MG35P12E1A

RoHS COMPLIANT



IGBT Modules

V_{CES} 1200V
I_C 35A

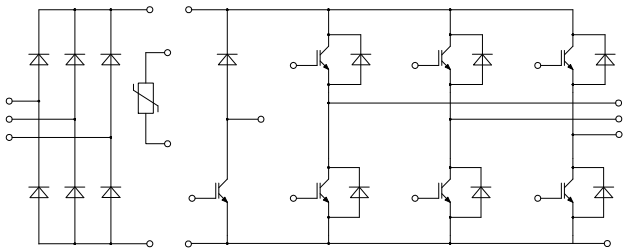
Applications

- 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℃	35	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	70	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	227	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=1.2mA,T_{vj}=25℃	5.2	5.9	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=35A,V_{GE}=15V, T_{vj}=25℃		1.95	2.35	V
		I_C=35A,V_{GE}=15V, T_{vj}=125℃		2.34		
		I_C=35A,V_{GE}=15V, T_{vj}=150℃		2.44		
Gate Charge	Q_G			0.27		uC
Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25℃		2.5		nF
Reverse Transfer Capacitance	C_{res}			0.087		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=35A V_{CE}=600V V_{GE}=±15V R_G=20Ω T_{vj}=25℃		75		ns
Rise Time	t_r			69		ns
Turn-off Delay Time	$t_{d(off)}$			195		ns
Fall Time	t_f			183		ns
Energy Dissipation During Turn-on Time	E_{on}			3.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.1		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=35A V_{CE}=600V V_{GE}=±15V R_G=20Ω T_{vj}=150℃		58		ns
Rise Time	t_r			79		ns
Turn-off Delay Time	$t_{d(off)}$			239		ns
Fall Time	t_f			243		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		140		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		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℃		2.27	2.70	V
		I_F=35A,T_{vj}=125℃		2.02		
		I_F=35A,T_{vj}=150℃		1.94		
Recovered Charge	Q_{rr}	I_F=35A V_R=600V -di_F/dt =1000A/us T_{vj}=25℃		2.4		uC
Peak Reverse Recovery Current	I_{rr}			12		A
Reverse Recovery Energy	E_{rec}			0.91		mJ
Recovered Charge	Q_{rr}	I_F=35A V_R=600V -di_F/dt =1000A/us T_{vj}=150℃		5.8		uC
Peak Reverse Recovery Current	I_{rr}			19		A
Reverse Recovery Energy	E_{rec}			2.24		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℃	35	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	70	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	5.8	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=35A,V_{GE}=15V, T_{vj}=25℃		1.85	2.35	V
		I_C=35A,V_{GE}=15V, T_{vj}=125℃		2.05		
		I_C=35A,V_{GE}=15V, T_{vj}=150℃		2.15		
Gate Charge	Q_G			0.27		uC
Input Capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25℃		2.5		nF
Reverse Transfer Capacitance	C_{res}			0.087		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=35A V_{CE}=600V V_{GE}=±15V R_G=20Ω T_{vj}=25℃		20		ns
Rise Time	t_r			42		ns
Turn-off Delay Time	$t_{d(off)}$			141		ns
Fall Time	t_f			250		ns
Energy Dissipation During Turn-on Time	E_{on}			4.45		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.95		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C=35A V_{CE}=600V V_{GE}=±15V R_G=20Ω T_{vj}=150℃		18		ns
Rise Time	t_r			46		ns
Turn-off Delay Time	$t_{d(off)}$			155		ns
Fall Time	t_f			275		ns
Energy Dissipation During Turn-on Time	E_{on}			5.28		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.27		mJ
SC Data	I_{sc}	t_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{CC}=900V,V_{CEM}≤1200V		140		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		15	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	30	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=125℃	48.0	A^2s
		V_R=0V,t_p=10ms,T_{vj}=150℃	42.0	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=15A,T_{vj}=25℃		2.00	2.70	V
		I_F=15A,T_{vj}=125℃		1.80		
		I_F=15A,T_{vj}=150℃		1.75		
Recovered Charge	Q_{rr}	I_F=15A V_R=600V -di_F/dt =550A/us T_{vj}=25℃		0.45		uC
Peak Reverse Recovery Current	I_{rr}			13		A
Reverse Recovery Energy	E_{rec}			0.49		mJ
Recovered Charge	Q_{rr}	I_F=15A V_R=600V -di_F/dt =550A/us T_{vj}=150℃		0.54		uC
Peak Reverse Recovery Current	I_{rr}			14		A
Reverse Recovery Energy	E_{rec}			0.71		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℃	65	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_C=100℃	110	A
Surge Forward Current	I_{FSM}	V_R=0V,t_p=10ms,T_{vj}=45℃	320	A
I^2t-value	I^2t	V_R=0V,t_p=10ms,T_{vj}=45℃	510	A^2s

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=35A,T_{vj}=25℃		1.10		V
		I_F=35A,T_{vj}=150℃		1.05		
Reverse Current	I_R	T_{vj}=125℃,V_R=1600V			2.0	mA
Valley Forward Voltage	V_{FO}	T_{vj}=150℃		0.73		V
Forward Slope Resistance	R_F	T_{vj}=150℃		8.6		mΩ

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}			40		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			0.66	K/W
		per Diode-inverter			1.00	
		per IGBT-brake-copper			0.90	
		per Diode-chopper			1.50	
		per Diode-rectifier			0.75	
Thermal Resistance Case to Sink	$R_{\theta CS}$	per IGBT-inverter		0.31		K/W
		per Diode-inverter		0.48		
		per IGBT-brake-copper		0.33		
		per Diode-chopper		0.70		
		per Diode-rectifier		0.36		
		per Module		0.02		
Mounting Force Per Clamp	F		3.0		6.0	N
Weight of Module	G			180		g

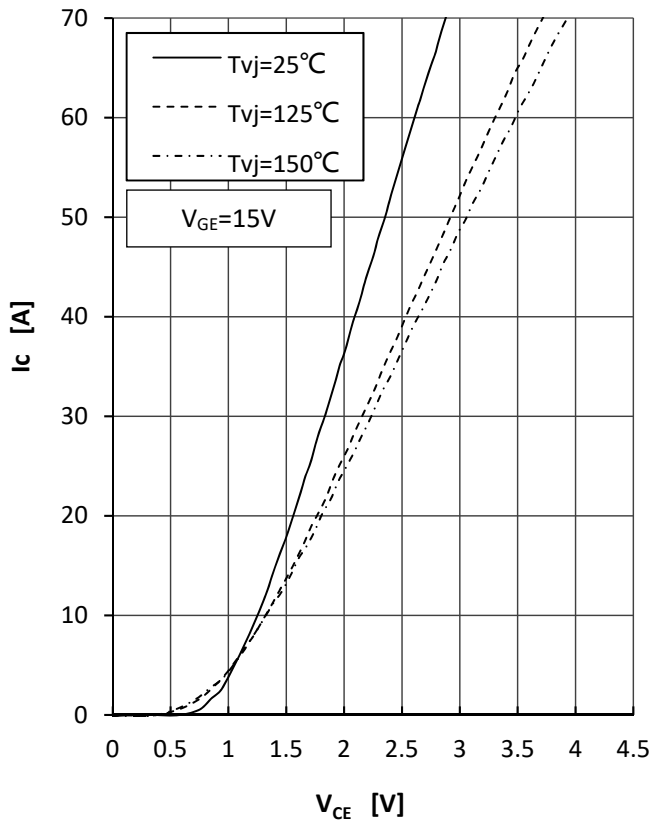


Fig1.IGBT-Inverter Output Characteristics

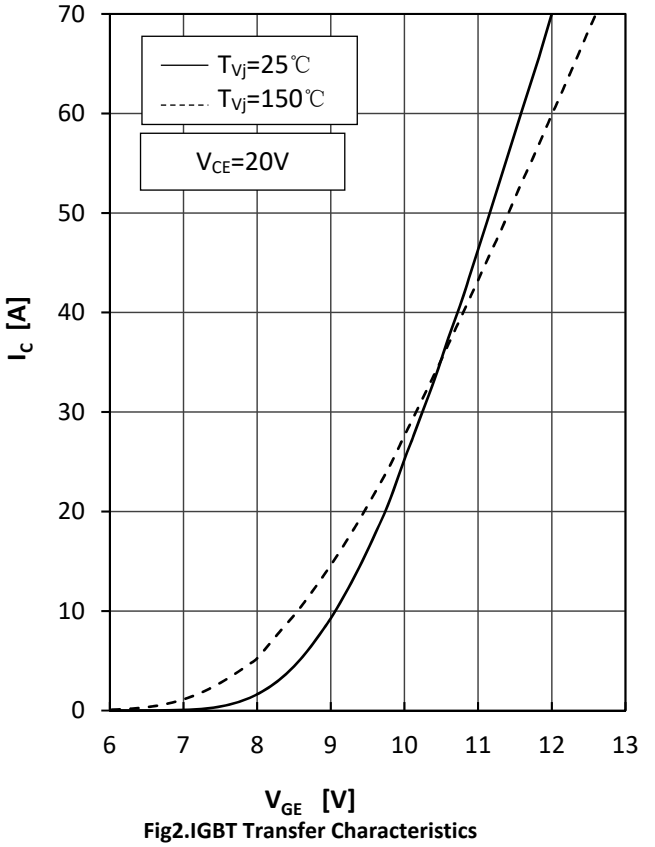


Fig2.IGBT Transfer Characteristics

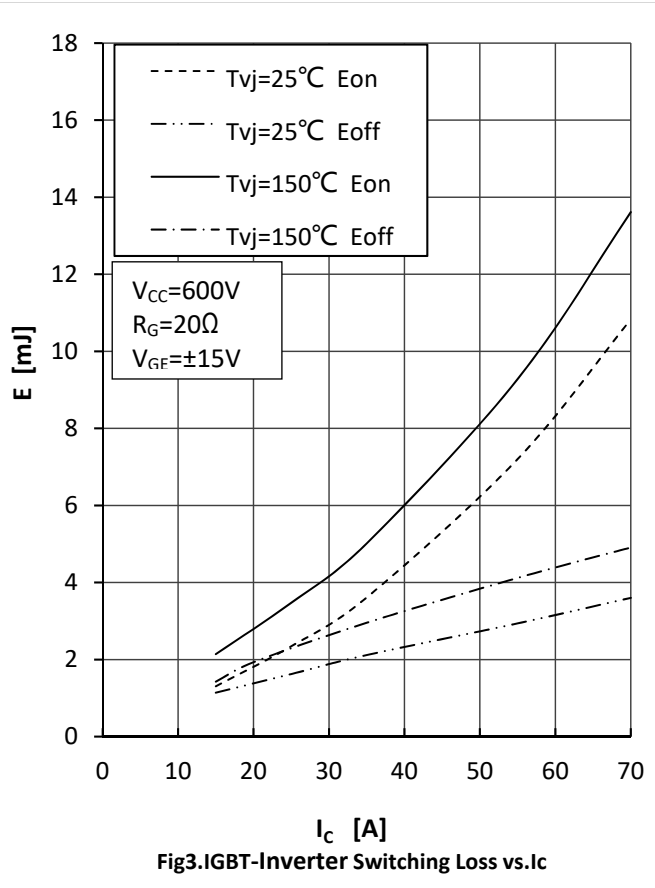


Fig3.IGBT-Inverter Switching Loss vs.Ic

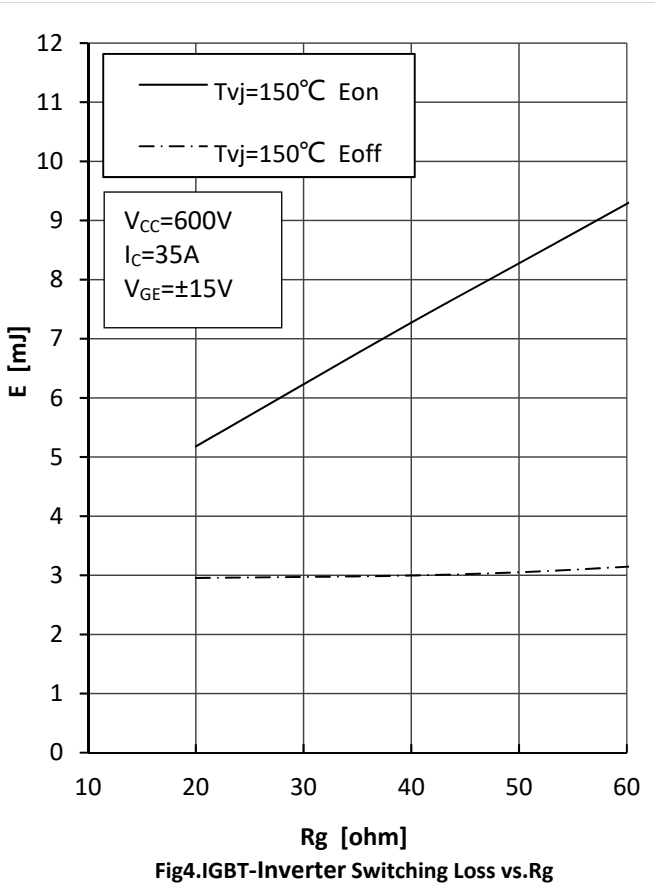


Fig4.IGBT-Inverter Switching Loss vs.Rg

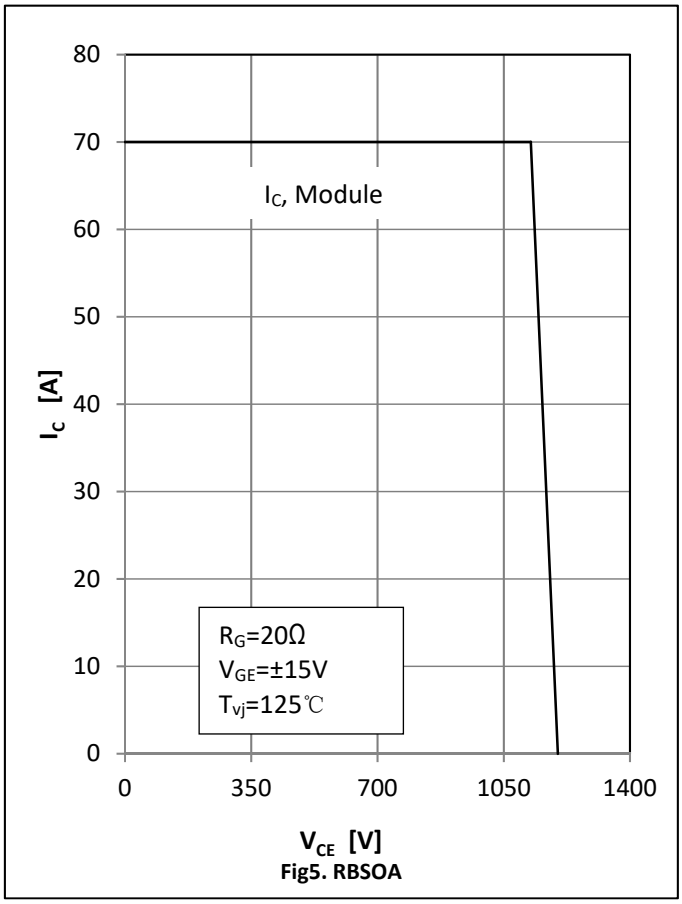


Fig5. RBSOA

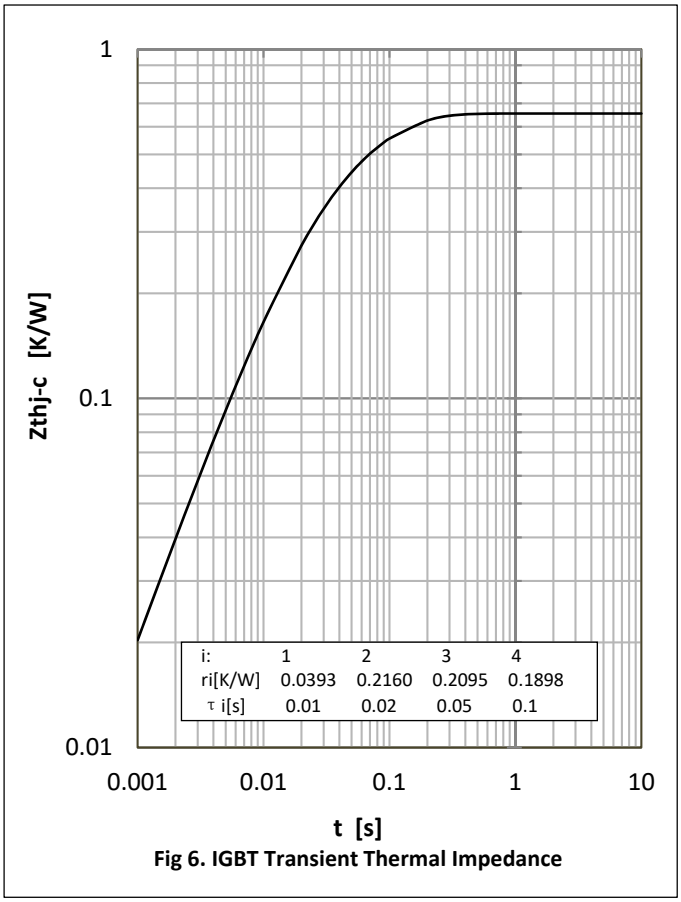


Fig 6. IGBT Transient Thermal Impedance

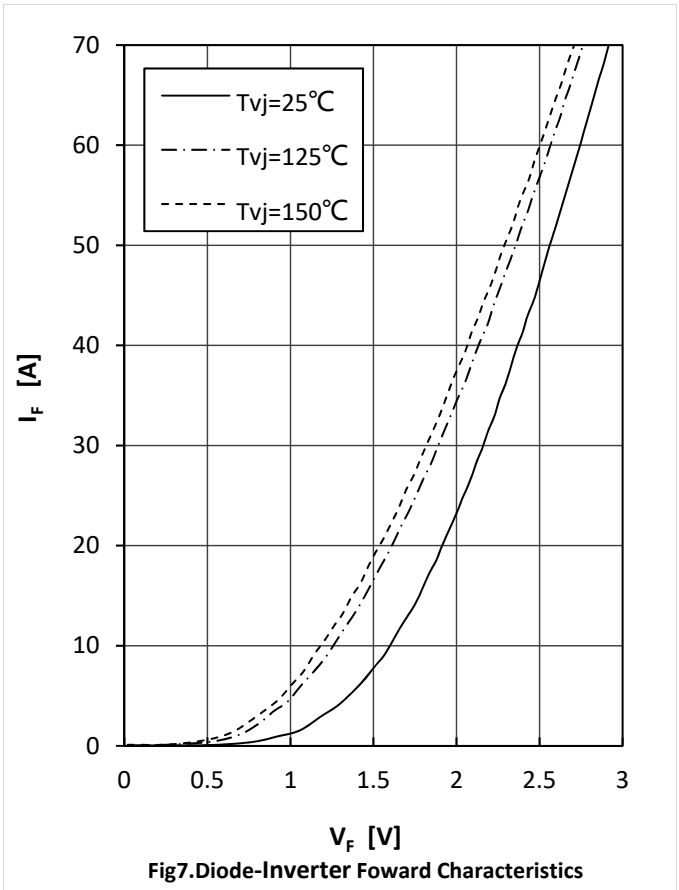


Fig7.Diode-Inverter Foward Characteristics

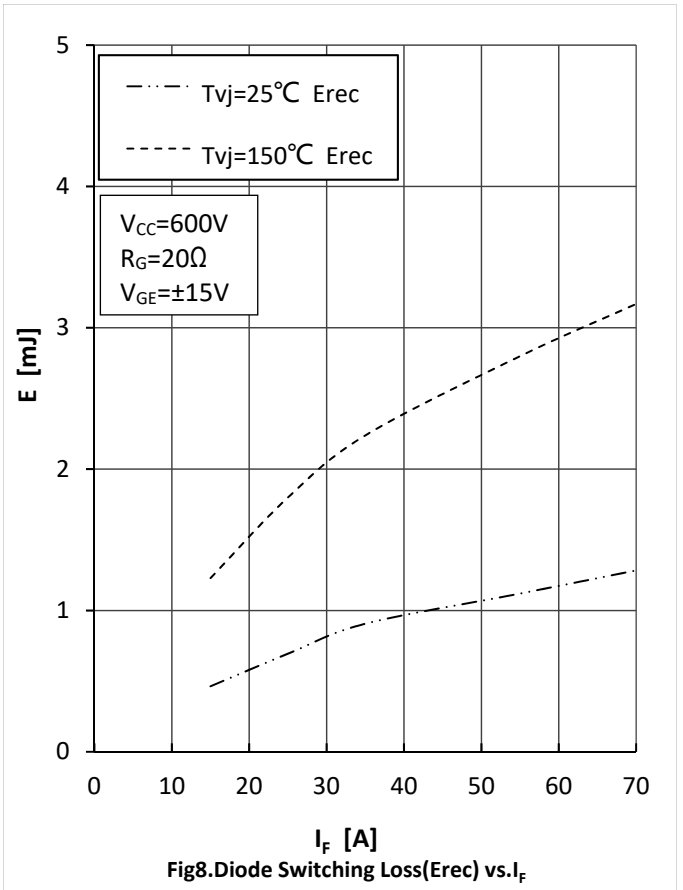


Fig8.Diode Switching Loss(Erec) vs.I_F

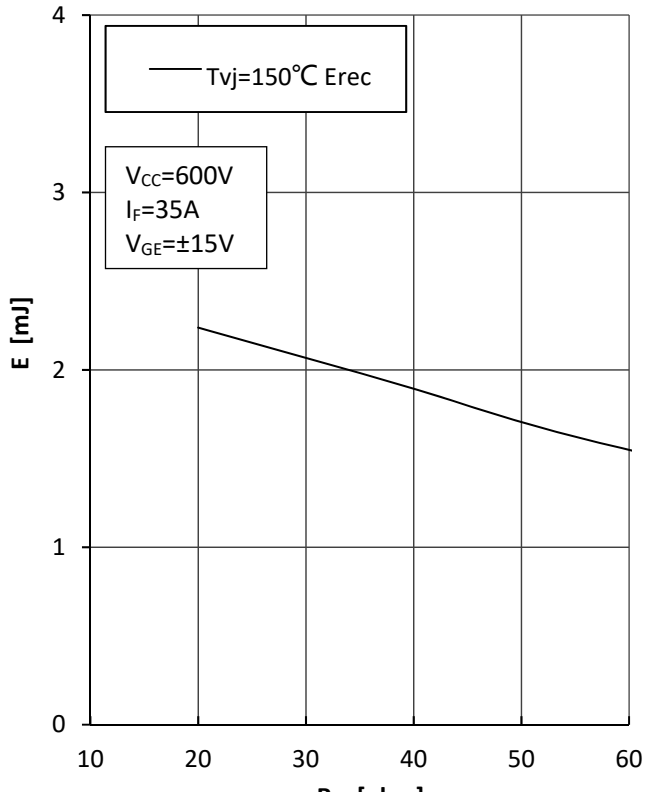


Fig9.Diode-Inverter Switching Loss vs.Rg

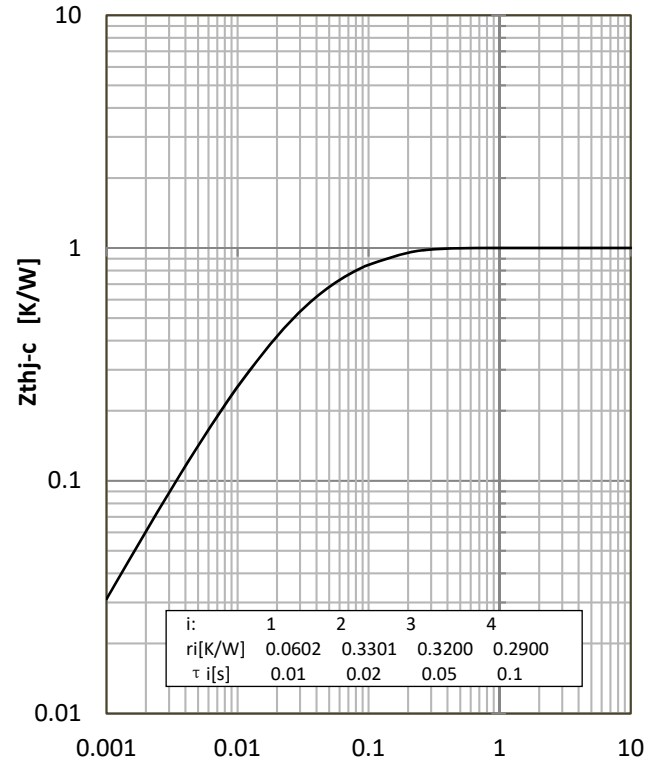


Fig10.Diode Transient Thermal Impedance

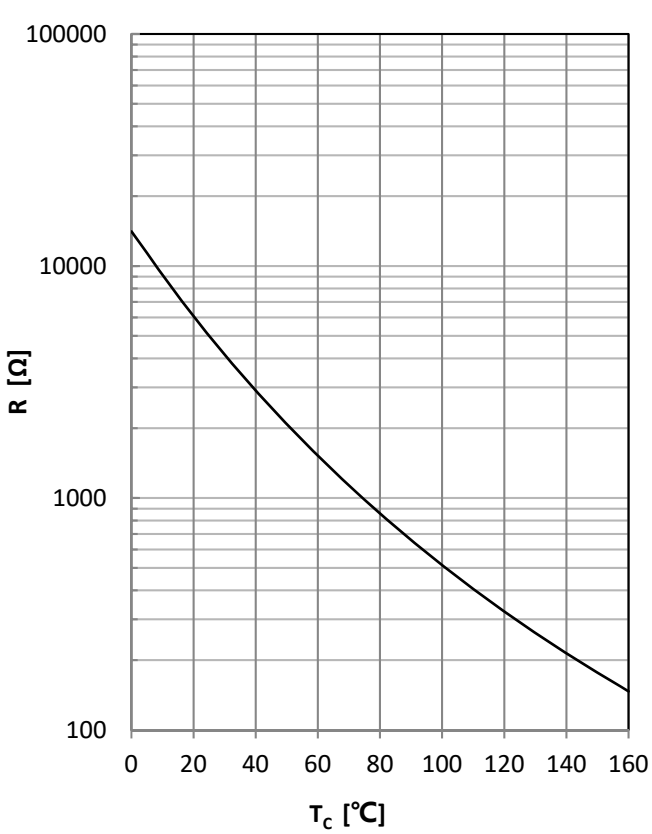


Fig 11. NTC Temperature Characteristic

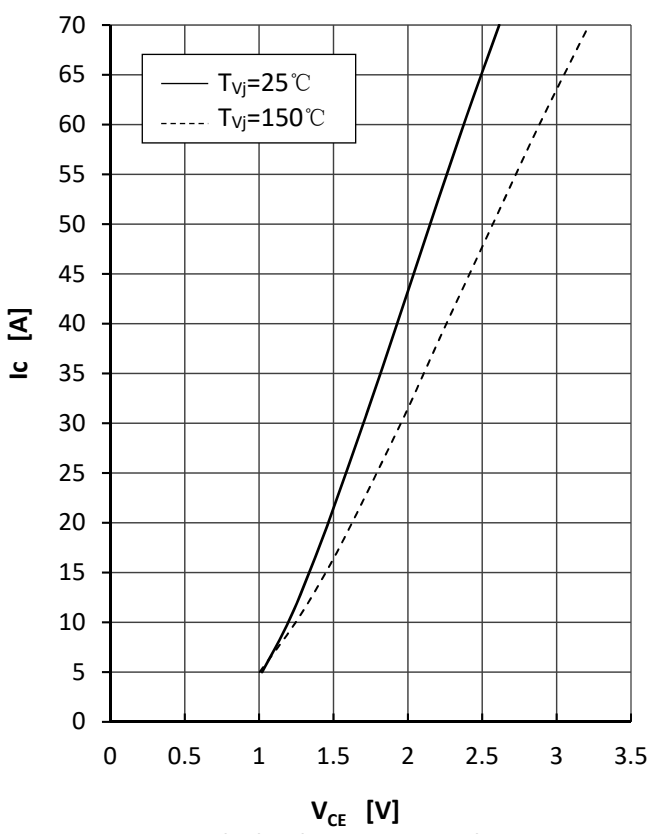


Fig12. IGBT-brake-Chopper output Characteristics

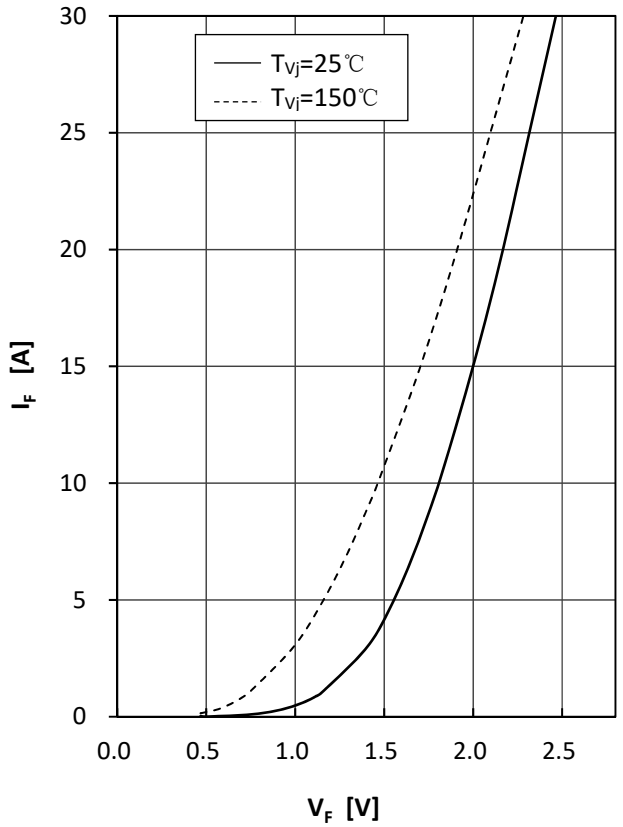


Fig13. Diode-brake-chopper Forward Characteristics

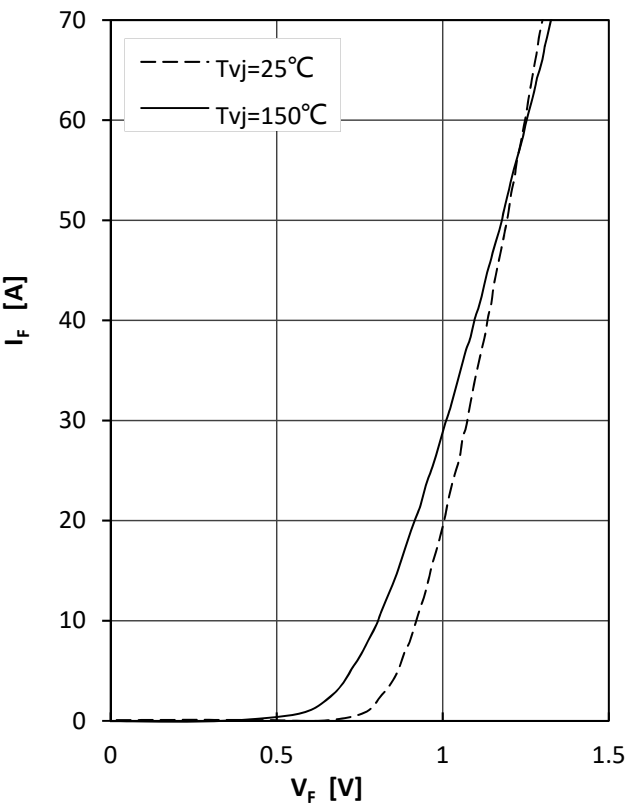
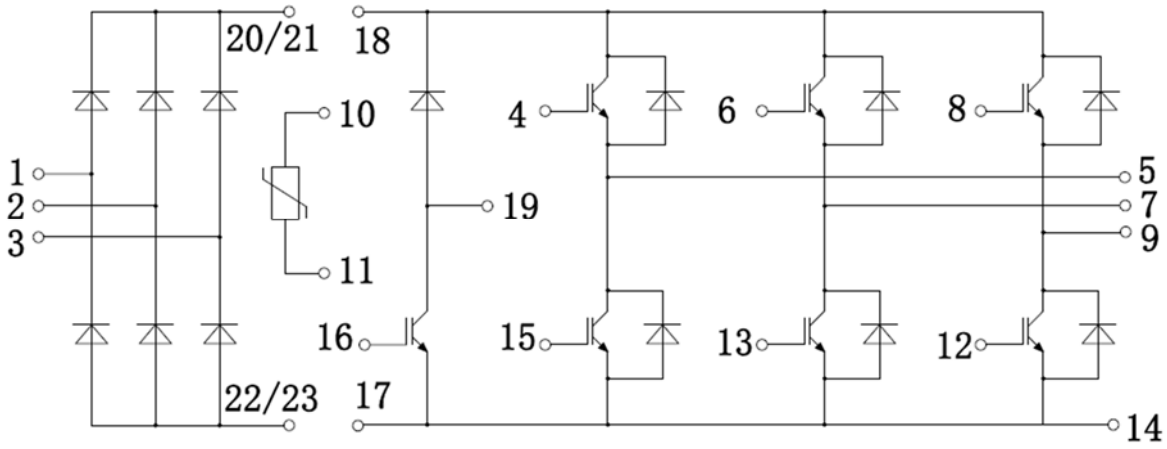
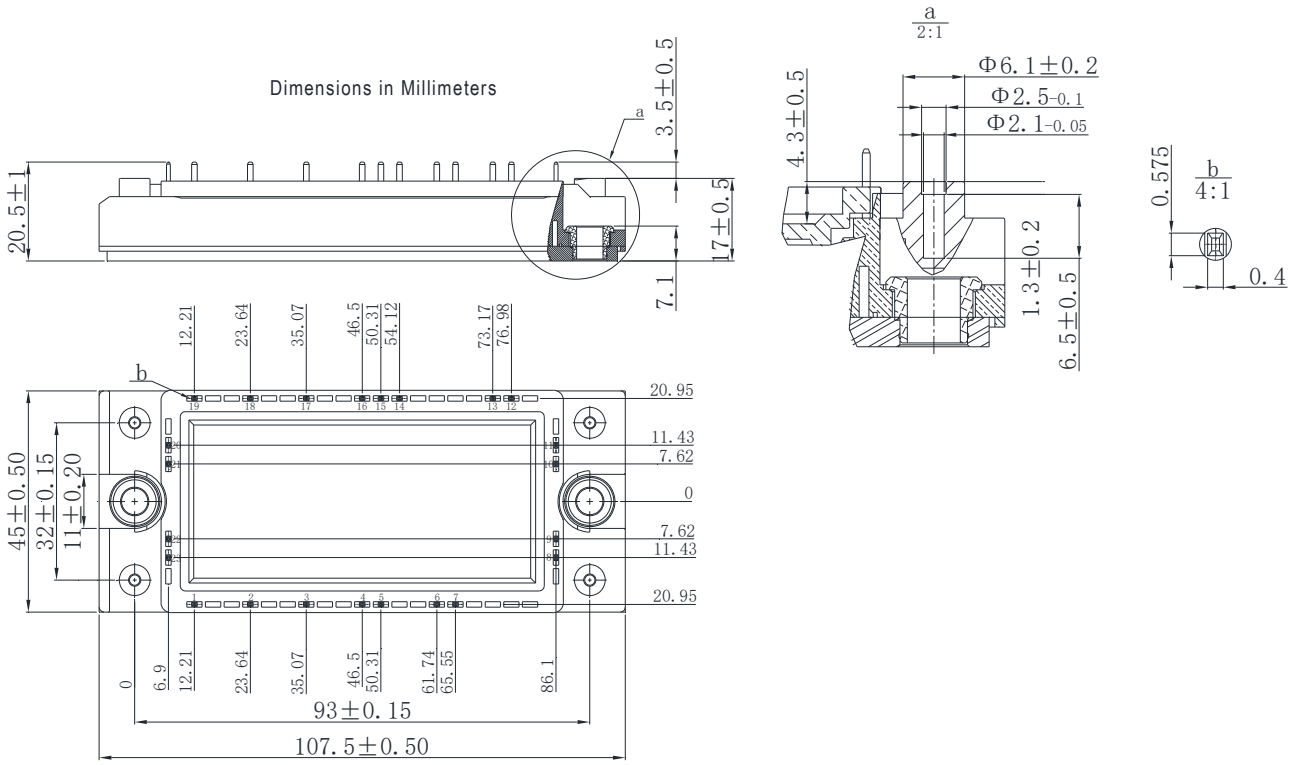


Fig14.Diode-Rectifier Foward Characteristics

- Circuit Diagram



- **Package Outline Information**



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