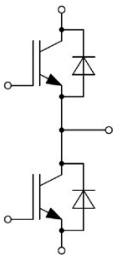
1200V 200A IGBT Half Bridge Module

1200V 200A IGBT 半桥模块

General Description / 概述

SOLIDPOWER IGBT Power Module provides low switching losses as well as high RBSOA capability. They are designed for the applications such as inductive heating, welding and high frequency switching etc.

索力德普 IGBT 功率模块具有低的开关损耗和良好的 RBSOA 能力。此设计适用于感应加热、电焊机、高频开关等应用。



V_{CES}=1200V

$I_{C\ com}$=200A/I_{CRM}=400A

Features：

- 1200V Planar Field Stop technology
- Freewheeling diodes with fast and soft reverse recovery
- Low switching losses
- High RBSOA capability

产品特性：

- 1200V 平面栅+场截止技术
- 快速的软恢复特性续流二极管
- 低开关损耗
- 高RBSOA性能

Typical Applications：

- Inductive heating
- Welding
- High frequency switching application

典型应用：

- 感应加热
- 电焊机
- 高频开关应用

IGBT, Inverter / IGBT，逆变器

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
集电极－发射极电压 Collector-emitter voltage	V_{CES}	T_{vj}=25°C	1200	V
连续集电极直流电流 Continuous DC collector current	I_C	T_C = 100°C, $T_{vj\,max}$= 175°C T_C = 25°C, $T_{vj\,max}$= 175°C	200 280	A A
集电极重复峰值电流 Peak repetitive collector current	I_{CRM}	t_p=1ms	400	A
总功率损耗 Total power dissipation	P_{tot}	T_C=25°C, T_{vj}=175°C	1070	W
栅极－发射极峰值电压 Maximum gate-emitter voltage	V_{GES}		±20	V

Characteristic Values / 特征值

Item	Symbol	Conditions		Min.	Typ.	Max.	Units
集电极－发射极饱和电压 Collector-emitter saturation voltage	$V_{CE\,(sat)}$	I_C=200A,V_{GE}=15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	1.50	2.40 2.95 3.00	3.00	V V V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	I_C=8mA, V_{CE}=V_{GE}, T_{vj}=25°C		5.0	6.0	7.0	V
栅极电荷 Gate charge	Q_G	V_{GE}=-15V…+15V			0.8		µC
内部栅极电阻 Internal gate resistor	R_{Gint}	T_{vj}=25°C			2.5		Ω
输入电容 Input capacitance	C_{ies}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			8.76		nF
反向传输电容 Reverse transfer capacitance	C_{res}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			0.40		nF
集电极-发射极截止电流 Collector-emitter cut-off current	I_{CES}	V_{CE}=1200V, V_{GE}=0V, T_{vj}=25°C				5.00	mA
栅极-发射极漏电流 Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V, T_{vj}=25°C				200	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d\,(on)}$	I_C=200A, V_{CE}=600V V_{GE}=±15V R_{Gon}=3.3 Ω R_{Goff}=3.3 Ω Inductive Load	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		65 75 75		ns ns ns
上升时间(电感负载) Rise time, inductive load	t_r		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		45 55 55		ns ns ns
关断延迟时间(电感负载) Turn-off delay time, inductive load	$t_{d\,(off)}$		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		205 230 235		ns ns ns
下降时间(电感负载) Fall time, inductive load	t_f		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		55 85 85		ns ns ns
开通损耗能量(每脉冲) Turn-on energy loss per pulse	E_{on}		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		16.7 26.4 28.2		mJ mJ mJ
关断损耗能量(每脉冲） Turn-off energy loss per pulse	E_{off}		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		4.9 8.8 9.6		mJ mJ mJ
短路数据 SC data	I_{SC}	V_{GE}≤15V, V_{CC}=800V V_{CEmax}=V_{CES}-L_{sCE}·di/dt, t_p=10µs, T_{vj}=150°C			800		A
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per IGBT / 每个 IGBT				0.14	K/W

工作温度 Temperature under switching conditions	T_{vjop}		-40	150	°C

Diode, Inverter / 二极管，逆变器

Maximum Rated Values /最大额定值

Item	Symbol	Conditions	Value	Units
反向重复峰值电压 Peak repetitive reverse voltage	V_{RRM}	T_{vj}=25°C	1200	V
连续正向直流电流 Continuous DC forward current	I_F		200	A
正向重复峰值电流 Peak repetitive forward current	I_{FRM}	t_p=1ms	400	A

Characteristic Values / 特征值

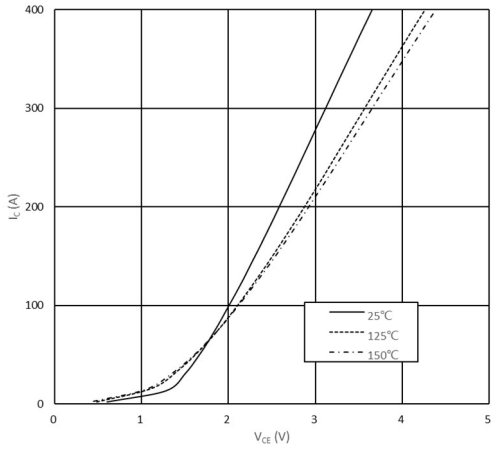
Item	Symbol	Conditions		Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	I_F=200A	T_{vj}=25°C	1.50	1.80	2.40	V
			T_{vj}=125°C		1.80		V
			T_{vj}=150°C		1.80		V
反向恢复峰值电流 Peak reverse recovery current	I_{RM}	I_F=200A -di/dt=3200A/μs V_R = 600V V_{GE}=-15V	T_{vj}=25°C		140		A
			T_{vj}=125°C		140		A
			T_{vj}=150°C		140		A
反向恢复电荷 Recovery charge	Q_r		T_{vj}=25°C		14.5		μC
			T_{vj}=125°C		22.5		μC
			T_{vj}=150°C		28.0		μC
反向恢复损耗（每脉冲） Reverse recovery energy (per pulse)	E_{rec}		T_{vj}=25°C		4.5		mJ
			T_{vj}=125°C		8.7		mJ
			T_{vj}=150°C		9.9		mJ
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管				0.23	K/W
工作温度 Temperature under switching conditions	T_{vjop}			-40		150	°C

Module / 模块

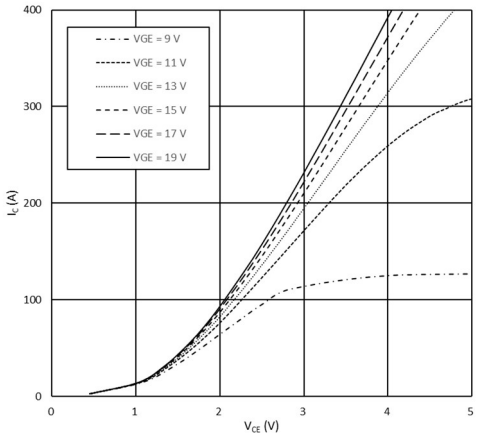
Item	Symbol	Conditions	Value	Units
绝缘测试电压 Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=1min	3.0	kV
模块基板材料 Material of module baseplate			Cu	
内部绝缘 Internal isolation		基本绝缘 (class 1, IEC 61140) Basic insulation (class 1, IEC 61140)	Al_2O_3	
爬电距离 Creepage distance		端子-散热片 / terminal to heatsink 端子-端子/terminal to terminal	29.0 23.0	mm
电气间隙 Clearance		端子-散热片 / terminal to heatsink 端子-端子/terminal to terminal	23.0 11.0	mm
相对电痕指数 Comperative tracking index	CTI		>400	

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
杂散电感，模块 Stray inductance module	L_{sCE}			20		nH
模块引脚电阻，端子-芯片 Module Lead Resistance，Terminals-Chip	$R_{CC'+EE'}$ $R_{AA'+CC'}$			0.7		mΩ
储存温度 Storage temperature	T_{stg}		-40		125	℃
模块安装的安装扭距 Mounting torque for module mounting	M	M6	3.00		6.00	Nm
端子联接扭距 Terminal connection torque	M	M6	2.50		5.00	Nm
重量 Weight	G			320		g

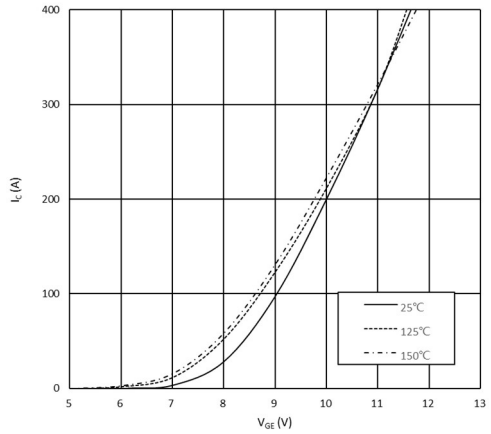
输出特性 IGBT，逆变器（典型）
Output characteristic IGBT, Inverter (typical)
$I_C=f(V_{CE})$
V_{GE}=15V



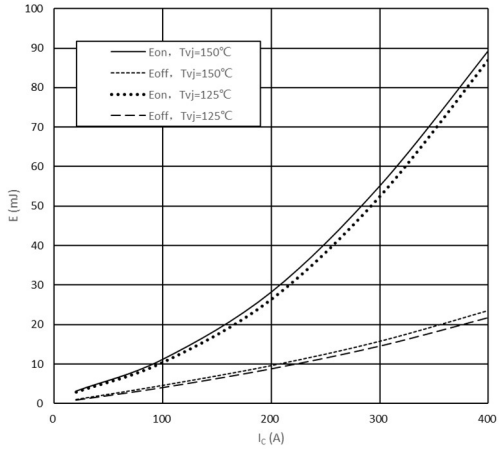
输出特性 IGBT，逆变器（典型）
Output characteristic IGBT, Inverter (typical)
$I_C=f(V_{CE})$
T_{vj}=150°C



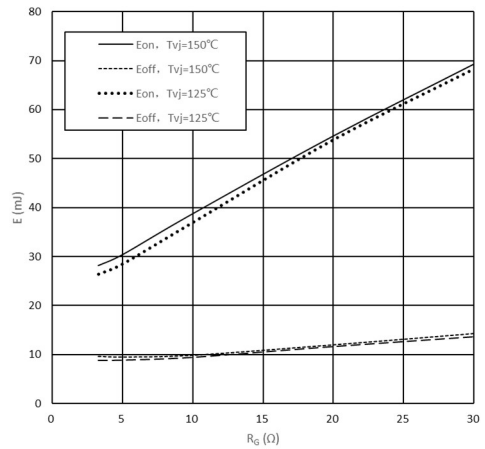
传输特性 IGBT，逆变器（典型）
Transfer characteristic IGBT, Inverter (typical)
$I_C=f(V_{GE})$
V_{CE}=20V



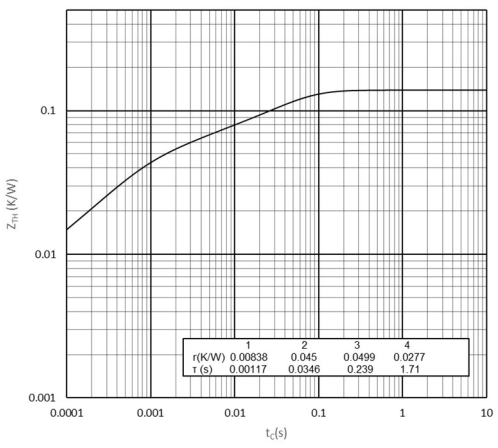
开关损耗 IGBT，逆变器（典型）
Switching losses IGBT, Inverter (typical)
$E=f(I_C)$, $E_{off}=f(I_C)$
V_{GE}=±15V, R_{Gon}=3.3 Ω, R_{Goff}=3.3 Ω, V_{CE}=600V



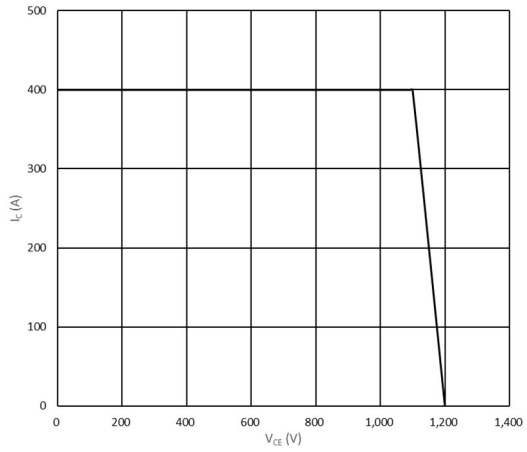
开关损耗 IGBT，逆变器（典型）
Switching losses IGBT, Inverter (typical)
$E=f(R_G)$
V_{GE}=±15V, I_C=200A, V_{CE}=600V



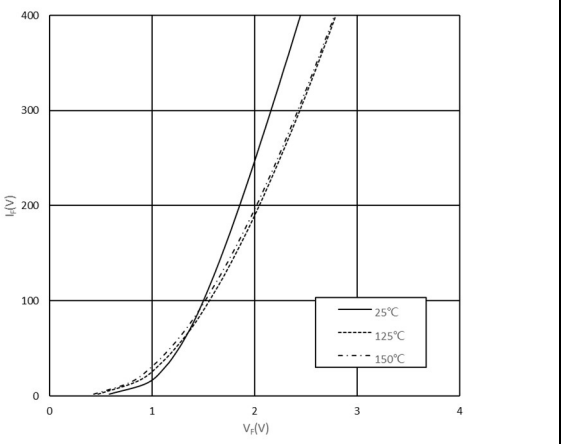
瞬态热阻抗 IGBT，逆变器
Transient thermal impedance IGBT, Inverter
$Z_{thJC}=f(t)$



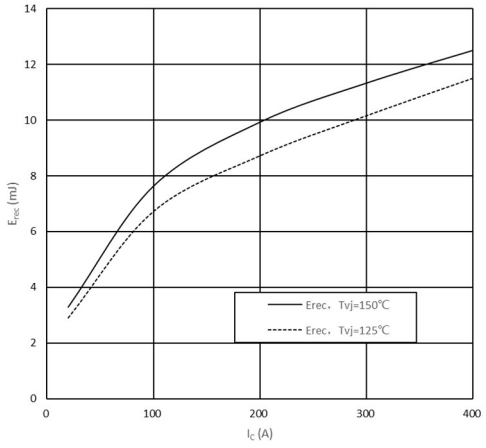
反偏安全工作区 IGBT，逆变器 （RBSOA）
Reverse bias safe operating area IGBT, Inverter (RBSOA)
$I_C=f(V_{CE})$
$V_{GE}=\pm15V$, $R_{Goff}=3.3\ \Omega$, $T_{vj}=150°C$



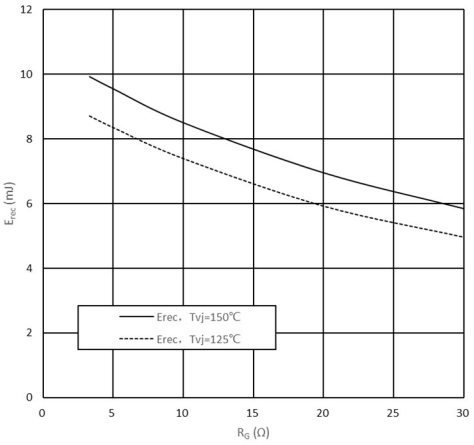
正向偏压特性 二极管，逆变器（典型)
Forward characteristic of Diode, Inverter (typical)
$I_F=f(V_F)$



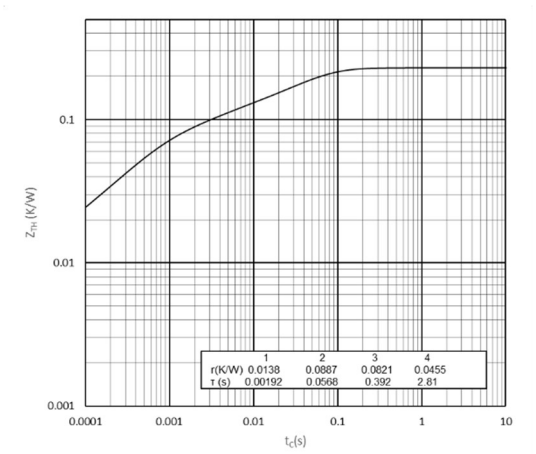
开关损耗 二极管，逆变器（典型）
Switching losses Diode, Inverter (typical)
$E_{rec}=f(I_F)$
$R_{Gon}=3.3\Omega$, $V_{CE}=600V$



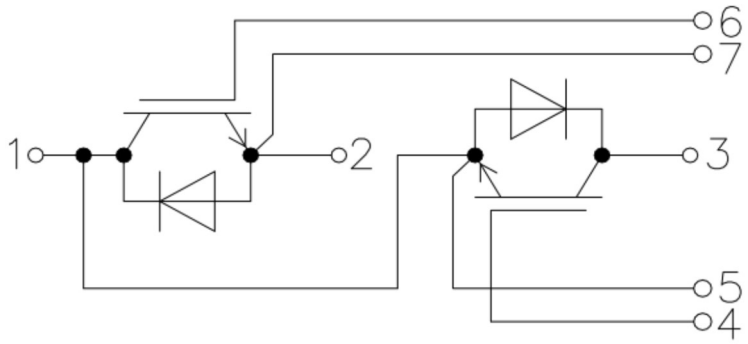
开关损耗 二极管，逆变器（典型）
Switching losses Diode, Inverter (typical)
$E_{rec}=f(R_G)$
$I_F=200A$, $V_{CE}=600V$



瞬态热阻抗 FRD，逆变器
Transient thermal impedance FRD, Inverter
$Z_{thJC}=f(t)$



Circuit diagram headline / 接线图



Package outlines / 封装尺寸