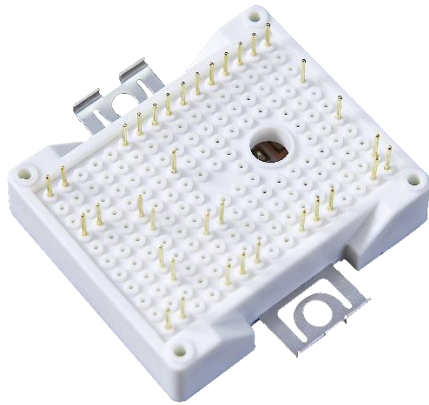


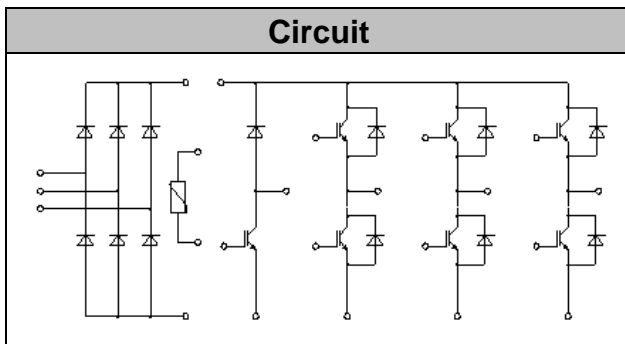
## IGBT Modules



$V_{CES}$	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)
- Isolated heatsink using DBC technology
- 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	$I_c$	$T_c=100^{\circ}C, T_{vjmax}=175^{\circ}C$	35	A
Repetitive Peak Collector Current	$I_{CRM}$	$t_p=1ms$	70	A
Gate-Emitter Voltage	$V_{GES}$	$T_{vj}=25^{\circ}C$	$\pm 20$	V
Total Power Dissipation	$P_{tot}$	$T_c=25^{\circ}C, T_{vjmax}=175^{\circ}C$	210	W



## ● IGBT- inverter

### Characteristic Values

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.4mA, T_{vj}=25^{\circ}C$	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	$V_{CE(sat)}$	$I_C=35A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.82	2.50	V	
		$I_C=35A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.00			
		$I_C=35A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.10			
Gate Charge	$Q_G$			0.27		uC	
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		2.5		nF	
Reverse Transfer Capacitance	$C_{res}$			0.087		nF	
Gate-Emitter leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA	
Turn-on Delay Time	$t_{d(on)}$	$I_C=35A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=25^{\circ}C$		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	$t_{d(on)}$		$I_C=35A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=150^{\circ}C$		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	$I_{SC}$	$t_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C,$ $V_{CC}=900V, V_{CEM} \leq 1200V$			140		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	$I_F$		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 <sup>2</sup> s
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	220	

### Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	$V_F$	$I_F=35A, T_{vj}=25^{\circ}C$		2.10	2.80	V
		$I_F=35A, T_{vj}=125^{\circ}C$		1.95		
		$I_F=35A, T_{vj}=150^{\circ}C$		1.85		
Recovered Charge	$Q_{rr}$	$I_F=35A$		0.85		uC
Peak Reverse Recovery Current	$I_{rr}$	$V_R=600V$ $-di_F/dt = 900A/us$		23		A
Reverse Recovery Energy	$E_{rec}$	$T_{vj}=25^{\circ}C$		0.95		mJ
Recovered Charge	$Q_{rr}$	$I_F=35A$		4.75		uC
Peak Reverse Recovery Current	$I_{rr}$	$V_R=600V$ $-di_F/dt = 900A/us$		25		A
Reverse Recovery Energy	$E_{rec}$	$T_{vj}=125^{\circ}C$		1.66		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	$I_C$	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	35	A
Repetitive Peak Collector Current	$I_{CRM}$	$t_p=1ms$	70	A
Gate-Emitter Voltage	$V_{GES}$	$T_{vj}=25^{\circ}C$	$\pm 20$	V
Total Power Dissipation	$P_{tot}$	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	210	W

**Characteristic Values**

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.4mA, T_{vj}=25^{\circ}C$	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	$V_{CE(sat)}$	$I_C=35A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.82	2.50	V
		$I_C=35A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.00		
		$I_C=35A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.10		
Gate Charge	$Q_G$			0.27		uC
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25^{\circ}C$		2.5		nF
Reverse Transfer Capacitance	$C_{res}$			0.087		nF
Gate-Emitter leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=35A, V_{CE}=600V, V_{GE}=\pm 15V, R_G=20\Omega, T_{vj}=25^{\circ}C$		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	$t_{d(on)}$	$I_C=35A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=20\Omega$ $T_{vj}=150^\circ C$		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	$I_{SC}$		$t_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^\circ C,$ $V_{CC}=900V, V_{CEM} \leq 1200V$	140		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	$I_F$		15	A
Repetitive Peak Forward Current	$I_{FRM}$	$t_p=1ms$	30	A
$I^2t$ -value	$I^2t$	$V_R=0V, t_p=10ms, T_{vj}=125^\circ C$	16.0	A <sup>2</sup> s
		$V_R=0V, t_p=10ms, T_{vj}=150^\circ C$	14.0	

### Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	$V_F$	$I_F=15A, T_{vj}=25^\circ C$		2.00	2.80	V
		$I_F=15A, T_{vj}=125^\circ C$		1.80		
		$I_F=15A, T_{vj}=150^\circ C$		1.75		
Recovered Charge	$Q_{rr}$	$I_F=15A$		0.45		uC
Peak Reverse Recovery Current	$I_{rr}$	$V_R=600V$ $-di_F/dt = 600A/\mu s$		13		A
Reverse Recovery Energy	$E_{rec}$	$T_{vj}=25^\circ C$		0.49		mJ
Recovered Charge	$Q_{rr}$	$I_F=15A$		0.54		uC
Peak Reverse Recovery Current	$I_{rr}$	$V_R=600V$ $-di_F/dt = 600A/\mu s$		14		A
Reverse Recovery Energy	$E_{rec}$	$T_{vj}=150^\circ C$		0.68		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	$I_{F(AV)}$	$T_C=100^{\circ}C$	35	A
Maximum RMS Current at Rectifier Output	$I_{RMSM}$	$T_C=100^{\circ}C$	60	A
Surge Forward Current	$I_{FSM}$	$V_R=0V, t_p=10ms, T_{vj}=25^{\circ}C$	420	A
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	350	A
I <sup>2</sup> t-value	I <sup>2</sup> t	$V_R=0V, t_p=10ms, T_{vj}=25^{\circ}C$	880	A <sup>2</sup> s
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	610	A <sup>2</sup> s

### Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	$V_F$	$I_F=10A, T_{vj}=150^{\circ}C$		1.02		V
Reverse Current	$I_R$	$T_{vj}=150^{\circ}C, V_R=1600V$			2	mA

## ● NTC-Thermistor

### Characteristic values

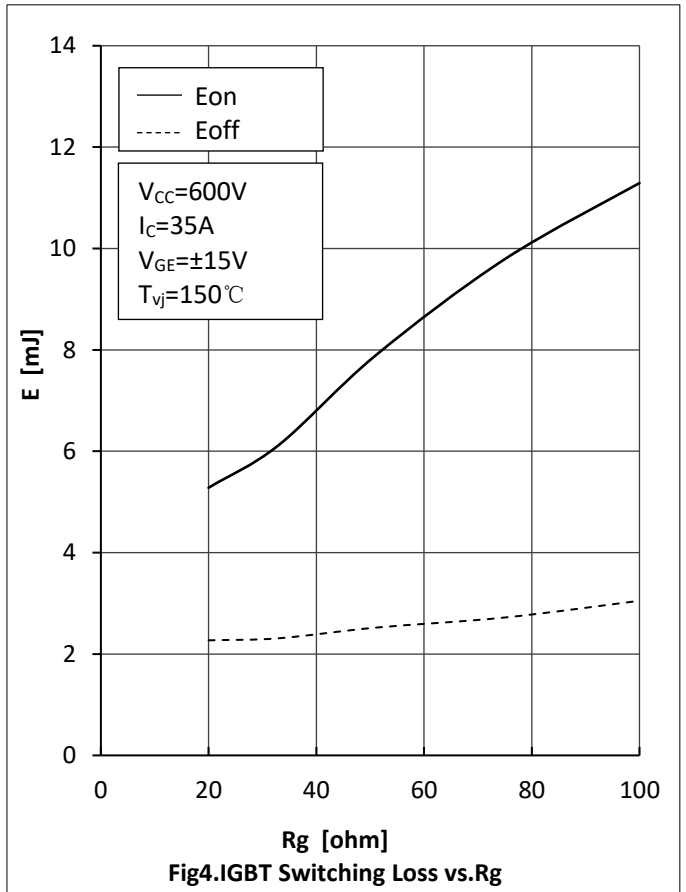
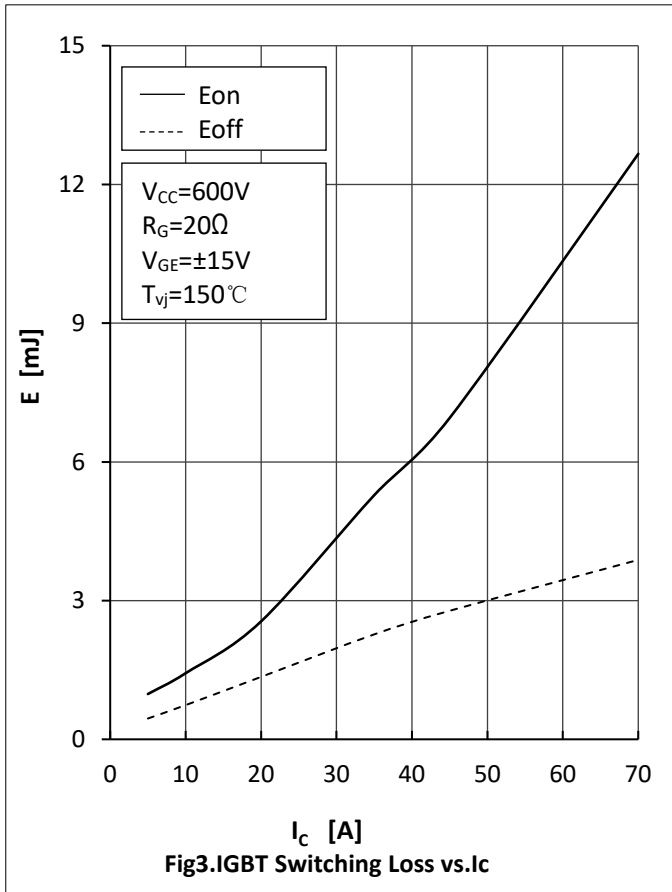
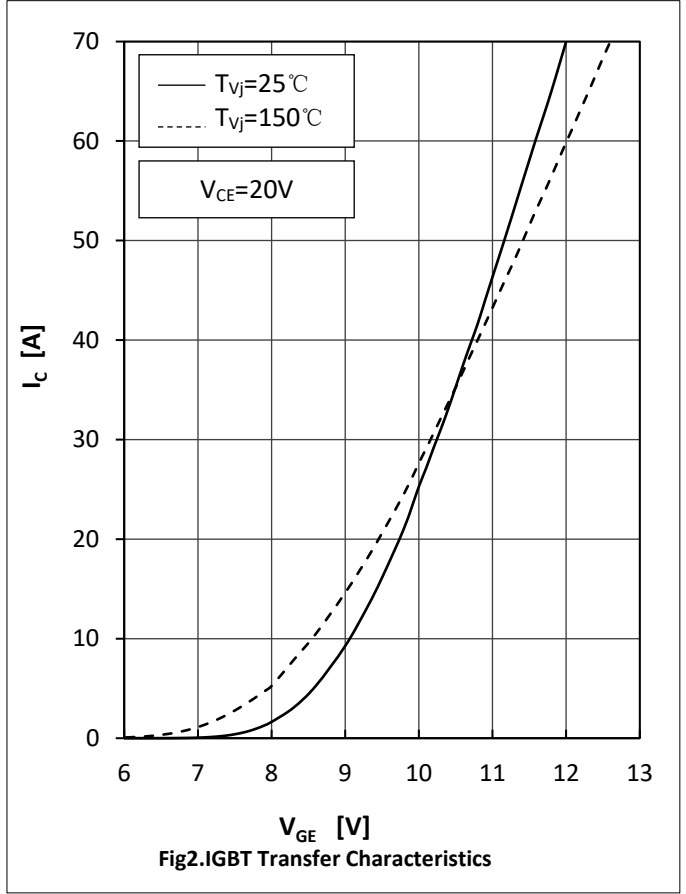
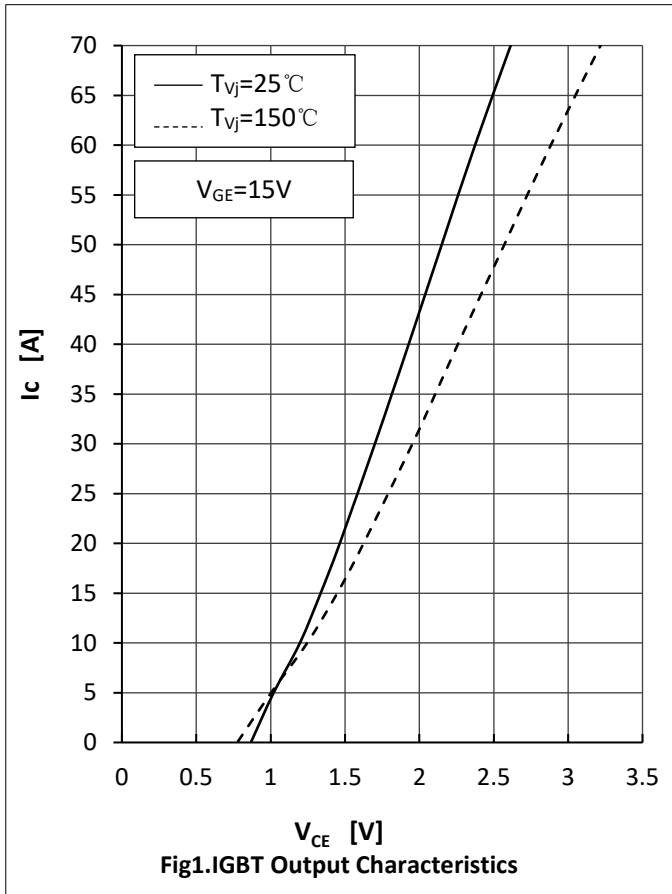
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	$R_{25}$			5.0		kΩ
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	$P_{25}$				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15 K))]$		3375		K



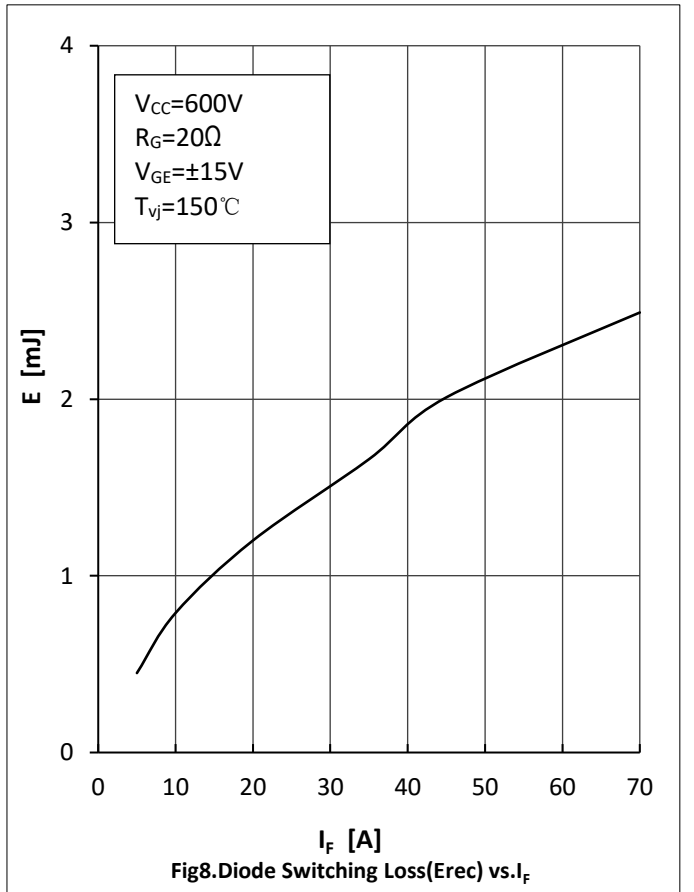
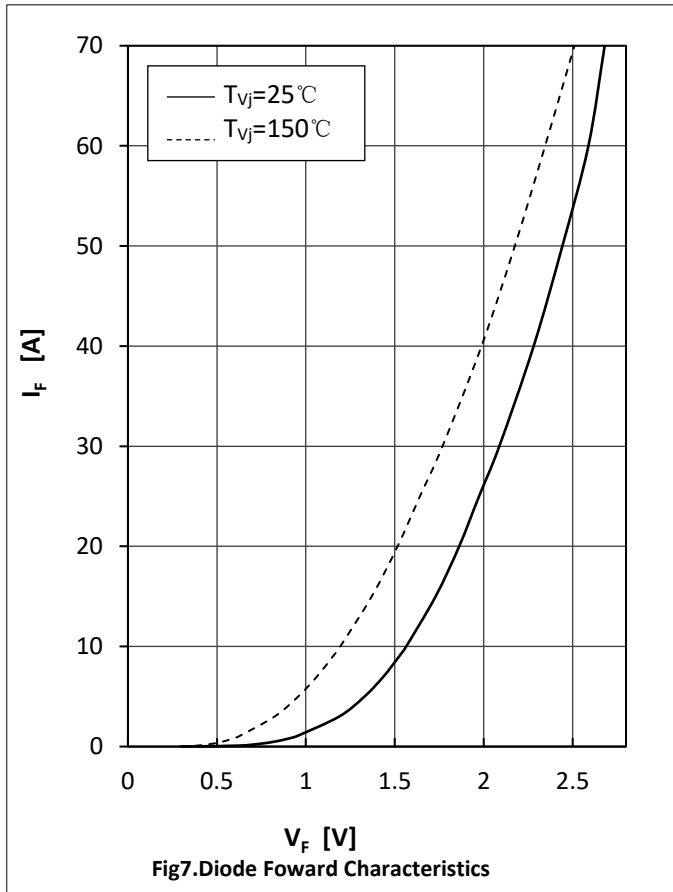
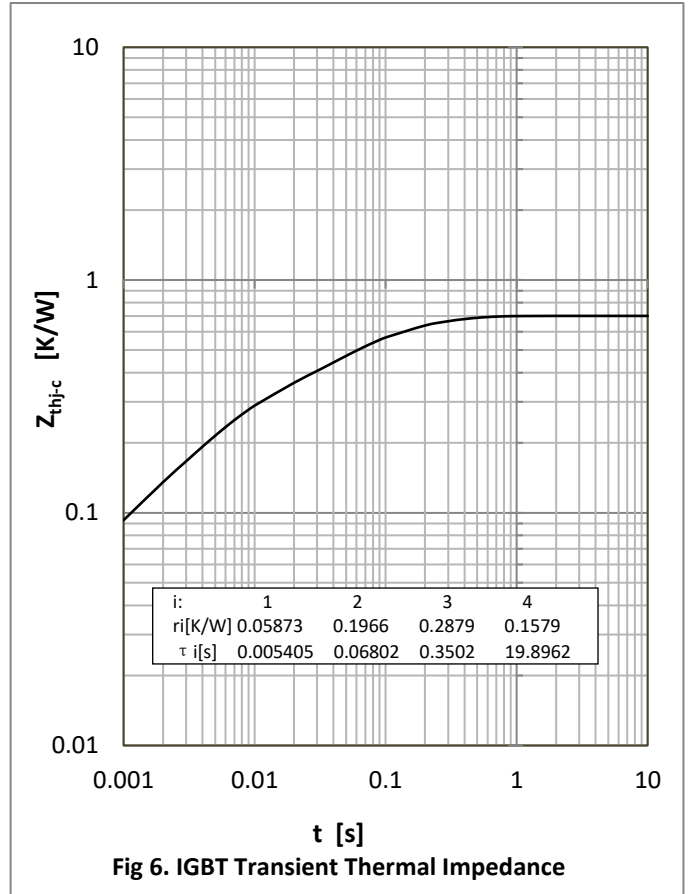
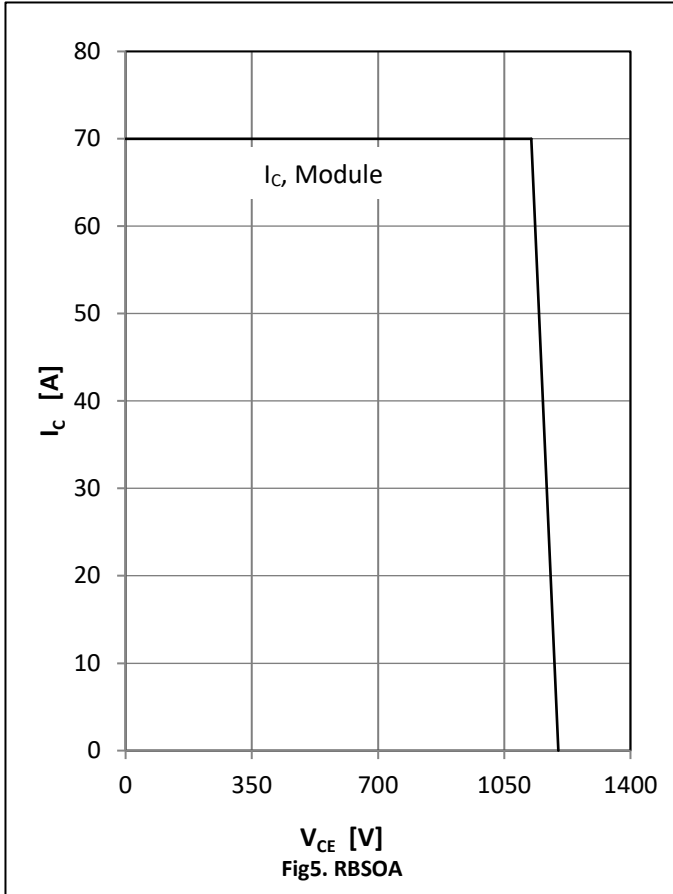
## ● Module Characteristics

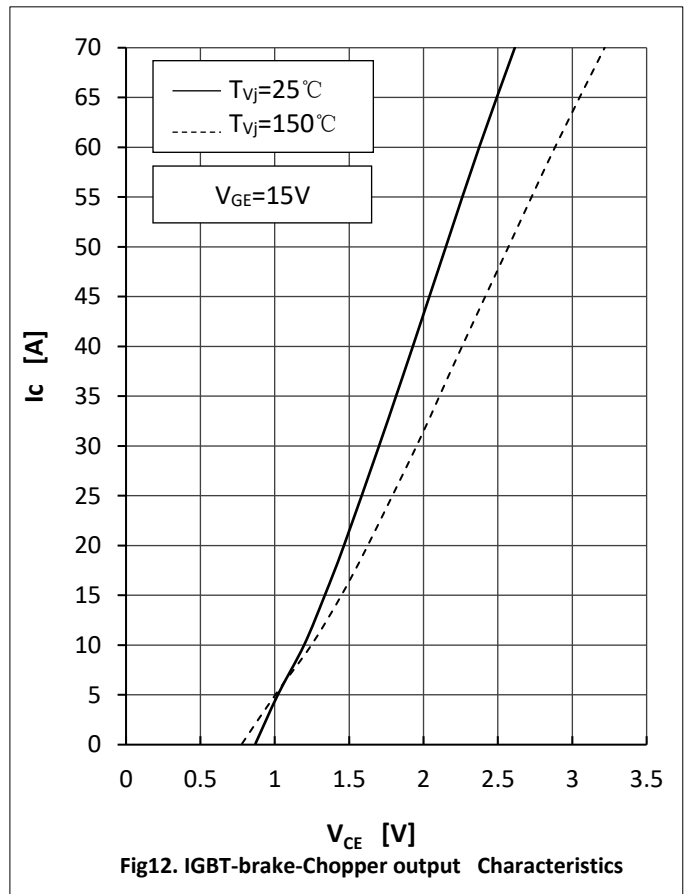
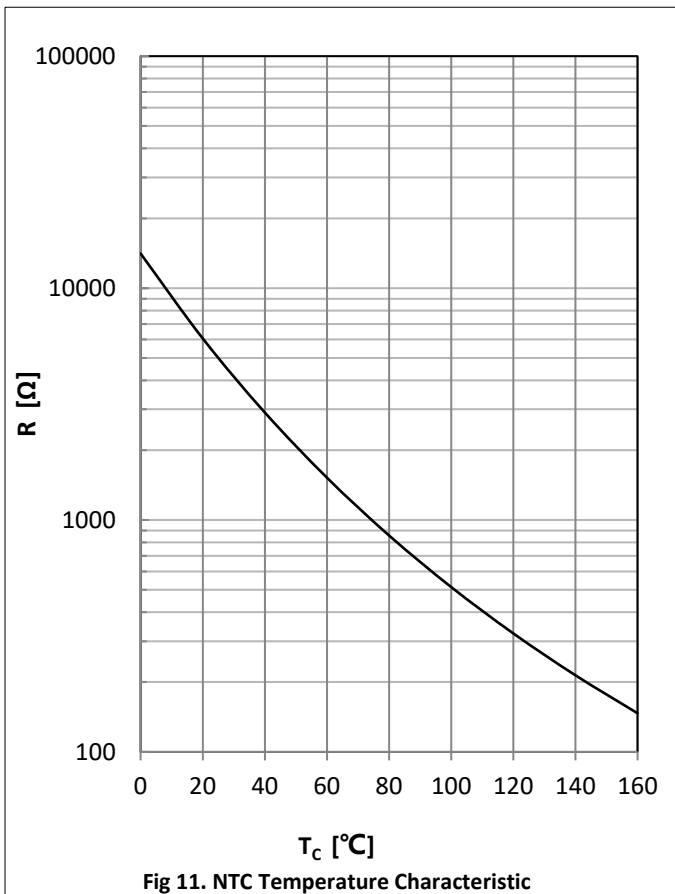
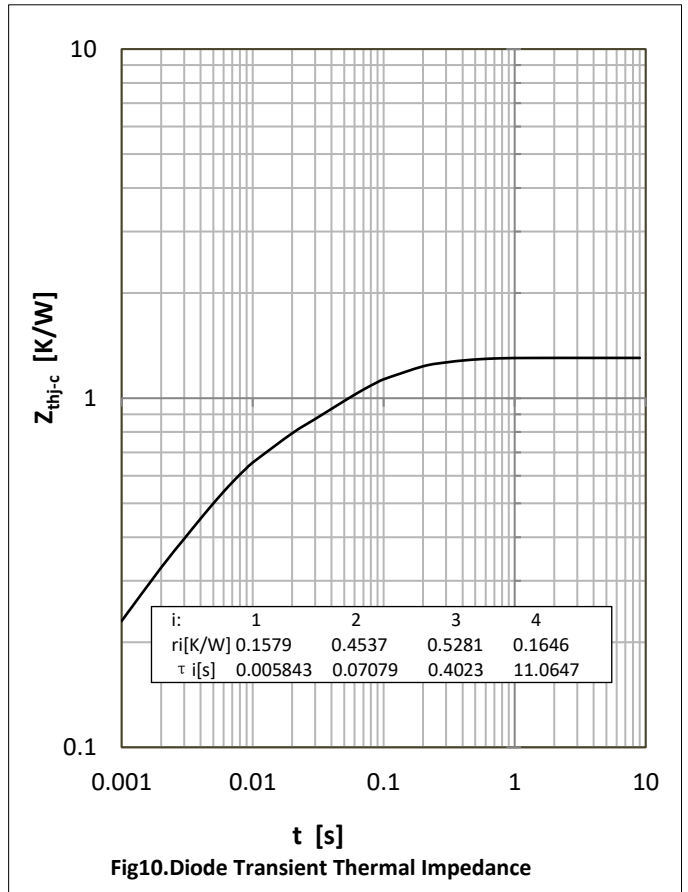
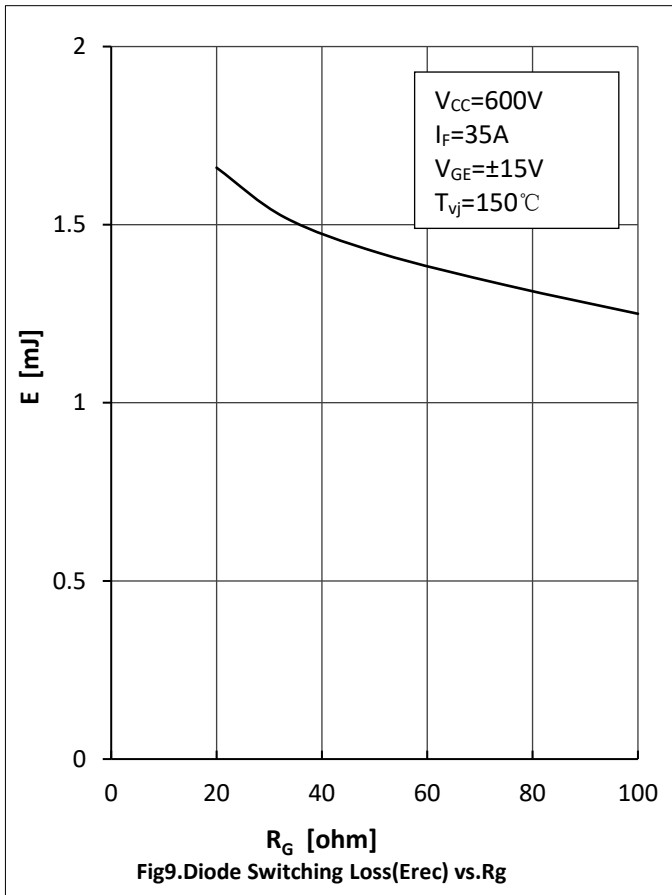
 $T_C=25^{\circ}\text{C}$  unless otherwise specified

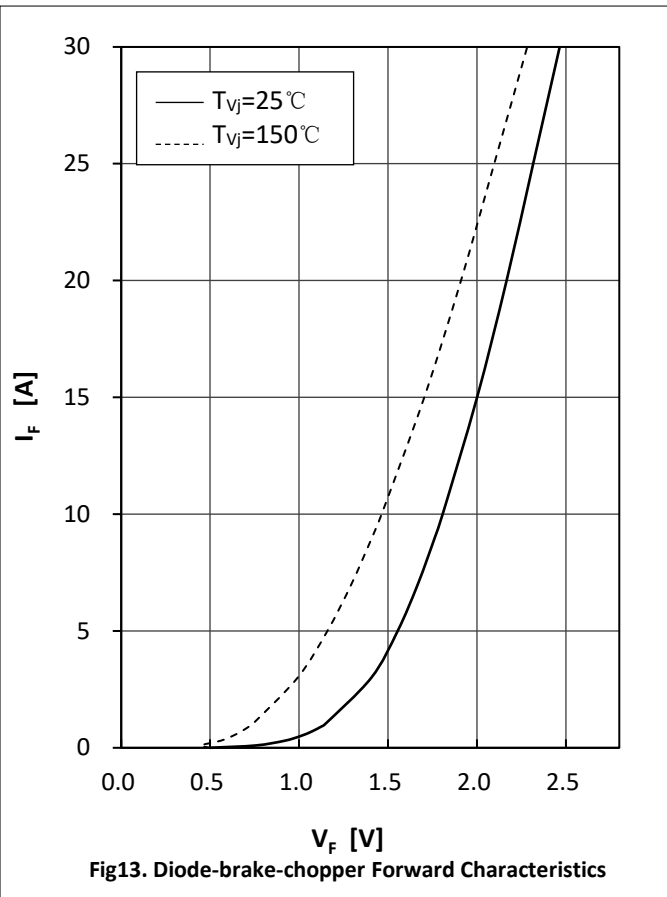
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation voltage	$V_{\text{isol}}$	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	$T_{\text{jmax}}$				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{\text{vjop}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	$T_{\text{stg}}$		-40		125	$^{\circ}\text{C}$
Stray-inductance-module	$L_{\text{SCE}}$			30		nH
Module lead resistance, terminals-chip	$R_{\text{CC}'+\text{EE}'}$	$T_C=25^{\circ}\text{C}$ , per switch		5.00		m $\Omega$
	$R_{\text{AA}'+\text{CC}'}$			6.00		
Thermal Resistance Junction-to Case	$R_{\theta\text{JC}}$	per IGBT-inverter			0.70	K/W
		per Diode-inverter			1.30	
		per IGBT-brake-chopper			0.70	
		per Diode-chopper			1.80	
		per Diode-rectifier			1.35	
Thermal Resistance Case-to Sink	$R_{\theta\text{CS}}$	per IGBT-inverter		0.60		K/W
		per Diode-inverter		0.75		
		per IGBT-brake-chopper		0.60		
		per Diode-chopper		1.05		
		per Diode-rectifier		0.95		
		per Module		0.037		
Mounting Force Per Clamp	F		30		80	N
Weight of Module	G			45		g





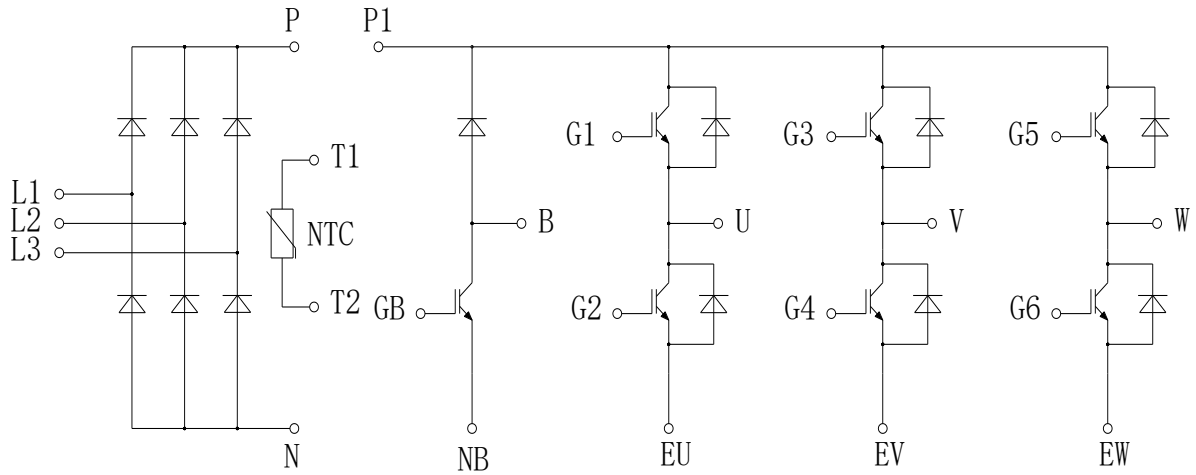




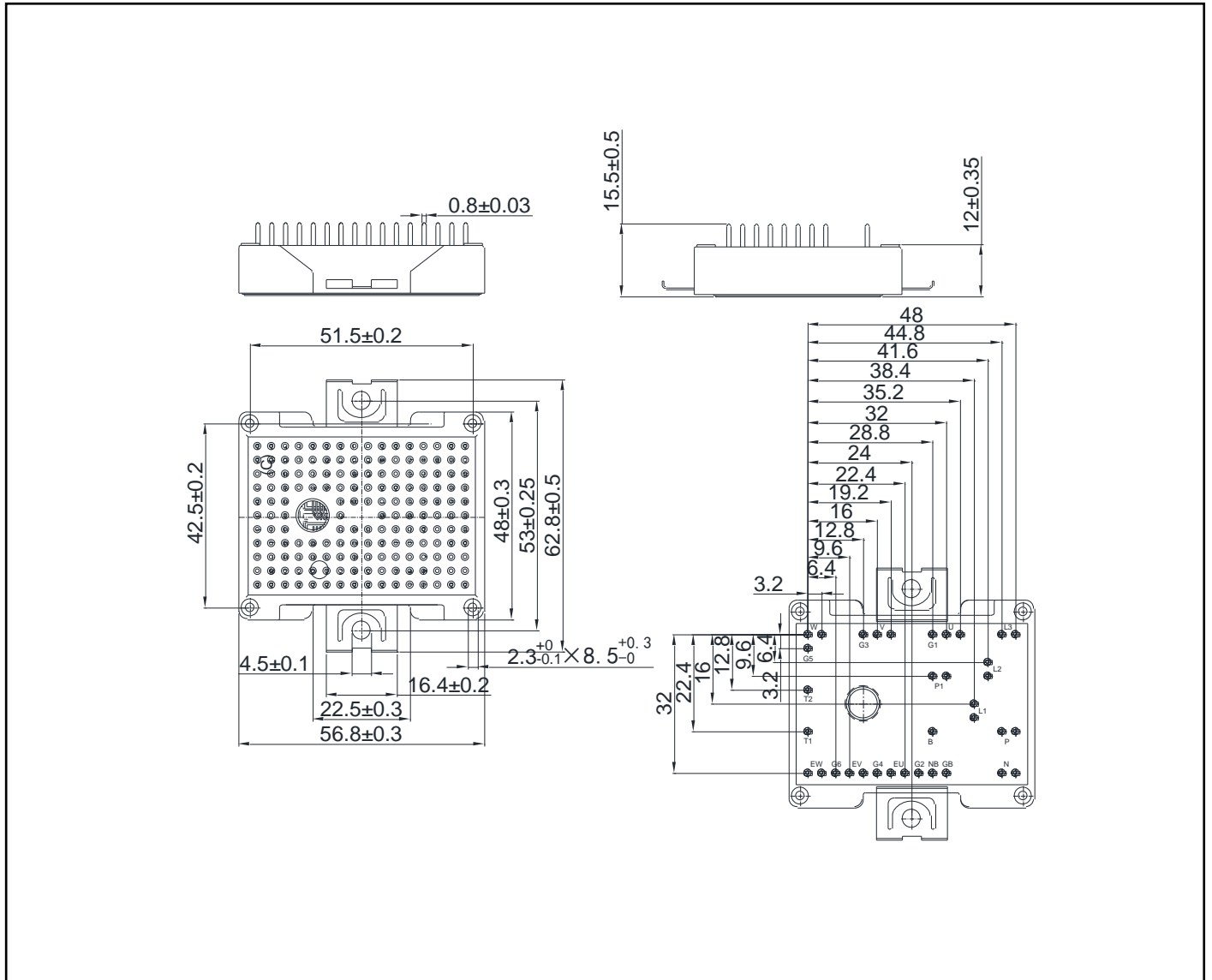




## Circuit Diagram



## Package Dimensions





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