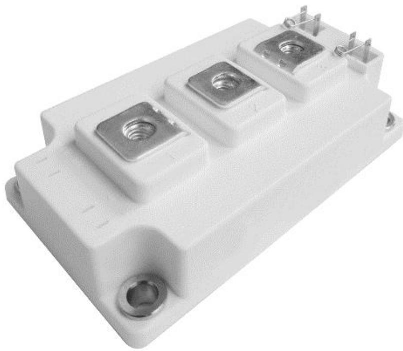
技术信息 / Technical Information

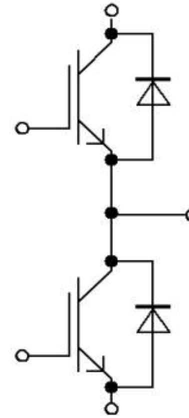
IGBT-模块

IGBT Module

GF450B120T4

科微半导体
GrandSemi

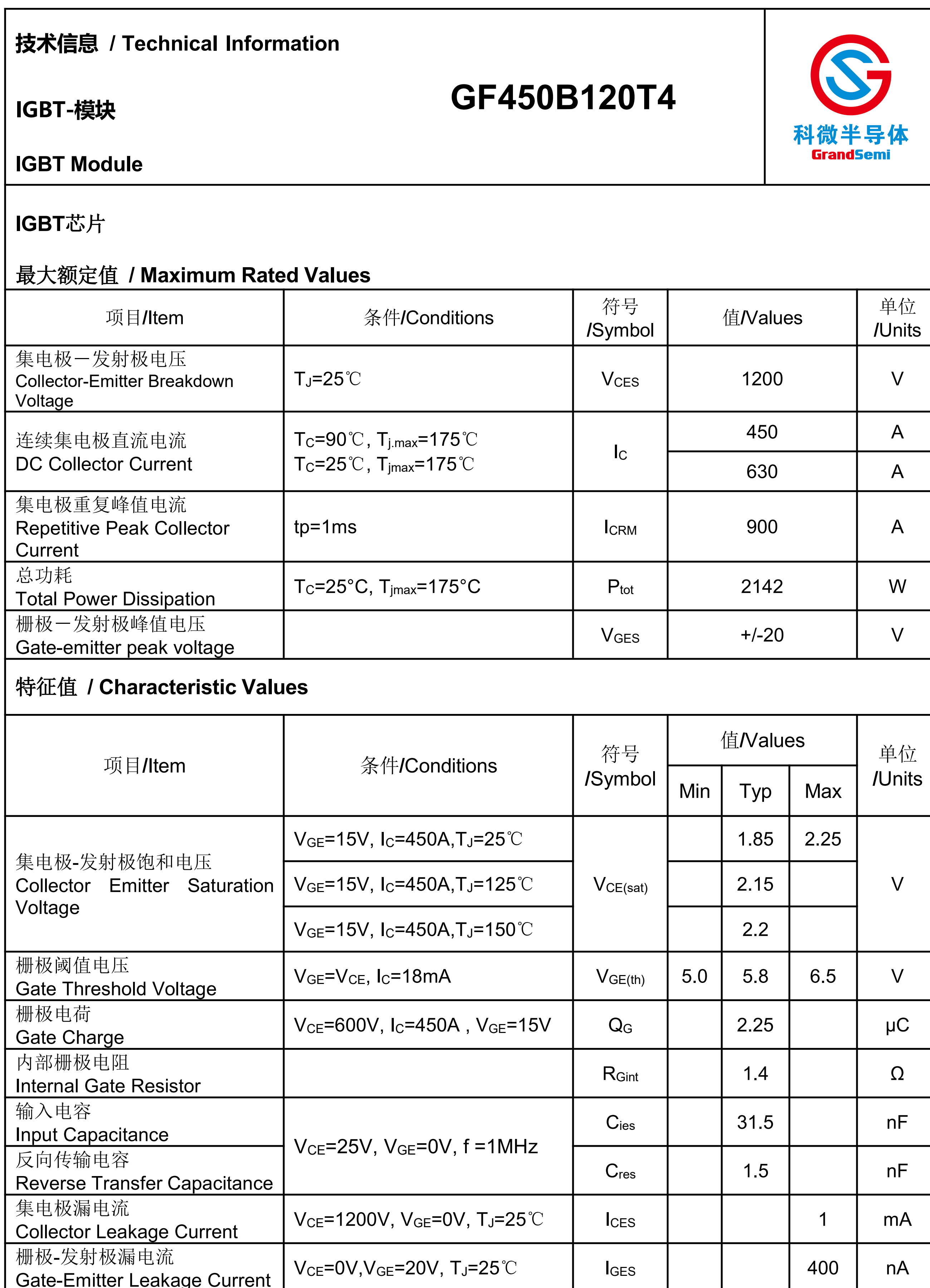




1200V / 450A 半桥模块

PRODUCT FEATURES	产品特性
☐ IGBT CHIP Trench+FS technology	☐ IGBT芯片采用Trench+FS技术
☐ Vcesat with positive temperature coefficient	☐ Vcesat 具有正温度系数特性
☐ Fast & soft recovery anti-parallel FWD	☐ 快速且软恢复反并联二极管
☐ High short circuit capability(10us)	☐ 高短路能力（10us）
☐ Low switching losses	☐ 低开关损耗

APPLICATIONS	典型应用
☐ Inverter for motor drive	☐ 电机驱动用变频器
☐ AC and DC servo drive amplifier	☐ 交直流伺服驱动
☐ Uninterruptible power supply	☐ 不间断电源



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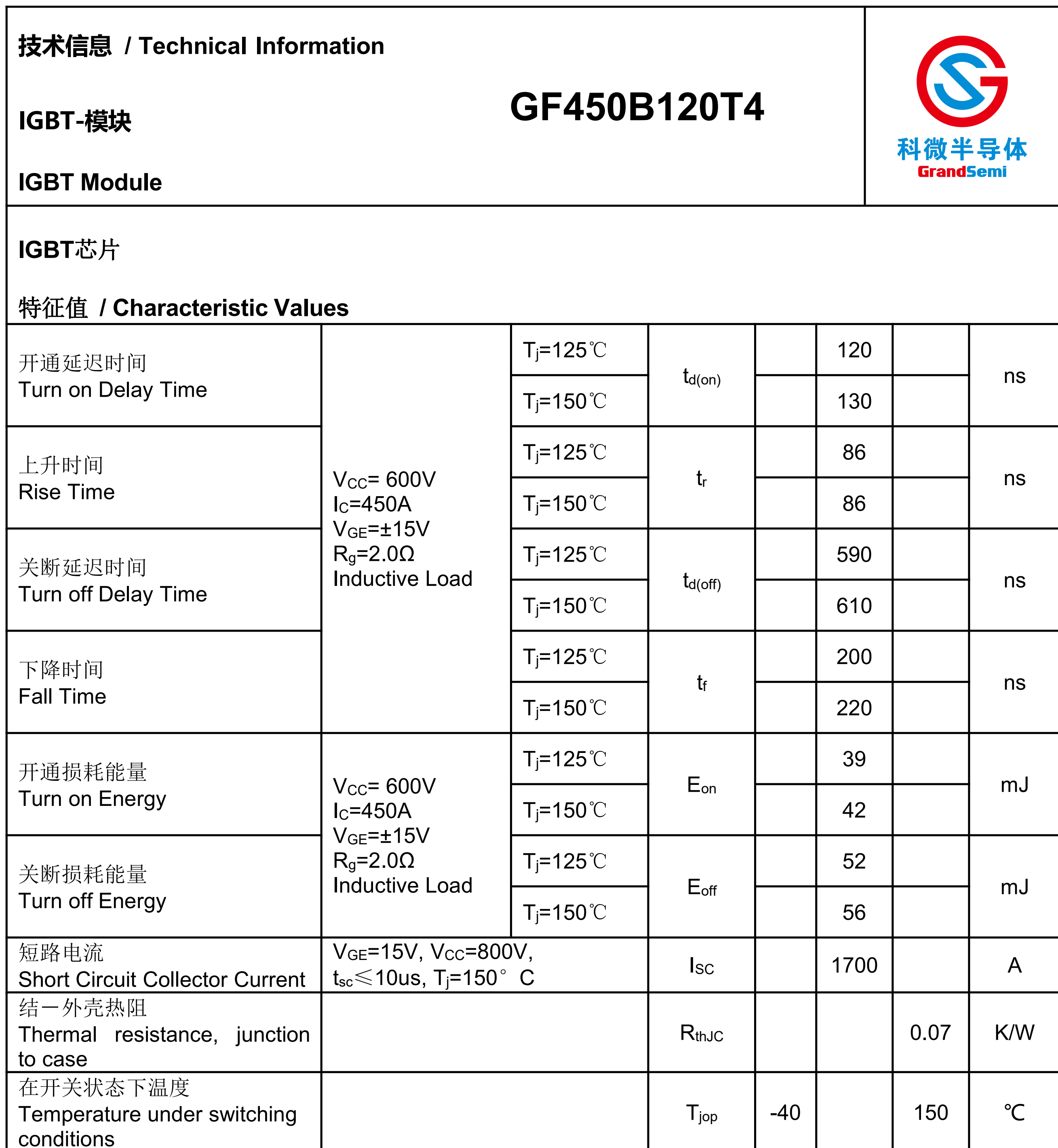
最大额定值 / Maximum Rated Values

项目/Item	条件/Conditions	符号 /Symbol	值/Values	单位 /Units
集电极一发射极电压 Collector-Emitter Breakdown Voltage	T_J=25℃	V_{CES}	1200	V
连续集电极直流电流 DC Collector Current	T_C=90℃, $T_{j.max}$=175℃	I_C	450	A
	T_C=25℃, T_{jmax}=175℃		630	A
集电极重复峰值电流 Repetitive Peak Collector Current	tp=1ms	I_{CRM}	900	A
总功耗 Total Power Dissipation	T_C=25°C, T_{jmax}=175°C	P_{tot}	2142	W
栅极一发射极峰值电压 Gate-emitter peak voltage		V_{GES}	+/-20	V

特征值 / Characteristic Values

项目/Item	条件/Conditions	符号 /Symbol	值/Values			单位 /Units
			Min	Typ	Max	
集电极-发射极饱和电压 Collector Emitter Saturation Voltage	V_{GE}=15V, I_C=450A,T_J=25℃	$V_{CE(sat)}$		1.85	2.25	V
	V_{GE}=15V, I_C=450A,T_J=125℃			2.15		
	V_{GE}=15V, I_C=450A,T_J=150℃			2.2		
栅极阈值电压 Gate Threshold Voltage	V_{GE}=V_{CE}, I_C=18mA	$V_{GE(th)}$	5.0	5.8	6.5	V
栅极电荷 Gate Charge	V_{CE}=600V, I_C=450A , V_{GE}=15V	Q_G		2.25		μC
内部栅极电阻 Internal Gate Resistor		R_{Gint}		1.4		Ω
输入电容 Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz	C_{ies}		31.5		nF
反向传输电容 Reverse Transfer Capacitance		C_{res}		1.5		nF
集电极漏电流 Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25℃	I_{CES}			1	mA
栅极-发射极漏电流 Gate-Emitter Leakage Current	V_{CE}=0V,V_{GE}=20V, T_J=25℃	I_{GES}			400	nA



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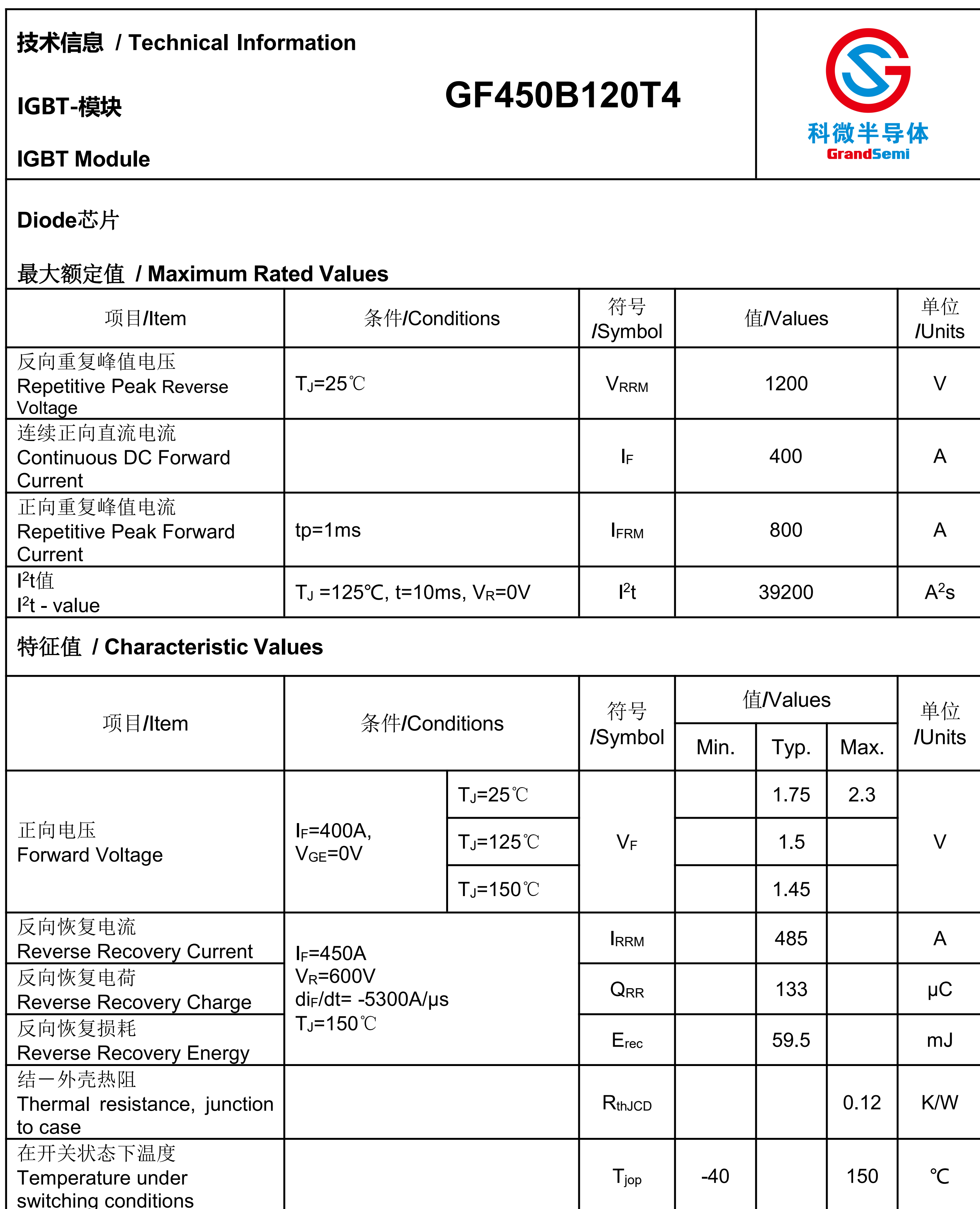
特征值 / Characteristic Values

Parameter	Conditions		Symbol	Min	Typ	Max	Unit
开通延迟时间 Turn on Delay Time	V_{CC}= 600V, I_C=450A, V_{GE}=±15V, R_g=2.0Ω, Inductive Load	T_j=125℃	$t_{d(on)}$		120		ns
		T_j=150℃			130		
上升时间 Rise Time		T_j=125℃	t_r		86		ns
		T_j=150℃			86		
关断延迟时间 Turn off Delay Time		T_j=125℃	$t_{d(off)}$		590		ns
		T_j=150℃			610		
下降时间 Fall Time		T_j=125℃	t_f		200		ns
		T_j=150℃			220		
开通损耗能量 Turn on Energy	V_{CC}= 600V, I_C=450A, V_{GE}=±15V, R_g=2.0Ω, Inductive Load	T_j=125℃	E_{on}		39		mJ
		T_j=150℃			42		
关断损耗能量 Turn off Energy		T_j=125℃	E_{off}		52		mJ
		T_j=150℃			56		
短路电流 Short Circuit Collector Current	V_{GE}=15V, V_{CC}=800V, t_{sc}≤10us, T_j=150° C		I_{SC}		1700		A
结一外壳热阻 Thermal resistance, junction to case			R_{thJC}			0.07	K/W
在开关状态下温度 Temperature under switching conditions			T_{jop}	-40		150	℃



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GrandSemi

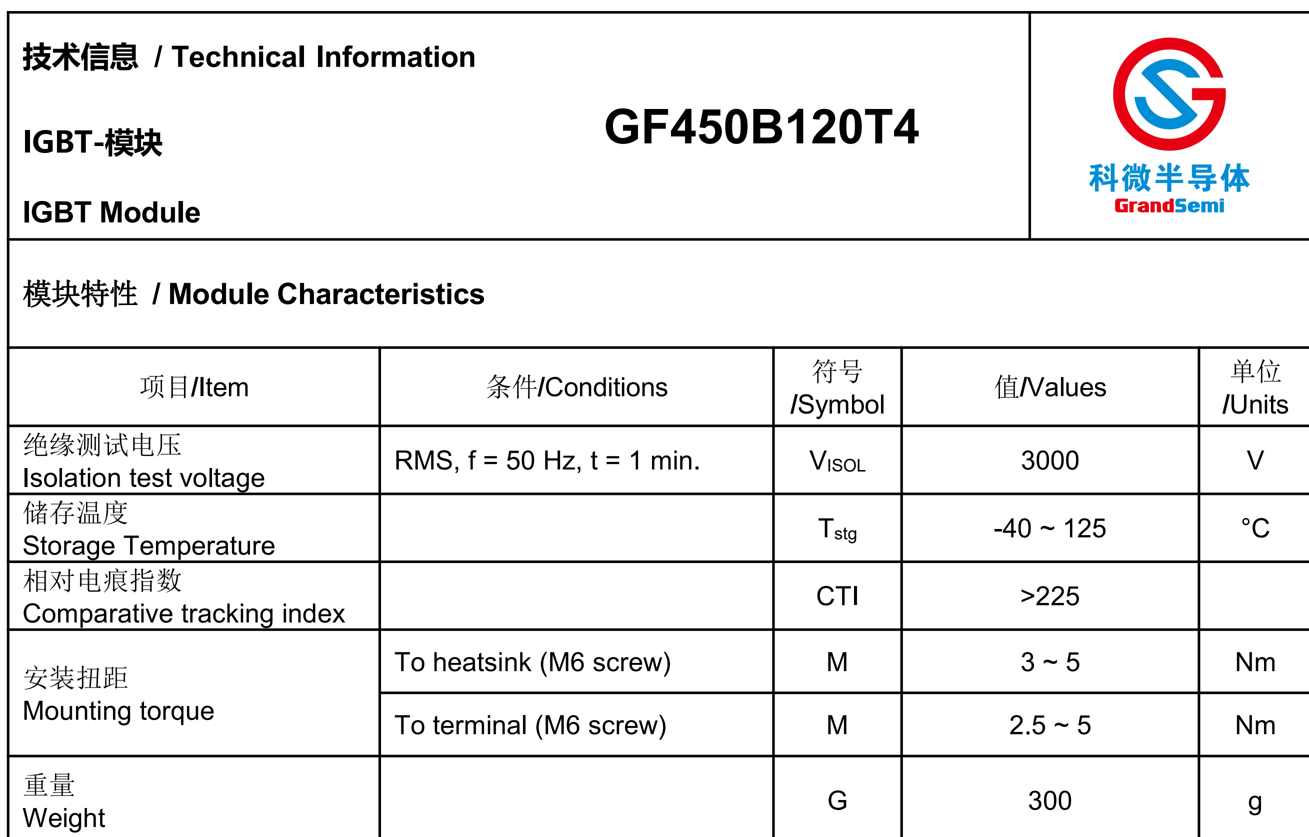
Diode芯片

最大额定值 / Maximum Rated Values

项目/Item	条件/Conditions	符号 /Symbol	值/Values	单位 /Units
反向重复峰值电压 Repetitive Peak Reverse Voltage	T_J=25℃	V_{RRM}	1200	V
连续正向直流电流 Continuous DC Forward Current		I_F	400	A
正向重复峰值电流 Repetitive Peak Forward Current	tp=1ms	I_{FRM}	800	A
I^2t值 I^2t - value	T_J =125℃, t=10ms, V_R=0V	I^2t	39200	A^2s

特征值 / Characteristic Values

项目/Item	条件/Conditions		符号 /Symbol	值/Values Min.	值/Values Typ.	值/Values Max.	单位 /Units
正向电压 Forward Voltage	I_F=400A, V_{GE}=0V	T_J=25℃	V_F		1.75	2.3	V
		T_J=125℃			1.5		
		T_J=150℃			1.45		
反向恢复电流 Reverse Recovery Current	I_F=450A V_R=600V di_F/dt= -5300A/μs T_J=150℃		I_{RRM}		485		A
反向恢复电荷 Reverse Recovery Charge			Q_{RR}		133		μC
反向恢复损耗 Reverse Recovery Energy			E_{rec}		59.5		mJ
结－外壳热阻 Thermal resistance, junction to case			R_{thJCD}			0.12	K/W
在开关状态下温度 Temperature under switching conditions			T_{jop}	-40		150	℃



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GrandSemi

模块特性 / Module Characteristics

项目/Item	条件/Conditions	符号 /Symbol	值/Values	单位 /Units
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	3000	V
储存温度 Storage Temperature		T_{stg}	-40 ~ 125	°C
相对电痕指数 Comparative tracking index		CTI	>225	
安装扭距 Mounting torque	To heatsink (M6 screw)	M	3 ~ 5	Nm
	To terminal (M6 screw)	M	2.5 ~ 5	Nm
重量 Weight		G	300	g

性能曲线 / Performance Curves

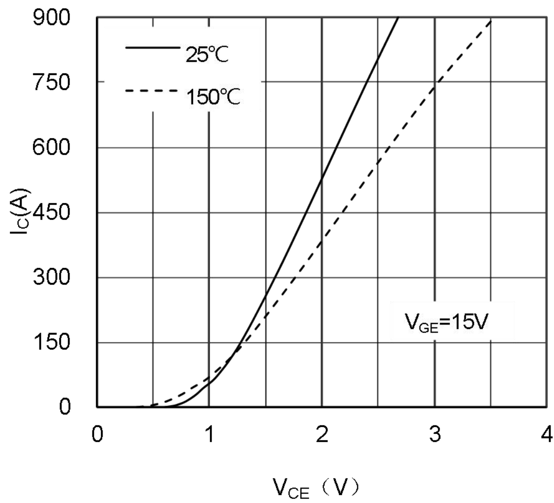


Figure 1. Typical Output Characteristics IGBT-inverter

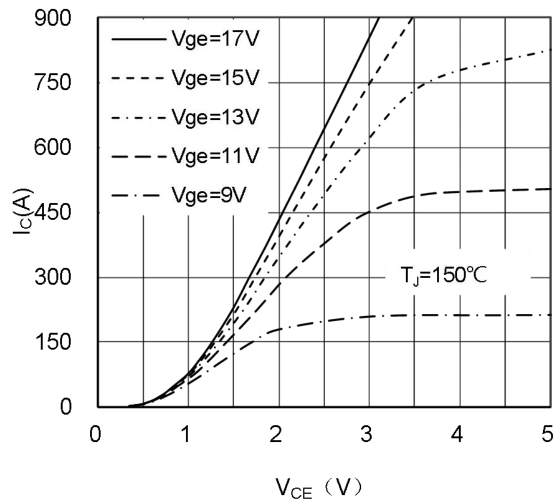


Figure 2. Typical Output Characteristics IGBT-inverter

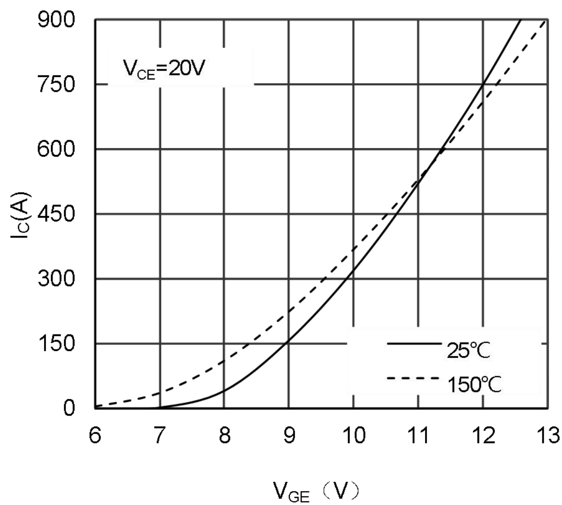


Figure 3. Typical Transfer characteristics IGBT-inverter

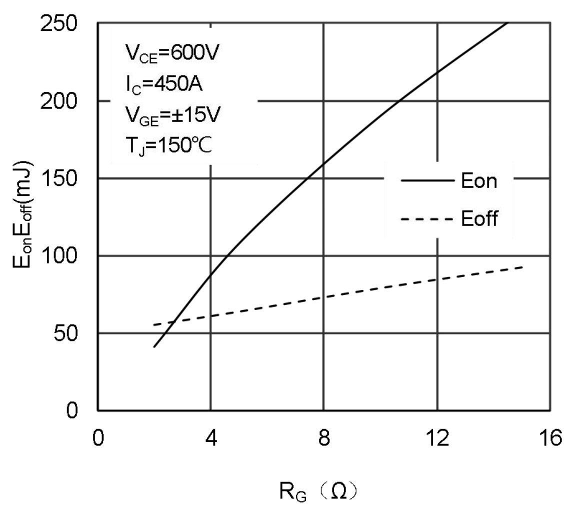


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

性能曲线 / Performance Curves

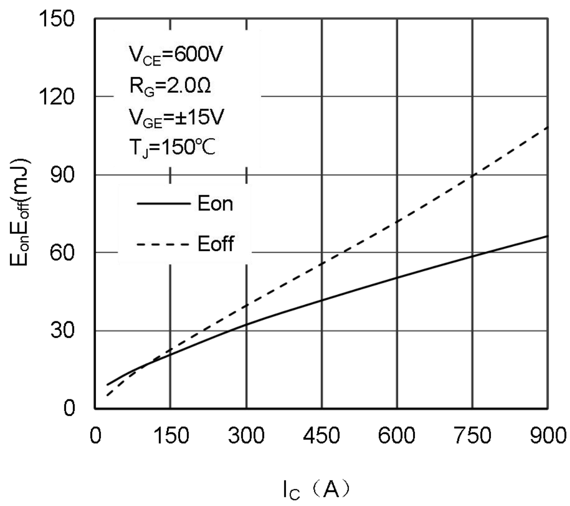


Figure 5. Switching Energy vs Collector Current IGBT-inverter

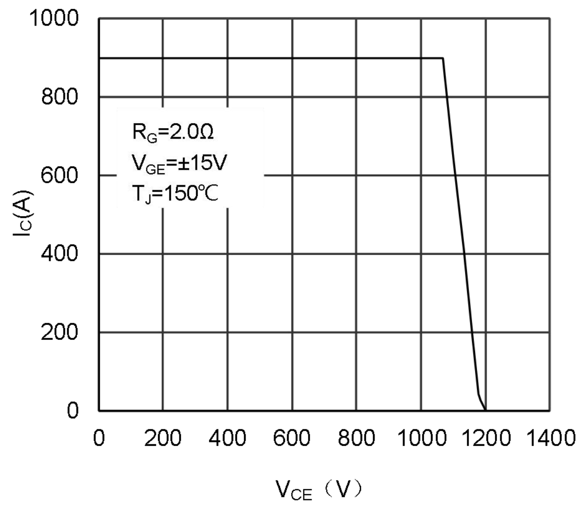


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

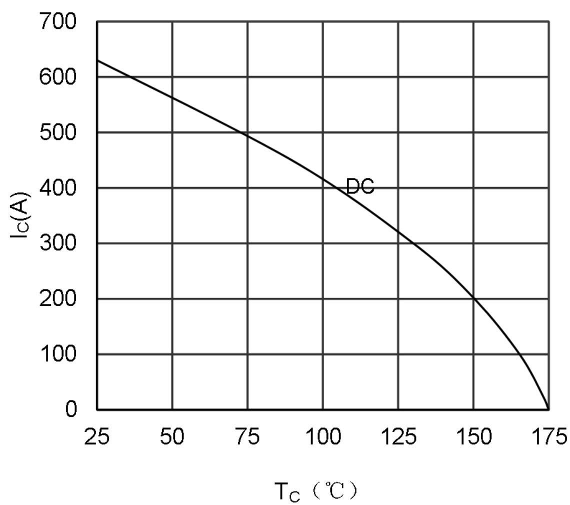


Figure 7. Collector Current vs Case temperature IGBT -inverter

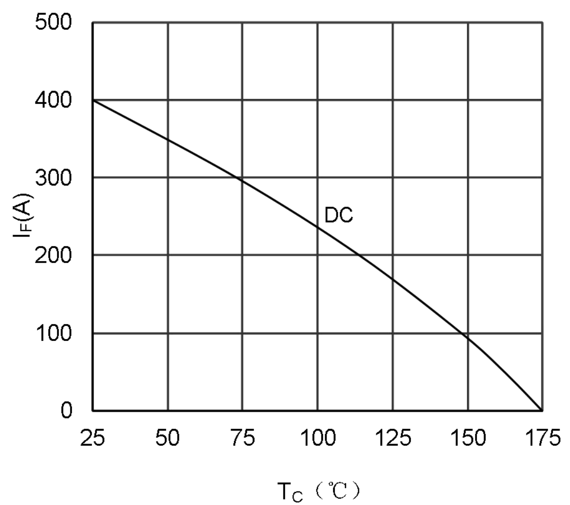


Figure 8. Forward current vs Case temperature Diode -inverter

性能曲线 / Performance Curves

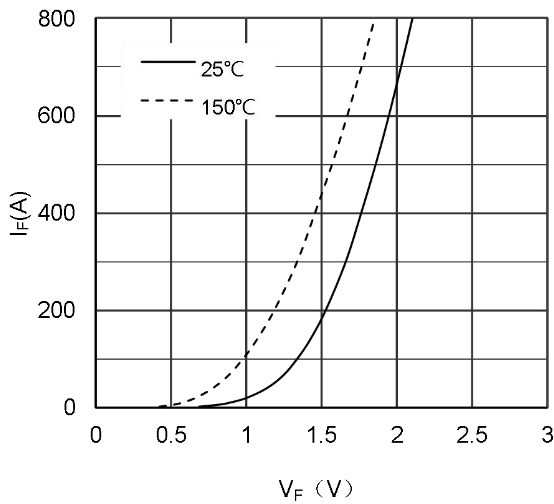


Figure 9. Diode Forward Characteristics Diode -inverter

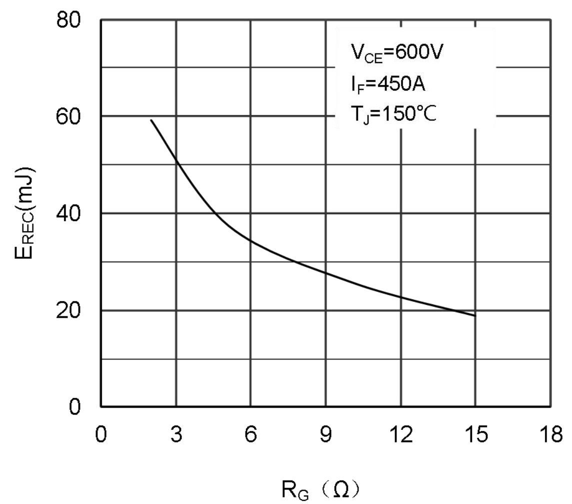


Figure 10. Switching Energy vs Gate Resistor Diode -inverter

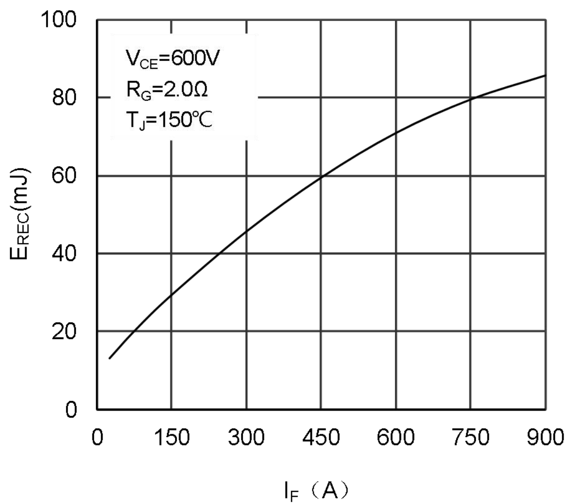


Figure 11. Switching Energy vs Forward Current Diode-inverter

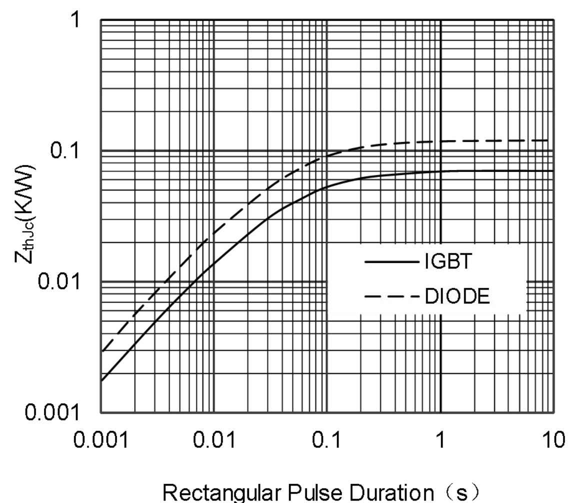


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

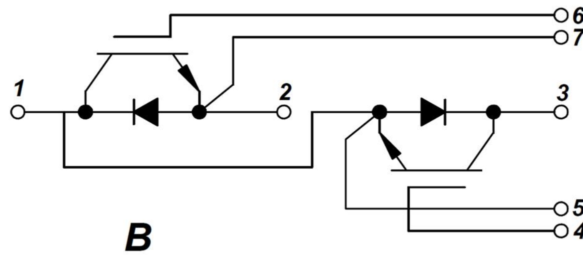
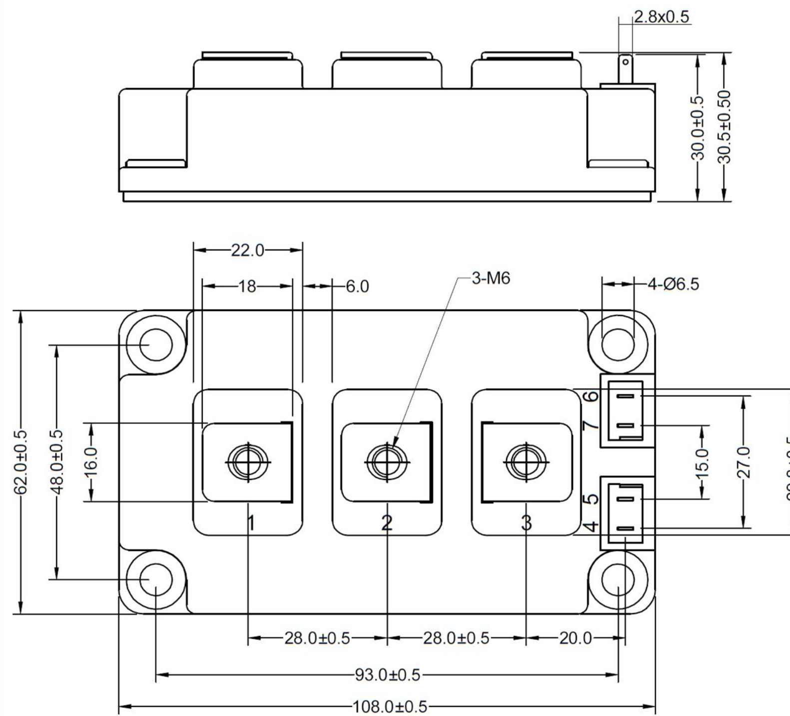


Figure 13. Circuit Diagram



Dimensions in （mm）
Figure 14. Package Outline