

IGBT Modules



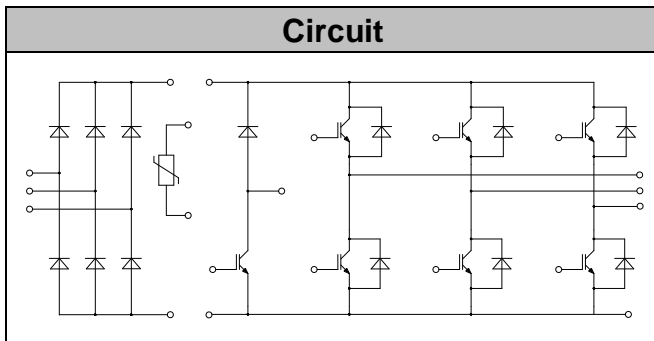
V _{CES}	1200V
I _C	50A

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(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°C	1200	V
Continuous Collector Current	I _C	T _C =100°C, T _{vjmax} =175°C	50	A
Repetitive Peak Collector Current	I _{CRM}	t _p =1ms	100	A
Gate-Emitter Voltage	V _{GES}	T _{vj} =25°C	± 20	V
Total Power Dissipation	P _{tot}	T _C =25°C T _{vjmax} =175°C	288	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	$V_{CE(sat)}$	$I_C=50A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.90		V	
		$I_C=50A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.20			
		$I_C=50A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.32			
Gate Charge	Q_G			0.35		uC	
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		2.60		nF	
Reverse Transfer Capacitance	C_{res}			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-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		50	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	100	A
I^2t -value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	560	A ² s
		$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	480	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=50A, T_{vj}=25^{\circ}C$		1.85		V
		$I_F=50A, T_{vj}=125^{\circ}C$		1.70		
		$I_F=50A, T_{vj}=150^{\circ}C$		1.62		
Recovered Charge	Q_{rr}	$I_F=50A$		4.39		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1000A/\mu s$		31		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}C$		1.35		mJ
Recovered Charge	Q_{rr}	$I_F=50A$		6.65		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 1000A/\mu s$		33		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}C$		2.10		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}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	227	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.4mA, T_{vj}=25^{\circ}C$	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	$V_{CE(sat)}$	$I_C=35A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.95		V	
		$I_C=35A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.15			
		$I_C=35A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.25			
Gate Charge	Q_G			0.27		uC	
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		2.00		nF	
Reverse Transfer Capacitance	C_{res}			0.07		nF	
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA	
Turn-on Delay Time	$t_{d(on)}$	$I_C=35A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=27\Omega$ $T_{vj}=25^{\circ}C$		30		ns	
Rise Time	t_r			40		ns	
Turn-off Delay Time	$t_{d(off)}$				151		ns
Fall Time	t_f				257		ns
Energy Dissipation During Turn-on Time	E_{on}				3.50		mJ
Energy Dissipation During Turn-off Time	E_{off}				2.43		mJ



Turn-on Delay Time	$t_{d(on)}$	$I_C=35A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=27\Omega$ $T_{vj}=150^\circ C$	33	ns
Rise Time	t_r		44	ns
Turn-off Delay Time	$t_{d(off)}$		158	ns
Fall Time	t_f		274	ns
Energy Dissipation During Turn-on Time	E_{on}		4.13	mJ
Energy Dissipation During Turn-off Time	E_{off}		2.75	mJ
SC Data	I_{sc}		$t_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^\circ C,$ $V_{CC}=900V, V_{CEM} \leq 1200V$	150

● 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 ² t-value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=125^\circ C$	16.0	A ² 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		V
		$I_F=15A, T_{vj}=125^\circ C$		1.80		
		$I_F=15A, T_{vj}=150^\circ C$		1.70		
Recovered Charge	Q_{rr}	$I_F=15A$		1.20		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 550A/\mu s$		10		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^\circ C$		0.35		mJ
Recovered Charge	Q_{rr}	$I_F=15A$		1.60		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt = 550A/\mu s$		15		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^\circ C$		1.20		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	$I_{F(AV)}$	$T_C=100^{\circ}C$	65	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	$T_C=100^{\circ}C$	110	A
Surge Forward Current	I_{FSM}	$V_R=0V, t_p=10ms, T_{vj}=45^{\circ}C$	850	A
I^2t -value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=45^{\circ}C$	3610	A^2s

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	$I_F=50A, T_{vj}=125^{\circ}C$		1.0		V
Reverse Current	I_R	$T_{vj}=125^{\circ}C, V_R=1600V$			1.5	mA

● NTC-Thermistor

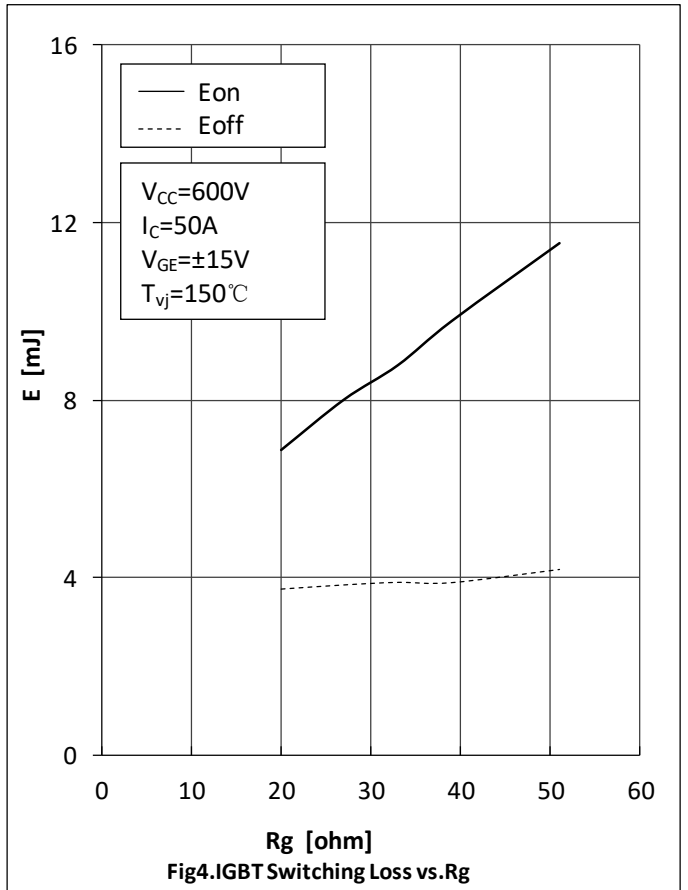
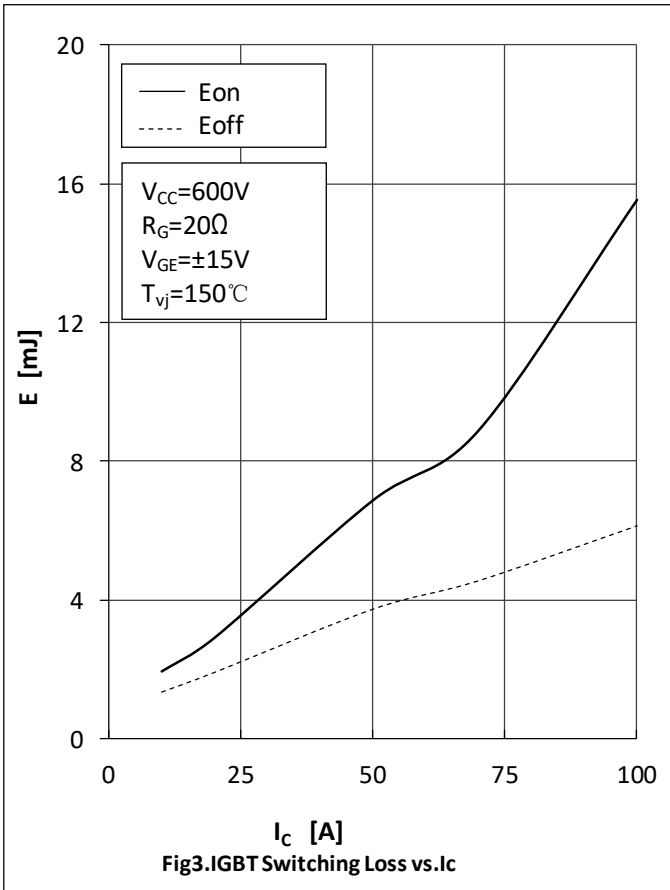
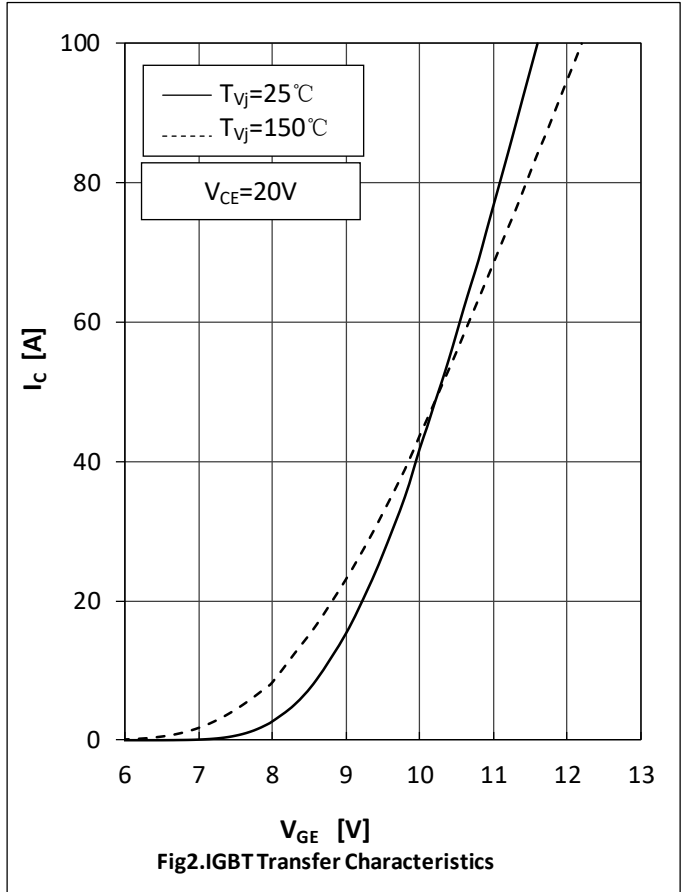
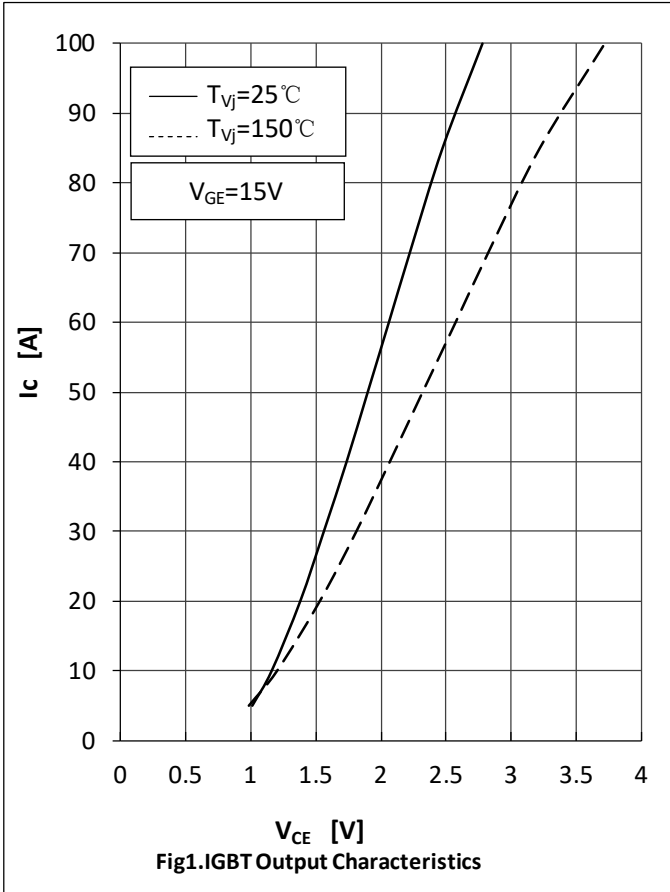
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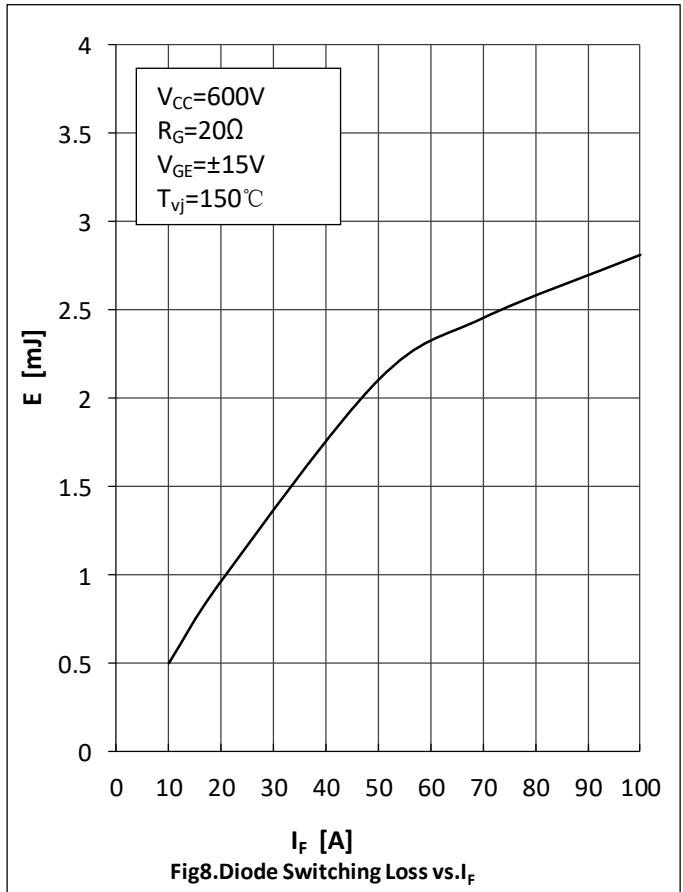
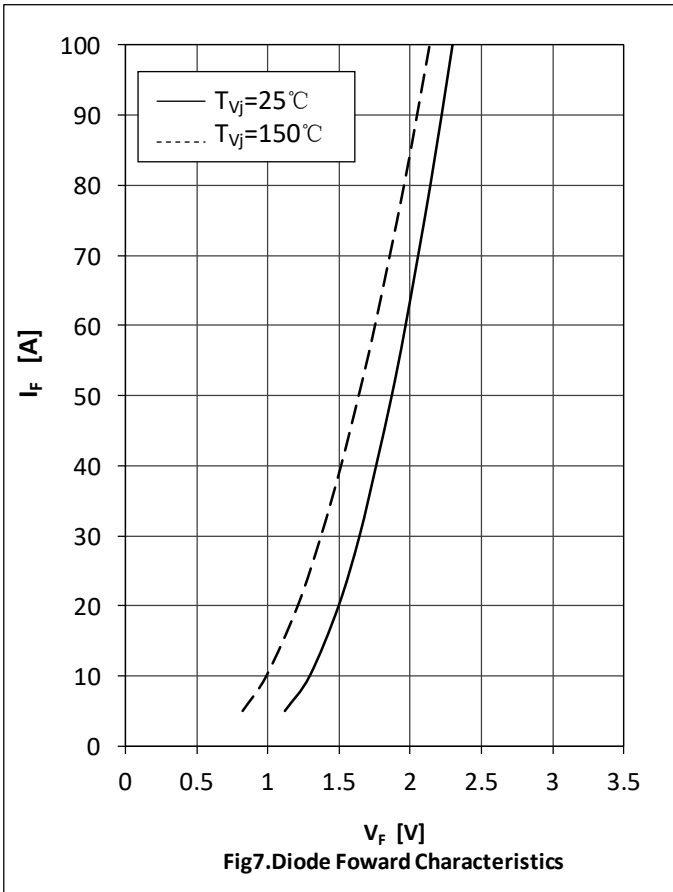
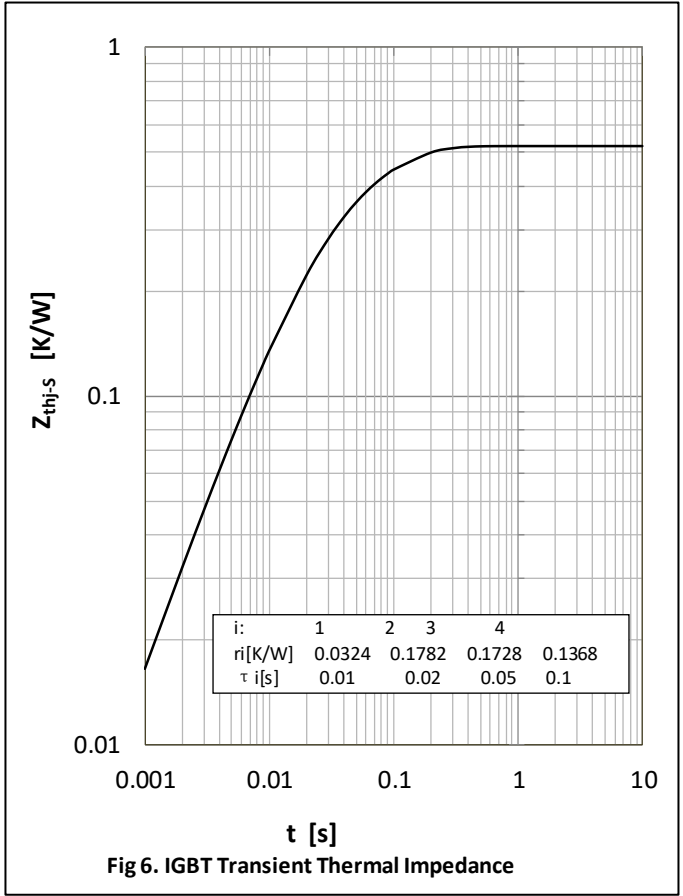
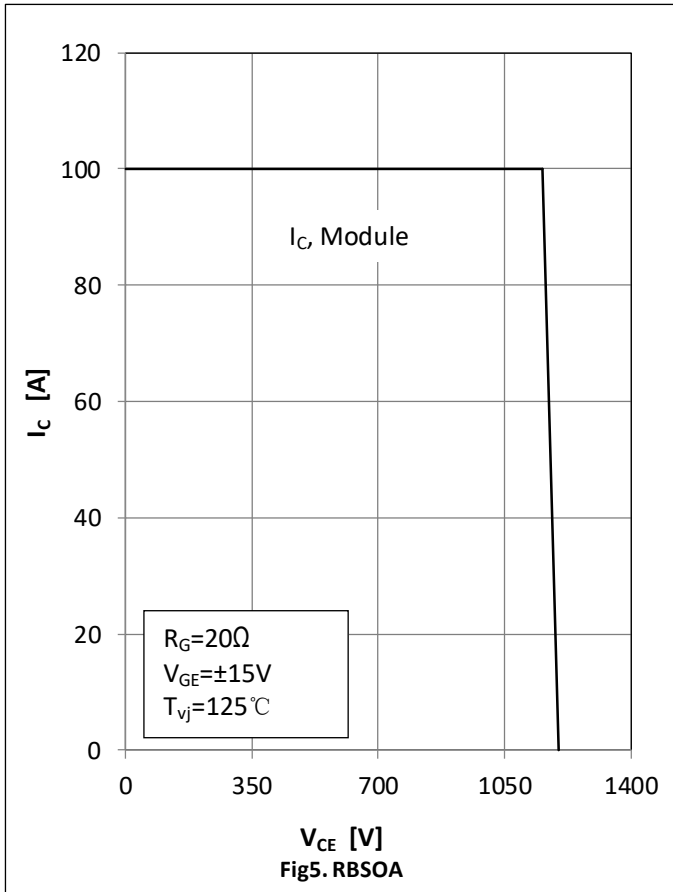
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		k Ω
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15 K))]$		3375		K

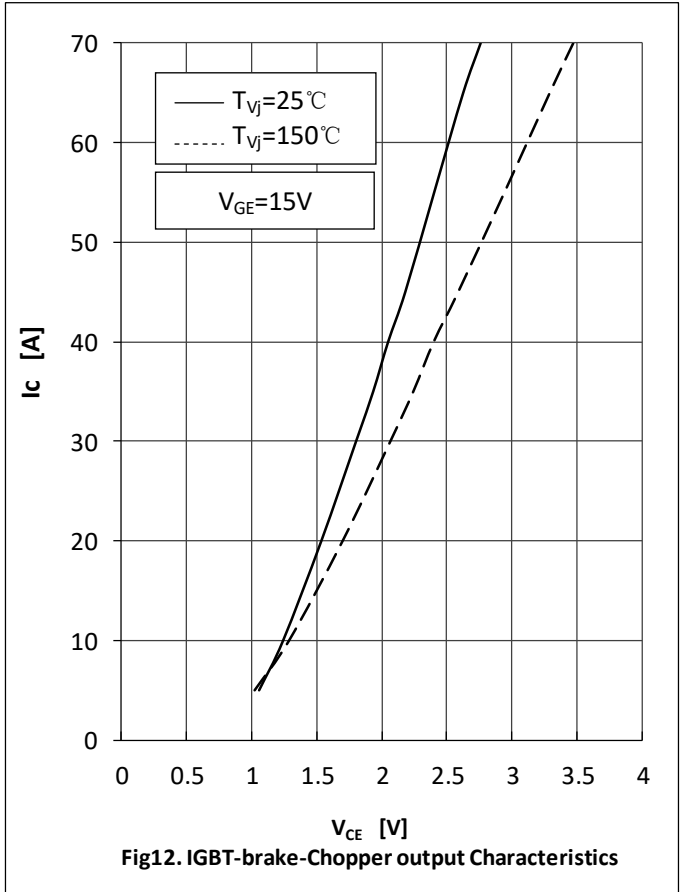
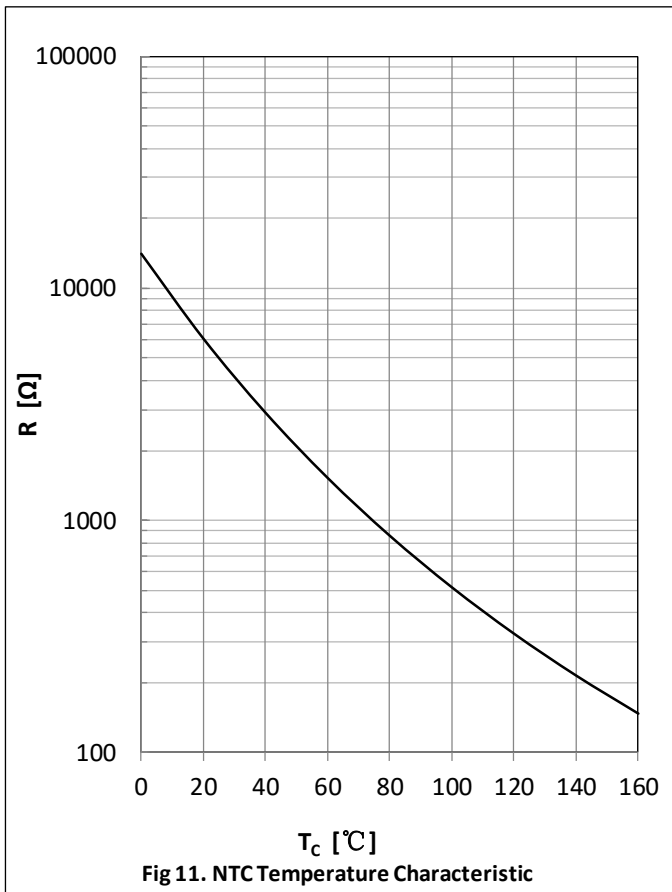
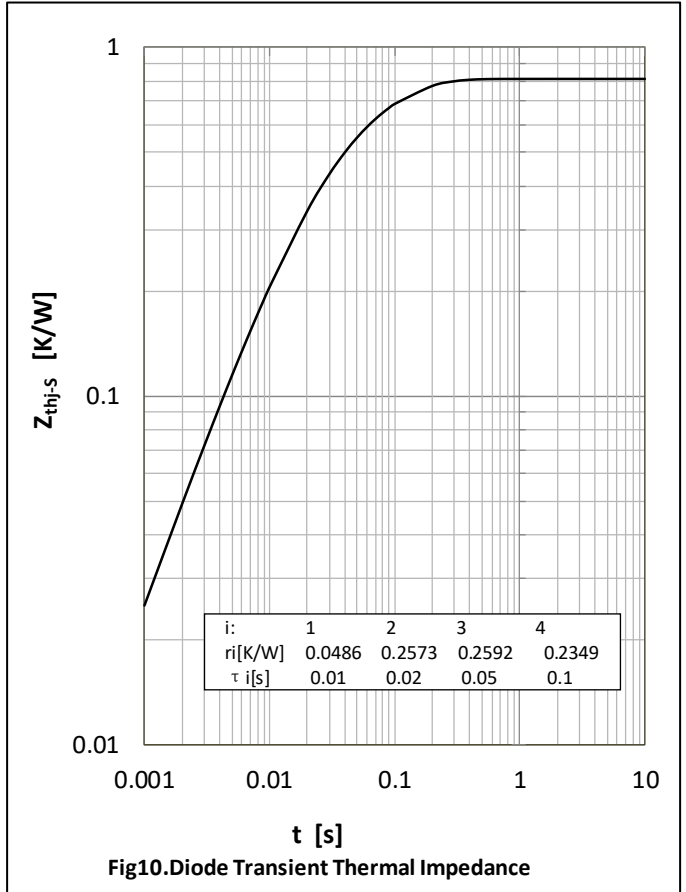
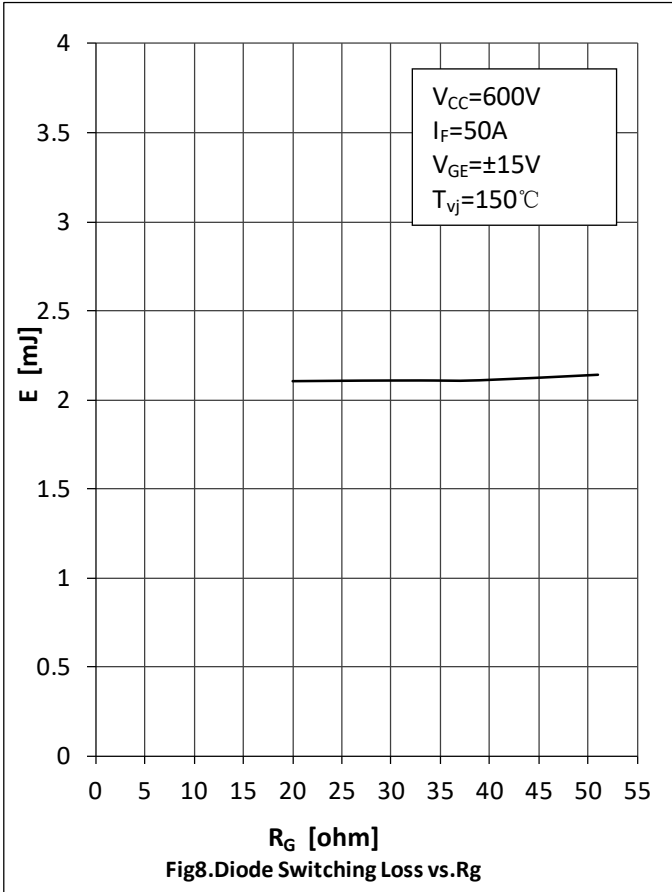


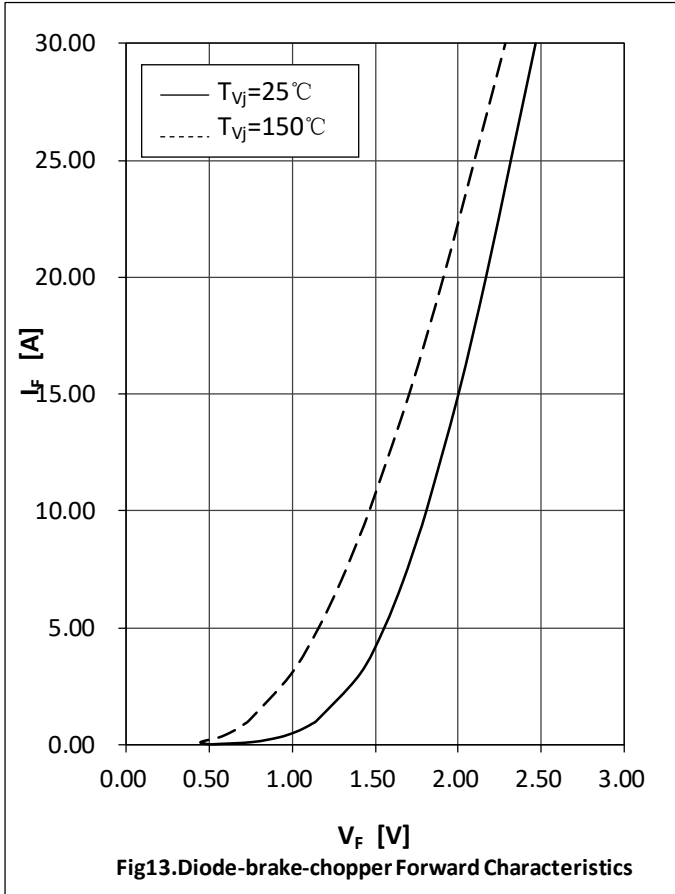
● **Module Characteristics** $T_C=25^\circ\text{C}$ unless otherwise specified

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
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		0.52		K/W
		per Diode-inverter		0.81		
		per IGBT-brake-chopper		0.66		
		per Diode-chopper		1.50		
		per Diode-rectifier		0.64		
Thermal Resistance Case-to Sink	$R_{\theta\text{CS}}$	per IGBT-inverter		0.29		K/W
		per Diode-inverter		0.44		
		per IGBT-brake-chopper		0.32		
		per Diode-chopper		0.33		
		per Diode-rectifier		0.70		
		per Module		0.009		
Module-to-Sink Torque	M_s		3.0		6.0	N·m
Weight of Module	G			300		g



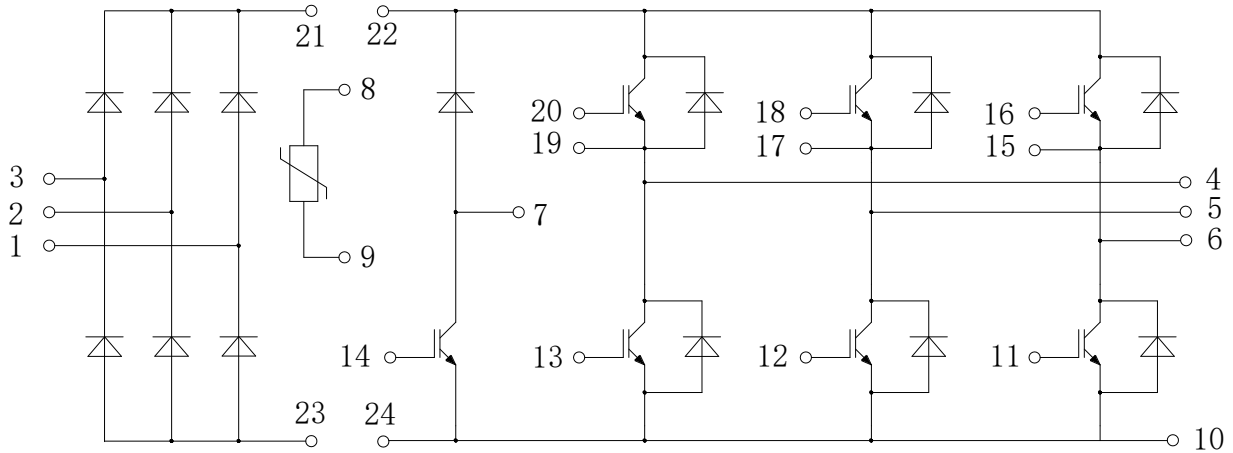




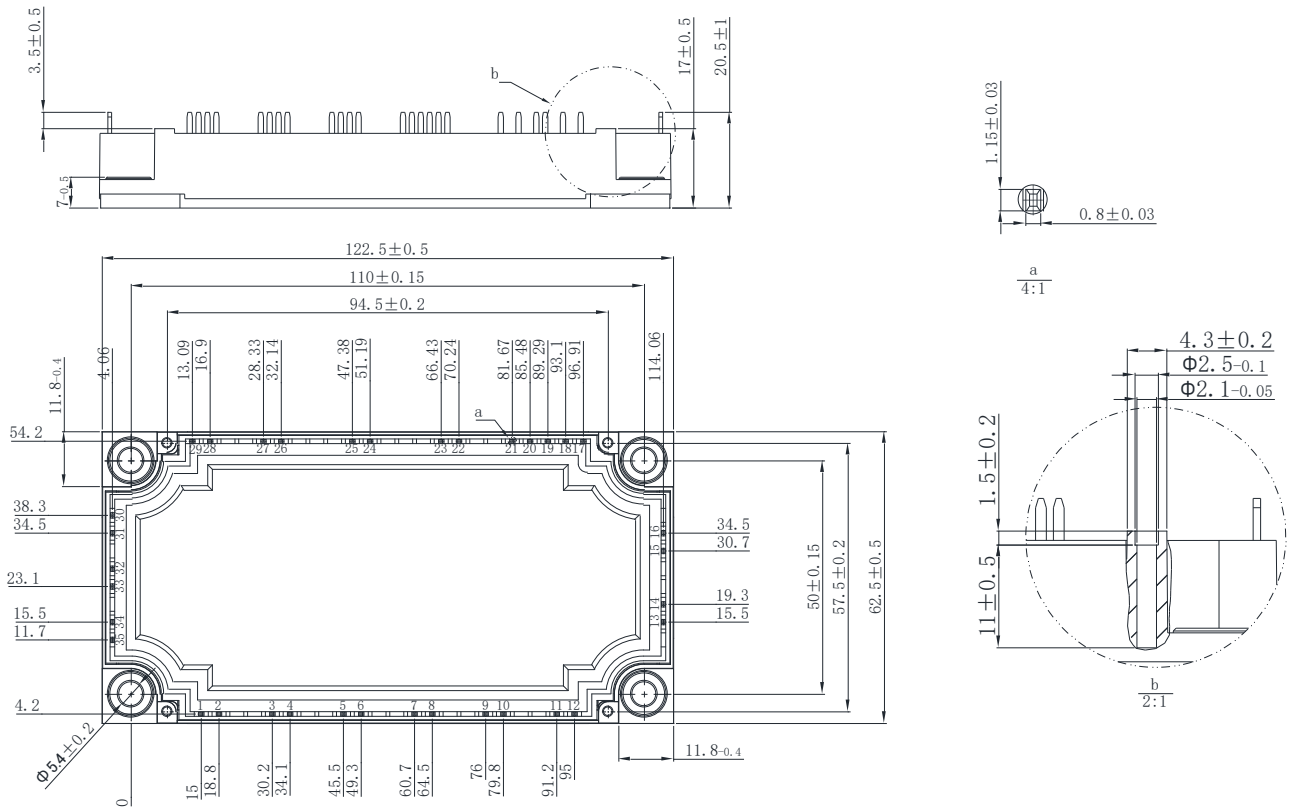




● Circuit Diagram



● Package Outline Information





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