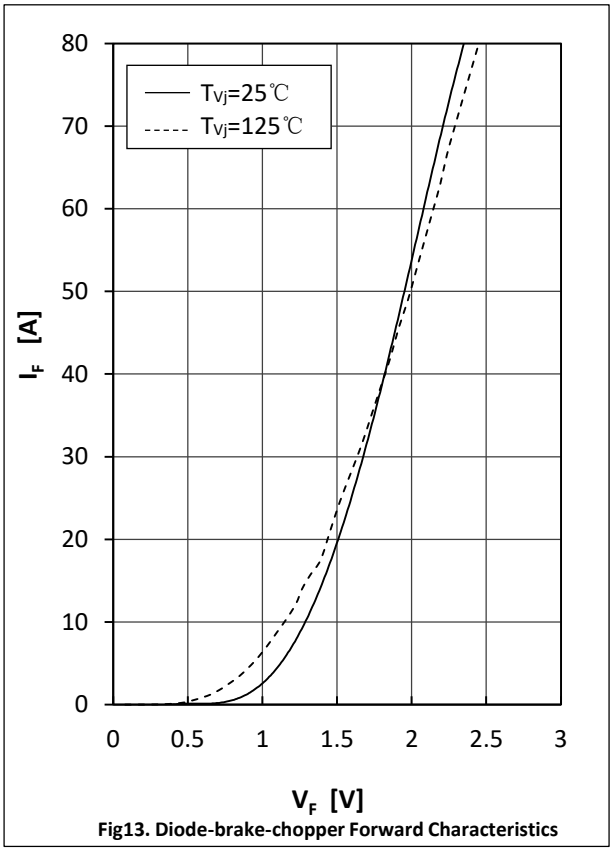
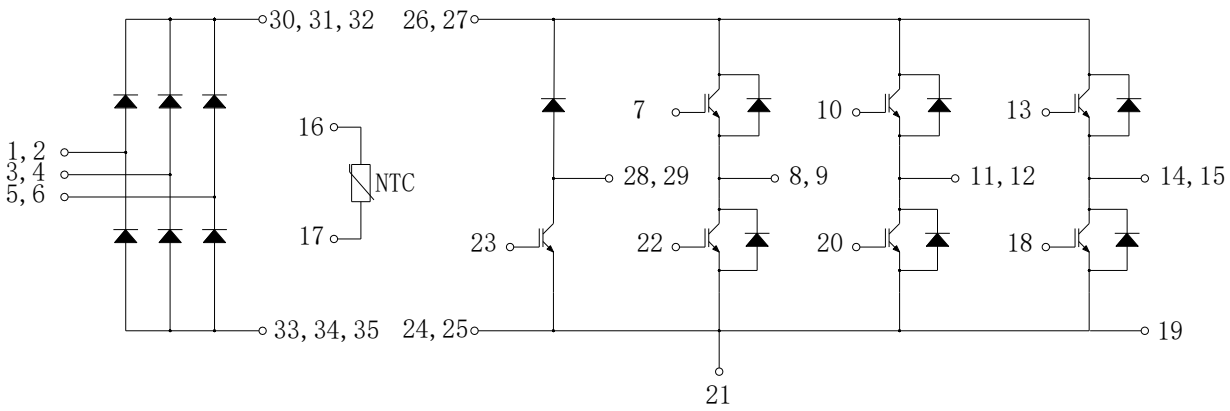


Fig13. Diode-brake-chopper Forward Characteristics

Circuit Diagram



Package Dimensions