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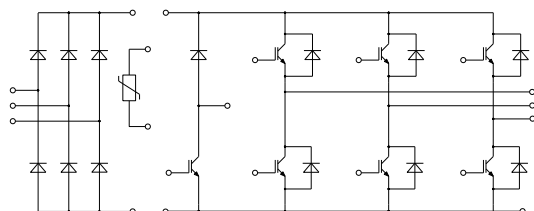
Features

- 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(10 μ s)
- Maximum Junction Temperature 175°C
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Applications

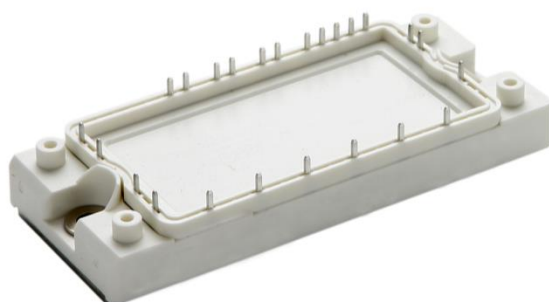
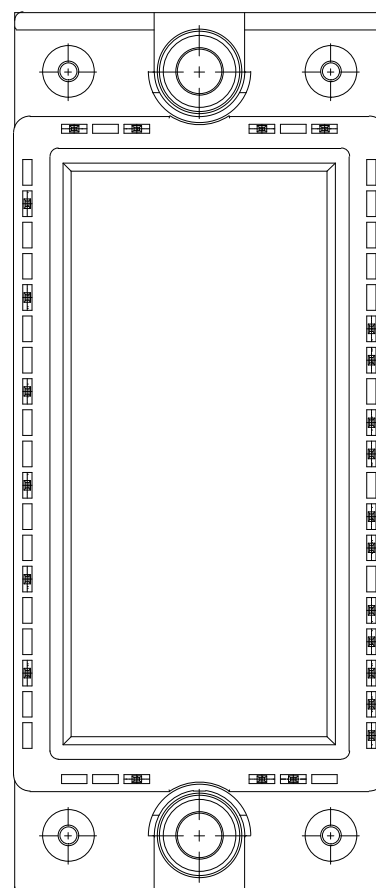
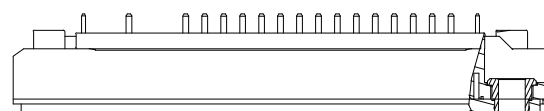
- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Circuit Diagram



IGBT Modules 1200V 25A

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● IGBT- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	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}	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	166	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=0.8mA, T_{vj}=25^{\circ}C$	5.2	6.0	6.8	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=25A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.85	2.25	V
		$I_C=25A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.15		V
		$I_C=25A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.25		V
Gate Charge	Q_g			0.2		μC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		1.45		nF
Reverse Transfer Capacitance	C_{res}			0.05		
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=25A, V_{GE}=\pm 15V, R_G=18\Omega, T_{vj}=25^{\circ}C$		158		ns
Rise Time	t_r			32		
Turn-Off Delay Time	$t_{d(off)}$			331		
Fall Time	t_f			83		
Turn-On Energy	E_{on}			1.8		mJ
Turn-Off Energy	E_{off}			1.4		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=25A, V_{GE}=\pm 15V, R_G=18\Omega, T_{vj}=125^{\circ}C$		172		ns
Rise Time	t_r			435		
Turn-Off Delay Time	$t_{d(off)}$			154		
Fall Time	t_f			212		
Turn-On Energy	E_{on}			2.4		mJ
Turn-Off Energy	E_{off}			2.18		
SC Data	I_{SC}	$T_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C, V_{CC}=900V, V_{CEM} \leq 1200V$		120		A

● Diode- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC Forward Current	I_F		25	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	50	A
I^2t -value	I^2t	$V_R=0, t_p=10ms, T_{vj}=125^{\circ}C$	90	A^2s
		$V_R=0, t_p=10ms, T_{vj}=150^{\circ}C$	75	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_F	$I_F=25A, T_{vj}=25^{\circ}C$		2.1	2.5	V
		$I_F=25A, T_{vj}=125^{\circ}C$		2.2		V
		$I_F=25A, T_{vj}=150^{\circ}C$		2.2		V
Recovered Charge	Q_{rr}	$I_F=25A, V_R=600V, -di_F/dt=680A/\mu s, T_{vj}=25^{\circ}C$		2.52		μC
Peak Reverse Recovery Current	I_{rr}			28.5		A
Reverse Recovery Energy	E_{rec}			0.94		mJ
Recovered Charge	Q_{rr}	$I_F=25A, V_R=600V, -di_F/dt=680A/\mu s, T_{vj}=125^{\circ}C$		50.8		μC
Peak Reverse Recovery Current	I_{rr}			30.5		A
Reverse Recovery Energy	E_{rec}			1.75		mJ

● IGBT- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	15	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	30	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	155	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=0.5mA, T_{vj}=25^{\circ}C$	5.2	6.0	6.8	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=15A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.85	2.25	V
		$I_C=15A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.15		V
		$I_C=15A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.25		V
Gate Charge	Q_g			0.09		μC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		1.35		nF
Reverse Transfer Capacitance	C_{res}			0.08		
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=15A, V_{GE}=\pm 15V, R_G=39\Omega, T_{vj}=25^{\circ}C$		46		ns
Rise Time	t_r			45		
Turn-Off Delay Time	$t_{d(off)}$			182		
Fall Time	t_f			168		
Turn-On Energy	E_{on}			0.92		mJ
Turn-Off Energy	E_{off}			0.56		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=15A, V_{GE}=\pm 15V, R_G=39\Omega, T_{vj}=125^{\circ}C$		46		ns
Rise Time	t_r			63		
Turn-Off Delay Time	$t_{d(off)}$			248		
Fall Time	t_f			220		
Turn-On Energy	E_{on}			1.37		mJ
Turn-Off Energy	E_{off}			0.81		
SC Data	I_{SC}	$T_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C, V_{CC}=900V, V_{CEM} \leq 1200V$		55		A

● Diode- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	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	$V_R=0, t_p=10ms, T_{vj}=125^{\circ}C$	40	A^2s
		$V_R=0, t_p=10ms, T_{vj}=150^{\circ}C$	34	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_F	$I_F=15A, T_{vj}=25^{\circ}C$		2.0	2.65	V
		$I_F=15A, T_{vj}=125^{\circ}C$		2.1		V
		$I_F=15A, T_{vj}=150^{\circ}C$		2.1		V
Recovered Charge	Q_{rr}	$I_F=15A, V_R=600V,$ $-di_F/dt=600A/\mu s, T_{vj}=25^{\circ}C$		1.2		μC
Peak Reverse Recovery Current	I_{rr}			13.0		A
Reverse Recovery Energy	E_{rec}			0.37		mJ
Recovered Charge	Q_{rr}	$I_F=15A, V_R=600V,$ $-di_F/dt=550A/\mu s, T_{vj}=125^{\circ}C$		2.4		μC
Peak Reverse Recovery Current	I_{rr}			19.4		A
Reverse Recovery Energy	E_{rec}			0.86		mJ

● Diode- Rectifier

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_J=25^{\circ}\text{C}$	1600	V
Average On-state Current 50/60Hz, sine wave	$I_{F(AV)}$	$T_C=100^{\circ}\text{C}$	35	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	$T_C=100^{\circ}\text{C}$	60	A
Surge Forward Current	I_{FSM}	$V_R=0, t_p=10\text{ms}, T_J=45^{\circ}\text{C}$	320	A
I^2t -value	I^2t	$V_R=0, t_p=10\text{ms}, T_J=45^{\circ}\text{C}$	510	A^2s

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F=25\text{A}, T_J=150^{\circ}\text{C}$		1.02		V
Reverse Current	I_r	$T_J=125^{\circ}\text{C}, V_R=1600\text{V}$			2	mA

● NTC-Thermistor

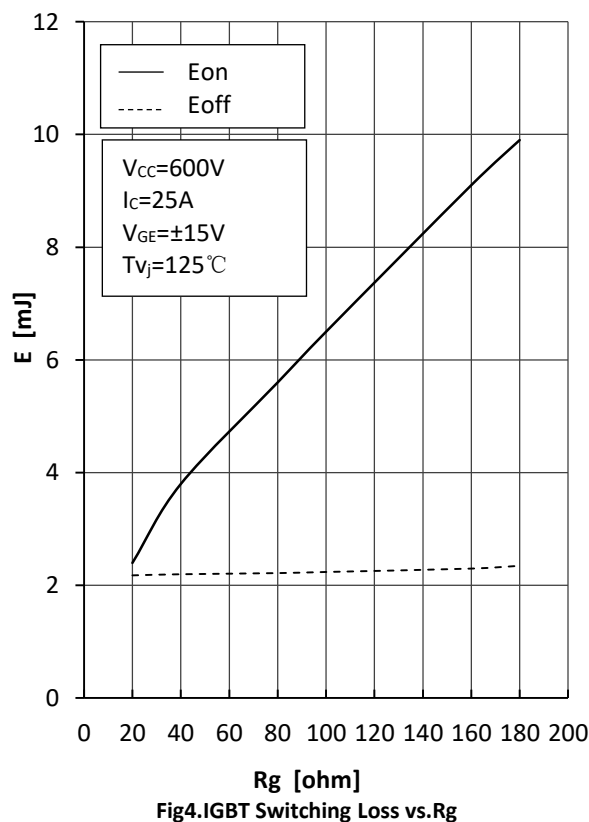
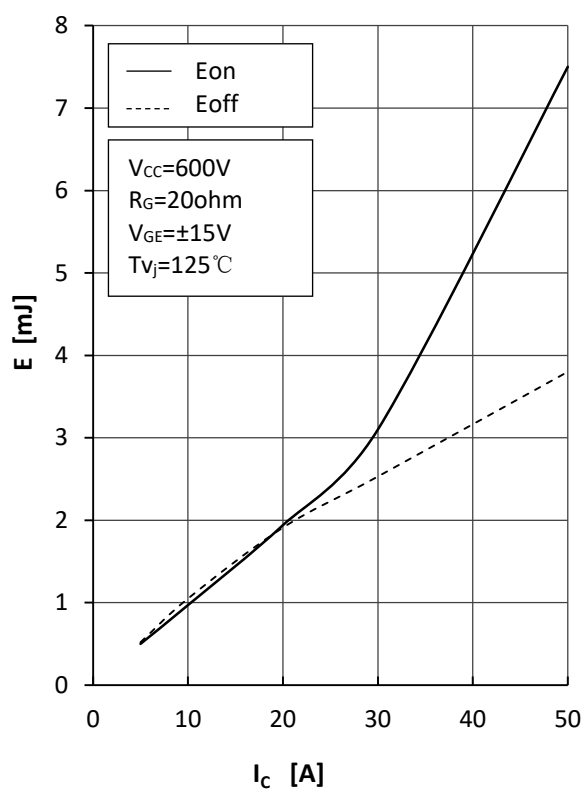
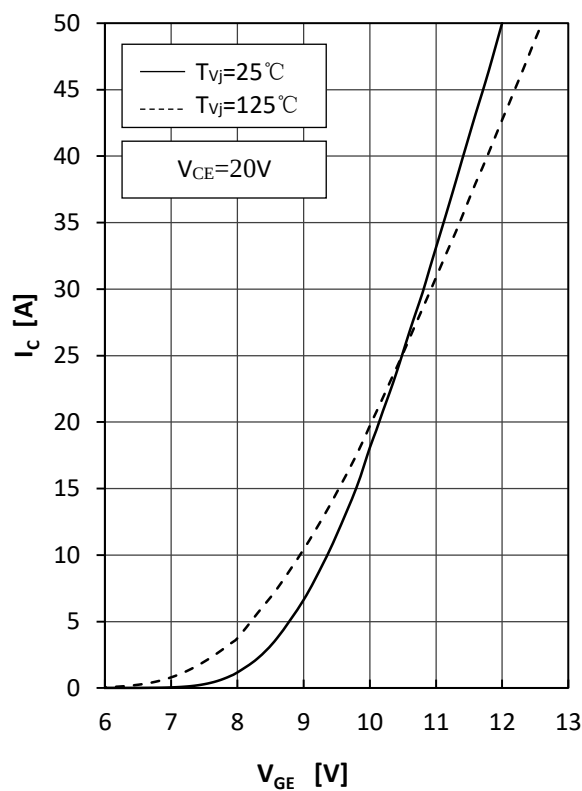
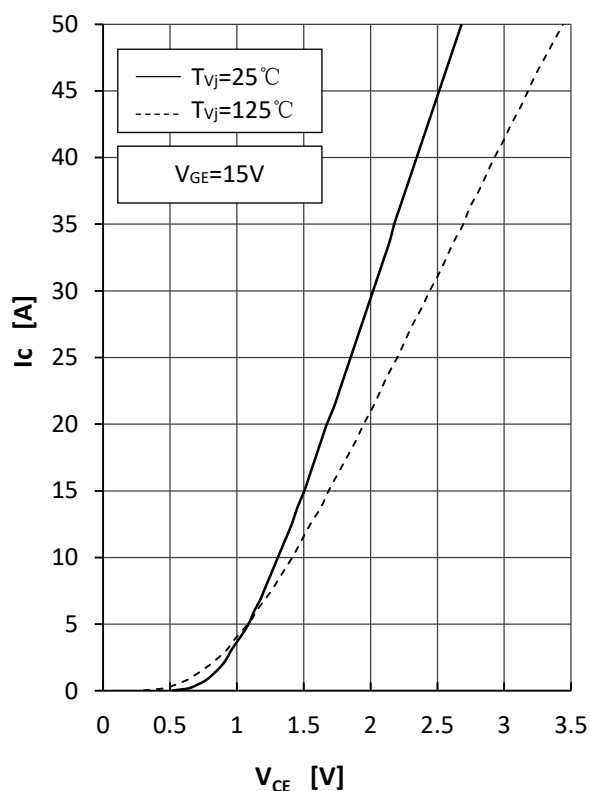
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Rated Resistance	R_{25}			5		k Ω
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

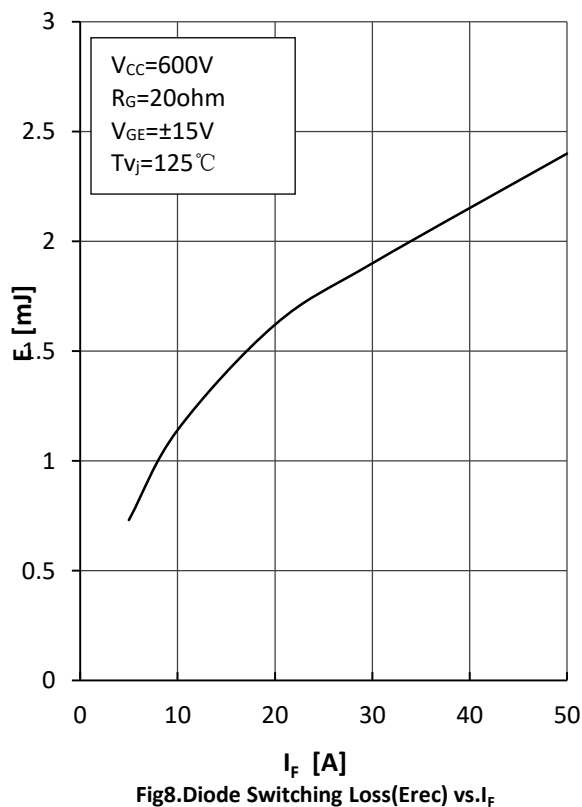
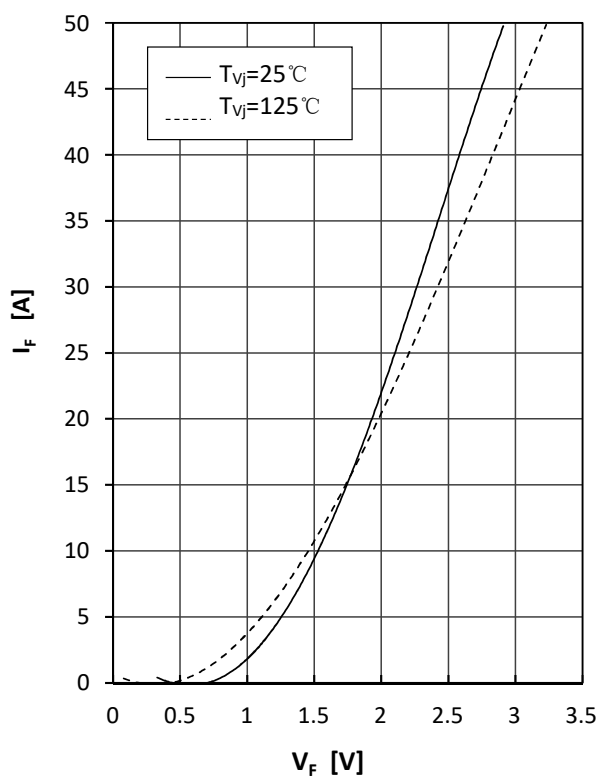
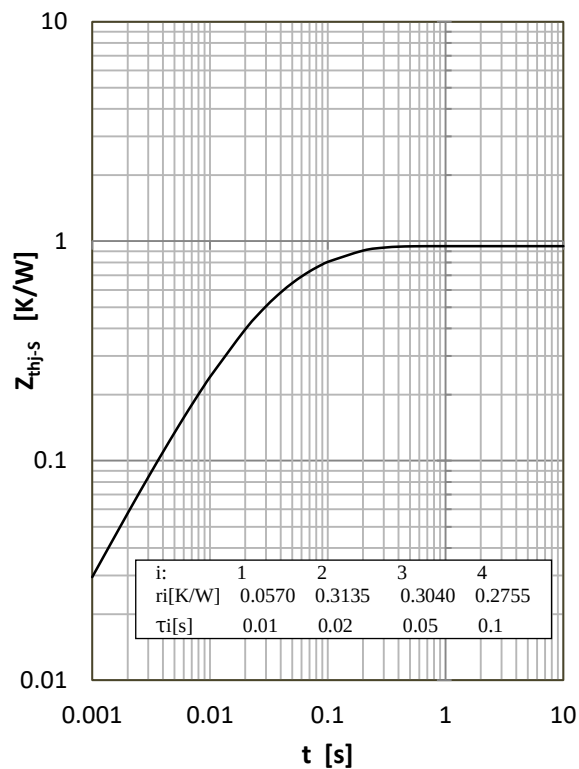
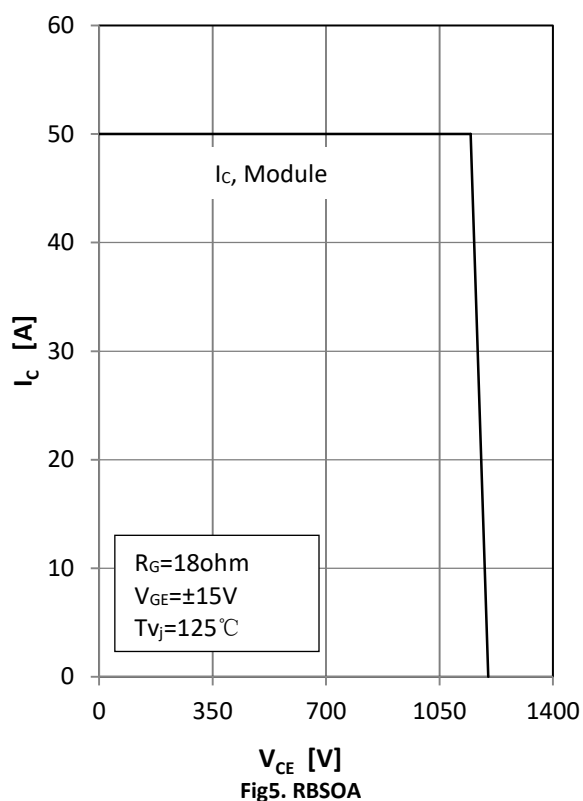
● Module Characteristics($T_c=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Isolation voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}	Inverter, brake			175	$^{\circ}\text{C}$
		rectifier			150	
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Operating Junction Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Stray Inductance	L_{CE}			60		nH
Module Lead Resistance , Terminal to Chip	$R_{\text{cc'+EE'}}$	TC=25 $^{\circ}\text{C}$, per switch		4		m Ω
	$R_{\text{AA'+CC'}}$			3		
Thermal Resistance Junction to Case	$R_{\theta\text{jc}}$	per IGBT-inverter			0.90	K/W
		per Diode-inverter			1.2	
		per IGBT-brake-chopper			1.2	
		per Diode-chopper			1.5	
		per Diode-rectifier			1.15	
Thermal Resistance Case to Sink	$R_{\theta\text{cs}}$	per IGBT-inverter		0.33		K/W
		per Diode-inverter		0.46		
		per IGBT-brake-chopper		0.46		
		per Diode-chopper		0.70		
		per Diode-rectifier		0.49		
		per Module		0.02		
Module-to-Sink Torque	M_{S}		3		6	N·m
Weight of Module	G			180		g

Curve Characteristics



Curve Characteristics



Curve Characteristics

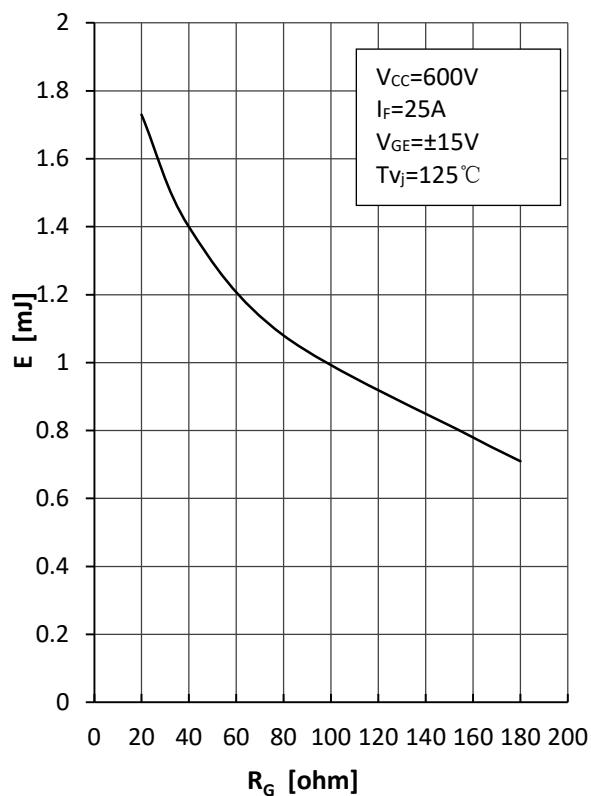


Fig9.Diode Switching Loss(E_{rec}) vs. R_g

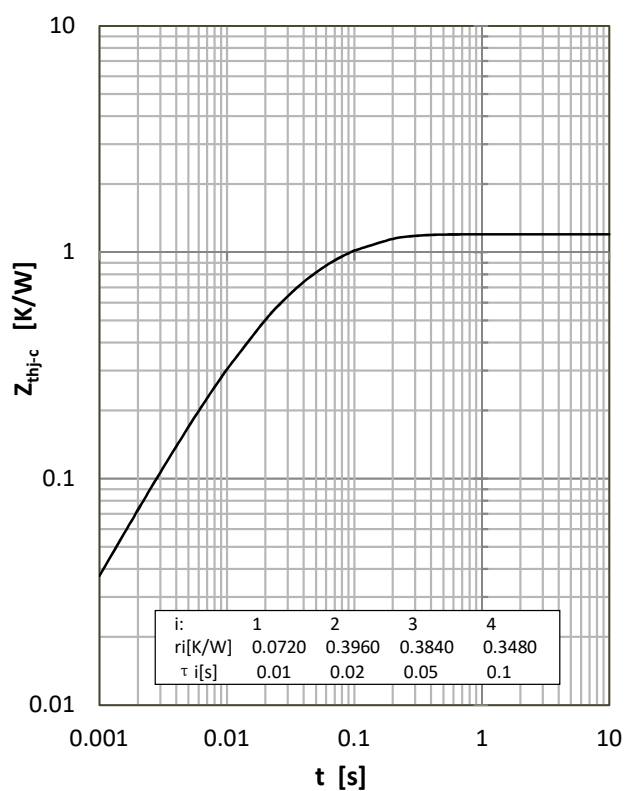


Fig10.Diode Transient Thermal Impedance

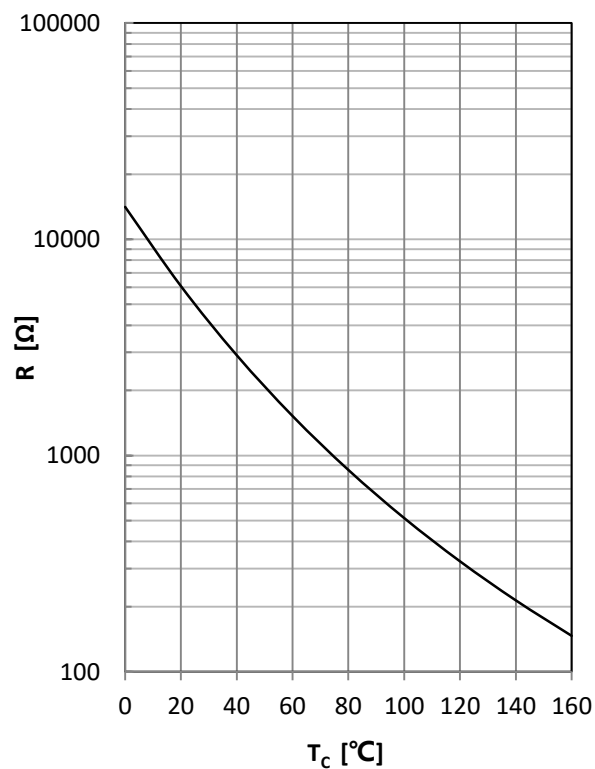


Fig 11. NTC Temperature Characteristic

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[illegible]

Ordering Information

Device	Packing
Part Number-BP	Bulk: 10pcs/Box ; 70pcs/Ctn

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