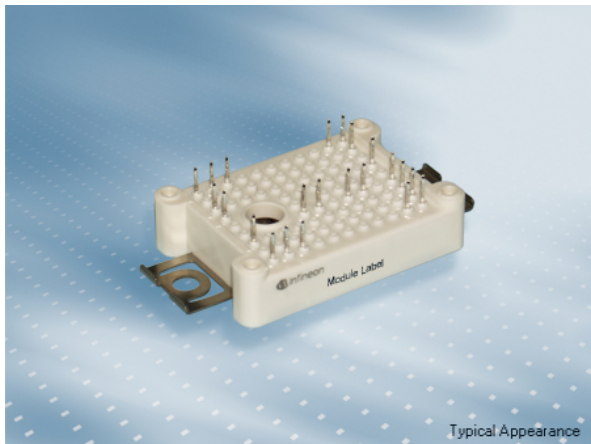
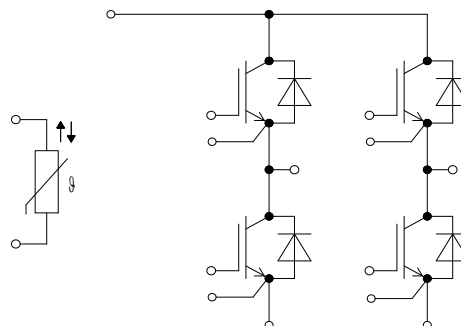


EasyPACK 模块 带有pressfit压接管脚和温度检测NTC  
EasyPACK module and PressFIT / NTC



Typical Appearance



$V_{CES} = 650V$   
 $I_{C\ nom} = 25A / I_{CRM} = 50A$

**典型应用**

- 汽车应用
- 高频开关应用
- zh
- 辅助逆变器
- 混合动力汽车
- 感应加热和电焊机

**Typical Applications**

- Automotive Applications
- High Frequency Switching Application
- DC/DC converter
- Auxiliary Inverters
- Hybrid Electrical Vehicles (H)EV
- Inductive Heating and Welding

**电气特性**

- 增加阻断电压至650V
- 高速IGBT H3
- 低电感设计
- 低开关损耗
- 低  $V_{CEsat}$

**Electrical Features**

- Increased blocking voltage capability to 650V
- High Speed IGBT H3
- Low inductive design
- Low Switching Losses
- Low  $V_{CEsat}$

**机械特性**

- 2.5 kV 交流 1分钟 绝缘
- 高爬电距离和电气间隙
- PressFIT 压接技术
- 符合RoHS
- 集成的安装夹使安装坚固

**Mechanical Features**

- 2.5 kV AC 1min Insulation
- High Creepage and Clearance Distances
- PressFIT Contact Technology
- RoHS compliant
- Rugged mounting due to integrated mounting clamps

**Module Label Code**

Barcode Code 128



DMX - Code



**Content of the Code**

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

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approved by: TR	revision: 3.0	UL approved (E83335)

**IGBT, 逆变器 / IGBT, Inverter**

**最大额定值 / Maximum Rated Values**

集电极 - 发射极电压 Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	650	V
集电极电流 Implemented collector current		$I_{CN}$	50	A
连续集电极直流电流 Continuous DC collector current	$T_C = 130^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$ $I_C$	25 55	A A
集电极重复峰值电流 Repetitive peak collector current	$t_p = 1\text{ ms}$	$I_{CRM}$	100	A
总功率损耗 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$P_{\text{tot}}$	200	W
栅极 - 发射极峰值电压 Gate-emitter peak voltage		$V_{GES}$	+/-20	V

**特征值 / Characteristic Values**

			min.	typ.	max.	
集电极 - 发射极饱和电压 Collector-emitter saturation voltage	$I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,50 1,55 1,60	1,85	V V V
栅极阈值电压 Gate threshold voltage	$I_C = 0,80\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{Eth}}$	4,9	5,8	6,5 V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	0,50		$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{int}}$	0,0		$\Omega$
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{\text{ies}}$	3,25		nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{\text{res}}$	0,09		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$		0,05	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{GES}$		400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$I_C = 25\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 6,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ on}}$	0,02 0,02 0,02		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
上升时间(电感负载) Rise time, inductive load	$I_C = 25\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 6,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,01 0,011 0,012		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 25\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 6,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ off}}$	0,15 0,18 0,19		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
下降时间(电感负载) Fall time, inductive load	$I_C = 25\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 6,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,007 0,011 0,013		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 25\text{ A}, V_{CE} = 300\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 2300\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{G\text{on}} = 6,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{\text{on}}$	0,21 0,32 0,35		mJ mJ mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 25\text{ A}, V_{CE} = 300\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 4800\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{G\text{off}} = 6,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{\text{off}}$	0,22 0,35 0,38		mJ mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_p \leq 4\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		$I_{SC}$	280		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		$R_{th\text{JC}}$	0,60	0,75	K/W

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外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$	$R_{\text{thCH}}$		0,75		K/W
在开关状态下温度 Temperature under switching conditions		$T_{\text{vj op}}$	-40		150	°C

## 二极管, 逆变器 / Diode, Inverter

### 最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{\text{vj}} = 25^\circ\text{C}$	$V_{\text{RRM}}$		650		V
连续正向直流电流 Continuous DC forward current		$I_{\text{F}}$		25		A
正向重复峰值电流 Repetitive peak forward current	$t_{\text{p}} = 1 \text{ ms}$	$I_{\text{FRM}}$		50		A
I <sup>2</sup> t-值 I <sup>2</sup> t - value	$V_{\text{R}} = 0 \text{ V}, t_{\text{p}} = 10 \text{ ms}, T_{\text{vj}} = 125^\circ\text{C}$	$I^2t$		50,0		A <sup>2</sup> s

### 特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	$I_{\text{F}} = 25 \text{ A}, V_{\text{GE}} = 0 \text{ V}$ $I_{\text{F}} = 25 \text{ A}, V_{\text{GE}} = 0 \text{ V}$ $I_{\text{F}} = 25 \text{ A}, V_{\text{GE}} = 0 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	$V_{\text{F}}$		1,65 1,60 1,55	2,15	V V V
反向恢复峰值电流 Peak reverse recovery current	$I_{\text{F}} = 25 \text{ A}, -di_{\text{F}}/dt = 2300 \text{ A}/\mu\text{s} (T_{\text{vj}}=150^\circ\text{C})$ $V_{\text{R}} = 300 \text{ V}$ $V_{\text{GE}} = -15 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	$I_{\text{RM}}$		35,0 40,0 41,0		A A A
恢复电荷 Recovered charge	$I_{\text{F}} = 25 \text{ A}, -di_{\text{F}}/dt = 2300 \text{ A}/\mu\text{s} (T_{\text{vj}}=150^\circ\text{C})$ $V_{\text{R}} = 300 \text{ V}$ $V_{\text{GE}} = -15 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	$Q_{\text{r}}$		0,96 1,60 1,75		$\mu\text{C}$ $\mu\text{C}$ $\mu\text{C}$
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_{\text{F}} = 25 \text{ A}, -di_{\text{F}}/dt = 2300 \text{ A}/\mu\text{s} (T_{\text{vj}}=150^\circ\text{C})$ $V_{\text{R}} = 300 \text{ V}$ $V_{\text{GE}} = -15 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	$E_{\text{rec}}$		0,21 0,35 0,39		mJ mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		$R_{\text{thJC}}$		1,25	1,45	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$		$R_{\text{thCH}}$		0,95		K/W
在开关状态下温度 Temperature under switching conditions			$T_{\text{vj op}}$	-40		150	°C

## 负温度系数热敏电阻 / NTC-Thermistor

### 特征值 / Characteristic Values

				min.	typ.	max.	
额定电阻值 Rated resistance	$T_{\text{C}} = 25^\circ\text{C}$		$R_{25}$		5,00		k $\Omega$
R100 偏差 Deviation of R100	$T_{\text{C}} = 100^\circ\text{C}, R_{100} = 493 \Omega$		$\Delta R/R$	-5		5	%
耗散功率 Power dissipation	$T_{\text{C}} = 25^\circ\text{C}$		$P_{25}$			20,0	mW
B-值 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$		$B_{25/50}$		3375		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$		$B_{25/80}$		3411		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$		$B_{25/100}$		3433		K

根据应用手册标定

Specification according to the valid application note.

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**模块 / Module**

绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	2,5		kV
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)		impr. Al <sub>2</sub> O <sub>3</sub>		
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 5,0		mm
相对电痕指数 Comperative tracking index		CTI	> 200		
			min.	typ.	max.
杂散电感,模块 Stray inductance module		L <sub>sCE</sub>		15	nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	T <sub>c</sub> = 25°C, 每个开关 / per switch	R <sub>CC+EE'</sub>		5,50	mΩ
储存温度 Storage temperature		T <sub>stg</sub>	-40		125 °C
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	20	-	50 N
重量 Weight		G		24	g

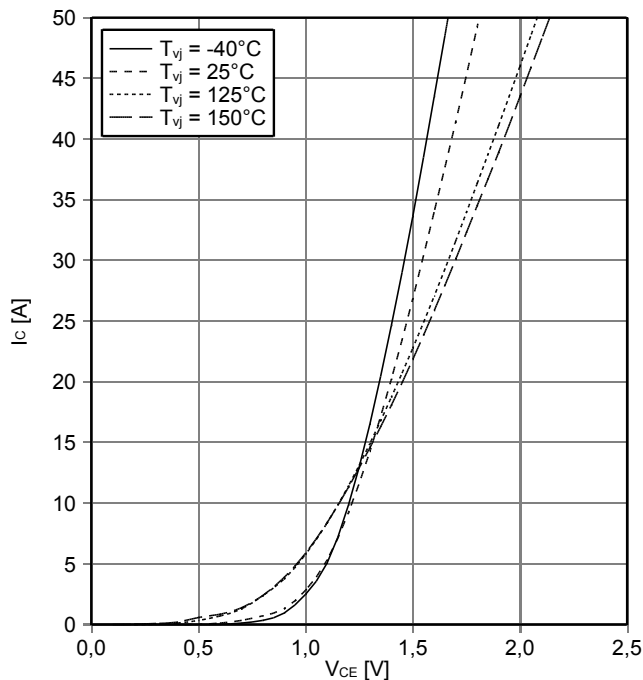
Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt.  
The current under continuous operation is limited to 25 A rms per connector pin.  
VGE muss im Kurzschluss auf 15V begrenzt werden (z.B. Klemmschaltung).  
VGE has to be limited to 15V during shortcircuit (e.g. clamping).

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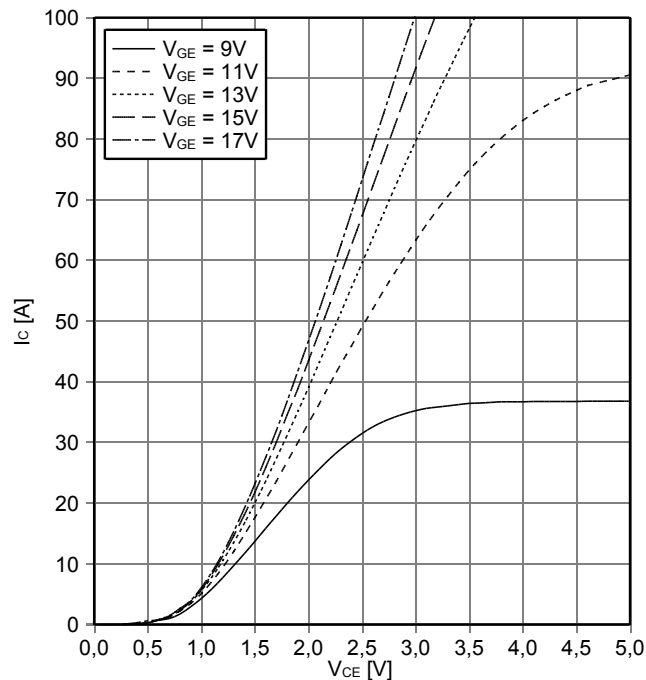
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



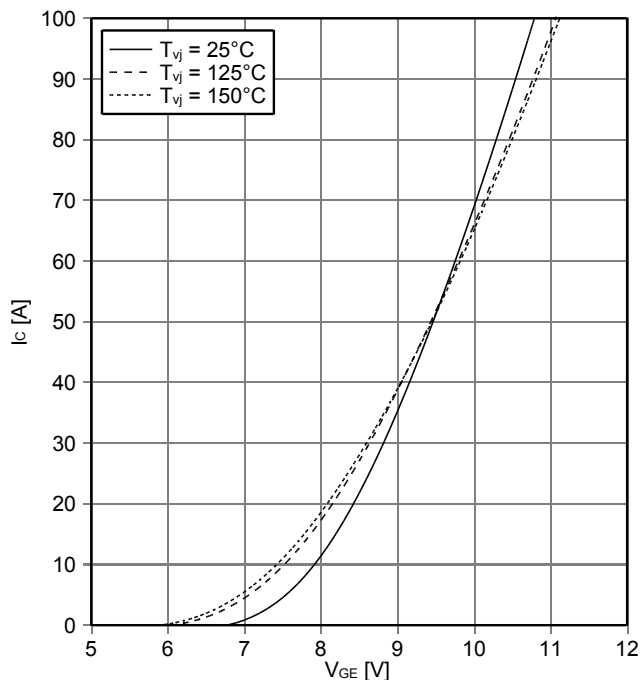
输出特性 IGBT, 逆变器 (典型)  
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$   
 $T_{vj} = 150^\circ\text{C}$



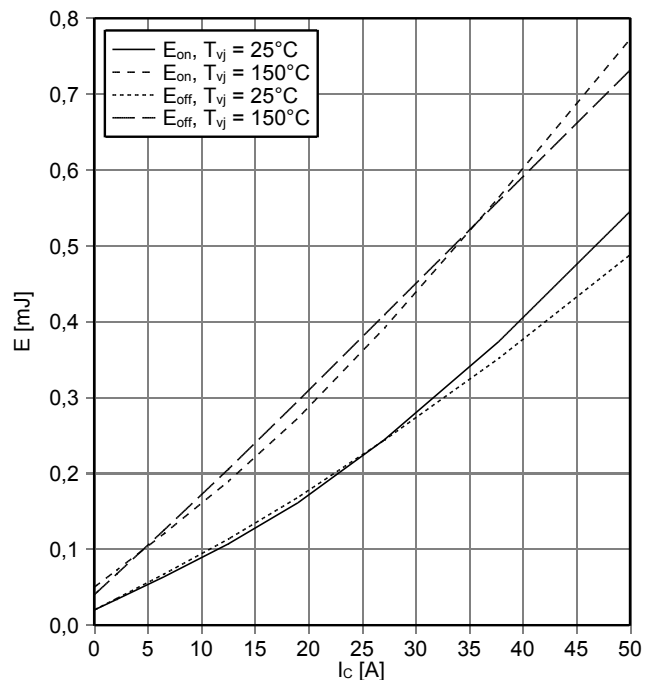
传输特性 IGBT, 逆变器 (典型)  
transfer characteristic IGBT, Inverter (typical)

$I_C = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$



开关损耗 IGBT, 逆变器 (典型)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C), E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 6.8\ \Omega, R_{Goff} = 6.8\ \Omega, V_{CE} = 300\text{ V}$

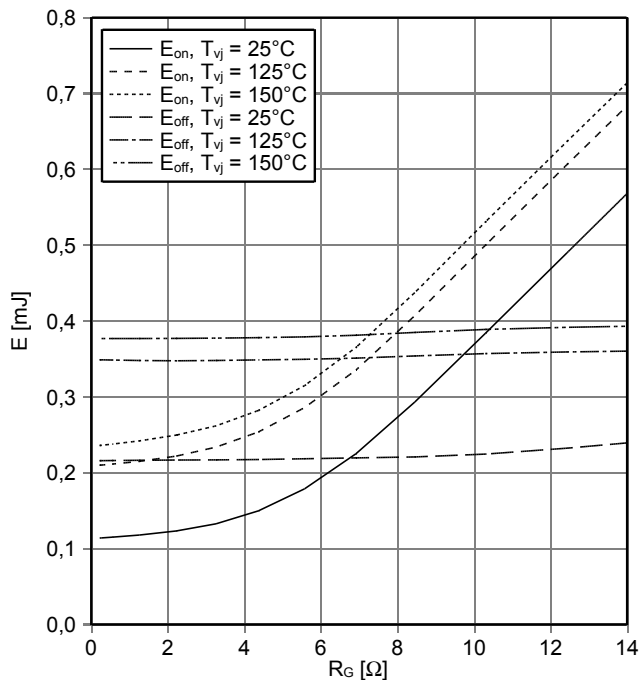


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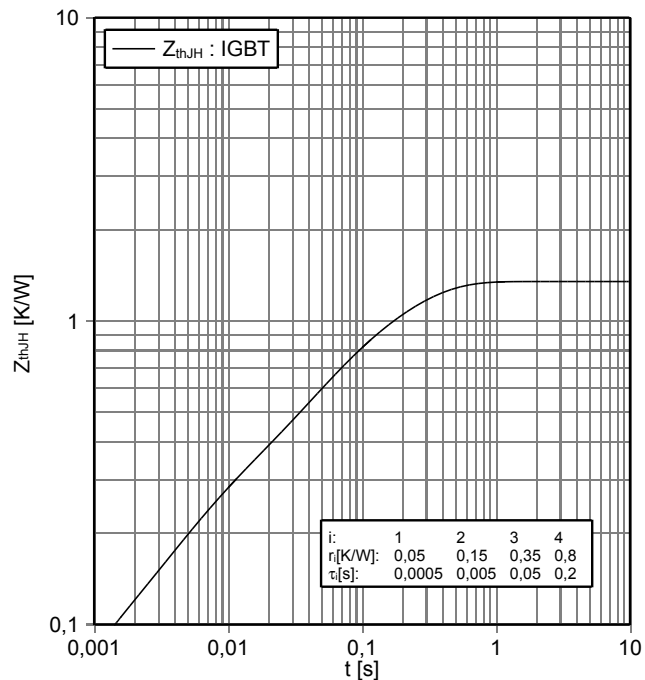
开关损耗 IGBT, 逆变器 (典型)  
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}, I_C = 25\text{ A}, V_{CE} = 300\text{ V}$



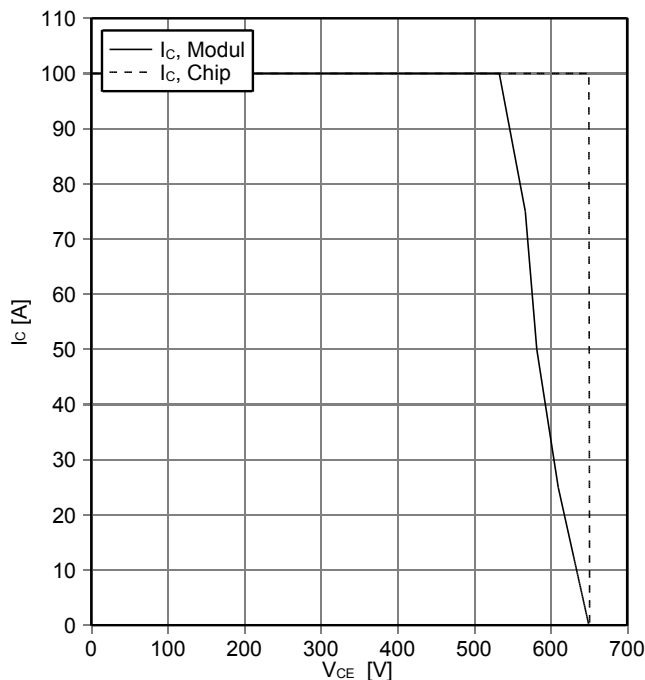
瞬态热阻抗 IGBT, 逆变器  
transient thermal impedance IGBT, Inverter

$Z_{thJH} = f(t)$



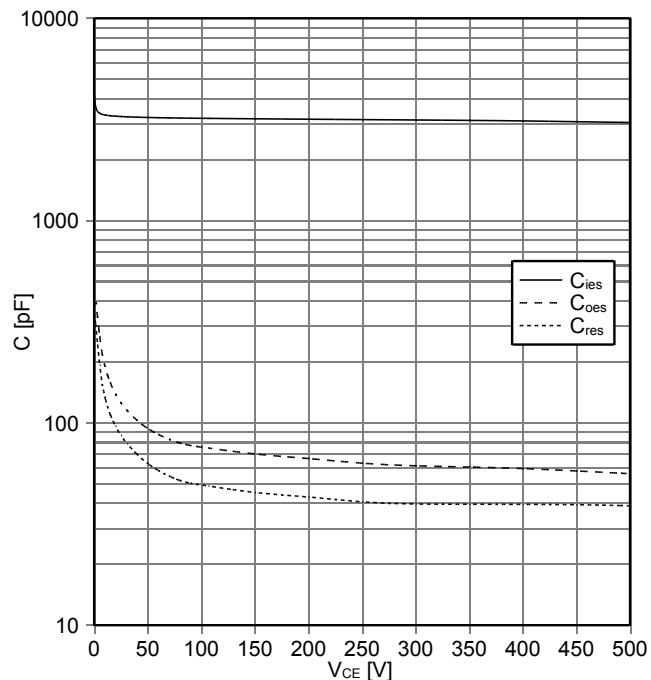
反偏安全工作区 IGBT, 逆变器 (RBSOA)  
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}, R_{Goff} = 6.8\ \Omega, T_{vj} = 150^\circ\text{C}$



电容特性 IGBT, 逆变器 (典型)  
capacity characteristic IGBT, Inverter (typical)

$C = f(V_{CE})$   
 $V_{GE} = 0\text{ V}, T_{vj} = 25^\circ\text{C}, f = 1\text{ MHz}$

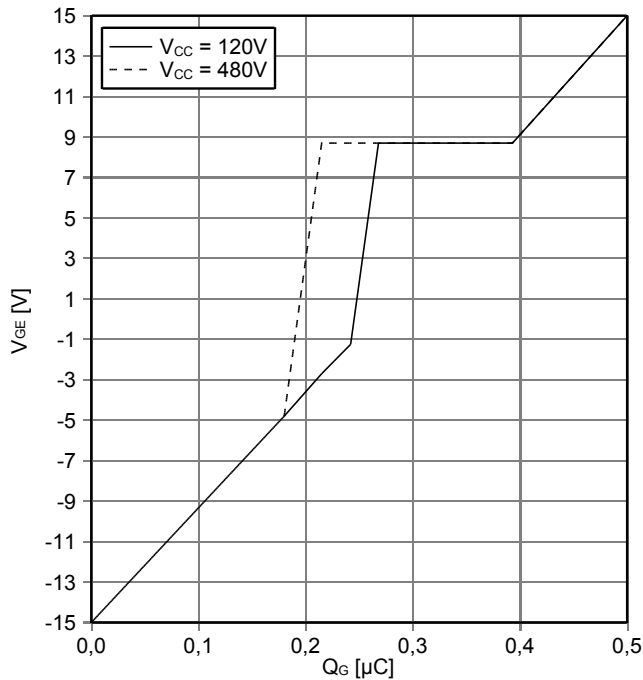


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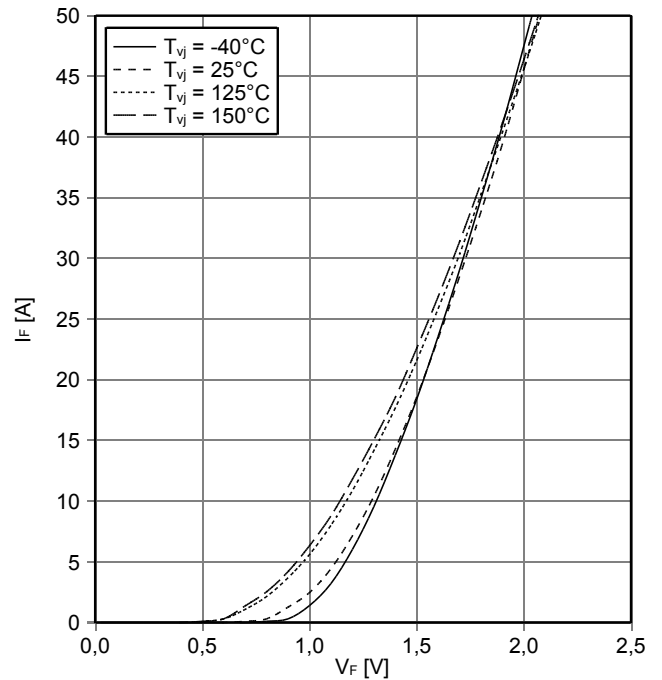
栅极电荷特性 IGBT, 逆变器 (典型)  
gate charge characteristic IGBT, Inverter (typical)

$V_{GE} = f(Q_G)$   
 $I_C = 25\text{ A}, T_{vj} = 25^\circ\text{C}$



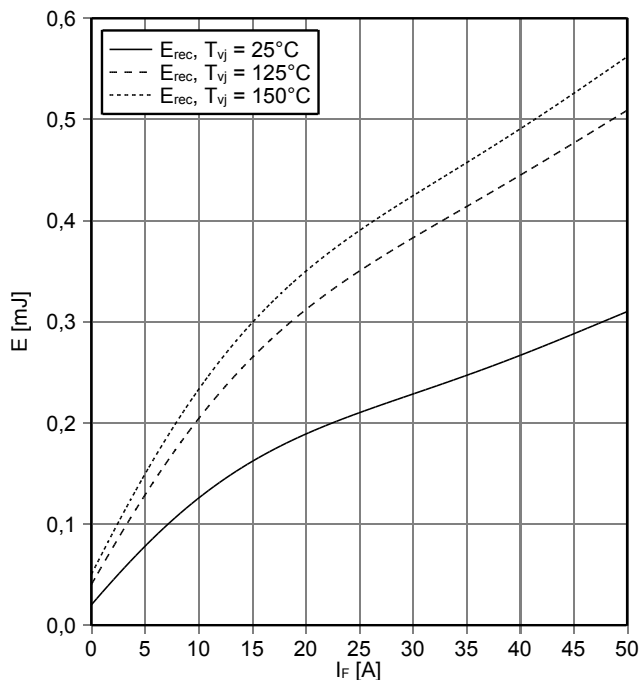
正向偏压特性 二极管, 逆变器 (典型)  
forward characteristic of Diode, Inverter (typical)

$I_F = f(V_F)$



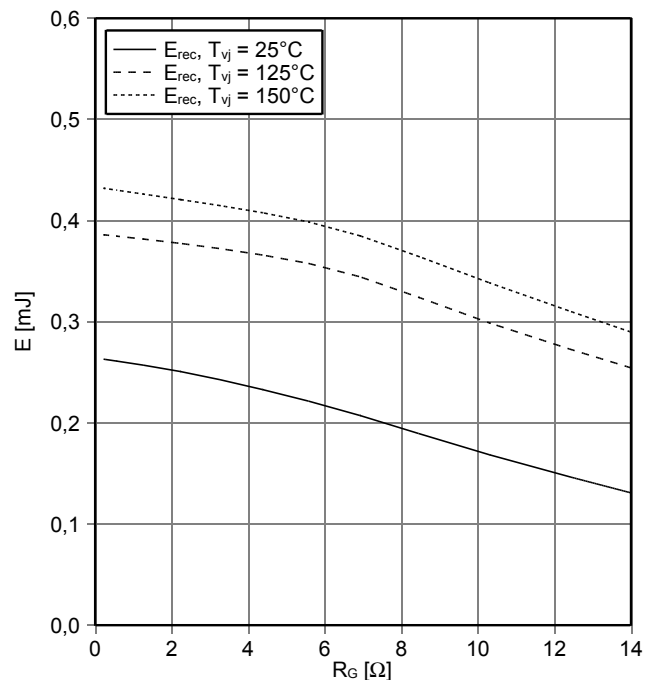
开关损耗 二极管, 逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 6.8\ \Omega, V_{CE} = 300\text{ V}$



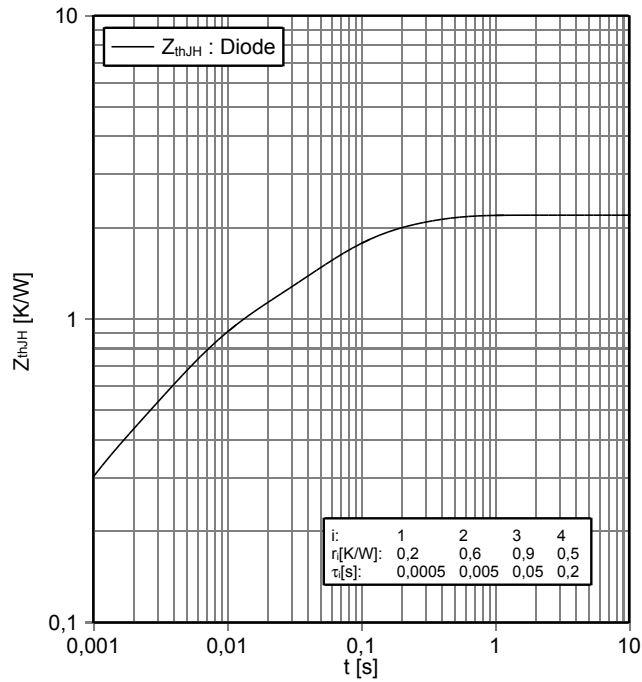
开关损耗 二极管, 逆变器 (典型)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 25\text{ A}, V_{CE} = 300\text{ V}$

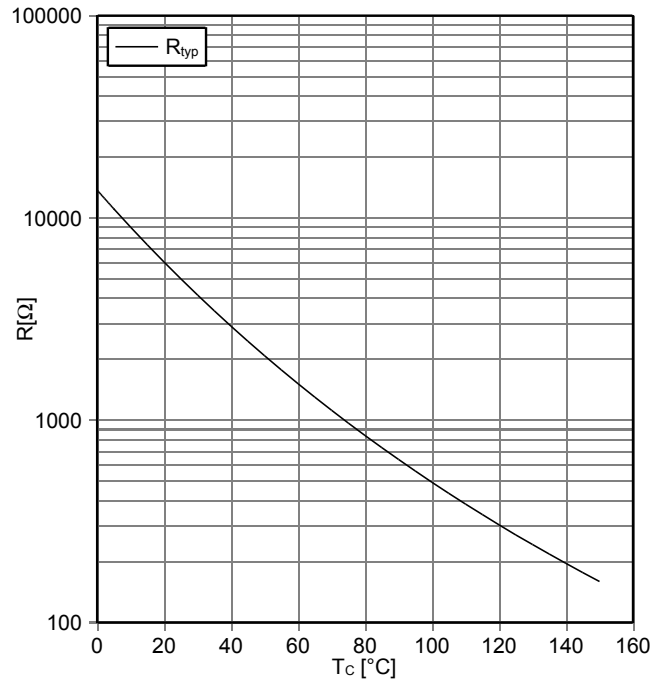


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瞬态热阻抗 二极管, 逆变器  
transient thermal impedance Diode, Inverter  
 $Z_{thJH} = f(t)$



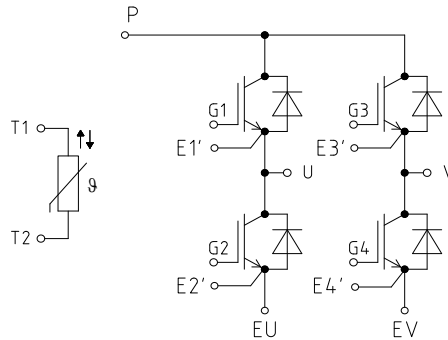
负温度系数热敏电阻 温度特性  
NTC-Thermistor-temperature characteristic (typical)  
 $R = f(T)$



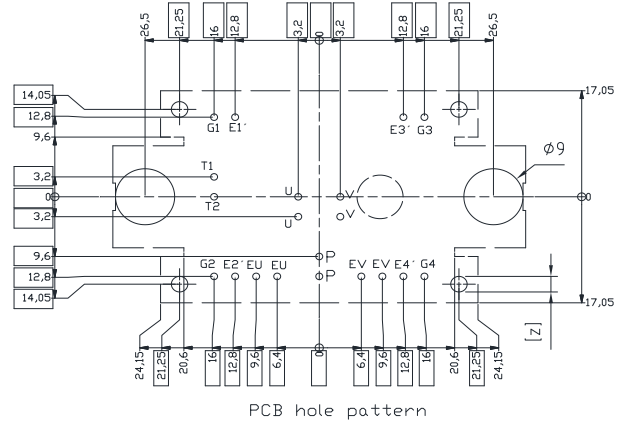
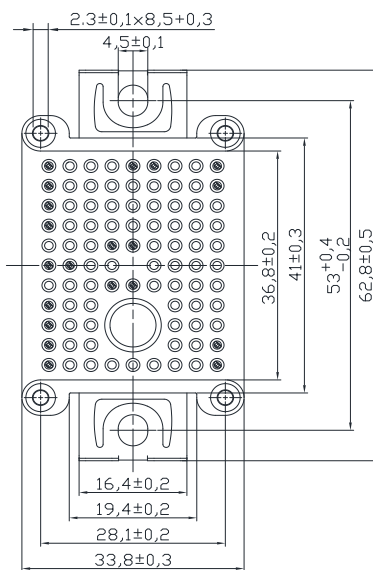
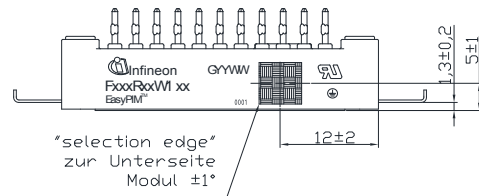
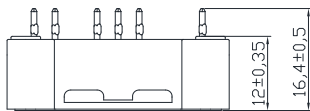
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接线图 / circuit\_diagram\_headline



封装尺寸 / package outlines



- Pin-Grid 3,2mm
- Tolerance of PCB hole pattern  $\pm 0,1$  24x
- Hole specification for contacts see application note EASY PressFIT
- Diameters of drill  $\varnothing 1,15$ mm and copper thickness in hole 25-50  $\mu$ m
- [Z] recommended diameter of PCB positioning guiding holes  $\varnothing 2,8$ mm

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**使用条件和条款**

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