



IGBT Modules

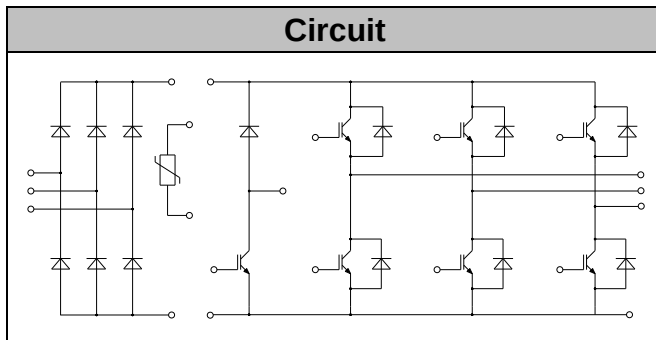
V_{CES}	1200V
I_C	50A

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(8us)
- Maximum junction temperature 175°C



● IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	50	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	100	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	272	W



● IGBT- inverter

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.7mA, T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=50A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.70		V
		$I_C=50A, V_{GE}=15V, T_{vj}=125^{\circ}C$		1.95		
		$I_C=50A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.05		
Gate Charge	Q_G			0.57		uC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		7.29		nF
Reverse Transfer Capacitance	C_{res}			0.09		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=50A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=15\Omega$ $T_{vj}=25^{\circ}C$		112		ns
Rise Time	t_r			134		ns
Turn-off Delay Time	$t_{d(off)}$			207		ns
Fall Time	t_f			230		ns
Energy Dissipation During Turn-on Time	E_{on}			5.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			3.4		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=50A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=15\Omega$ $T_{vj}=150^{\circ}C$		99		ns
Rise Time	t_r			138		ns
Turn-off Delay Time	$t_{d(off)}$			241		ns
Fall Time	t_f			293		ns
Energy Dissipation During Turn-on Time	E_{on}			7.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			4.5		mJ
SC Data	I_{sc}	$t_p \leq 8\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C,$ $V_{CC}=600V, V_{CEM} \leq 1200V$		200		A



● Diode-inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC Forward Current	I_F		50	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	100	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=50\text{A}, T_{vj}=25^{\circ}\text{C}$		1.95	2.80	V
		$I_F=50\text{A}, T_{vj}=125^{\circ}\text{C}$		1.85		
		$I_F=50\text{A}, T_{vj}=150^{\circ}\text{C}$		1.80		
Recovered Charge	Q_{rr}	$I_F=50\text{A}$		2.9		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=280\text{A}/\mu\text{s}$		20		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		0.95		mJ
Recovered Charge	Q_{rr}	$I_F=50\text{A}$		6.2		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=280\text{A}/\mu\text{s}$		28		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		2.2		mJ



● IGBT-brake-chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	25	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	50	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	165	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.2mA, T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=25A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.95	2.50	V
		$I_C=25A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.15		
		$I_C=25A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.25		
Gate Charge	Q_G			0.20		uC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		1.67		nF
Reverse Transfer Capacitance	C_{res}			0.056		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=25A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=25^{\circ}C$		10		ns
Rise Time	t_r			26		ns
Turn-off Delay Time	$t_{d(off)}$			82		ns
Fall Time	t_f			222		ns
Energy Dissipation During Turn-on Time	E_{on}			2.59		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.13		mJ



MG50P12MLE2

COMPLIANT
RoHS

Turn-on Delay Time	$t_{d(on)}$	$I_C=25A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=150^\circ C$		18		ns
Rise Time	t_r			27		ns
Turn-off Delay Time	$t_{d(off)}$			89		ns
Fall Time	t_f			262		ns
Energy Dissipation During Turn-on Time	E_{on}			2.92		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.43		mJ
SC Data	I_{sc}	$t_p \leq 8\mu s, V_{GE}=15V, T_{vj}=150^\circ C,$ $V_{CC}=600V, V_{CEM} \leq 1200V$		100		A

● Diode-Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^\circ C$	1200	V
Continuous DC Forward Current	I_F		20	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	40	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=20A, T_{vj}=25^\circ C$		2.10	2.80	V
		$I_F=20A, T_{vj}=125^\circ C$		1.95		
		$I_F=20A, T_{vj}=150^\circ C$		1.85		
Recovered Charge	Q_{rr}	$I_F=20A$		0.65		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1500A/\mu s$		20		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^\circ C$		0.71		mJ
Recovered Charge	Q_{rr}	$I_F=20A$		2.98		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1500A/\mu s$		21		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^\circ C$		1.25		mJ



● Diode-Rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1600	V
Average output Current 50/60Hz, sine wave	$I_{F(AV)}$	$T_C=100^{\circ}\text{C}$	50	A
Surge Forward Current	I_{FSM}	$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=25^{\circ}\text{C}$	520	A
I^2t -value	I^2t	$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=25^{\circ}\text{C}$	1300	A^2s

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	$I_F=50\text{A}, T_{vj}=150^{\circ}\text{C}$		1.15		V
Reverse Current	I_R	$T_{vj}=150^{\circ}\text{C}, V_R=1600\text{V}$			1.5	mA

● NTC-Thermistor

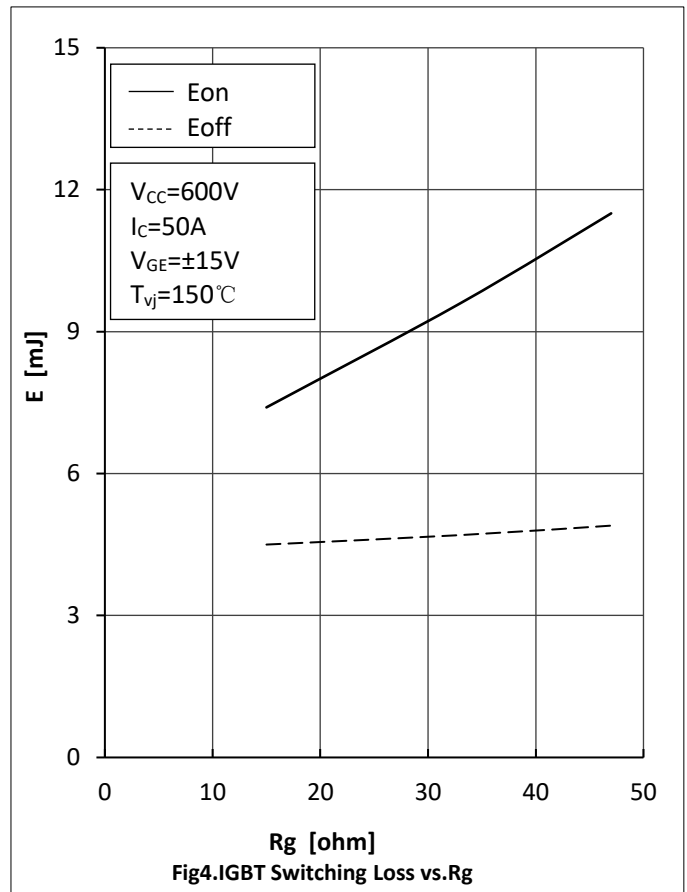
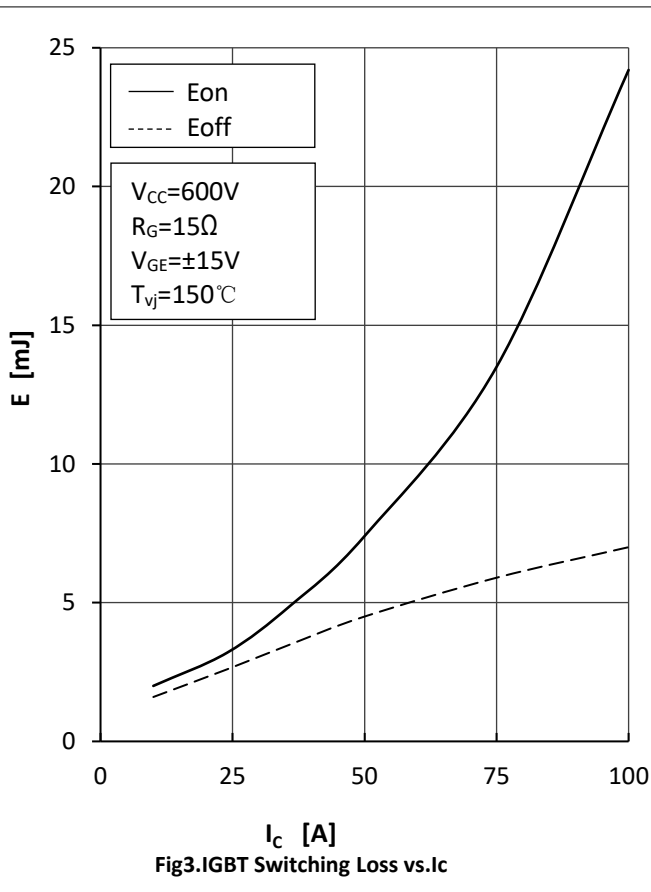
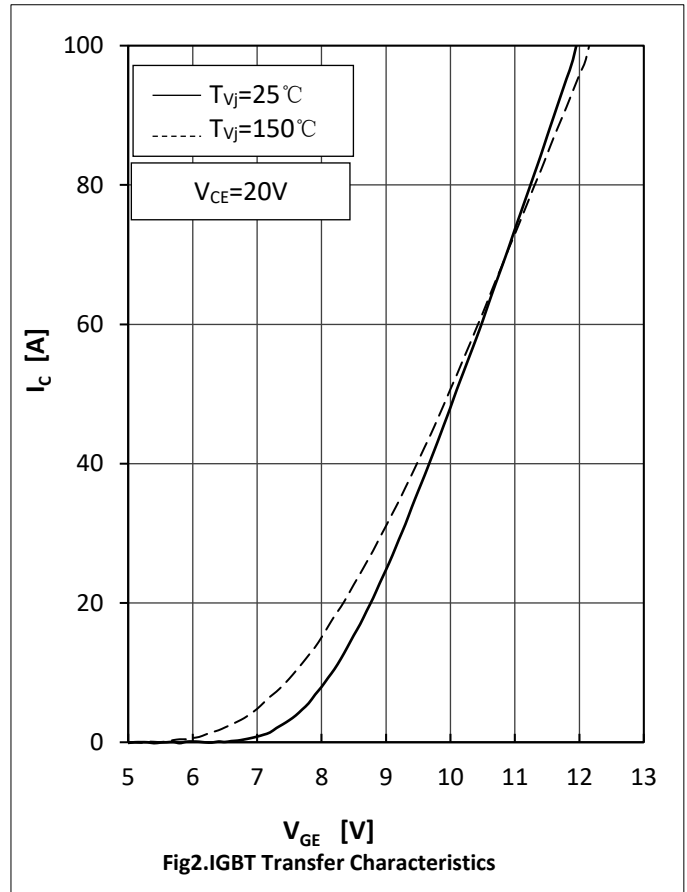
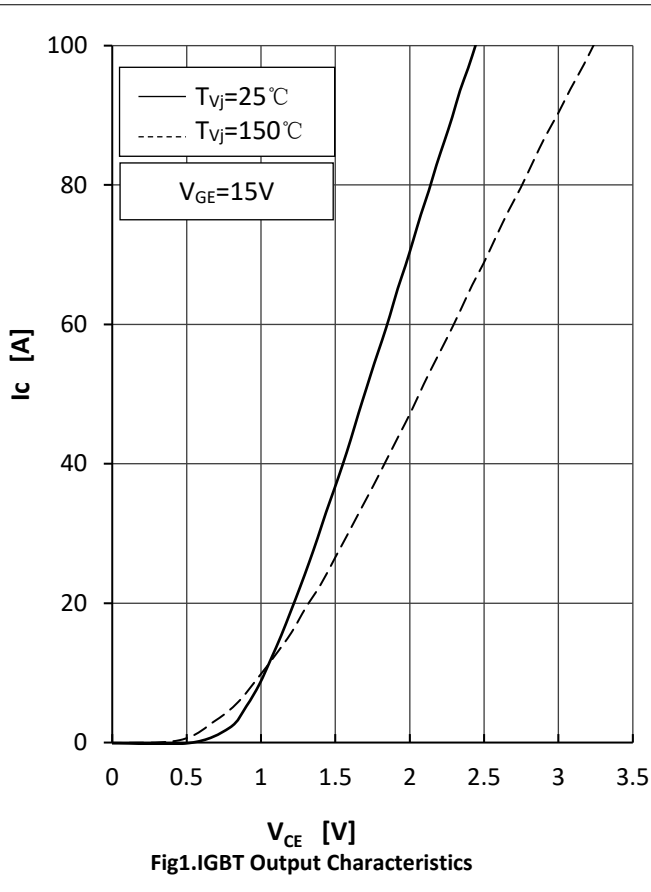
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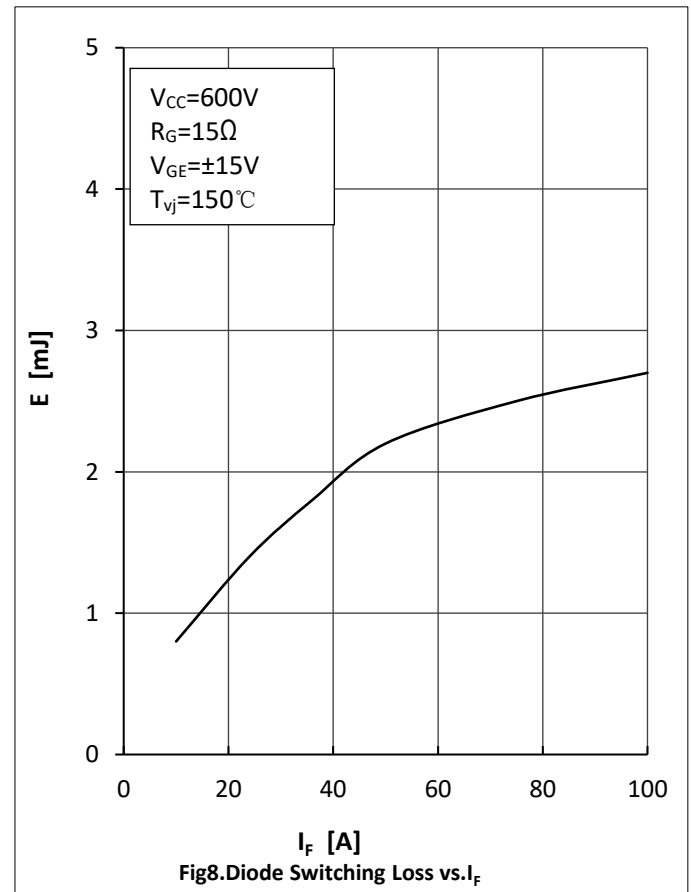
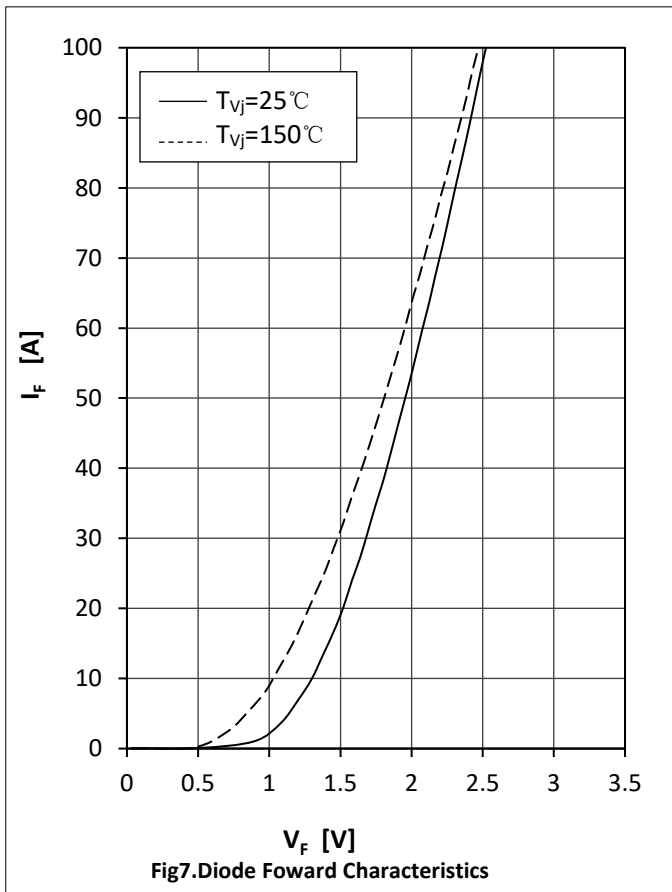
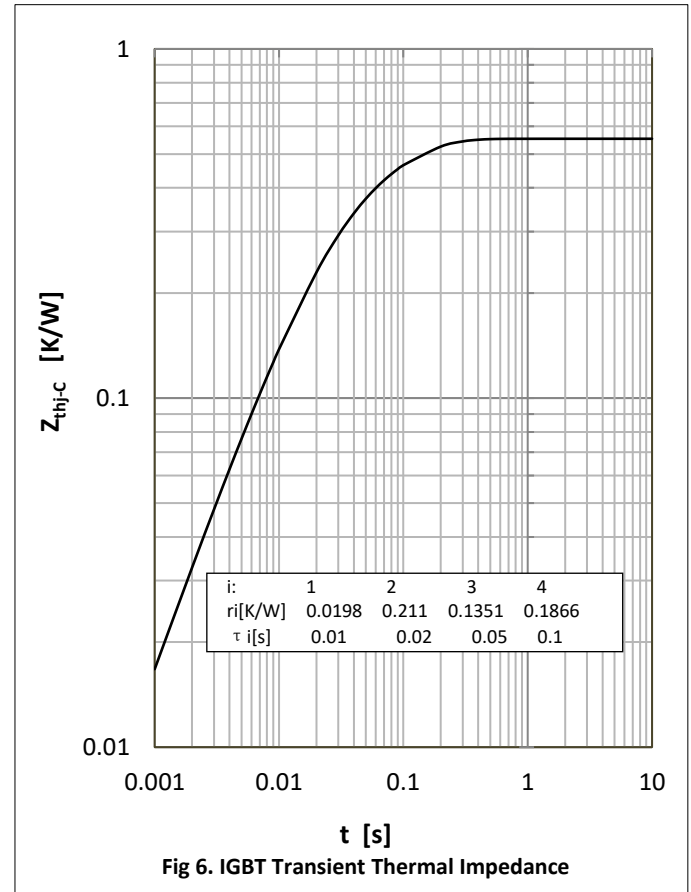
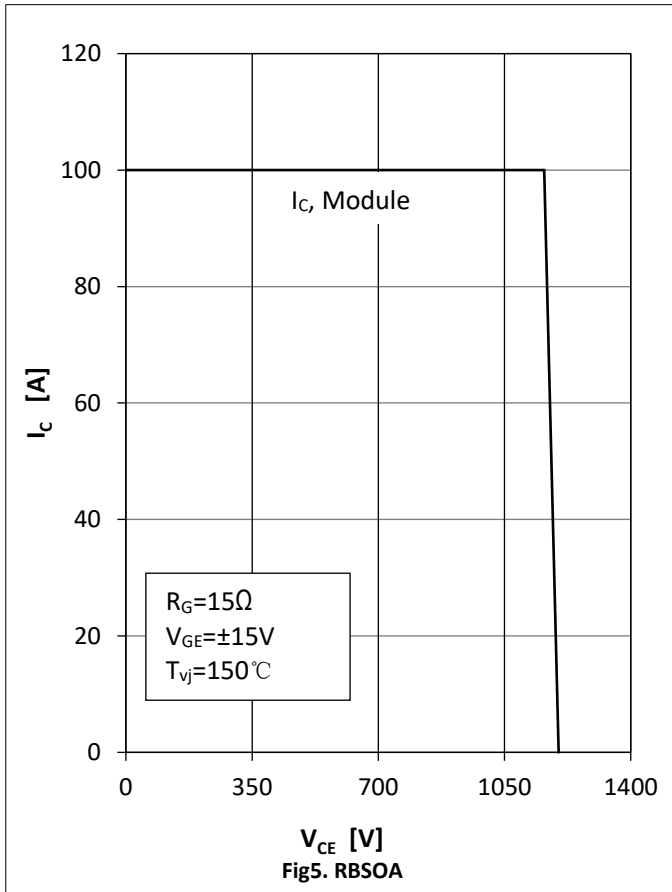
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		k Ω
Deviation of R_{100}	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

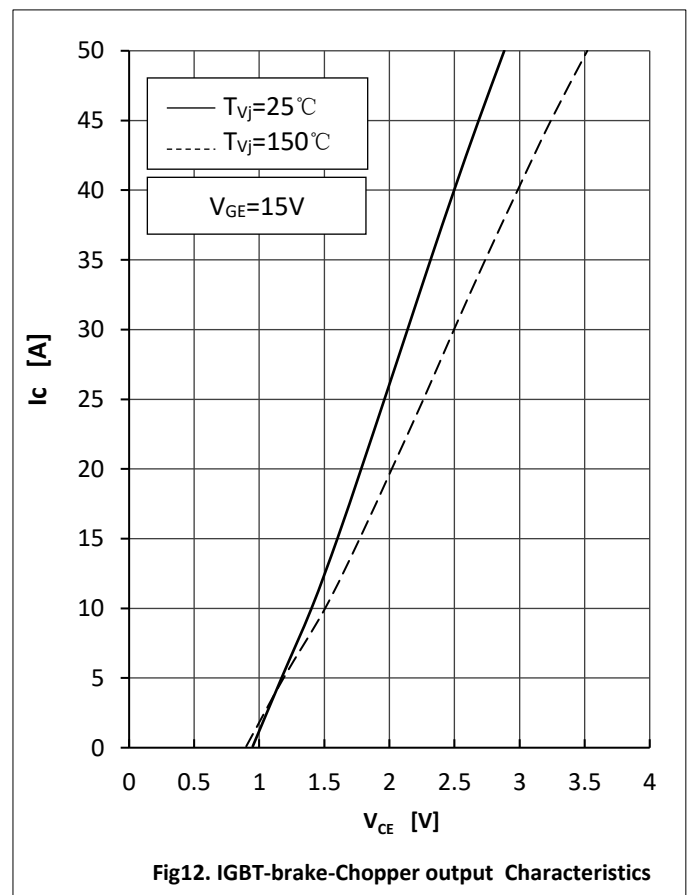
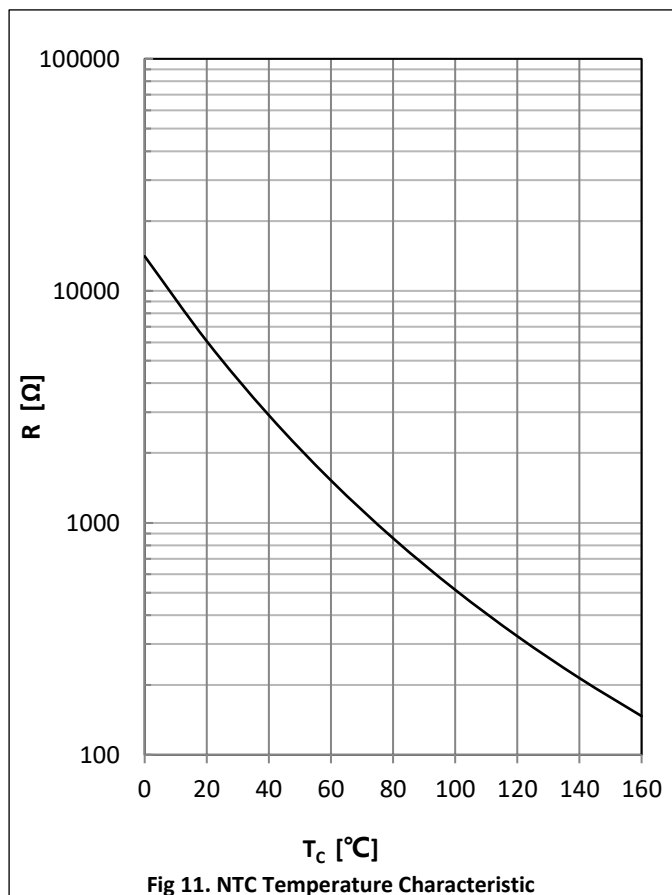
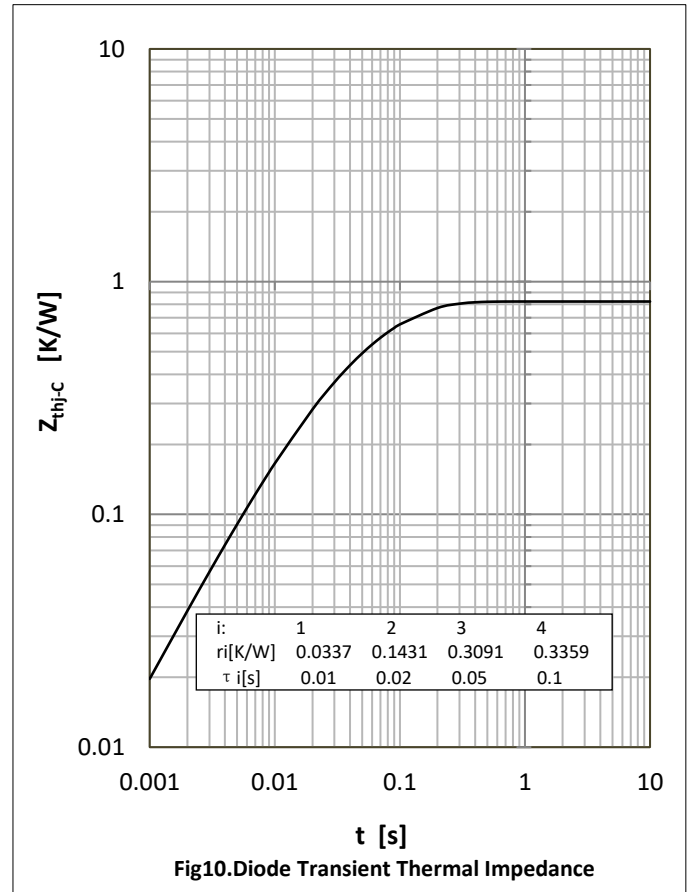
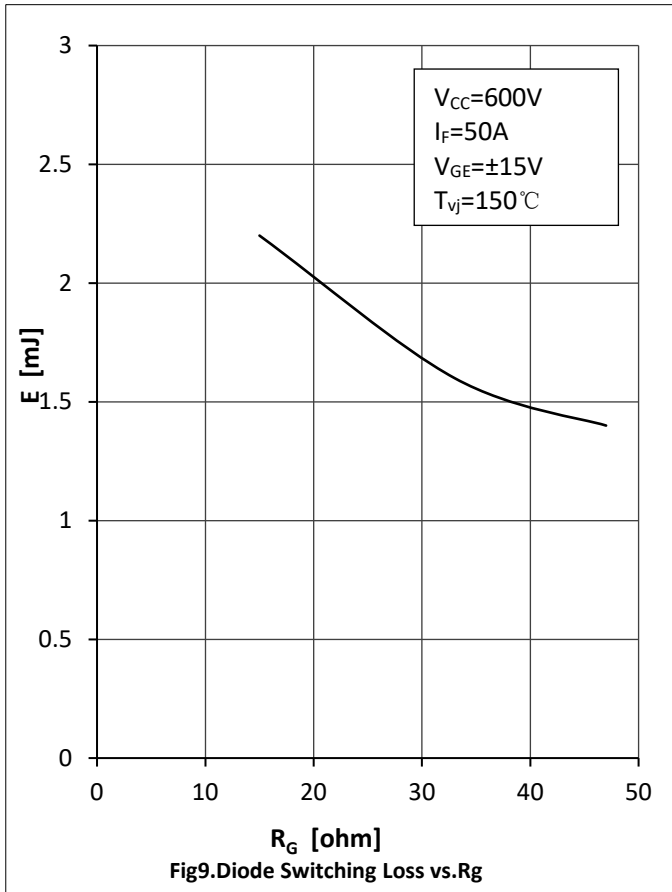


● **Module Characteristics** $T_C=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Stray-inductance-module	L_{SCE}			40		nH
Module Lead Resistance, Terminals-chip	$R_{\text{CC}'+\text{EE}'}$	$T_C=25^{\circ}\text{C}$, per switch		4.0		m Ω
	$R_{\text{AA}'+\text{CC}'}$			3.0		
Thermal Resistance Junction to Case	$R_{\theta\text{JC}}$	per IGBT-inverter			0.55	K/W
		per Diode-inverter			0.82	
		per IGBT-brake-chopper			0.90	
		per Diode-brake-chopper			1.50	
		per Diode-rectifier			0.80	
Thermal Resistance Case to Sink	$R_{\theta\text{CS}}$	per Module		0.009		K/W
Module-to-Sink Torque	M_s		3.0		6.0	N·m
Weight of Module	G			180		g







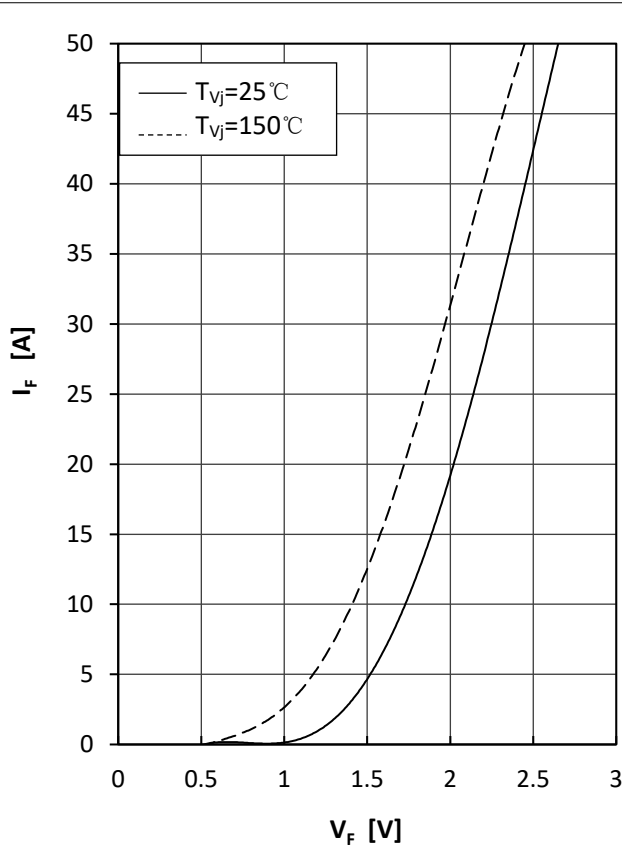
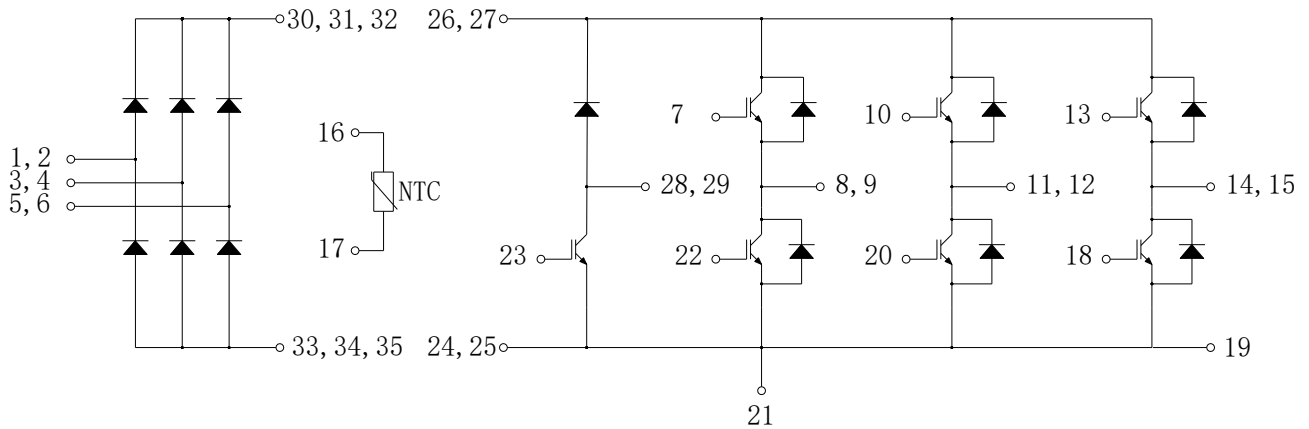


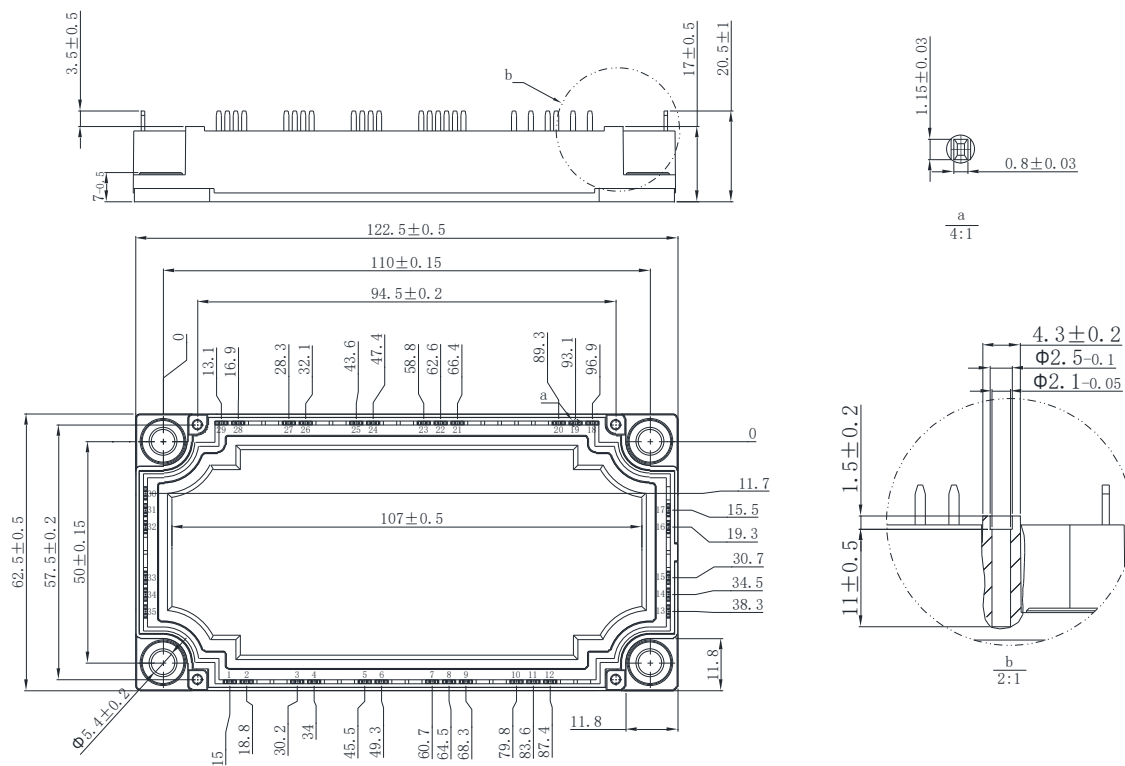
Fig13.Diode-brake-chopper Forward Characteristics



● Circuit Diagram



● Package Outline Information





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