

## Preliminary

EconoPIM™3 模块采用第七代沟槽栅/场终止 IGBT7 和第七代发射极控制二极管 带有温度检测 NTC

### 特性

- 电气特性
  - $V_{CES} = 1200\text{ V}$
  - $I_{Cnom} = 150\text{ A} / I_{CRM} = 300\text{ A}$
  - 沟槽栅 IGBT7
  - 过载操作达  $175^{\circ}\text{C}$
  - 低  $V_{CEsat}$
- 机械特性
  - 集成 NTC 温度传感器
  - 焊接技术
  - 铜基板
  - 低热阻的三氧化二铝  $\text{Al}_2\text{O}_3$  衬底



Typical appearance

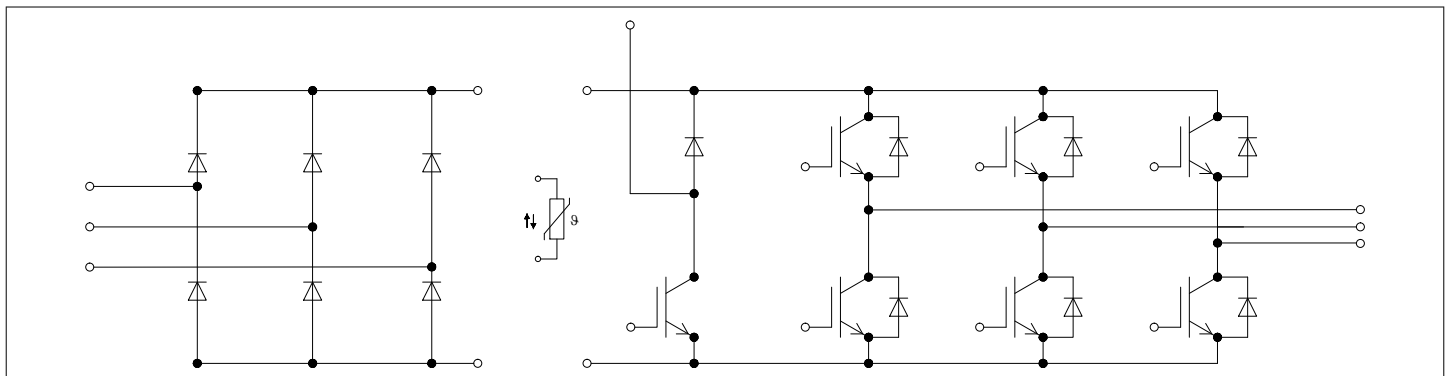
### 可选应用

- 辅助逆变器
- 电机传动
- 伺服驱动器

### 产品认证

- 根据 IEC 60747、60749 和 60068 标准的相关测试，符合工业应用的要求。

### 描述



## 内容

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1 封装

## 1 封装

表 1 绝缘协调

特征参数	代号	标注或测试条件	数值	单位
绝缘测试电压	$V_{ISOL}$	RMS, $f = 50 \text{ Hz}$ , $t = 1 \text{ min}$	2.5	kV
模块基板材料			Cu	
内部绝缘		基本绝缘 (class 1, IEC 61140)	$Al_2O_3$	
爬电距离	$d_{Creep}$	端子至散热器	10.0	mm
电气间隙	$d_{Clear}$	端子至散热器	7.5	mm
相对电痕指数	$CTI$		> 200	
相对温度指数 (电)	$RTI$	住房	140	°C

表 2 特征值

特征参数	代号	标注或测试条件	数值			单位
			最小值	典型值	最大值	
杂散电感, 模块	$L_{SCE}$			25		nH
模块引线电阻, 端子-芯片	$R_{AA'+CC'}$	$T_C = 25^\circ\text{C}$ , 每个开关		1.1		$m\Omega$
模块引线电阻, 端子-芯片	$R_{CC'+EE'}$	$T_C = 25^\circ\text{C}$ , 每个开关		1.6		$m\Omega$
储存温度	$T_{stg}$		-40		125	°C
模块安装的安装扭矩	$M$	根据相应的应用手册进行安装 M5, 螺丝	3		6	Nm
重量	$G$			300		g

## 2 IGBT, 逆变器

表 3 最大标定值

特征参数	代号	标注或测试条件	数值	单位
集电极-发射极电压	$V_{CES}$	$T_{vj} = 25^\circ\text{C}$	1200	V
连续集电极直流电流	$I_{CDC}$	$T_{vj \max} = 175^\circ\text{C}$ $T_C = 80^\circ\text{C}$	150	A
集电极重复峰值电流	$I_{CRM}$	$t_p = 1 \text{ ms}$	300	A
栅极-发射极峰值电压	$V_{GES}$		$\pm 20$	V

表 4 特征值

特征参数	代号	标注或测试条件	数值			单位	
			最小值	典型值	最大值		
集电极-发射极饱和电压	$V_{CE\ sat}$	$I_C = 150\ A,$ $V_{GE} = 15\ V$		$T_{vj} = 25\ ^\circ C$	1.55	TBD	V
				$T_{vj} = 125\ ^\circ C$	1.69		
				$T_{vj} = 175\ ^\circ C$	1.77		
栅极阈值电压	$V_{GEth}$	$I_C = 3.5\ mA,$ $V_{CE} = V_{GE},$ $T_{vj} = 25\ ^\circ C$	5.15	5.80	6.45	V	
栅极电荷	$Q_G$	$V_{GE} = \pm 15\ V,$ $V_{CE} = 600\ V$		2.5		$\mu C$	
内部栅极电阻	$R_{Gint}$	$T_{vj} = 25\ ^\circ C$		1		$\Omega$	
输入电容	$C_{ies}$	$f = 100\ kHz,$ $T_{vj} = 25\ ^\circ C,$ $V_{CE} = 25\ V,$ $V_{GE} = 0\ V$		30.1		nF	
反向传输电容	$C_{res}$	$f = 100\ kHz,$ $T_{vj} = 25\ ^\circ C,$ $V_{CE} = 25\ V,$ $V_{GE} = 0\ V$		0.105		nF	
集电极-发射极截止电流	$I_{CES}$	$V_{CE} = 1200\ V,$ $V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$		0.012	mA	
栅极-发射极漏电流	$I_{GES}$	$V_{CE} = 0\ V,$ $V_{GE} = 20\ V,$ $T_{vj} = 25\ ^\circ C$			100	nA	
开通延迟时间(感性负载)	$t_{don}$	$I_C = 150\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Gon} = 3.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.172		$\mu s$
				$T_{vj} = 125\ ^\circ C$	0.183		
				$T_{vj} = 175\ ^\circ C$	0.189		
上升时间(感性负载)	$t_r$	$I_C = 150\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Gon} = 3.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.072		$\mu s$
				$T_{vj} = 125\ ^\circ C$	0.077		
				$T_{vj} = 175\ ^\circ C$	0.080		

表 4 特征值 (continued)

特征参数	代号	标注或测试条件	数值			单位
			最小值	典型值	最大值	
关断延迟时间(感性负载)	$t_{doff}$	$I_C = 150\text{ A},$ $V_{CE} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 3.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		0.331	$\mu\text{s}$
					0.414	
					0.433	
下降时间(感性负载)	$t_f$	$I_C = 150\text{ A},$ $V_{CE} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 3.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		0.103	$\mu\text{s}$
					0.198	
					0.262	
开通损耗能量(每脉冲)	$E_{on}$	$I_C = 150\text{ A},$ $V_{CE} = 600\text{ V},$ $L_\sigma = 35\text{ nH},$ $V_{GE} = \pm 15\text{ V},$ $R_{Gon} = 3.3\ \Omega,$ $di/dt = 1700\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		16.6	mJ
					24.9	
					29.6	
关断损耗能量(每脉冲)	$E_{off}$	$I_C = 150\text{ A},$ $V_{CE} = 600\text{ V},$ $L_\sigma = 35\text{ nH},$ $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 3.3\ \Omega,$ $dv/dt = 3200\text{ V}/\mu\text{s}$ ( $T_{vj} = 175\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		10.4	mJ
					15.9	
					19.9	
短路数据	$I_{SC}$	$V_{GE} \leq 15\text{ V},$ $V_{CC} = 800\text{ V},$ $V_{CEmax} = V_{CES} - L_{sCE} * di/dt$	$t_p \leq 8\ \mu\text{s},$ $T_{vj} = 150\text{ }^\circ\text{C}$ $t_p \leq 7\ \mu\text{s},$ $T_{vj} = 175\text{ }^\circ\text{C}$		520	A
					490	
结-外壳热阻	$R_{thJC}$	每个 IGBT			0.290	K/W
外壳-散热器热阻	$R_{thCH}$	每个 IGBT, $\lambda_{grease} = 1\text{ W}/(\text{m}^*\text{K})$			0.0680	K/W
允许开关的温度范围	$T_{vj\text{ op}}$			-40	175	$^\circ\text{C}$

注:  $T_{vj\text{ op}} > 150\text{ }^\circ\text{C}$  is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

### 3 二极管,逆变器

表 5 最大标定值

特征参数	代号	标注或测试条件	数值	单位	
反向重复峰值电压	$V_{RRM}$	$T_{vj} = 25\text{ °C}$	1200	V	
连续正向直流电流	$I_F$		150	A	
正向重复峰值电流	$I_{FRM}$	$t_p = 1\text{ ms}$	300	A	
I2t-值	$I^2t$	$t_p = 10\text{ ms},$ $V_R = 0\text{ V}$	$T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$	2700 2250	A <sup>2</sup> s

表 6 特征值

特征参数	代号	标注或测试条件	数值			单位	
			最小值	典型值	最大值		
正向电压	$V_F$	$I_F = 150\text{ A},$ $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$ $T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$		1.72	TBD	V
					1.59		
					1.52		
反向恢复峰值电流	$I_{RM}$	$V_R = 600\text{ V},$ $I_F = 150\text{ A},$ $V_{GE} = -15\text{ V},$ $-di_F/dt = 1700\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ °C}$ )	$T_{vj} = 25\text{ °C}$ $T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$		65.3		A
					91.8		
					107		
恢复电荷	$Q_r$	$V_R = 600\text{ V},$ $I_F = 150\text{ A},$ $V_{GE} = -15\text{ V},$ $-di_F/dt = 1700\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ °C}$ )	$T_{vj} = 25\text{ °C}$ $T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$		10.3		$\mu\text{C}$
					21.7		
					28.6		
反向恢复损耗 (每脉冲)	$E_{rec}$	$V_R = 600\text{ V},$ $I_F = 150\text{ A},$ $V_{GE} = -15\text{ V},$ $-di_F/dt = 1700\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ °C}$ )	$T_{vj} = 25\text{ °C}$ $T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$		3.27		mJ
					7.32		
					9.88		
结-外壳热阻	$R_{thJC}$	每个二极管			0.463		K/W
外壳-散热器热阻	$R_{thCH}$	每个二极管, $\lambda_{grease} = 1\text{ W}/(\text{m}^*\text{K})$			0.0698		K/W
允许开关的温度范围	$T_{vj\text{ op}}$			-40		175	°C

注:  $T_{vj\text{ op}} > 150\text{ °C}$  is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

4 二极管,整流器

## 4 二极管,整流器

表 7 最大标定值

特征参数	代号	标注或测试条件		数值	单位
反向重复峰值电压	$V_{RRM}$	$T_{vj} = 25\text{ }^{\circ}\text{C}$		1600	V
最大正向均方根电流(每芯片)	$I_{FRMSM}$	$T_C = 100\text{ }^{\circ}\text{C}$		150	A
最大整流器输出均方根电流	$I_{RMSM}$	$T_C = 100\text{ }^{\circ}\text{C}$		150	A
正向浪涌电流	$I_{FSM}$	$t_p = 10\text{ ms}$	$T_{vj} = 25\text{ }^{\circ}\text{C}$	1600	A
			$T_{vj} = 150\text{ }^{\circ}\text{C}$	1400	
I2t-值	$I^2t$	$t_p = 10\text{ ms}$	$T_{vj} = 25\text{ }^{\circ}\text{C}$	12800	A <sup>2</sup> s
			$T_{vj} = 150\text{ }^{\circ}\text{C}$	9800	

表 8 特征值

特征参数	代号	标注或测试条件	数值			单位	
			最小值	典型值	最大值		
正向电压	$V_F$	$I_F = 150\text{ A}$	$T_{vj} = 150\text{ }^{\circ}\text{C}$		0.97	V	
反向电流	$I_r$	$T_{vj} = 150\text{ }^{\circ}\text{C}$ , $V_R = 1600\text{ V}$			1	mA	
结-外壳热阻	$R_{thJC}$	每个二极管			0.333	K/W	
外壳-散热器热阻	$R_{thCH}$	每个二极管, $\lambda_{grease} = 1\text{ W}/(\text{m}^{\circ}\text{K})$			0.0670	K/W	
允许开关的温度范围	$T_{vj, op}$				-40	150	$^{\circ}\text{C}$

## 5 IGBT, 制动-斩波器

表 9 最大标定值

特征参数	代号	标注或测试条件		数值	单位
集电极-发射极电压	$V_{CES}$	$T_{vj} = 25\text{ }^{\circ}\text{C}$		1200	V
连续集电极直流电流	$I_{CDC}$	$T_{vj\text{ max}} = 175\text{ }^{\circ}\text{C}$	$T_C = 90\text{ }^{\circ}\text{C}$	100	A
集电极重复峰值电流	$I_{CRM}$	$t_p = 1\text{ ms}$		200	A
栅极-发射极峰值电压	$V_{GES}$			$\pm 20$	V

表 10 特征值

特征参数	代号	标注或测试条件	数值			单位	
			最小值	典型值	最大值		
集电极-发射极饱和电压	$V_{CE\ sat}$	$I_C = 100\ A,$ $V_{GE} = 15\ V$		$T_{vj} = 25\ ^\circ C$	1.50	TBD	V
				$T_{vj} = 125\ ^\circ C$	1.64		
				$T_{vj} = 175\ ^\circ C$	1.72		
栅极阈值电压	$V_{GEth}$	$I_C = 2.5\ mA,$ $V_{CE} = V_{GE},$ $T_{vj} = 25\ ^\circ C$	5.15	5.80	6.45	V	
栅极电荷	$Q_G$	$V_{GE} = \pm 15\ V,$ $V_{CE} = 600\ V$		1.8		$\mu C$	
内部栅极电阻	$R_{Gint}$	$T_{vj} = 25\ ^\circ C$		1.5		$\Omega$	
输入电容	$C_{ies}$	$f = 100\ kHz,$ $T_{vj} = 25\ ^\circ C,$ $V_{CE} = 25\ V,$ $V_{GE} = 0\ V$		21.7		nF	
反向传输电容	$C_{res}$	$f = 100\ kHz,$ $T_{vj} = 25\ ^\circ C,$ $V_{CE} = 25\ V,$ $V_{GE} = 0\ V$		0.076		nF	
集电极-发射极截止电流	$I_{CES}$	$V_{CE} = 1200\ V,$ $V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$		0.01	mA	
栅极-发射极漏电流	$I_{GES}$	$V_{CE} = 0\ V,$ $V_{GE} = 20\ V,$ $T_{vj} = 25\ ^\circ C$			100	nA	
开通延迟时间(感性负载)	$t_{don}$	$I_C = 100\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Gon} = 4.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.169		$\mu s$
				$T_{vj} = 125\ ^\circ C$	0.180		
				$T_{vj} = 175\ ^\circ C$	0.187		
上升时间(感性负载)	$t_r$	$I_C = 100\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Gon} = 4.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.063		$\mu s$
				$T_{vj} = 125\ ^\circ C$	0.067		
				$T_{vj} = 175\ ^\circ C$	0.070		



表 10 特征值 (continued)

特征参数	代号	标注或测试条件	数值			单位
			最小值	典型值	最大值	
关断延迟时间(感性负载)	$t_{doff}$	$I_C = 100\text{ A},$ $V_{CE} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 4.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		0.310	$\mu\text{s}$
					0.390	
					0.410	
下降时间(感性负载)	$t_f$	$I_C = 100\text{ A},$ $V_{CE} = 600\text{ V},$ $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 4.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		0.110	$\mu\text{s}$
					0.190	
					0.250	
开通损耗能量(每脉冲)	$E_{on}$	$I_C = 100\text{ A},$ $V_{CE} = 600\text{ V},$ $L_\sigma = 35\text{ nH},$ $V_{GE} = \pm 15\text{ V},$ $R_{Gon} = 4.3\ \Omega,$ $di/dt = 1100\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		7.12	mJ
					11.7	
					14.5	
关断损耗能量(每脉冲)	$E_{off}$	$I_C = 100\text{ A},$ $V_{CE} = 600\text{ V},$ $L_\sigma = 35\text{ nH},$ $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 4.3\ \Omega,$ $dv/dt = 2800\text{ V}/\mu\text{s}$ ( $T_{vj} = 175\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		6.93	mJ
					10.6	
					13.3	
短路数据	$I_{SC}$	$V_{GE} \leq 15\text{ V},$ $V_{CC} = 800\text{ V},$ $V_{CEmax} = V_{CES} - L_{sCE} * di/dt$	$t_p \leq 8\ \mu\text{s},$ $T_{vj} = 150\text{ }^\circ\text{C}$ $t_p \leq 7\ \mu\text{s},$ $T_{vj} = 175\text{ }^\circ\text{C}$		370	A
					350	
结-外壳热阻	$R_{thJC}$	每个 IGBT			0.373	K/W
外壳-散热器热阻	$R_{thCH}$	每个 IGBT, $\lambda_{grease} = 1\text{ W}/(\text{m}^*\text{K})$			0.0680	K/W
允许开关的温度范围	$T_{vj\text{ op}}$			-40	175	$^\circ\text{C}$

注:  $T_{vj\text{ op}} > 150\text{ }^\circ\text{C}$  is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

## 6 二极管，制动-斩波器

表 11 最大标定值

特征参数	代号	标注或测试条件	数值	单位	
反向重复峰值电压	$V_{RRM}$	$T_{vj} = 25\text{ °C}$	1200	V	
连续正向直流电流	$I_F$		50	A	
正向重复峰值电流	$I_{FRM}$	$t_p = 1\text{ ms}$	100	A	
I2t-值	$I^2t$	$t_p = 10\text{ ms},$ $V_R = 0\text{ V}$	$T_{vj} = 125\text{ °C}$	220	A <sup>2</sup> s
			$T_{vj} = 175\text{ °C}$	200	

表 12 特征值

特征参数	代号	标注或测试条件	数值			单位	
			最小值	典型值	最大值		
正向电压	$V_F$	$I_F = 50\text{ A},$ $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.72	TBD	V	
				$T_{vj} = 125\text{ °C}$			1.59
				$T_{vj} = 175\text{ °C}$			1.52
反向恢复峰值电流	$I_{RM}$	$V_R = 600\text{ V},$ $I_F = 50\text{ A},$ $V_{GE} = -15\text{ V},$ $-di_F/dt = 550\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	37.3	A		
			$T_{vj} = 125\text{ °C}$	44.3			
			$T_{vj} = 175\text{ °C}$	49.6			
恢复电荷	$Q_r$	$V_R = 600\text{ V},$ $I_F = 50\text{ A},$ $V_{GE} = -15\text{ V},$ $-di_F/dt = 550\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	3.86	$\mu\text{C}$		
			$T_{vj} = 125\text{ °C}$	7.05			
			$T_{vj} = 175\text{ °C}$	10.1			
反向恢复损耗（每脉冲）	$E_{rec}$	$V_R = 600\text{ V},$ $I_F = 50\text{ A},$ $V_{GE} = -15\text{ V},$ $-di_F/dt = 550\text{ A}/\mu\text{s}$ ( $T_{vj} = 175\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	1.13	mJ		
			$T_{vj} = 125\text{ °C}$	2.34			
			$T_{vj} = 175\text{ °C}$	3.23			
结-外壳热阻	$R_{thJC}$	每个二极管		0.909	K/W		
外壳-散热器热阻	$R_{thCH}$	每个二极管, $\lambda_{grease} = 1\text{ W}/(\text{m}^*\text{K})$		0.109	K/W		
允许开关的温度范围	$T_{vj\text{ op}}$		-40	175	°C		

注:  $T_{vj\text{ op}} > 150\text{ °C}$  is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

## 7 负温度系数热敏电阻

表 13 特征值

特征参数	代号	标注或测试条件	数值			单位
			最小值	典型值	最大值	
额定电阻值	$R_{25}$	$T_{NTC} = 25\text{ °C}$		5		kΩ
$R_{100}$ 偏差	$\Delta R/R$	$T_{NTC} = 100\text{ °C}$ , $R_{100} = 493\text{ }\Omega$	-5		5	%
耗散功率	$P_{25}$	$T_{NTC} = 25\text{ °C}$			20	mW
B-值	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15\text{ K}))]$		3375		K
B-值	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15\text{ K}))]$		3411		K
B-值	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15\text{ K}))]$		3433		K

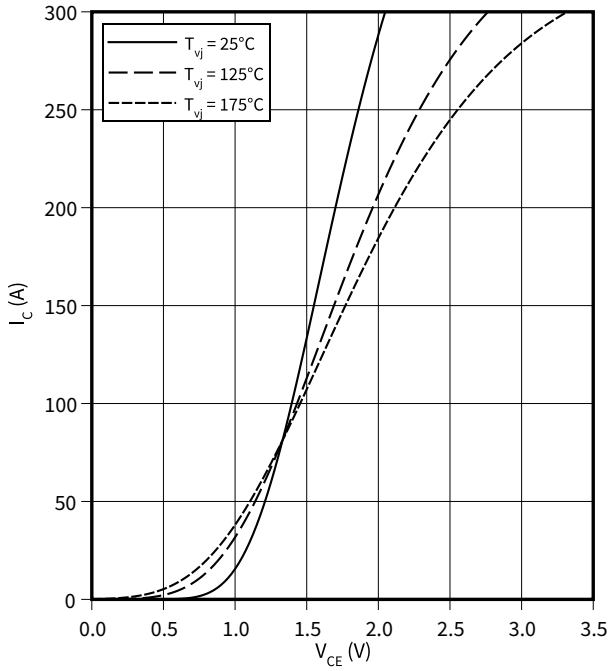
注: 根据应用手册标定

## 8 特征参数图表

输出特性 (典型), IGBT, 逆变器

$$I_C = f(V_{CE})$$

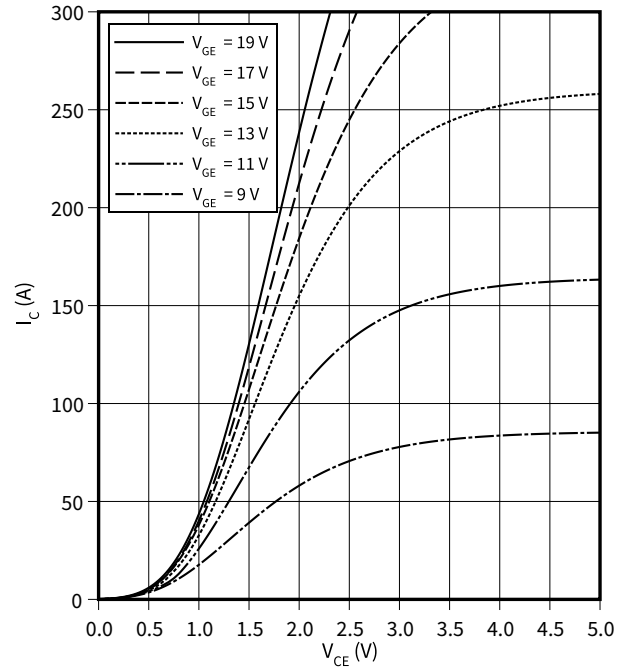
$$V_{GE} = 15 \text{ V}$$



输出特性 (典型), IGBT, 逆变器

$$I_C = f(V_{CE})$$

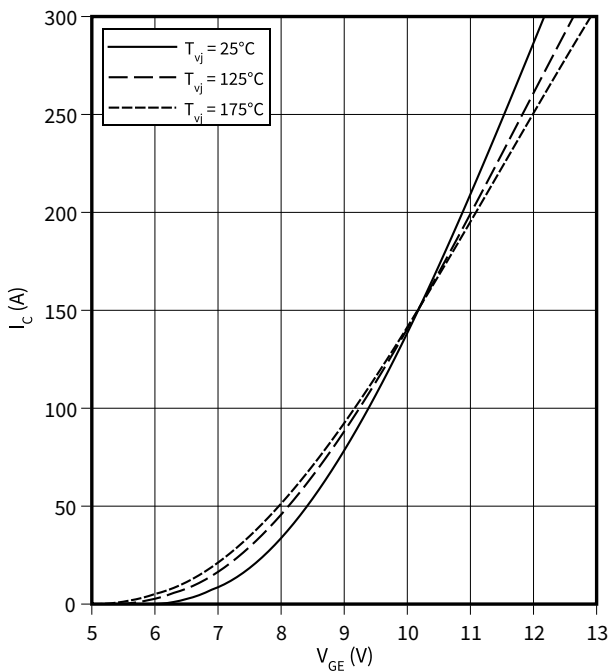
$$T_{vj} = 175 \text{ °C}$$



传输特性 (典型), IGBT, 逆变器

$$I_C = f(V_{GE})$$

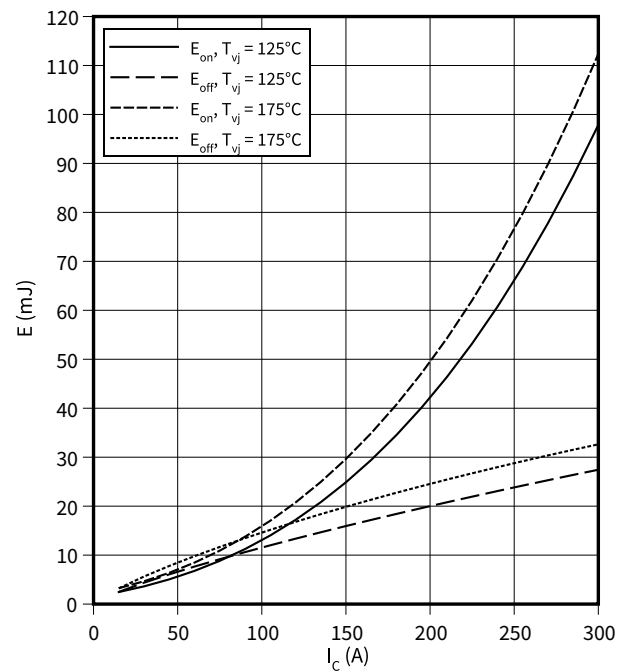
$$V_{CE} = 20 \text{ V}$$



开关损耗 (典型), IGBT, 逆变器

$$E = f(I_C)$$

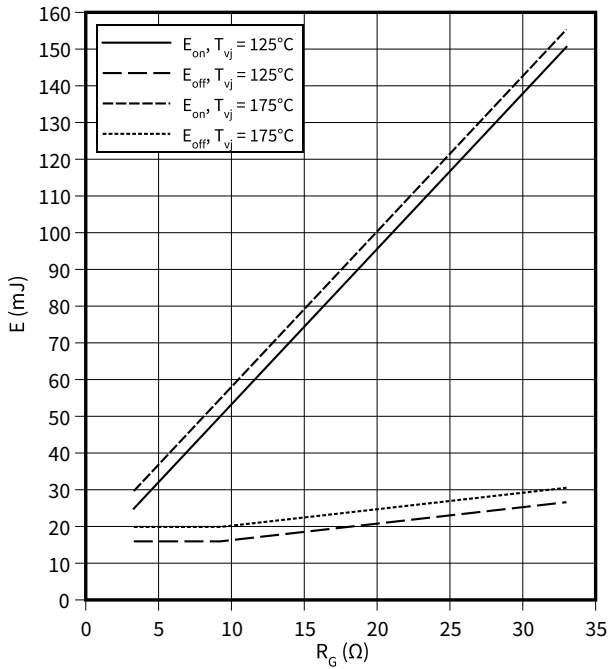
$$R_{Goff} = 3.3 \text{ } \Omega, R_{Gon} = 3.3 \text{ } \Omega, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}$$



开关损耗 (典型), IGBT, 逆变器

$E = f(R_G)$

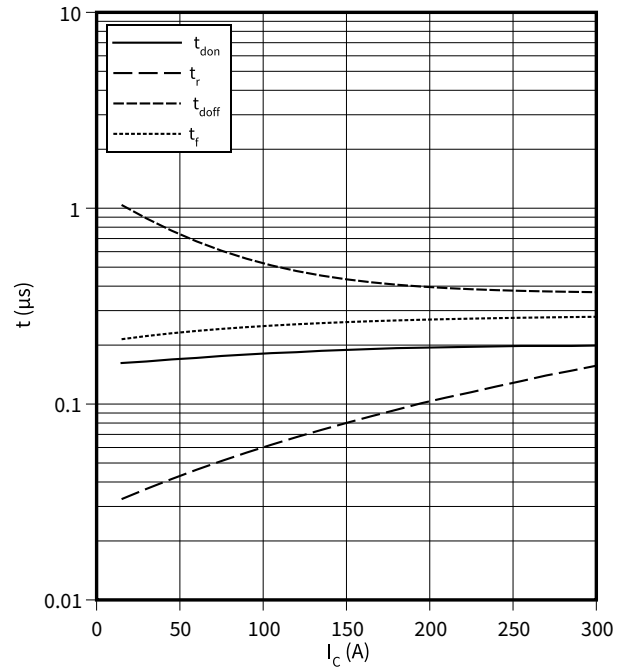
$I_C = 150 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}$



??? (典型), IGBT, 逆变器

$t = f(I_C)$

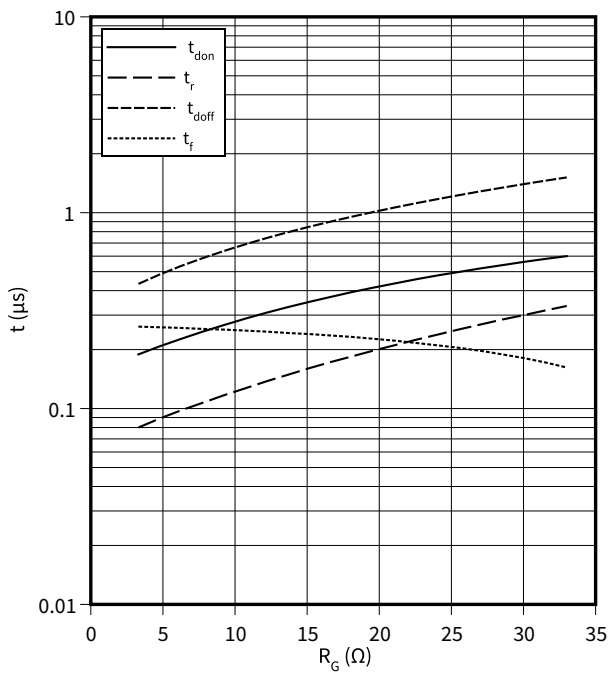
$R_{Goff} = 3.3 \Omega, R_{Gon} = 3.3 \Omega, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 175 \text{ °C}$



??? (典型), IGBT, 逆变器

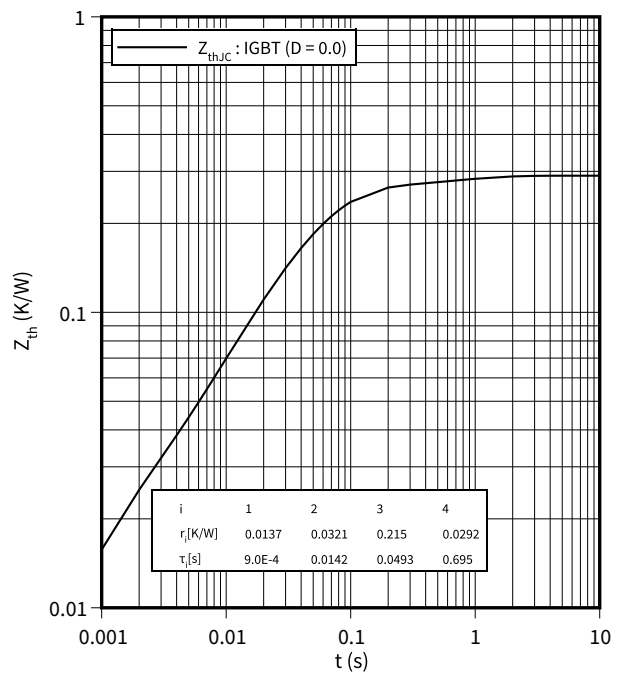
$t = f(R_G)$

$I_C = 150 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 175 \text{ °C}$



瞬态热阻抗, IGBT, 逆变器

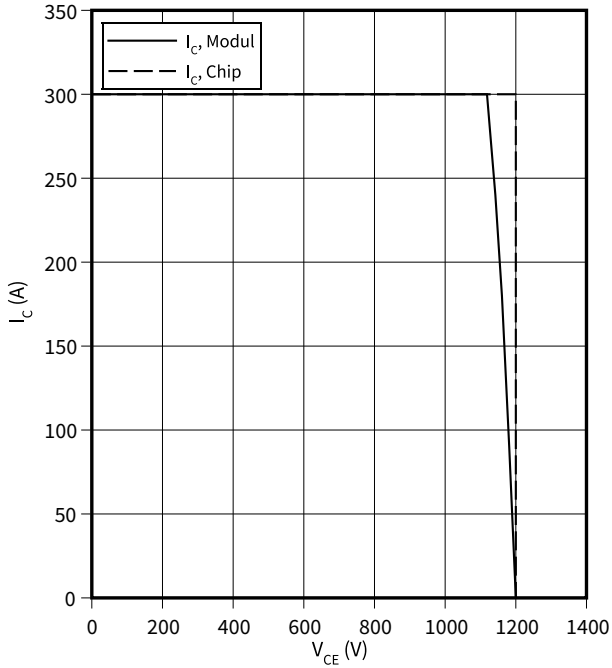
$Z_{th} = f(t)$



**反偏安全工作区 (RBSOA), IGBT, 逆变器**

$I_C = f(V_{CE})$

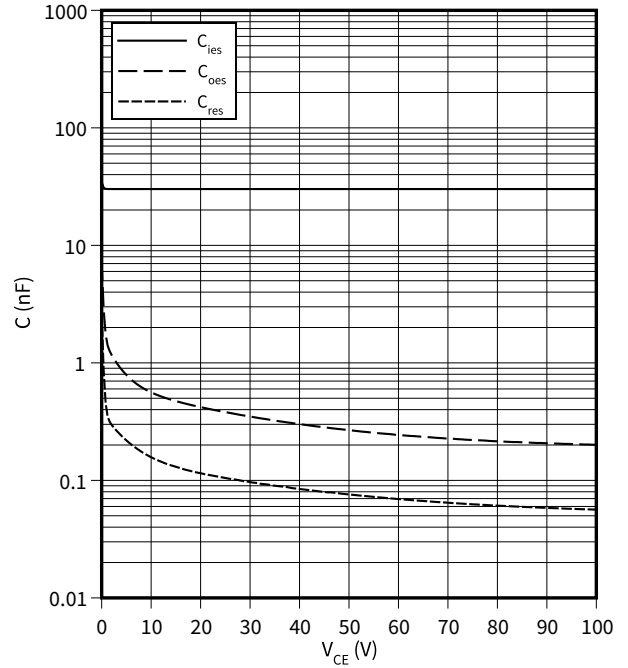
$R_{Goff} = 3.3 \Omega, V_{GE} = 15 V, T_{vj} = 175 \text{ }^\circ\text{C}$



**电容特性 (典型), IGBT, 逆变器**

$C = f(V_{CE})$

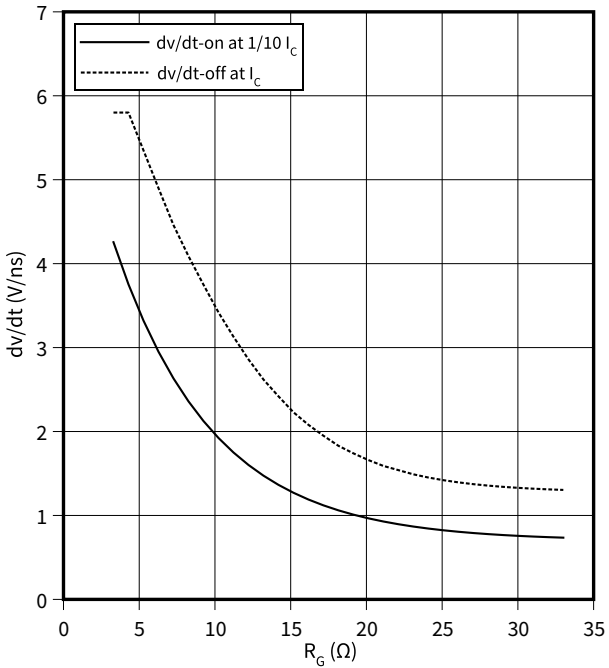
$f = 100 \text{ kHz}, V_{GE} = 0 V, T_{vj} = 25 \text{ }^\circ\text{C}$



**dv/dt (典型), IGBT, 逆变器**

$dv/dt = f(R_G)$

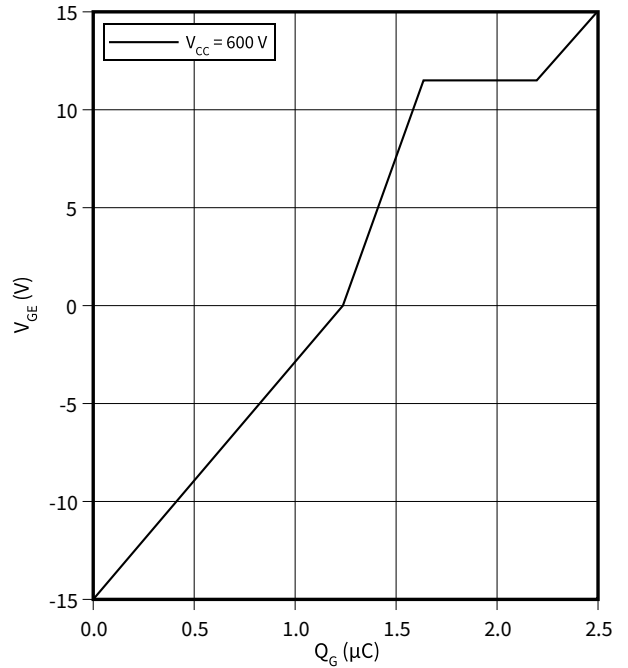
$I_C = 150 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 25 \text{ }^\circ\text{C}$



**栅极电荷特性 (典型), IGBT, 逆变器**

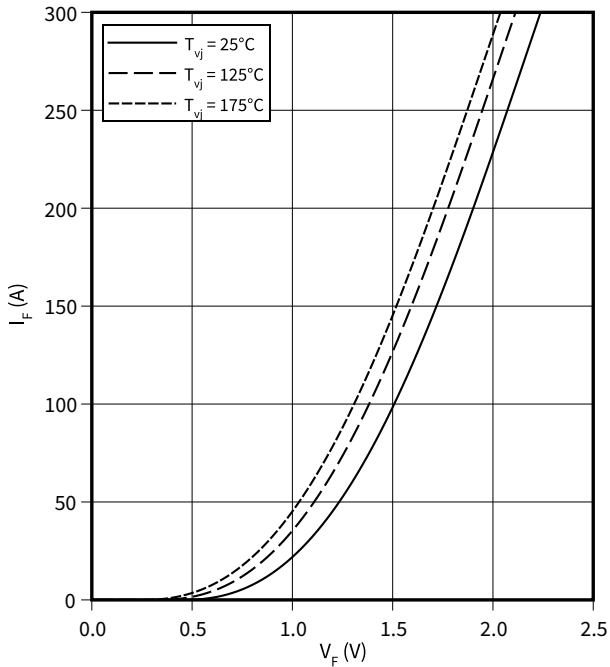
$V_{GE} = f(Q_G)$

$I_C = 150 \text{ A}, T_{vj} = 25 \text{ }^\circ\text{C}$



正向偏压特性 (典型), 二极管, 逆变器

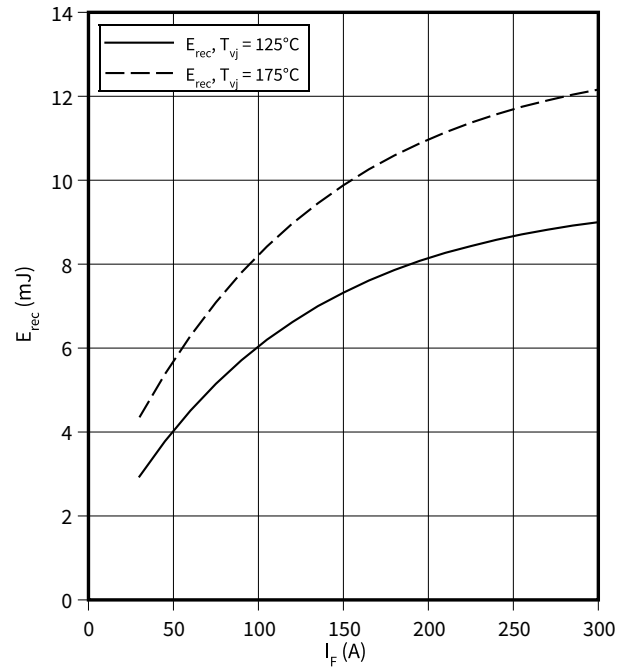
$I_F = f(V_F)$



开关损耗 (典型), 二极管, 逆变器

$E_{rec} = f(I_F)$

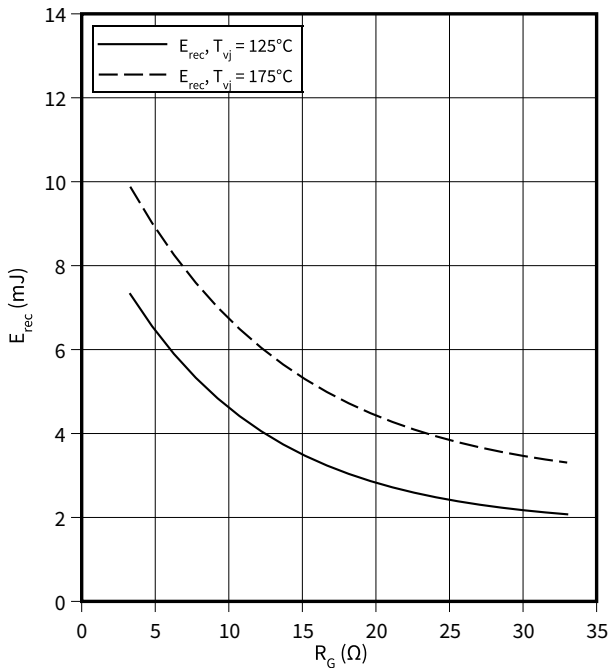
$R_{Gon} = 3.3 \Omega, V_{CE} = 600 V$



开关损耗 (典型), 二极管, 逆变器

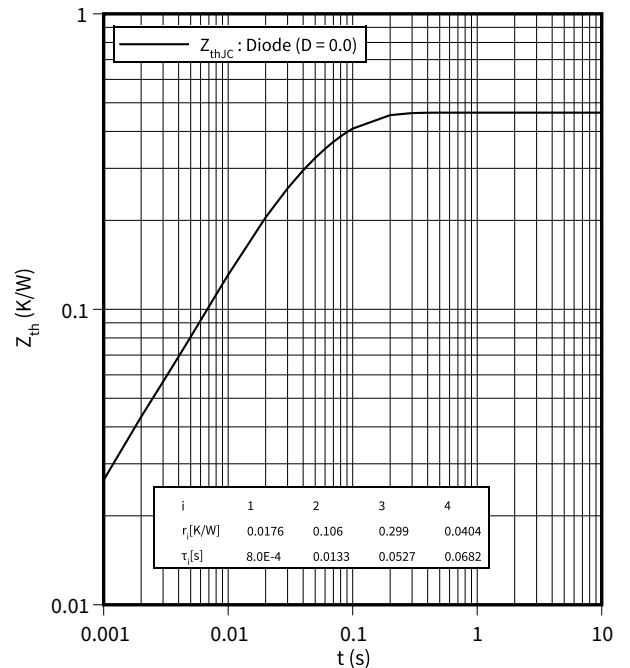
$E_{rec} = f(R_G)$

$V_{CE} = 600 V, I_F = 150 A$



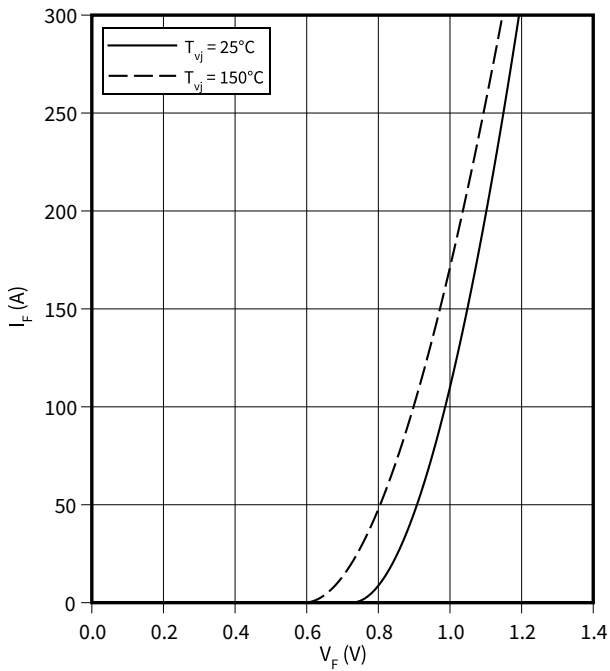
瞬态热阻抗, 二极管, 逆变器

$Z_{th} = f(t)$



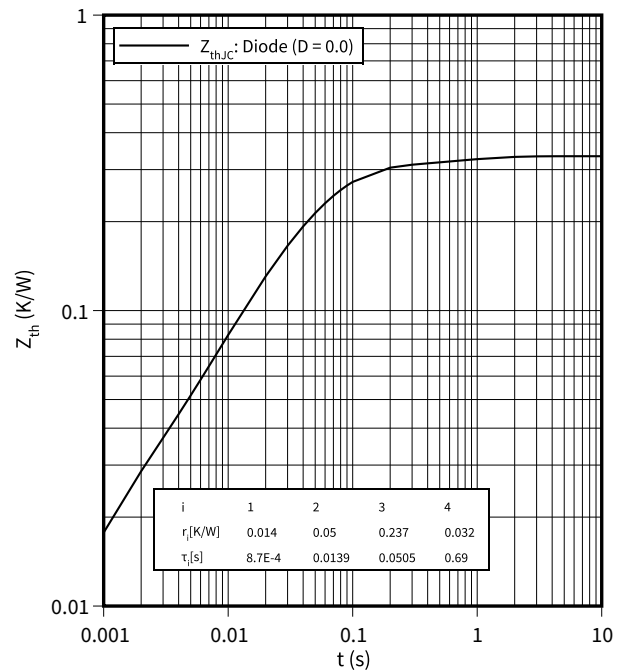
正向偏压特性 (典型), 二极管, 整流器

$I_F = f(V_F)$



瞬态热阻抗, 二极管, 整流器

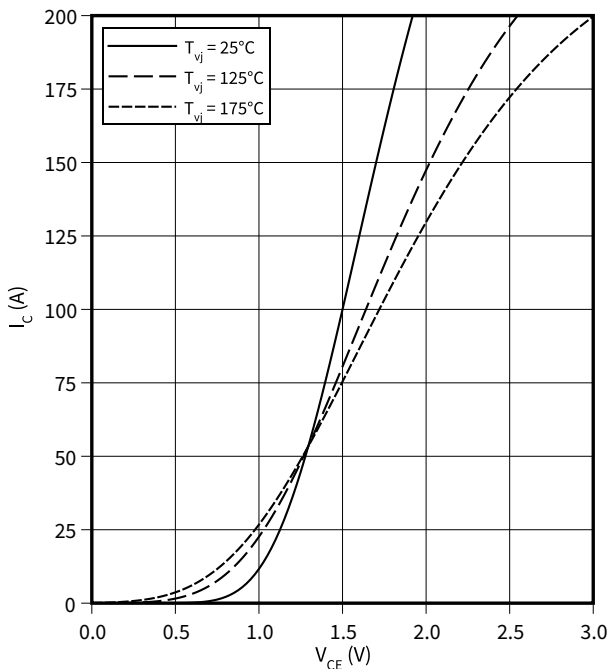
$Z_{th} = f(t)$



输出特性 (典型), IGBT, 制动-斩波器

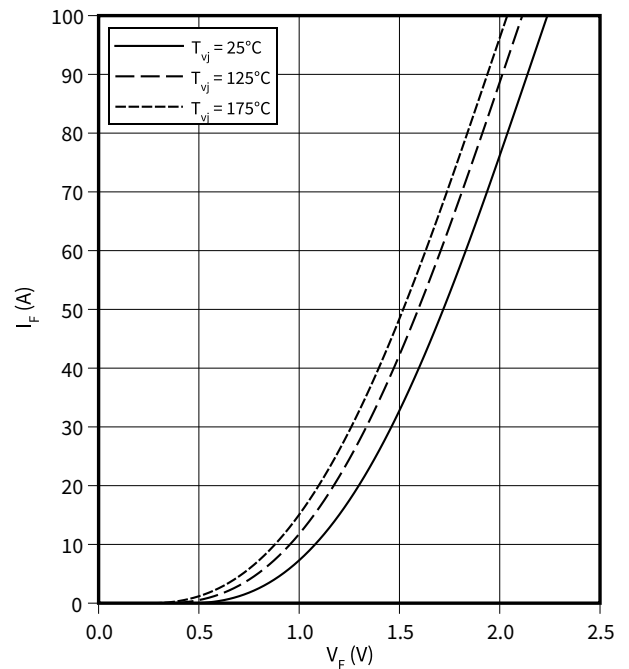
$I_C = f(V_{CE})$

$V_{GE} = 15\text{ V}$



正向偏压特性 (典型), 二极管, 制动-斩波器

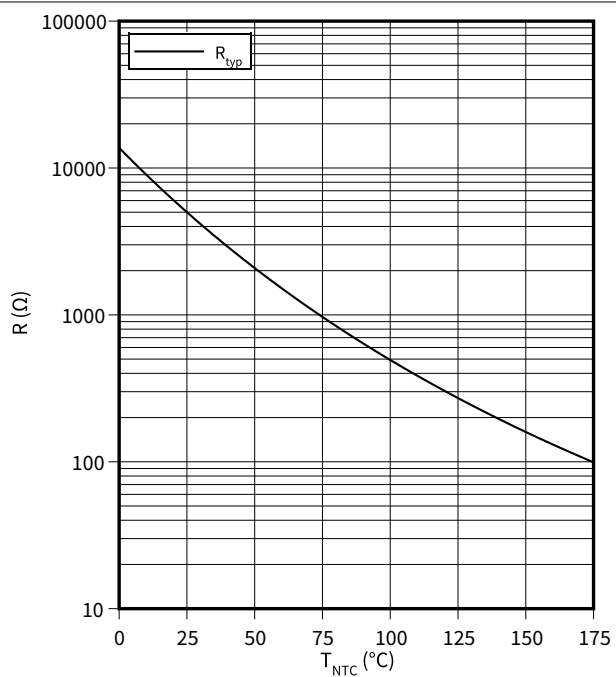
$I_F = f(V_F)$





温度特性, 负温度系数热敏电阻

$$R = f(T_{NTC})$$



## 9 电路拓扑图

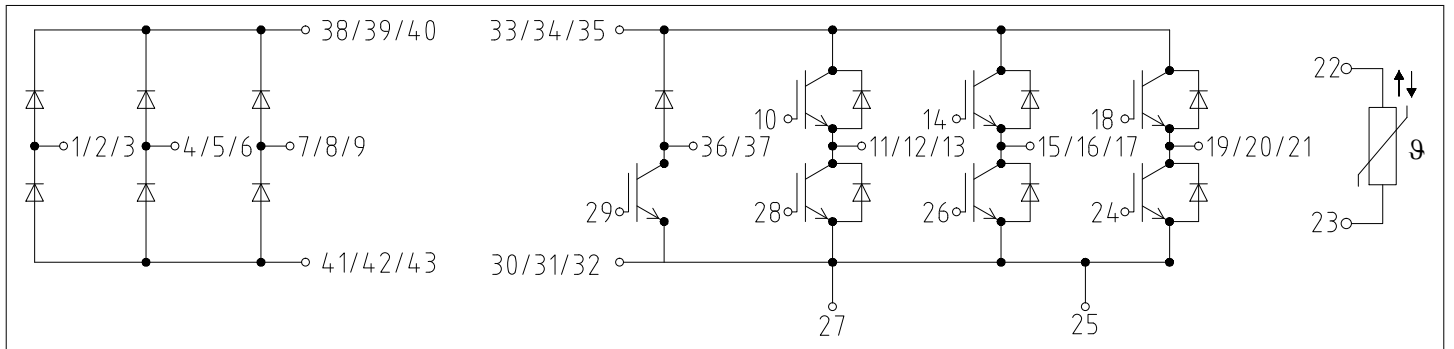


图 2

10 封装尺寸

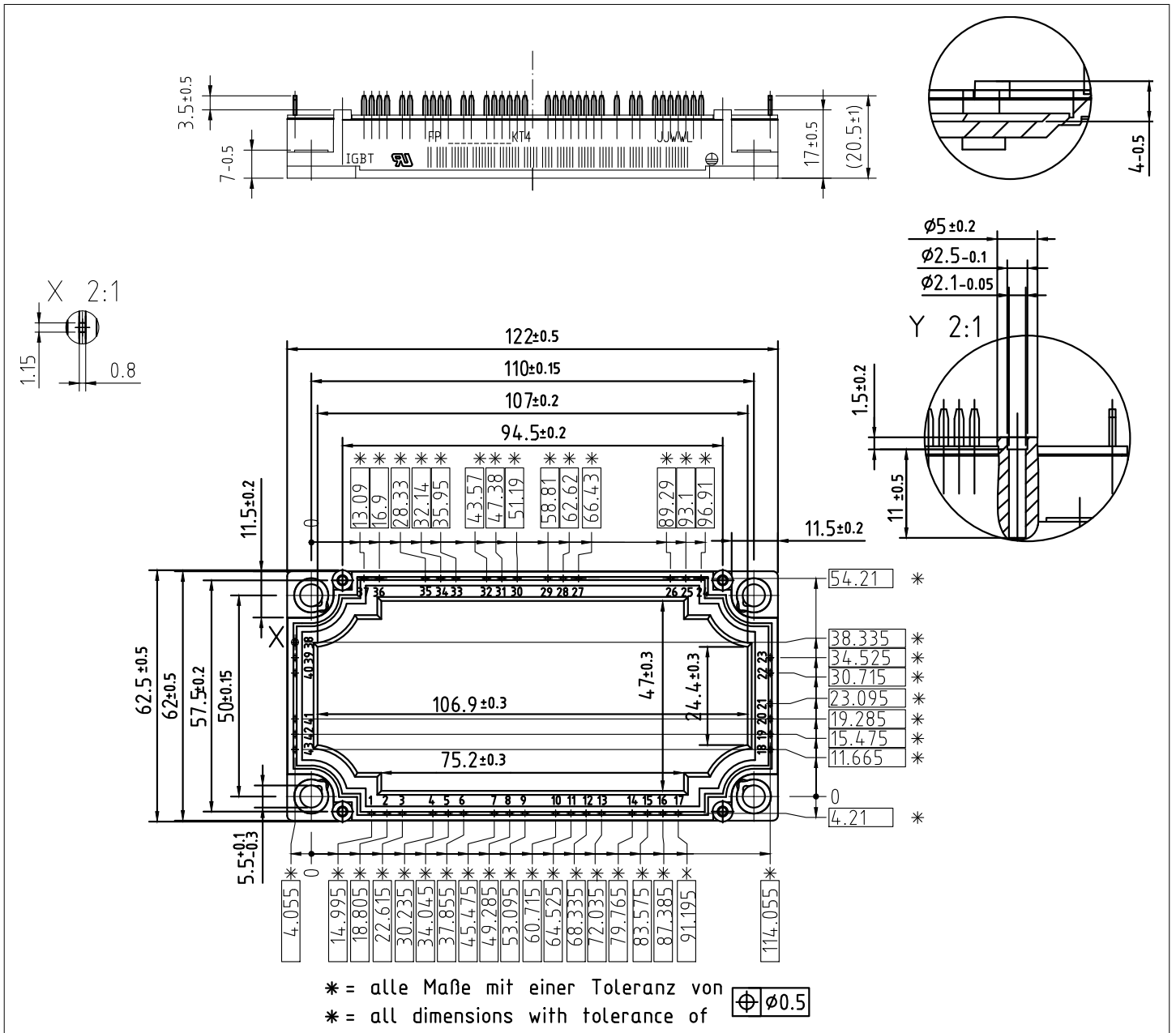


图 3

## 11 模块标签代码



Module label code			
Code format	Data Matrix	Barcode Code128	
Encoding	ASCII text	Code Set A	
Symbol size	16x16	23 digits	
Standard	IEC24720 and IEC16022	IEC8859-1	
Code content	Content	Digit	Example
	Module serial number	1 - 5	71549
	Module material number	6 - 11	142846
	Production order number	12 - 19	55054991
	Date code (production year)	20 - 21	15
	Date code (production week)	22 - 23	30
Example	 		
	71549142846550549911530		71549142846550549911530

图 4

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