受控文件

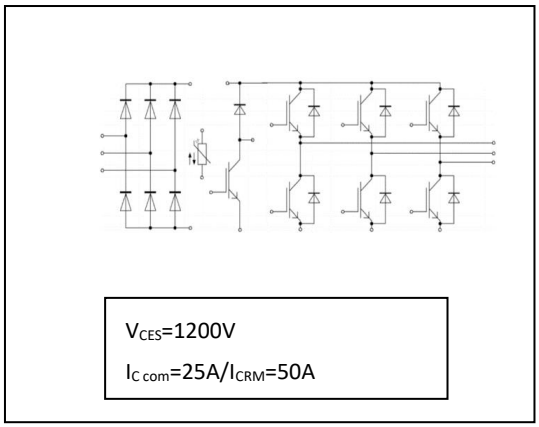
1200V 25A IGBT PIM Module

1200V 25A IGBT PIM 模块

General Description / 概述

SOLIDPOWER IGBT Power Module provides low conduction loss as well as short circuit ruggedness. They are designed for the applications such as motor drives, servo drives etc.

索力德普 IGBT 功率模块具有低的导通损耗和良好短路稳定性。此设计适用于电机驱动、伺服驱动等应用。



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

受控文件

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	$I_{C\ nom}$ I_C	 T_C=80°C, T_{vj}=150°C	25 33	A A
集电极重复峰值电流 Peak repetitive collector current	I_{CRM}	t_p=1ms	50	A
总功率损耗 Total power dissipation	P_{tot}	T_C=25°C, T_{vj}=150°C	180	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=25A,V_{GE}=15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		2.00 2.50 2.50	2.20	V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	I_C=1mA, V_{CE}= V_{GE}, T_{vj}=25°C		4.5	5.8	6.5	V
栅极电荷 Gate charge	Q_G	V_{GE}=-15V…+15V, T_{vj}=25°C			0.1		µC
内部栅极电阻 Internal gate resistor	R_{Gint}	T_{vj}=25°C			-		Ω
输入电容 Input capacitance	C_{ies}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			1.79		nF
反向传输电容 Reverse transfer capacitance	C_{res}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			0.08		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				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°C				200	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d\ (on)}$	I_C=25A, V_{CE}=600V V_{GE}=-15V…+15V R_{Gon}=30 Ω R_{Goff}=30 Ω Inductive Load	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		15 16 16		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		21 22 22		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		90 100 105		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		210 275 290		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		2.30 3.00 3.30		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		1.20 1.60 1.75		mJ
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per IGBT / 每个 IGBT			0.47	0.70	K/W
工作温度 Temperature under switching conditions	T_{vjop}			-40		150	°C

受控文件

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		25	A
正向重复峰值电流 Peak repetitive forward current	I_{FRM}	t_p=1ms	50	A

Characteristic Values / 特征值

Item	Symbol	Conditions		Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	I_F=25A	T_{vj}=25°C		1.95	2.20	V
			T_{vj}=125°C		1.90		
			T_{vj}=150°C		1.85		
反向恢复峰值电流 Peak reverse recovery current	I_{RM}	I_F=25A $-di_F/dt_{off}$=660A/μs V_R = 600 V V_{GE}=-15V	T_{vj}=25°C		20		A
			T_{vj}=125°C		23		
			T_{vj}=150°C		25		
反向恢复电荷 Reverse recovery charge	Q_r		T_{vj}=25°C		1.50		μC
			T_{vj}=125°C		2.70		
			T_{vj}=150°C		3.10		
反向恢复损耗（每脉冲） Reverse recovery energy (per pulse)	E_{rec}		T_{vj}=25°C		0.10		mJ
			T_{vj}=125°C		0.55		
			T_{vj}=150°C		0.67		
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管			0.85		K/W
工作温度 Temperature under switching conditions	T_{vjop}			-40		150	°C

受控文件

IGBT, Brake Chopper / IGBT，刹车

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	$I_{C\ nom}$ I_C	 T_C=80°C, T_{vj}=150°C	25 33	A A
集电极重复峰值电流 Peak repetitive collector current	I_{CRM}	t_p=1ms	50	A
总功率损耗 Total power dissipation	P_{tot}	T_C=25°C, T_{vj}=150°C	180	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=25A,V_{GE}=15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		2.00 2.50 2.50	2.20	V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	I_C=1.0mA, V_{CE}=V_{GE}, T_{vj}=25°C		4.5	5.8	6.5	V
栅极电荷 Gate charge	Q_G	V_{GE}=-15V…+15V, T_{vj}=25°C			0.1		µC
内部栅极电阻 Internal gate resistor	R_{Gint}	T_{vj}=25°C			-		Ω
输入电容 Input capacitance	C_{ies}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			1.79		nF
反向传输电容 Reverse transfer capacitance	C_{res}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			0.08		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				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°C				200	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d\ (on)}$	I_C=25A, V_{CE}=600V V_{GE}=-15V…+15V R_{Gon}=30 Ω R_{Goff}=30Ω Inductive Load	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		15 16 16		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		21 22 22		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		90 100 105		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		210 275 290		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		2.30 3.00 3.30		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		1.20 1.60 1.75		mJ
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per IGBT / 每个 IGBT			0.47	0.70	K/W
工作温度 Temperature under switching conditions	T_{vjop}			-40		150	°C

受控文件

Diode, Brake Chopper / 二极管，刹车

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		25	A
正向重复峰值电流 Peak repetitive forward current	I_{FRM}	t_p=1ms	50	A

Characteristic Values / 特征值

Item	Symbol	Conditions		Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	I_F=25A	T_{vj}=25°C		1.95	2.20	V
			T_{vj}=125°C		1.90		
			T_{vj}=150°C		1.85		
反向恢复峰值电流 Peak reverse recovery current	I_{RM}	I_F=25A $-di_F/dt_{off}$=660A/μs V_R = 600 V V_{GE}=-15V	T_{vj}=25°C		20		A
			T_{vj}=125°C		23		
			T_{vj}=150°C		25		
反向恢复电荷 Reverse recovery charge	Q_r		T_{vj}=25°C		1.50		μC
			T_{vj}=125°C		2.70		
			T_{vj}=150°C		3.10		
反向恢复损耗（每脉冲） Reverse recovery energy (per pulse)	E_{rec}		T_{vj}=25°C		0.10		mJ
			T_{vj}=125°C		0.55		
			T_{vj}=150°C		0.67		
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管			0.85		K/W
工作温度 Temperature under switching conditions	T_{vjop}			-40		150	°C

受控文件

Diode, Rectifier / 二极管，整流

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	1800	V
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	I_{FRMSM}		25	A
正向浪涌电流 Surge forward current	I_{FSM}	t_p=10ms, T_{vj}=25°C, sin180°	300	A
I^2t-值 I^2t-value	I^2t	t_p=10ms, T_{vj}=150°C, sin180°	450	A^2S

Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	T_{vj}=125°C, I_F=25A		1.00		V
反向电流 Reverse current	I_R	T_{vj}=25°C, V_R=1800V			1	mA
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管		1.13		K/W
工作温度 Temperature under switching conditions	T_{vjop}		-40		150	°C

NTC-Thermistor / 负温度系数热敏电阻

Characteristic Values /特征值

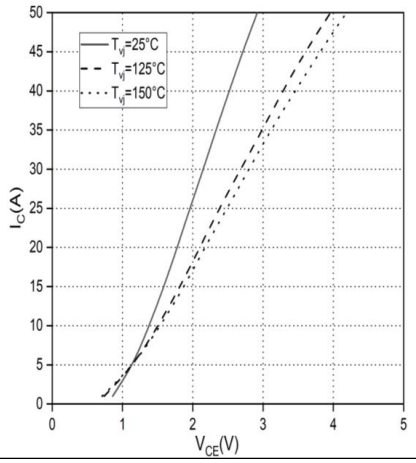
Item	Symbol	Conditions	Value	Units
额定电阻值 Rated resistance	R_{25}	T_C=25°C	5.00	kΩ
B-值 B-value	$B_{25/50}$		3380	K

Module / 模块

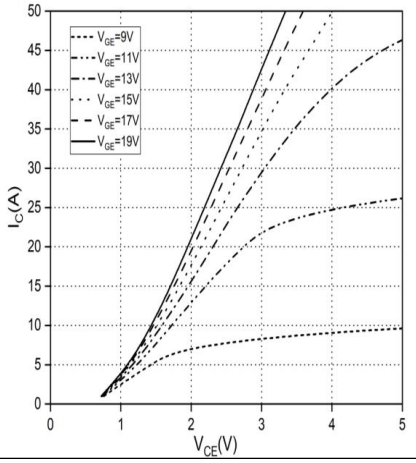
Item	Symbol	Conditions	Value	Units
绝缘测试电压 Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=1min	2.5	kV
内部绝缘 Internal isolation		基本绝缘 (class 1, IEC 61140) Basic insulation (class 1, IEC 61140)	Al_2O_3	
爬电距离 Creepage distance		端子-散热片 terminal to heatsink 端子-端子 terminal to terminal	11.5 6.3	mm
电气间隙 Clearance		端子-散热片 terminal to heatsink 端子-端子 terminal to terminal	10.0 5.5	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}			30		nH
模块引脚电阻，端子-芯片 Module Lead Resistance，Terminals-Chip	$R_{CC'+EE'}$ $R_{AA'+CC'}$			5.00 6.00		mΩ
储存温度 Storage temperature	T_{stg}		-40		125	°C
模块安装的安装扭距 Mounting torque for module mounting	M		1.2		1.8	Nm
重量 Weight	G			40		g

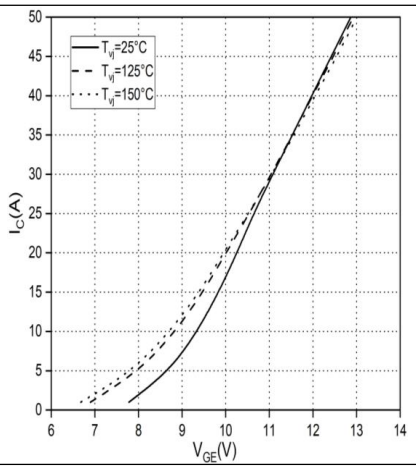
输出特性 IGBT，逆变器（典型）
Output characteristic IGBT, Inverter (typical)
$I_C=f(V_{CE})$
$V_{GE}=15V$



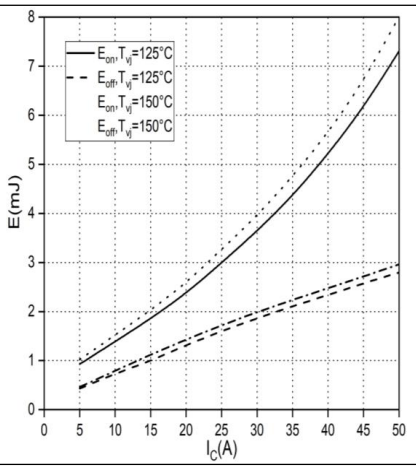
输出特性 IGBT，逆变器（典型）
Output characteristic IGBT, Inverter (typical)
$I_C=f(V_{CE})$
$T_{vj}=150°C$



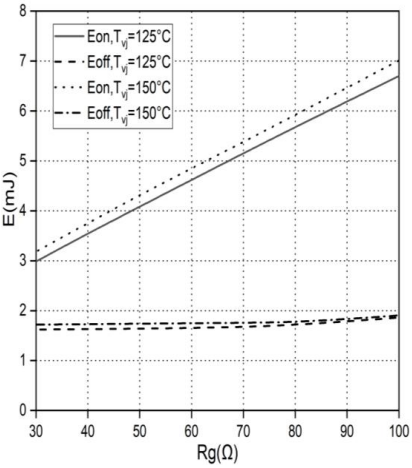
转移特性 IGBT，逆变器（典型）
Transfer characteristic IGBT, Inverter (typical)
$I_C=f(V_{GE})$
$V_{CE}=20V$



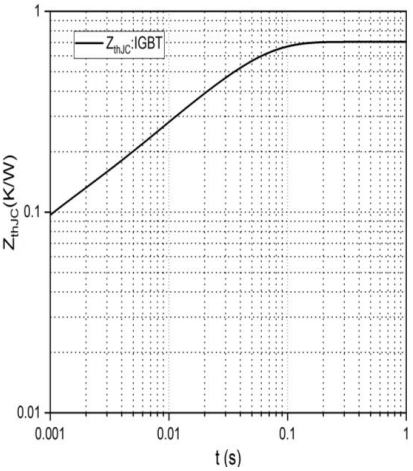
开关损耗 IGBT，逆变器（典型）
Switching losses IGBT, Inverter (typical)
$E=f(I_C)$
$R_G=30\Omega$, $V_{CE}=600V$, $V_{GE}=-15V...+15V$



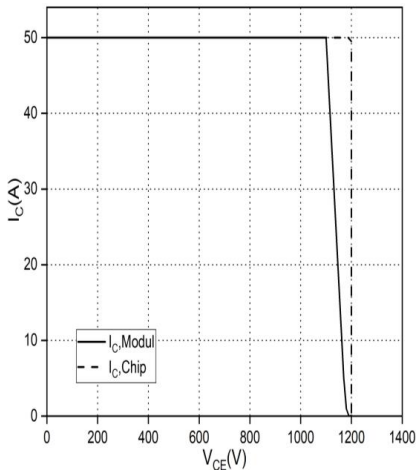
开关损耗 IGBT，逆变器（典型）
Switching losses IGBT, Inverter (typical)
$E=f(R_G)$
$I_C=25A$, $V_{CE}=600V$, $V_{GE}=-15V...+15V$



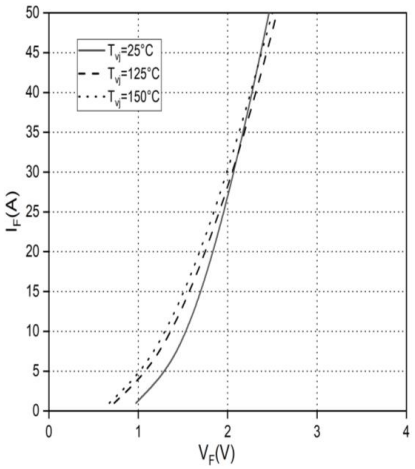
瞬态热阻抗 IGBT，逆变器
Transient thermal impedance IGBT, Inverter
$Z_{thJC}=f(t)$



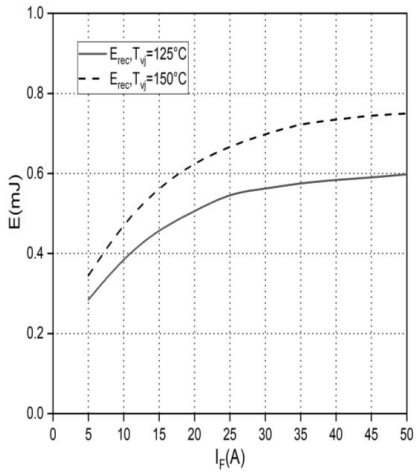
反偏安全工作区 IGBT，逆变器 （RBSOA）
Reverse bias safe operating area IGBT, Inverter (RBSOA)
$I_C=f(V_{CE})$
V_{GE}=-15V…+15V, T_{vj}=150°C, R_G=30Ω



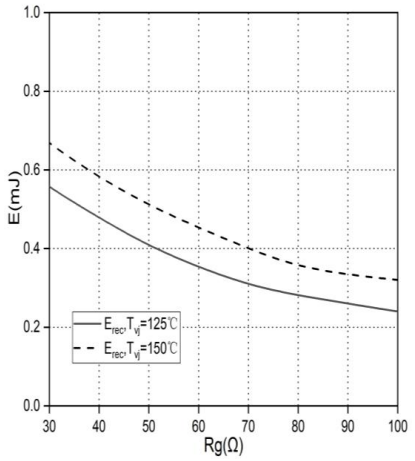
正向偏压特性 FRD，逆变器（典型）
Forward characteristic of FRD, Inverter (typical)
$I_F=f(V_F)$



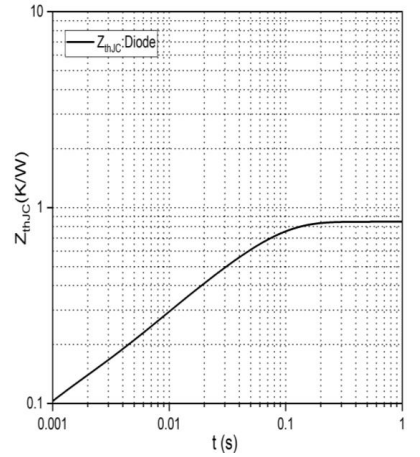
开关损耗 FRD，逆变器（典型）
Switching losses FRD, Inverter (typical)
$E_{rec}=f(I_F)$
V_{CE}=600V, R_{Gon}=30Ω



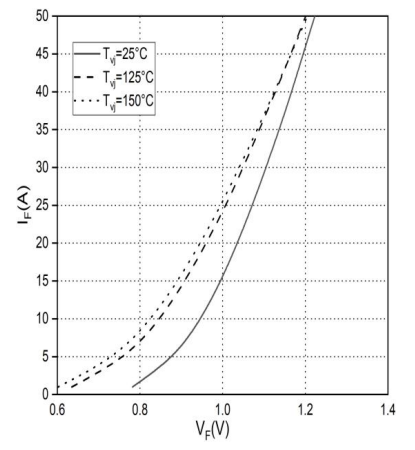
开关损耗 FRD，逆变器（典型）
Switching losses FRD, Inverter (typical)
$E_{rec}=f(R_G)$
V_{CE}=600V, I_F=25A



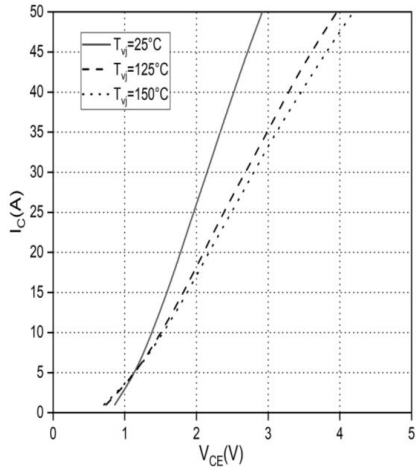
瞬态热阻抗 FRD，逆变器
Transient thermal impedance FRD, Inverter
$Z_{thJC}=f(t)$



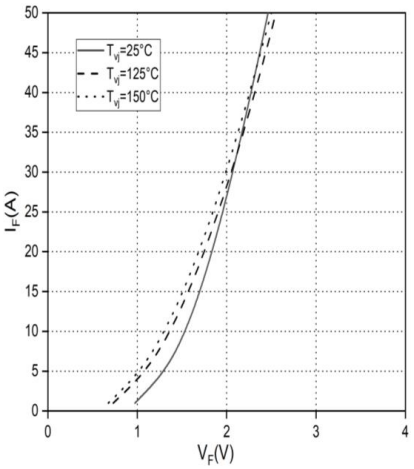
正向偏压特性 二极管，整流器（典型）
Forward characteristic of Diode, Rectifier (typical)
$I_F=f(V_F)$



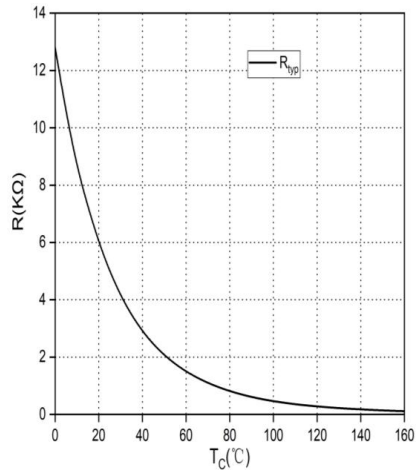
输出特性 IGBT，刹车（典型）
Output characteristic IGBT, Brake-Chopper (typical)
$I_C=f(V_{CE})$
$V_{GE}=15V$



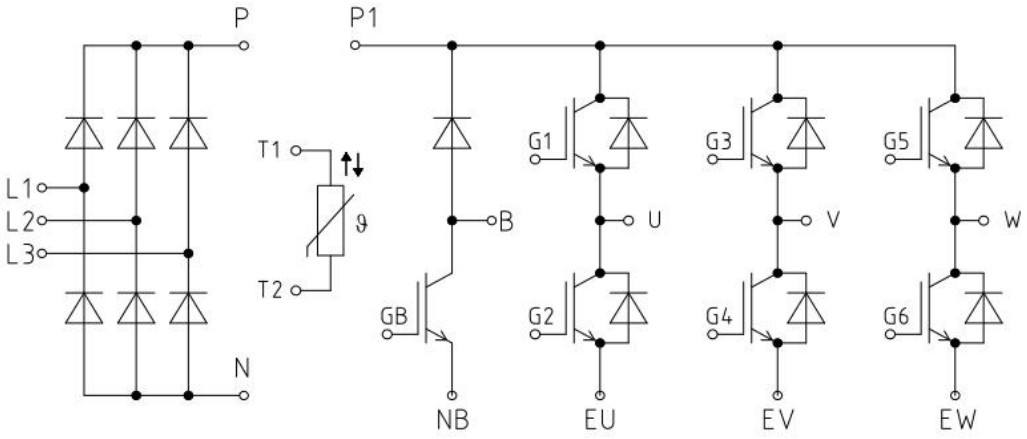
正向偏压特性 FRD，刹车（典型）
Forward characteristic of FRD, Brake-Chopper (typical)
$I_F=f(V_F)$



负温度系数热敏电阻 温度特性（典型值）
NTC Thermistor - temperature characteristic (typical)
R = f (T)



Circuit diagram headline / 接线图



Package outlines / 封装尺寸