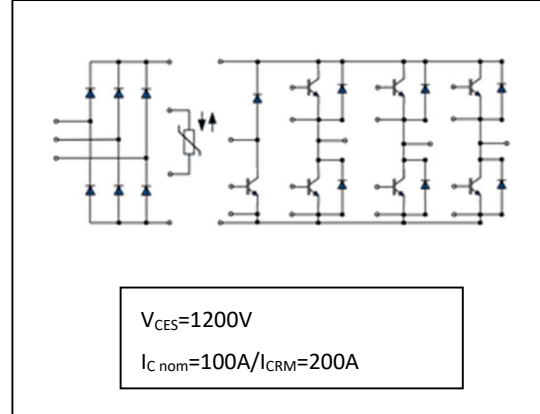


## 1200V 100A IGBT PIM Module

## 受控文件

## 1200V 100A IGBT PIM 模块



### Features:

- 1200V Trench+ Field Stop technology
- Freewheeling diodes with fast and soft reverse recovery
- $V_{CE(sat)}$  with positive temperature coefficient
- Low switching losses
- Short circuit ruggedness

### 产品特性:

- 1200V 沟槽栅+场截止技术
- 快速的软恢复特性续流二极管
- 导通压降具有正温度系数
- 低开关损耗
- 良好的短路稳定性

### Typical Applications:

- Motor drives
- Servo drives

### 典型应用:

- 电机驱动
- 伺服驱动

### IGBT, Inverter / IGBT, 逆变器

#### Maximum Rated Values / 最大额定值

## 受控文件

Item	Symbol	Conditions	Value	Units
集电极-发射极电压 Collector-emitter voltage	$V_{CES}$	$T_{vj}=25^{\circ}\text{C}$	1200	V
连续集电极直流电流 Continuous DC collector current	$I_c$	$T_c=100^{\circ}\text{C}$	100	A
集电极重复峰值电流 Peak repetitive collector current	$I_{CRM}$	$t_p=1\text{ms}$	200	A
栅极-发射极峰值电压 Maximum gate-emitter voltage	$V_{GES}$		$\pm 20$	V
总功率损耗 Total power dissipation	$P_{tot}$	$T_c=25^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$	515	W

#### 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	$V_{CE(sat)}$	$I_c=100\text{A}, V_{GE}=15\text{V}$		$T_{vj}=25^{\circ}\text{C}$ 1.92 $T_{vj}=125^{\circ}\text{C}$ 2.34 $T_{vj}=150^{\circ}\text{C}$ 2.44	2.50	V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	$I_c=3.8\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$	5.2	5.8	6.4	V
内部栅极电阻 Internal gate resistor	$R_{Gint}$	$T_{vj}=25^{\circ}\text{C}$		6.2		$\Omega$
输入电容 Input capacitance	$C_{ies}$	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$		7.47		nF
反向传输电容 Reverse transfer capacitance	$C_{res}$	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$		0.28		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$I_{CES}$	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			1.00	mA
栅极-发射极漏电流 Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0\text{V}, V_{GE}=20\text{V}, T_{vj}=25^{\circ}\text{C}$			100	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d(on)}$		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	104 113 118		ns
上升时间(电感负载) Rise time, inductive load	$t_r$		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	27 32 34		ns
关断延迟时间(电感负载) Turn-off delay time, inductive load	$t_{d(off)}$	$I_c=100\text{A}, V_{CE}=600\text{V}$ $V_{GE}=-15\text{V}\dots+15\text{V}$ $R_{Gon}=2\Omega$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	203 251 259		ns
下降时间(电感负载) Fall time, inductive load	$t_f$	$R_{Goff}=2\Omega$ Inductive Load	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	181 184 197		ns
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$E_{on}$		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	3.04 6.17 7.22		mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$E_{off}$		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	6.11 8.24 8.77		mJ
短路数据 SC data	$I_{sc}$	$V_{GE}=-15\text{V}\dots+15, V_{CC}=800\text{V}$ $V_{CEmax}=V_{CES}-L_{SCE}\cdot di/dt, t_p=10\mu\text{s}, T_{vj}=25^{\circ}\text{C}$		330		A
结-外壳热阻 Thermal resistance, junction to case	$R_{thJC}$	Per IGBT / 每个 IGBT			0.29	K/W
工作温度 Temperature under switching conditions	$T_{vjop}$		-40		150	$^{\circ}\text{C}$

### Diode, Inverter / 二极管, 逆变器

## 受控文件

#### 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	$V_{RRM}$	$T_{vj}=25^{\circ}\text{C}$	1200	V
连续正向直流电流 Continuous DC forward current	$I_F$		100	A
正向重复峰值电流 Peak repetitive forward current	$I_{FRM}$	$t_p=1\text{ms}$	200	A

#### Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	$V_F$	$I_F=100\text{A}$	$T_{vj}=25^{\circ}\text{C}$	2.20	2.80	V
			$T_{vj}=125^{\circ}\text{C}$	2.15		
			$T_{vj}=150^{\circ}\text{C}$	2.07		
反向恢复峰值电流 Peak reverse recovery current	$I_{rm}$	$I_F=100\text{A}$	$T_{vj}=25^{\circ}\text{C}$	110		A
			$T_{vj}=125^{\circ}\text{C}$	120		
			$T_{vj}=150^{\circ}\text{C}$	125		
反向恢复电荷 Reverse recovery charge	$Q_{rr}$	$-\text{di}_F/\text{dt}_{\text{off}}=2700\text{A}/\mu\text{s}$ $V_R = 600\text{V}$ $V_{GE}=-15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	6.04		$\mu\text{C}$
			$T_{vj}=125^{\circ}\text{C}$	12.58		
			$T_{vj}=150^{\circ}\text{C}$	15.34		
反向恢复损耗 (每脉冲) Reverse recovery energy (per pulse)	$E_{rec}$		$T_{vj}=25^{\circ}\text{C}$	2.09		mJ
			$T_{vj}=125^{\circ}\text{C}$	4.72		
			$T_{vj}=150^{\circ}\text{C}$	5.79		
结-外壳热阻 Thermal resistance, junction to case	$R_{thJC}$	Per diode / 每个二极管			0.62	K/W
工作温度 Temperature under switching conditions	$T_{vjop}$		-40		150	$^{\circ}\text{C}$

### IGBT, Brake Chopper / IGBT, 刹车

#### Maximum Rated Values / 最大额定值

## 受控文件

Item	Symbol	Conditions	Value	Units
集电极-发射极电压 Collector-emitter voltage	$V_{CEs}$	$T_{vj}=25^{\circ}C, I_c=1mA, V_{GE}=0V$	1200	V
连续集电极直流电流 Continuous DC collector current	$I_c$	$T_c=100^{\circ}C, T_{vj}=175^{\circ}C$	50	A
集电极重复峰值电流 Peak repetitive collector current	$I_{CRM}$	$t_p=1ms$	100	A
栅极-发射极峰值电压 Maximum gate-emitter voltage	$V_{GES}$		$\pm 20$	V
总功率损耗 Total power dissipation	$P_{tot}$	$T_c=25^{\circ}C, T_{vj}=175^{\circ}C$	270	W

#### 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	$V_{CE(sat)}$	$I_c=50A, V_{GE}=15V$		$T_{vj}=25^{\circ}C$ 2.10 $T_{vj}=125^{\circ}C$ 2.53 $T_{vj}=150^{\circ}C$ 2.61	2.40	V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	$I_c=1.6mA, V_{CE}=10V, T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
栅极电荷 Gate charge	$Q_G$	$V_{GE}=-15V...+15V$		0.24		$\mu C$
输入电容 Input capacitance	$C_{ies}$	$f=1MHz, T_{vj}=25^{\circ}C, V_{CE}=25V, V_{GE}=0V$		2.96		nF
反向传输电容 Reverse transfer capacitance	$C_{res}$	$f=1MHz, T_{vj}=25^{\circ}C, V_{CE}=25V, V_{GE}=0V$		0.11		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.00	mA
栅极-发射极漏电流 Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			100	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d(on)}$			$T_{vj}=25^{\circ}C$ 56 $T_{vj}=125^{\circ}C$ 60 $T_{vj}=150^{\circ}C$ 61		ns
上升时间(电感负载) Rise time, inductive load	$t_r$			$T_{vj}=25^{\circ}C$ 36 $T_{vj}=125^{\circ}C$ 43 $T_{vj}=150^{\circ}C$ 45		ns
关断延迟时间(电感负载) Turn-off delay time, inductive load	$t_{d(off)}$	$I_c=50A, V_{CE}=600V$ $V_{GE}=-15V...+15V$ $R_{Gon}=15\Omega$		$T_{vj}=25^{\circ}C$ 189 $T_{vj}=125^{\circ}C$ 235 $T_{vj}=150^{\circ}C$ 245		ns
下降时间(电感负载) Fall time, inductive load	$t_f$	$R_{Goff}=15\Omega$ Inductive Load		$T_{vj}=25^{\circ}C$ 184 $T_{vj}=125^{\circ}C$ 221 $T_{vj}=150^{\circ}C$ 244		ns
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$E_{on}$			$T_{vj}=25^{\circ}C$ 3.50 $T_{vj}=125^{\circ}C$ 5.83 $T_{vj}=150^{\circ}C$ 6.59		mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$E_{off}$			$T_{vj}=25^{\circ}C$ 2.93 $T_{vj}=125^{\circ}C$ 4.05 $T_{vj}=150^{\circ}C$ 4.42		mJ
短路数据 SC data	$I_{sc}$	$V_{GE}=-15V...+15, V_{CC}=800V$ $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt, t_p=10\mu s, T_{vj}=25^{\circ}C$		190		A
结-外壳热阻 Thermal resistance, junction to case	$R_{th(jc)}$	Per IGBT / 每个 IGBT			0.54	K/W
工作温度 Temperature under switching conditions	$T_{vjop}$		-40		150	$^{\circ}C$

### Diode, Brake Chopper / 二极管, 刹车

## 受控文件

#### 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	$V_{RRM}$	$T_{vj}=25^{\circ}C$	1200	V
连续正向直流电流 Continuous DC forward current	$I_F$		30	A
正向重复峰值电流 Peak repetitive forward current	$I_{FRM}$	$t_p=1ms$	60	A

#### Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	$V_F$	$I_F=50A$	$T_{vj}=25^{\circ}C$	1.94	2.40	V
			$T_{vj}=125^{\circ}C$	1.64		
			$T_{vj}=150^{\circ}C$	1.57		
反向恢复峰值电流 Peak reverse recovery current	$I_{rr}$	$I_F=50A$	$T_{vj}=25^{\circ}C$	20		A
			$T_{vj}=125^{\circ}C$	29		
			$T_{vj}=150^{\circ}C$	31		
反向恢复电荷 Reverse recovery charge	$Q_r$	$-di_r/dt_{off}=800A/\mu s$ $V_R = 600 V$ $V_{GE}=-15V$	$T_{vj}=25^{\circ}C$	2.04		$\mu C$
			$T_{vj}=125^{\circ}C$	5.23		
			$T_{vj}=150^{\circ}C$	6.18		
反向恢复损耗 (每脉冲) Reverse recovery energy (per pulse)	$E_{rec}$		$T_{vj}=25^{\circ}C$	0.95		mJ
			$T_{vj}=125^{\circ}C$	2.01		
			$T_{vj}=150^{\circ}C$	2.28		
结-外壳热阻 Thermal resistance, junction to case	$R_{thJC}$	Per diode / 每个二极管			1.35	K/W
工作温度 Temperature under switching conditions	$T_{vjop}$		-40		150	$^{\circ}C$

### Diode, Rectifier / 二极管, 整流

## 受控文件

#### 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	$V_{RRM}$	$T_{vj}=25^{\circ}C$	1800	V
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	$I_{FRMSM}$	$T_c = 80^{\circ}C$	80	A
正向浪涌电流 Surge forward current	$I_{FSM}$	$t_p=10ms, T_{vj}=25^{\circ}C, \sin 180^{\circ}$	960	A
I <sup>2</sup> t-值 I <sup>2</sup> t-value	$I^2t$	$t_p=10ms, T_{vj}=25^{\circ}C, \sin 180^{\circ}$	4600	A <sup>2</sup> s

#### Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	$V_F$	$T_{vj}=25^{\circ}C, I_F=80A$		1.10	1.20	V
反向电流 Reverse current	$I_R$	$T_{vj}=25^{\circ}C, V_R=1800V$			10	$\mu A$
工作温度 Temperature under switching conditions	$T_{vjop}$		-40		150	$^{\circ}C$

### NTC-Thermistor / 负温度系数热敏电阻

#### Characteristic Values / 特征值

Item	Symbol	Conditions	Value	Units
额定电阻值 Rated resistance	$R_{25}$	$T_c=25^{\circ}C$	5.00	k $\Omega$
B-值 B-value	$B_{25/50}$	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15K))]$	3375	K

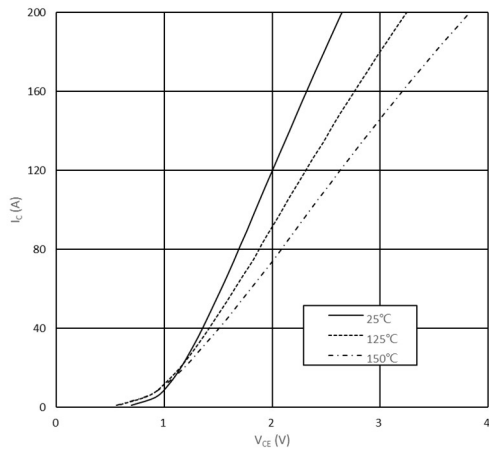
### Module / 模块

受控文件

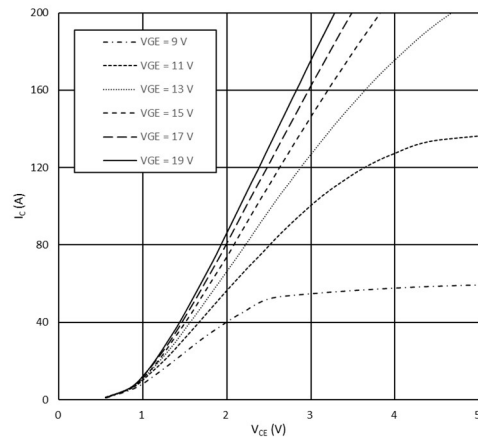
Item	Symbol	Conditions	Value	Units
绝缘测试电压 Isolation test voltage	$V_{ISOL}$	RMS, f=50Hz, t=1min	2.5	kV
模块基板材料 Material of module baseplate			Cu	
内部绝缘 Internal isolation		基本绝缘 (class 1, IEC 61140) Basic insulation (class 1, IEC 61140)	$Al_2O_3$	
爬电距离 Creepage distance			10	mm
电气间隙 Clearance			7.5	mm
相对电痕指数 Comperative tracking index	CTI		> 200	

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
杂散电感, 模块 Stray inductance module	$L_{SCE}$			25		nH
模块引脚电阻, 端子-芯片 Module Lead Resistance, Terminals-Chip	$R_{CC^+EE^+}$	$T_H=25^{\circ}C$ , 每个开关/perswitch		1.1		m $\Omega$
储存温度 Storage temperature	$T_{stg}$		-40		125	$^{\circ}C$
模块安装的安装扭距 Mounting torque for module mounting	M		3.00		6.00	Nm
重量 Weight	G			300		g

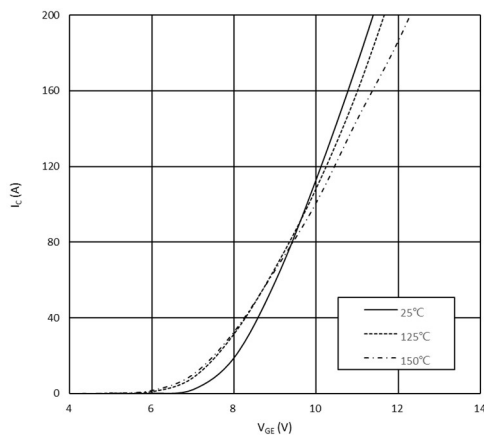
输出特性 IGBT, 逆变器 (典型)  
Output characteristic IGBT, Inverter (typical)  
 $I_C = f(V_{CE})$



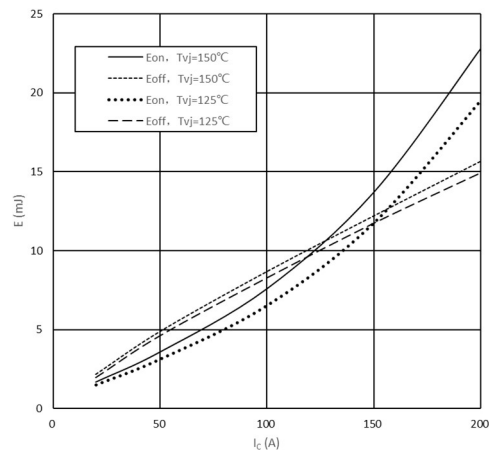
输出特性 IGBT, 逆变器 (典型)  
Output characteristic IGBT, Inverter (typical)  
 $I_C = f(V_{CE})$   
 $T_{vj}=150^{\circ}C$



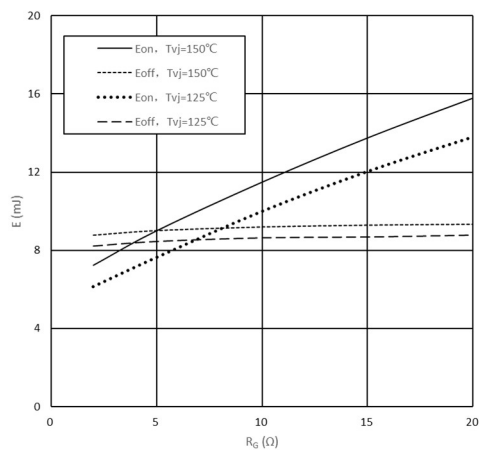
转移特性 IGBT, 逆变器 (典型)  
Transfer characteristic IGBT, Inverter (typical)  
 $I_C = f(V_{GE})$   
 $V_{CE}=20V$



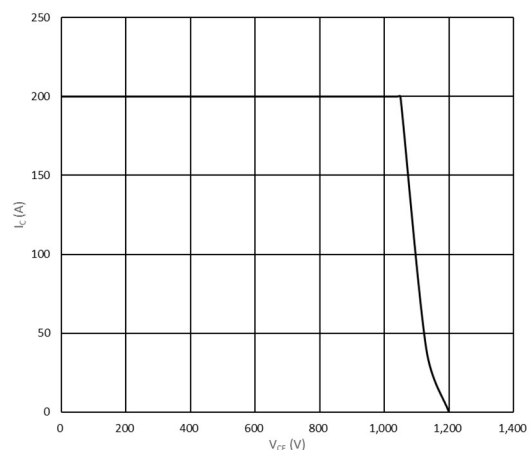
开关损耗 IGBT, 逆变器 (典型)  
Switching losses IGBT, Inverter (typical)  
 $E = f(I_C)$   
 $V_{GE}=\pm 15V, R_G=2\Omega, V_{CE}=600V$



开关损耗 IGBT, 逆变器 (典型)  
Switching losses IGBT, Inverter (typical)  
 $E = f(R_G)$   
 $V_{GE}=\pm 15V, I_C=100A, V_{CE}=600V$



反偏安全工作区 IGBT, 逆变器 (RBSOA)  
Reverse bias safe operating area IGBT, Inverter (RBSOA)  
 $I_C = f(V_{CE})$   
 $V_{GE}=\pm 15V, R_{Goff}=2\Omega, T_{vj}=150^{\circ}C$

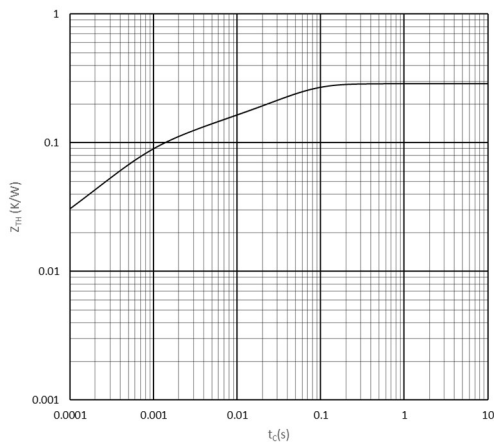




瞬态热阻抗 IGBT, 逆变器

Transient thermal impedance IGBT, Inverter

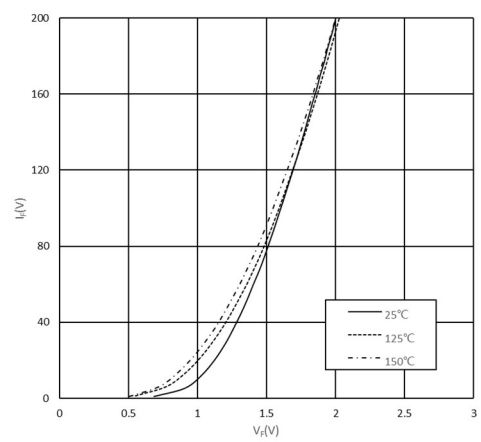
$Z_{thJC}=f(t)$



正向偏压特性 FRD, 逆变器 (典型)

Forward characteristic of FRD, Inverter (typical)

$I_F=f(V_F)$

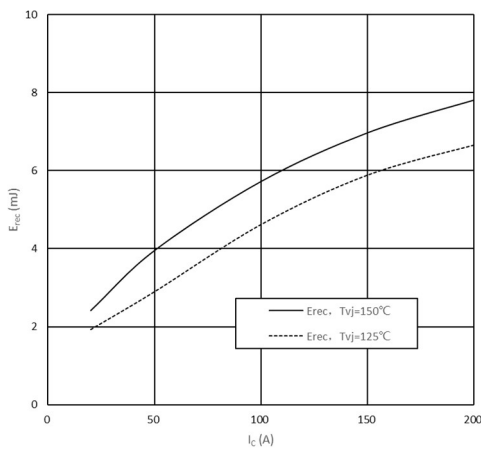


开关损耗 FRD, 逆变器 (典型)

Switching losses FRD, Inverter (typical)

$E=f(I_c)$

$R_G=2\ \Omega, V_{CE}=600V$

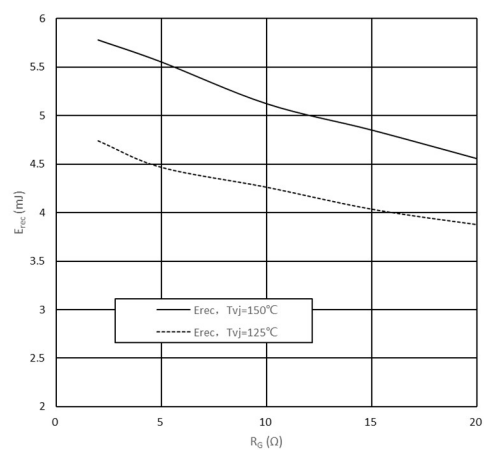


开关损耗 FRD, 逆变器 (典型)

Switching losses FRD, Inverter (typical)

$E=f(R_G)$

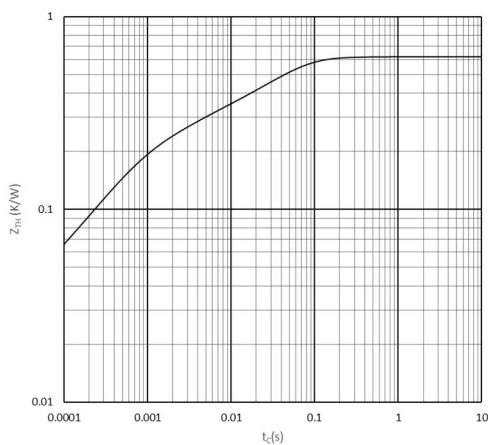
$I_F=100A, V_{CE}=600V$



瞬态热阻抗 FRD, 逆变器

Transient thermal impedance FRD, Inverter

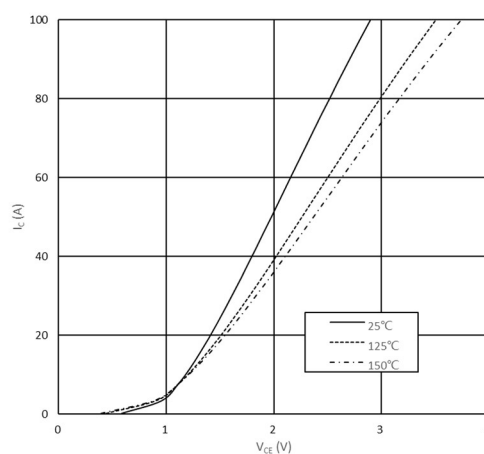
$Z_{thJC}=f(t)$



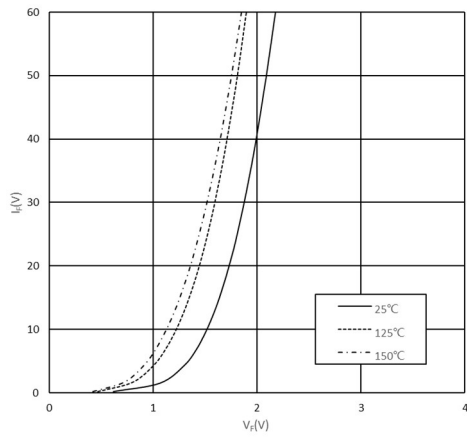
输出特性 IGBT, 刹车 (典型)

Output characteristic IGBT, Brake Chopper (typical)

$I_c=f(V_{CE})$

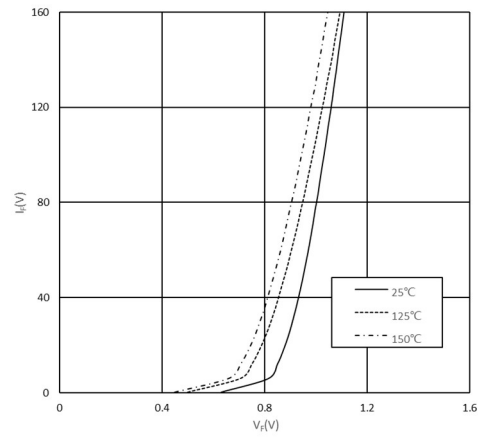


正向偏压特性 FRD, 刹车 (典型)  
Forward characteristic of FRD, Brake Chopper (typical)  
 $I_F=f(V_F)$



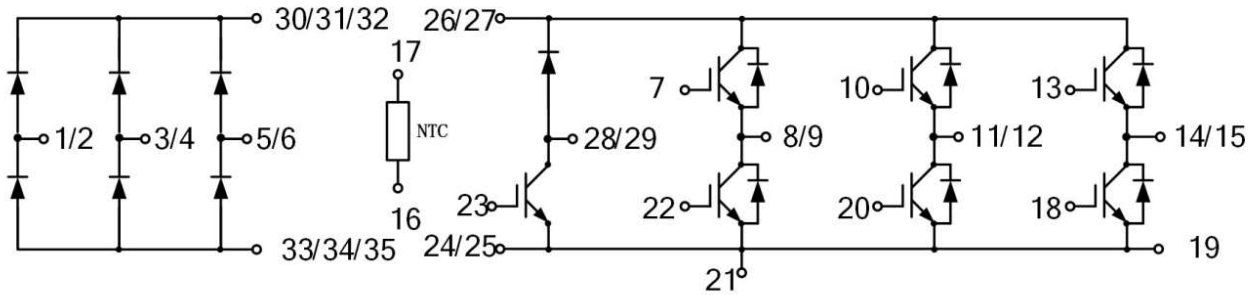
正向偏压特性 Diode, 整流 (典型)  
Forward characteristic of Diode, Rectifier (typical)  
 $I_F=f(V_F)$

受控文件



Circuit diagram headline / 接线图

### 受控文件



Package outlines / 封装尺寸

