

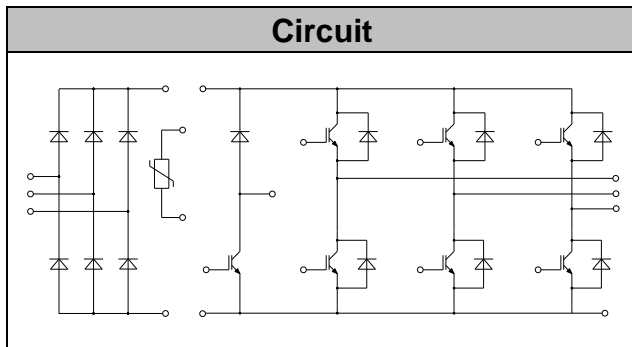


IGBT Modules

V_{CES}	1200V
I_c	75A

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°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	$T_c=100^{\circ}C, T_{vjmax}=175^{\circ}C$	75	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	150	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_c=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	405	W



● **IGBT- inverter**
Characteristic Values

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=3.3mA, T_{vj}=25^{\circ}C$	5.0	5.8	6.5	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	$V_{CE(sat)}$	$I_C=75A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.95	2.50	V	
		$I_C=75A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.20			
		$I_C=75A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.30			
Gate Charge	Q_G			0.85		uC	
Internal Gate Resistance	R_{gint}			10		Ω	
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		4.20		nF	
Reverse Transfer Capacitance	C_{res}			0.32		nF	
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA	
Turn-on Delay Time	$t_{d(on)}$	$I_C=75A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=2.2\Omega$ $T_{vj}=25^{\circ}C$		75		ns	
Rise Time	t_r			40		ns	
Turn-off Delay Time	$t_{d(off)}$				163		ns
Fall Time	t_f				235		ns
Energy Dissipation During Turn-on Time	E_{on}				4.71		mJ
Energy Dissipation During Turn-off Time	E_{off}				5.45		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=75A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=2.2\Omega$ $T_{vj}=150^{\circ}C$		77		ns	
Rise Time	t_r			47		ns	
Turn-off Delay Time	$t_{d(off)}$				173		ns
Fall Time	t_f				309		ns
Energy Dissipation During Turn-on Time	E_{on}				6.73		mJ
Energy Dissipation During Turn-off Time	E_{off}				6.24		mJ
SC Data	I_{SC}	$t_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C,$ $V_{CC}=900V, V_{CEM} \leq 1200V$		300		A	



● Diode-inverter

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		75	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	150	A
I^2t -value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	810	A ² s
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	690	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=75A, T_{vj}=25^{\circ}C$		1.95	2.80	V
		$I_F=75A, T_{vj}=125^{\circ}C$		1.78		
		$I_F=75A, T_{vj}=150^{\circ}C$		1.70		
Recovered Charge	Q_{rr}	$I_F=75A$		2.1		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1700A/us$		53		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}C$		0.35		mJ
Recovered Charge	Q_{rr}	$I_F=75A$		5.8		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1700A/us$		56		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}C$		1.67		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	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	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}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	270	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.7mA, T_{vj}=25^{\circ}C$	5.0	5.7	6.5	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	$V_{CE(sat)}$	$I_C=50A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.90	2.50	V	
		$I_C=50A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.25			
		$I_C=50A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.32			
Gate Charge	Q_G			0.35		μC	
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$		2.60		nF	
Reverse Transfer Capacitance	C_{res}	$f=1MHz, T_{vj}=25^{\circ}C$		0.10		nF	
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA	
Turn-on Delay Time	$t_{d(on)}$	$I_C=50A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=25^{\circ}C$		41		ns	
Rise Time	t_r			48		ns	
Turn-off Delay Time	$t_{d(off)}$			160		ns	
Fall Time	t_f			244		ns	
Energy Dissipation During Turn-on Time	E_{on}			5.92		mJ	
Energy Dissipation During Turn-off Time	E_{off}			3.39		mJ	
Turn-on Delay Time	$t_{d(on)}$		$I_C=50A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=150^{\circ}C$		45		ns
Rise Time	t_r				50		ns
Turn-off Delay Time	$t_{d(off)}$				169		ns
Fall Time	t_f				302		ns
Energy Dissipation During Turn-on Time	E_{on}			6.87		mJ	
Energy Dissipation During Turn-off Time	E_{off}			3.73		mJ	
SC Data	I_{SC}	$t_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C,$ $V_{CC}=900V, V_{CEM} \leq 1200V$			200		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		35	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	70	A
I^2t -value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	240	A^2s
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	220	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max	
Forward Voltage	V_F	$I_F=35A, T_{vj}=25^{\circ}C$		1.95	2.80	V
		$I_F=35A, T_{vj}=125^{\circ}C$		1.78		
		$I_F=35A, T_{vj}=150^{\circ}C$		1.69		
Recovered Charge	Q_{rr}	$I_F=35A$		2.35		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1600A/\mu s$		21		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}C$		0.67		mJ
Recovered Charge	Q_{rr}	$I_F=35A$		3.81		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1600A/\mu s$		25		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}C$		1.13		mJ



● Diode-rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1600	V
Average output Current 50/60Hz, sine wave	$I_{F(AV)}$	$T_C=100^{\circ}C$	80	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	$T_C=100^{\circ}C$	120	A
Surge Forward Current	I_{FSM}	$V_R=0V, t_p=10ms, T_{vj}=25^{\circ}C$	1200	A
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	1000	A
I^2t -value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=25^{\circ}C$	7200	A ² s
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	5000	A ² s

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	$I_F=50A, T_J=125^{\circ}C$		0.98		V
Reverse Current	I_R	$T_{vj}=125^{\circ}C, V_R=1600V$			2.0	mA

● NTC-Thermistor

Characteristic Values

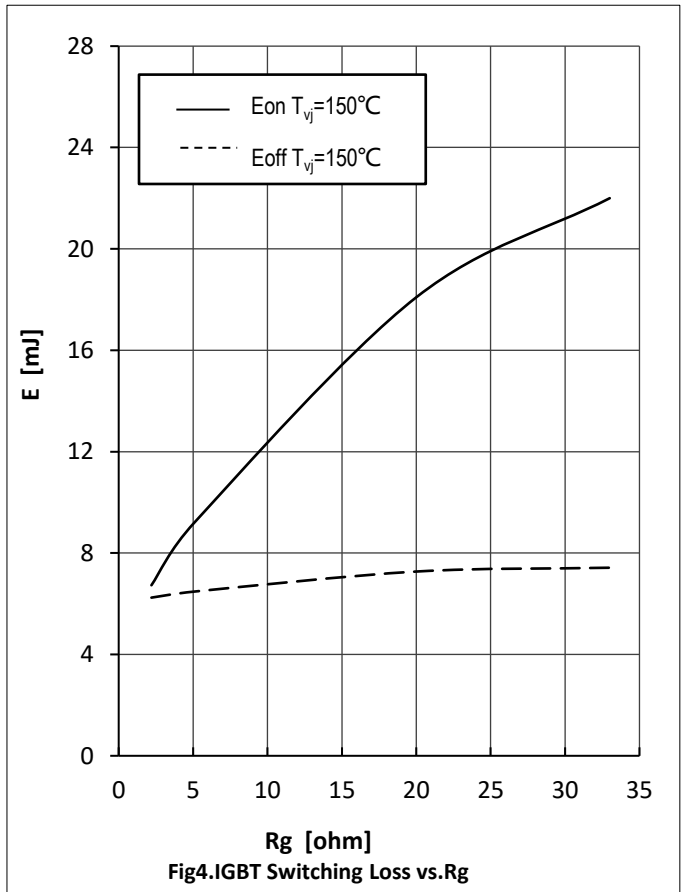
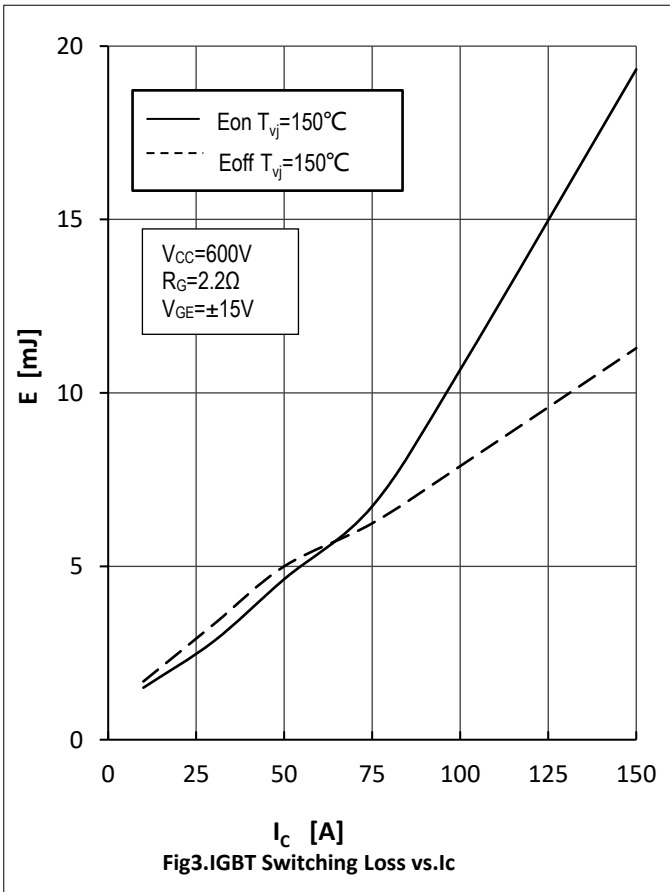
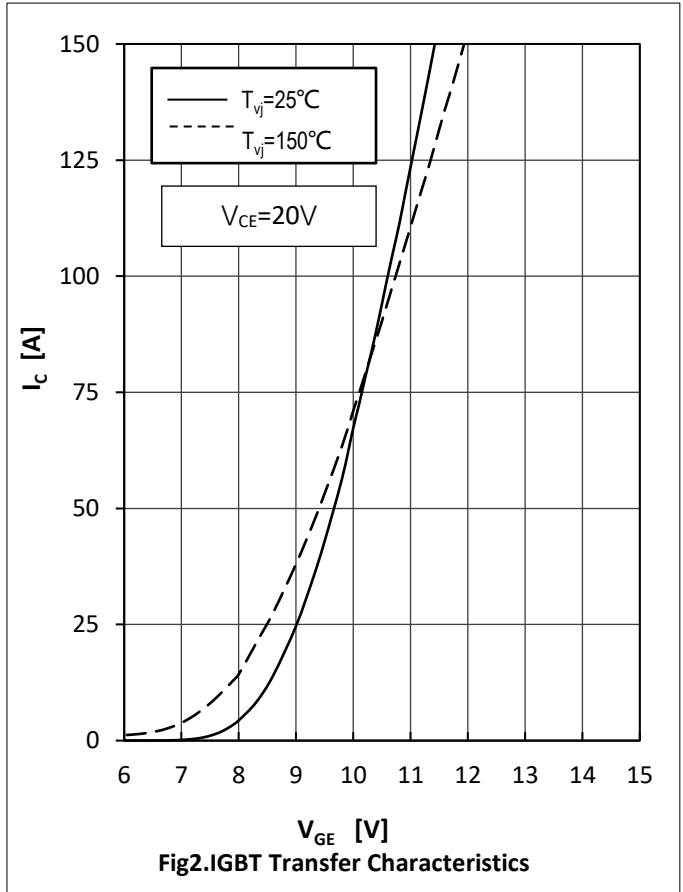
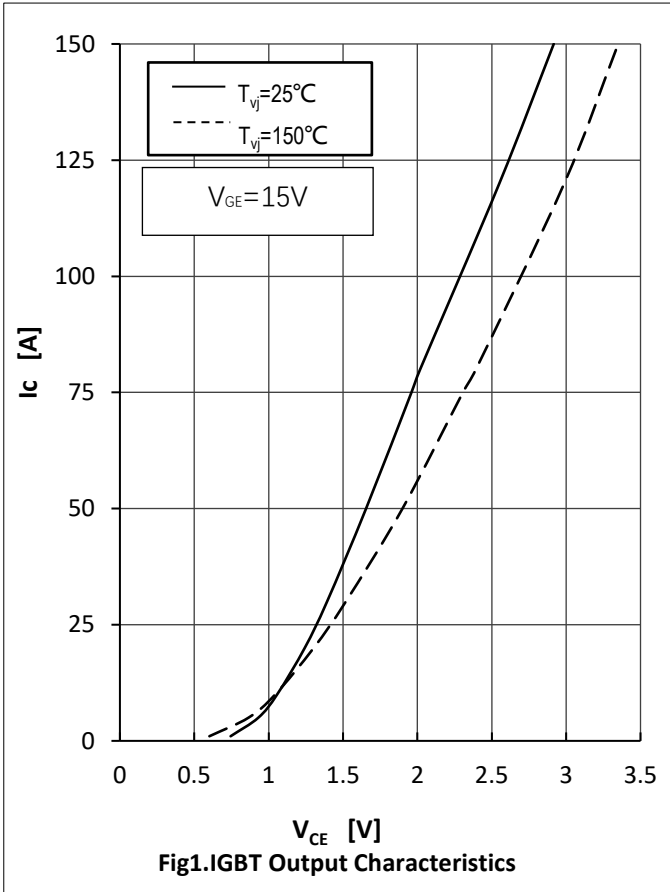
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		k Ω
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3 \Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15 K))]$		3375		K

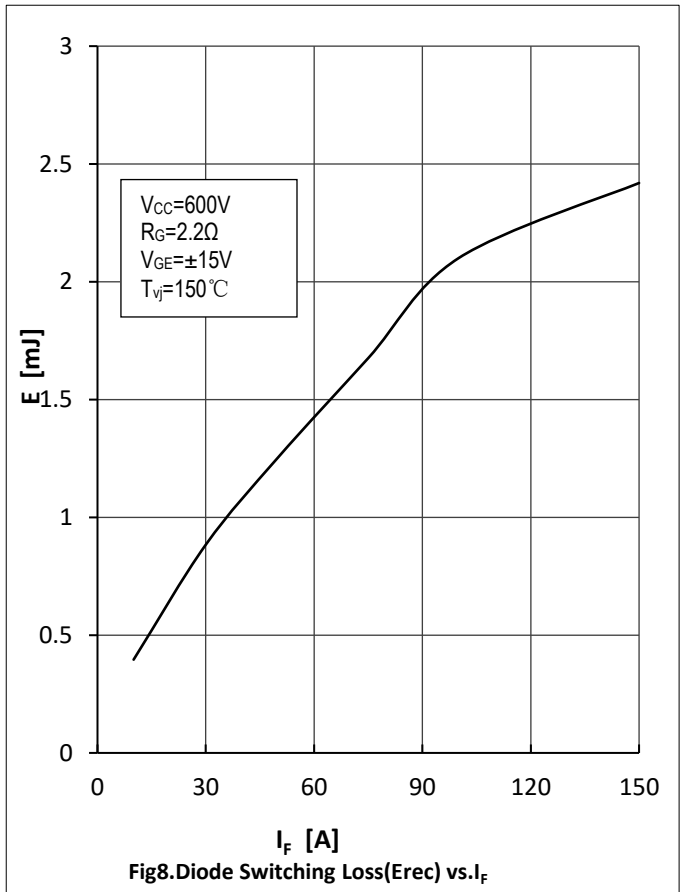
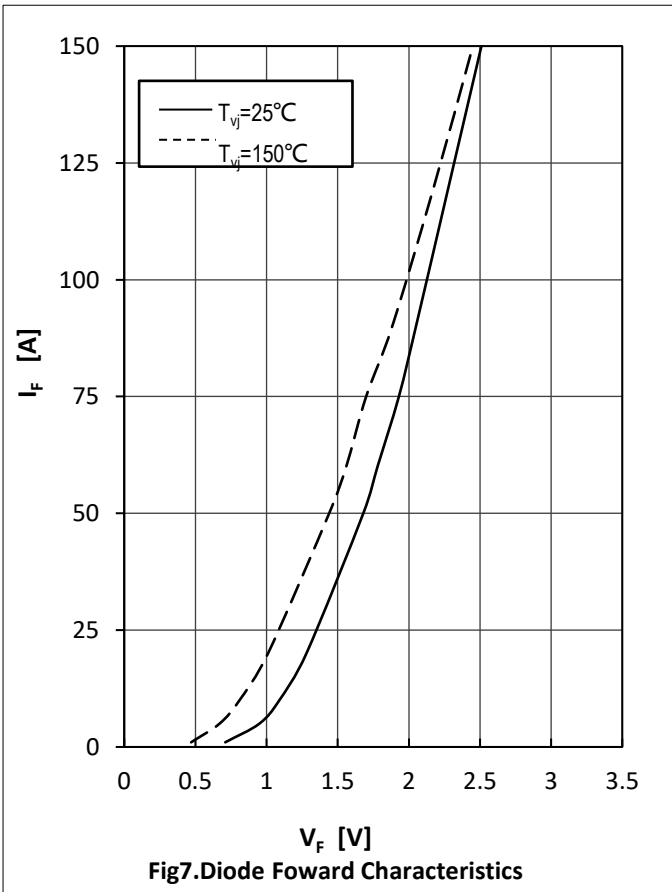
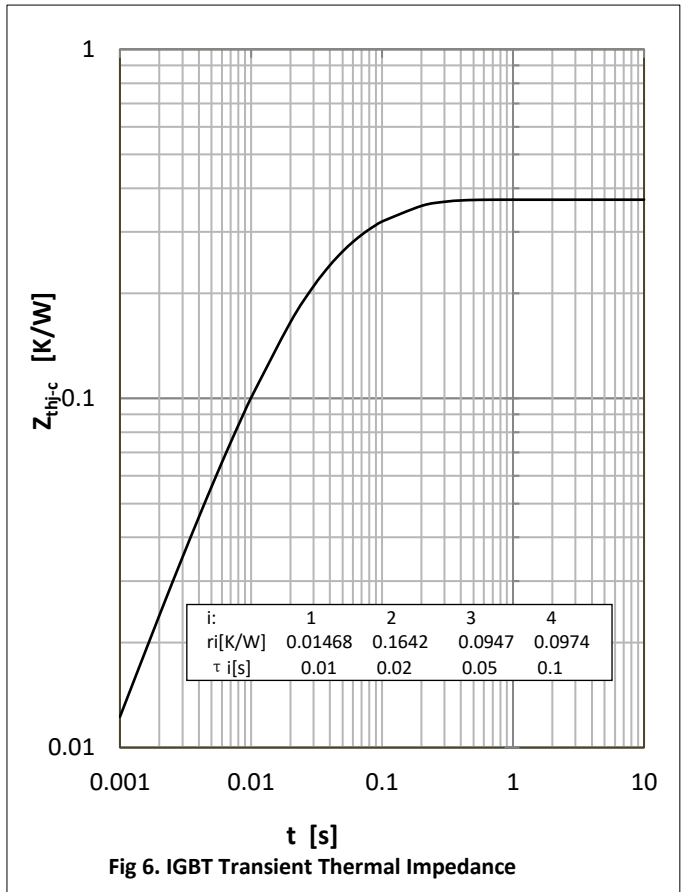
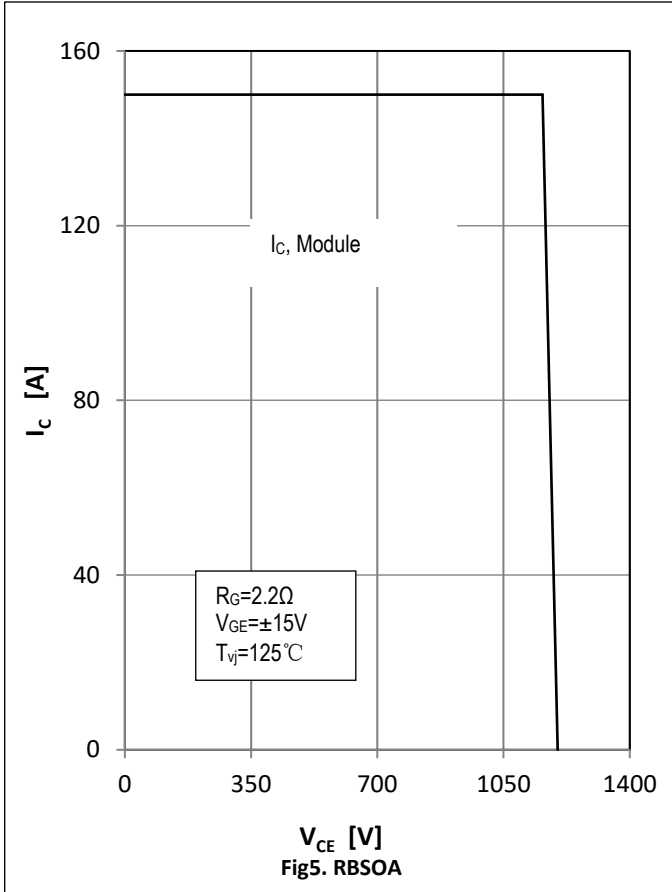


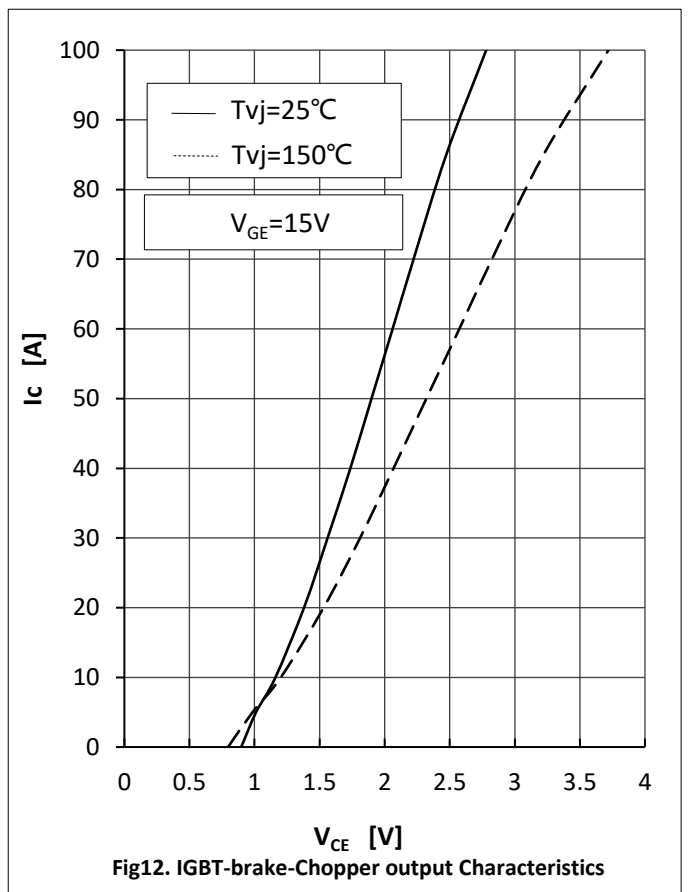
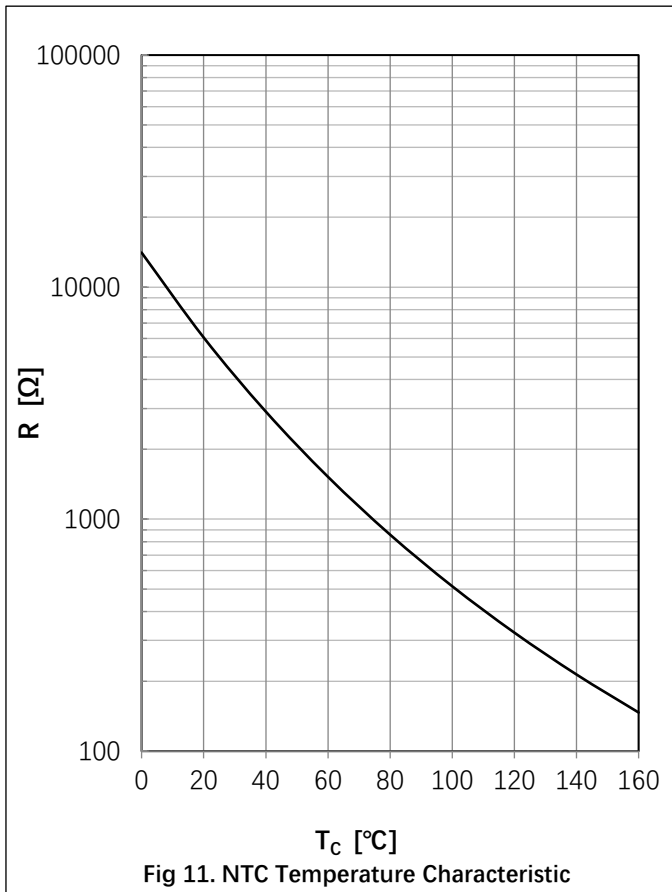
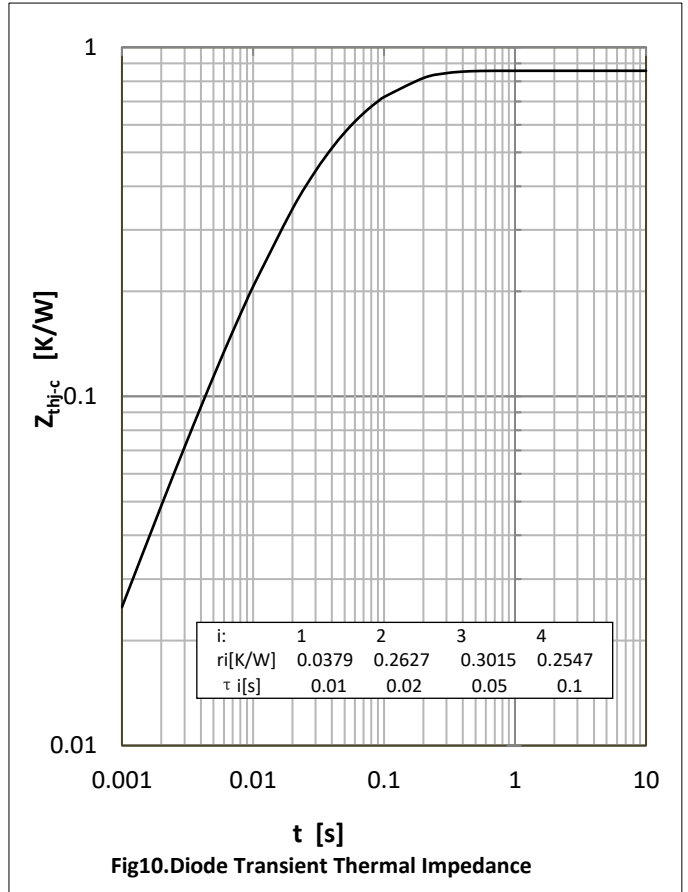
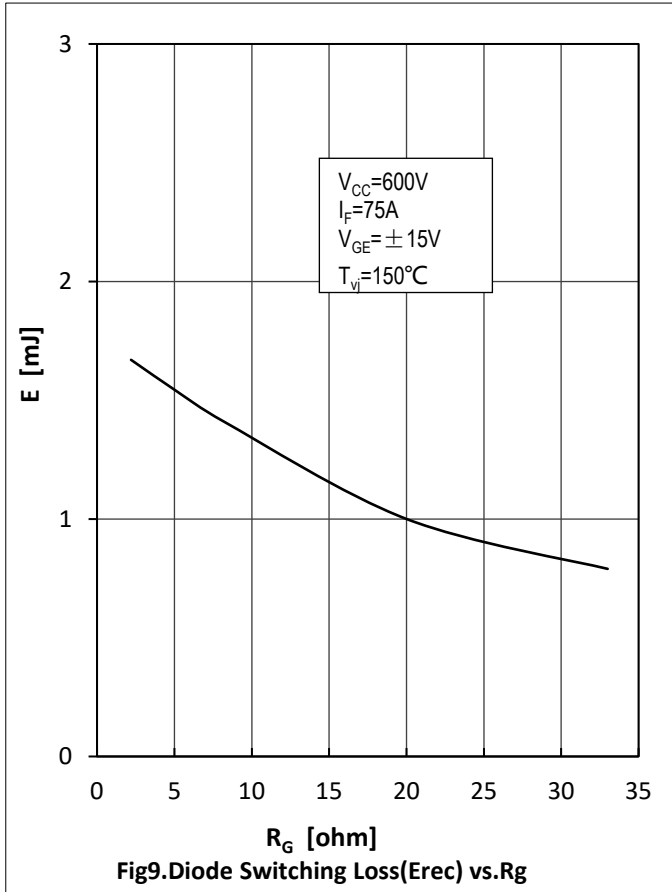
● Module Characteristics

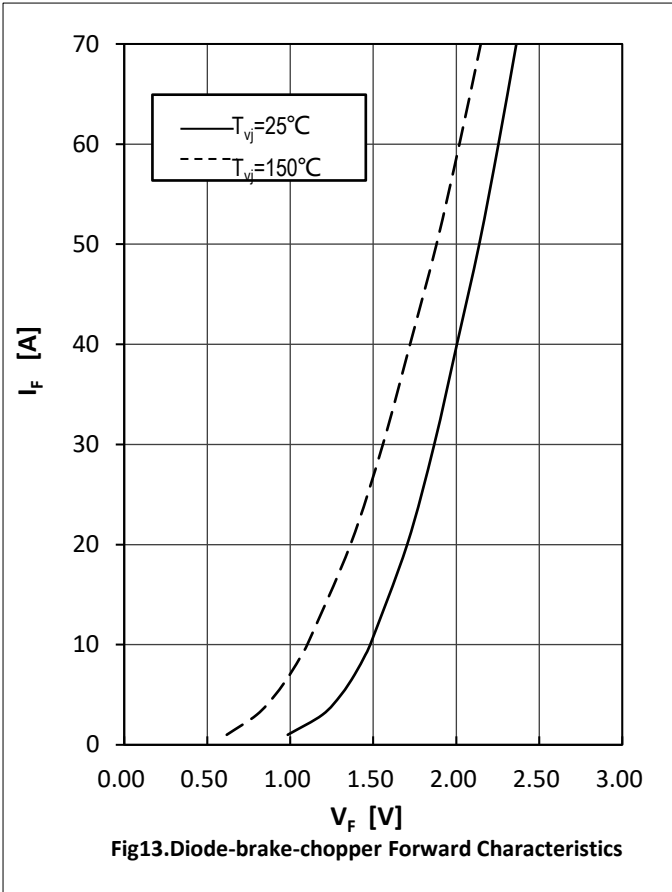
$T_C=25^{\circ}\text{C}$ unless otherwise specified

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}			60		nH
Comparative Tracking Index	CTI		200			
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			0.37	K/W
		per Diode-inverter			0.85	
		per IGBT-brake-chopper			0.55	
		per Diode-chopper			1.30	
		per Diode-rectifier			0.65	
Thermal Resistance Case-to Sink	$R_{\theta\text{CS}}$	per IGBT-inverter		0.121		K/W
		per Diode-inverter		0.221		
		per IGBT-brake-chopper		0.180		
		per Diode-chopper		0.452		
		per Diode-rectifier		0.227		
		per Module		0.009		
Module-to-Sink Torque	M_s		3.0		6.0	N·m
Weight of Module	G			300		g











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