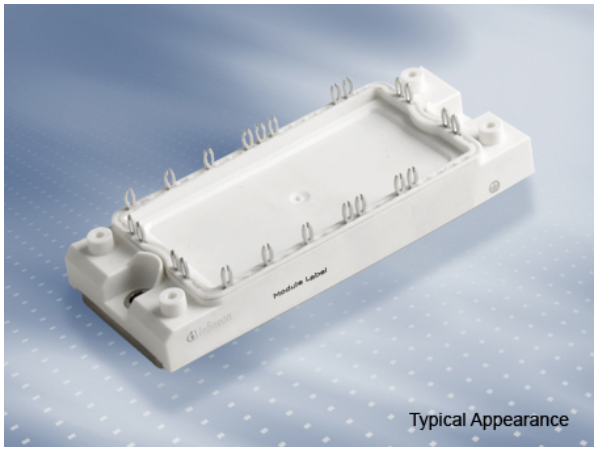
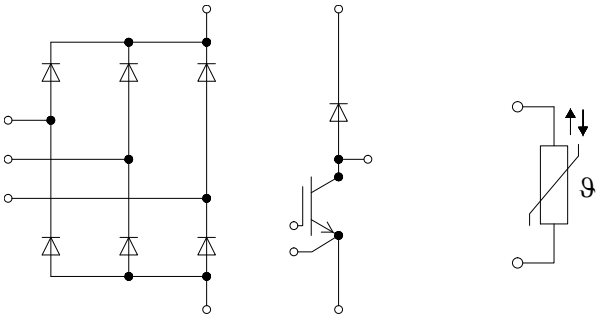
EconoPACK™2 模块 采用第四代沟槽栅/场终止IGBT4和第四代发射极控制二极管 带有pressfit预涂导热材料
EconoPACK™2 module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode and PressFIT / pre-applied Thermal Interface Material





V_{CES} = 1600V
$I_{C\ nom}$ = 180A / I_{CRM} = 360A

潜在应用
- 伺服驱动器
- 电机传动
- 空调
- 辅助逆变器

Potential Applications
- Servo drives
- Motor drives
- Air conditioning
- Auxiliary inverters

电气特性
- $T_{vj\ op}$ = 150°C

Electrical Features
- $T_{vj\ op}$ = 150°C

机械特性
- PressFIT 压接技术
- 低热阻的三氧化二铝 Al_2O_3 衬底
- 标准封装
- 符合RoHS
- 紧凑型设计
- 绝缘的基板
- 预涂导热介质
- 高功率密度

Mechanical Features
- PressFIT contact technology
- Al_2O_3 substrate with low thermal resistance
- Standard housing
- RoHS compliant
- Compact design
- Isolated base plate
- Pre-applied Thermal Interface Material
- High power density

Module Label Code

Barcode Code 128

DMX - 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

二极管,整流器 / Diode, Rectifier

最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1600	V
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	T_H = 70°C	I_{FRMSM}	150	A
最大整流器输出均方根电流 Maximum RMS current at rectifier output	T_H = 70°C	I_{RMSM}	180	A
正向浪涌电流 Surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	1600 1400	A A
I2t-值 I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I²t	12800 9800	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	T_{vj} = 150°C, I_F = 150 A	V_F		1,20		V
阈值电压 Threshold voltage	T_{vj} = 150°C	V_{TO}		0,83		V
斜率电阻 Slope resistance	T_{vj} = 150°C	r_T		2,30		mΩ
反向电流 Reverse current	T_{vj} = 150°C, V_R = 1600 V	I_R		1,00		mA
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode valid with IFX pre-applied thermal interface material	R_{thJH}			0,500	K/W
在开关状态下温度 Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

IGBT, 制动-斩波器 / IGBT, Brake-Chopper

最大额定值 / Maximum Rated Values

集电极 - 发射极电压 Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1200	V
连续集电极直流电流 Continuous DC collector current	T_H = 65°C, $T_{vj\,max}$ = 175°C	I_{CDC}	100	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	200	A
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 = 100 A, V_{GE} = 15 V I_C = 100 A, V_{GE} = 15 V I_C = 100 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,75 2,05 2,10	2,10	V V V
栅极阈值电压 Gate threshold voltage	I_C = 3,80 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,25	5,80	6,35	V
栅极电荷 Gate charge	V_{GE} = -15 / 15 V		Q_G		0,75		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		7,5		Ω
输入电容 Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		6,20		nF
反向传输电容 Reverse transfer capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,35		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1,0	mA
栅极-发射极漏电流 Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			100	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	I_C = 100 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Gon} = 1,6 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,16 0,17 0,17		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 100 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Gon} = 1,6 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,03 0,04 0,04		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 100 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Goff} = 1,6 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,33 0,43 0,45		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 100 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Goff} = 1,6 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,08 0,145 0,17		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 100 A, V_{CE} = 600 V, Lσ = 30 nH di/dt = 3000 A/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Gon} = 1,6 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		5,50 8,50 9,50		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 100 A, V_{CE} = 600 V, Lσ = 30 nH du/dt = 3600 V/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Goff} = 1,6 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		5,50 8,50 9,50		mJ mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 800 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 150°C	I_{SC}		360		A
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个 IGBT / per IGBT valid with IFX pre-applied thermal interface material		R_{thJH}			0,425	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

二极管，制动-斩波器 / Diode, Brake-Chopper

最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
连续正向直流电流 Continuous DC forward current		I_F	50	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	100	A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I²t	510	A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 50 A, V_{GE} = 0 V I_F = 50 A, V_{GE} = 0 V I_F = 50 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,70 1,65 1,65	2,15	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 50 A, - di_F/dt = 2500 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		54,0 60,0 63,0		A A A
恢复电荷 Recovered charge	I_F = 50 A, - di_F/dt = 2500 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		5,50 8,80 10,2		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 50 A, - di_F/dt = 2500 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		1,70 3,00 3,70		mJ mJ mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode valid with IFX pre-applied thermal interface material		R_{thJH}			1,19	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-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_{NTC} = 25°C	R_{25}		5,00		kΩ
R100 偏差 Deviation of R100	T_{NTC} = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
耗散功率 Power dissipation	T_{NTC} = 25°C	P_{25}			20,0	mW
B-值 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\ K))]$	$B_{25/80}$		3411		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\ K))]$	$B_{25/100}$		3433		K

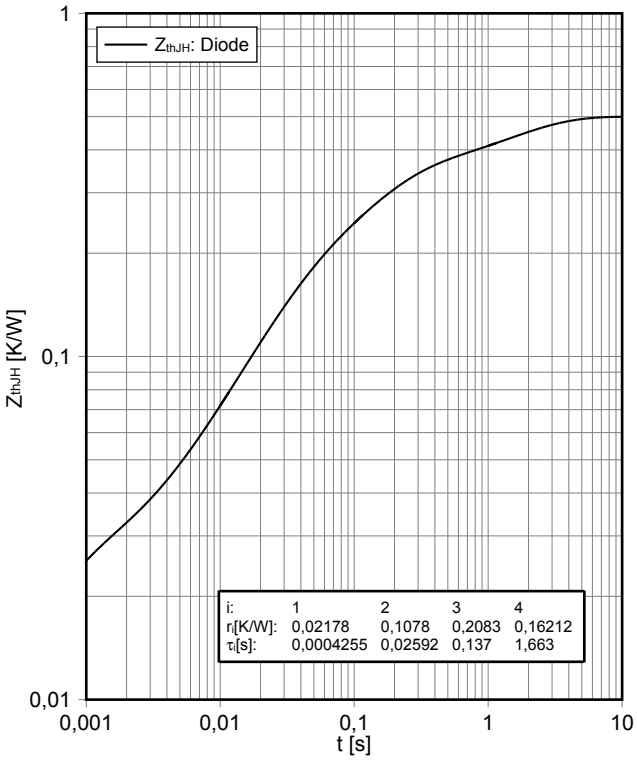
根据应用手册标定
Specification according to the valid application note.

模块 / Module

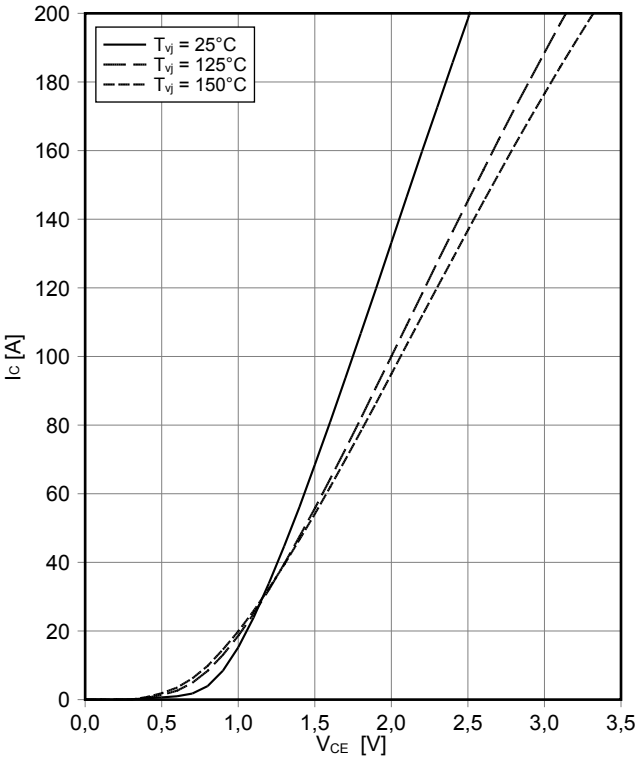
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		kV
模块基板材料 Material of module baseplate				Cu		
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)			Al_2O_3		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			10,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			7,5		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_{sCE}		50		nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	T_H = 25°C, 每个开关 / per switch	$R_{AA'+CC'}$		1,30		mΩ
储存温度 Storage temperature		T_{stg}	-40		125	°C
最高基板工作温度 Maximum baseplate operation temperature		T_{BPmax}			125	°C
模块安装的安装扭距 Mounting torque for modul mounting	螺丝 M5 根据相应的应用手册进行安装 Screw M5 - Mounting according to valid application note	M	3,00		6,00	Nm
重量 Weight		G		180		g

Lagerung und Transport von Modulen mit TIM => siehe AN 2012-07
Storage and shipment of modules with TIM => see AN 2012-07

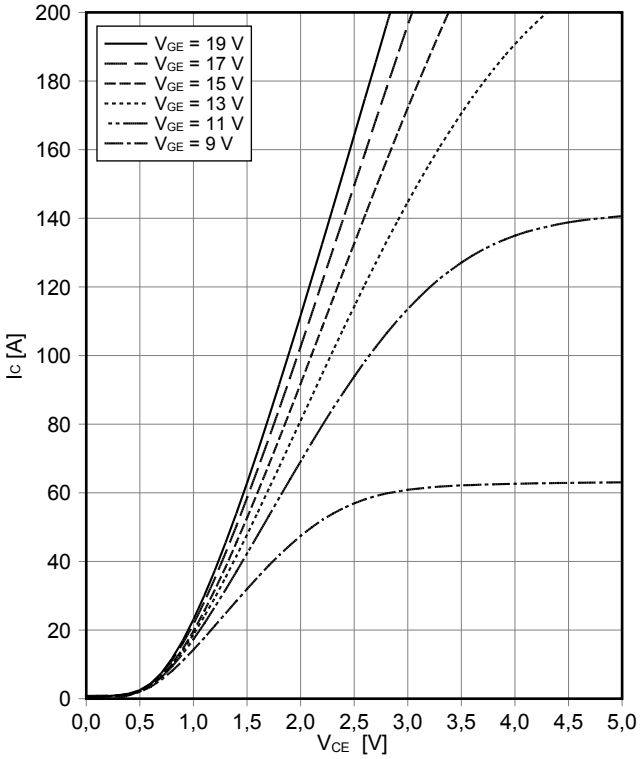
瞬态热阻抗 二极管,整流器
transient thermal impedance Diode, Rectifier
$Z_{thJH} = f(t)$



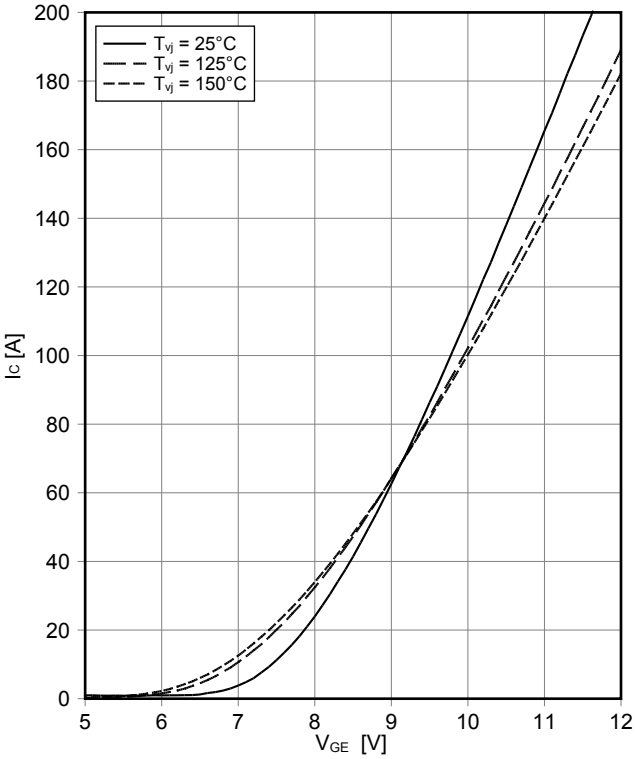
输出特性 IGBT, 制动-斩波器 （典型）
output characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15\ V$



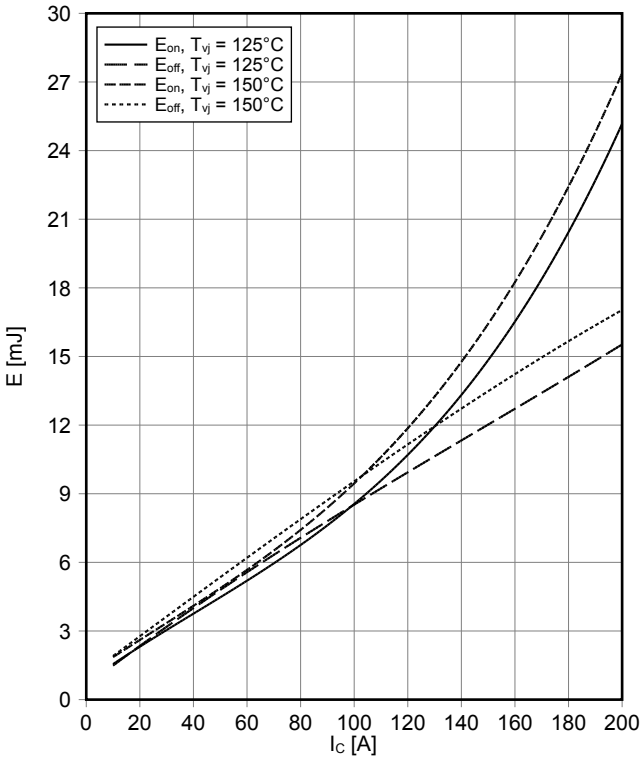
输出特性 IGBT, 制动-斩波器 （典型）
output characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



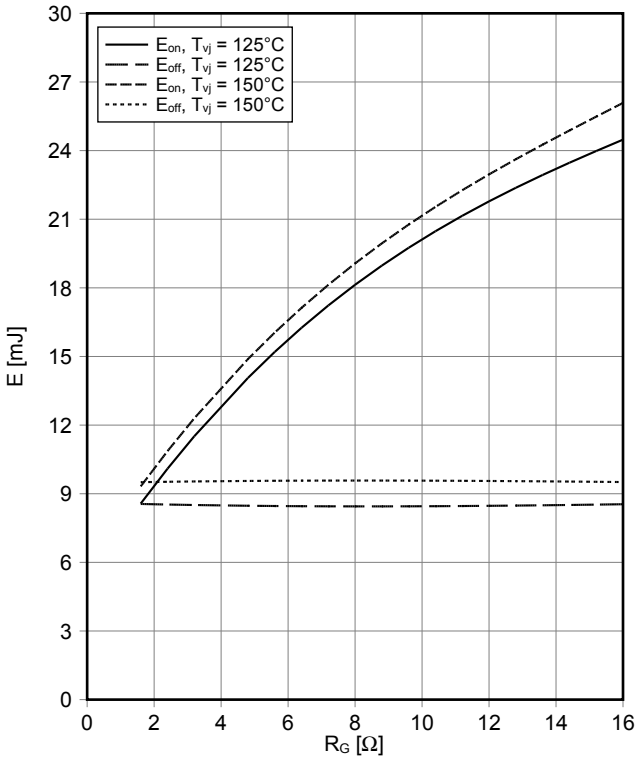
传输特性 IGBT, 制动-斩波器 (典型)
transfer characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20\ V$



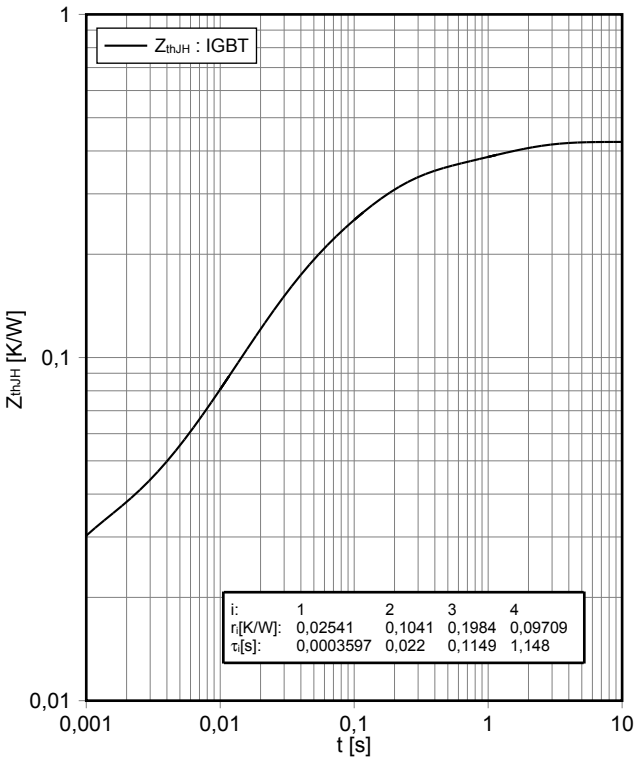
开关损耗 IGBT, 制动-斩波器 （典型）
switching losses IGBT, Brake-Chopper (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 1.6 Ω, R_{Goff} = 1.6 Ω, V_{CE} = 600 V



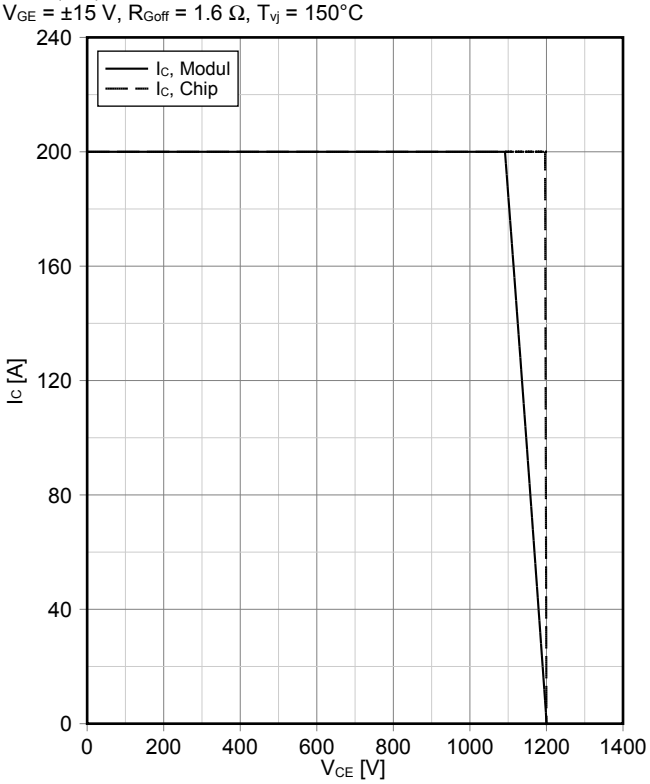
开关损耗 IGBT, 制动-斩波器 （典型）
switching losses IGBT, Brake-Chopper (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 100 A, V_{CE} = 600 V



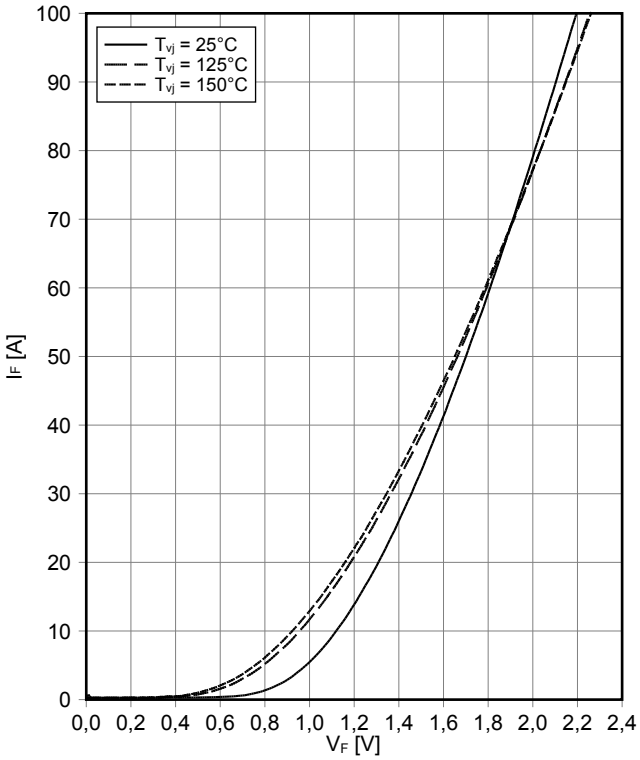
瞬态热阻抗 IGBT, 制动-斩波器
transient thermal impedance IGBT, Brake-Chopper
$Z_{thJH} = f(t)$



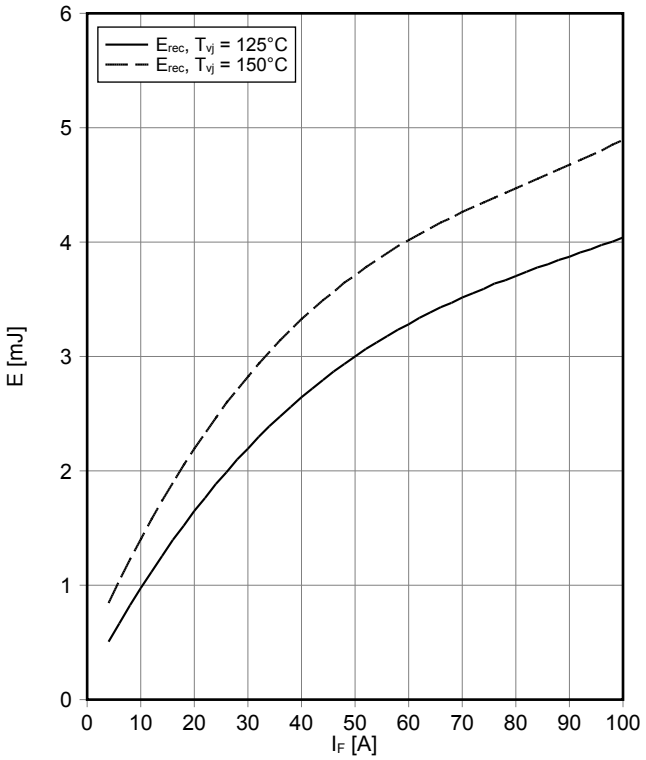
反偏安全工作区 IGBT, 制动-斩波器 （RBSOA）
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 1.6 Ω, T_{vj} = 150°C



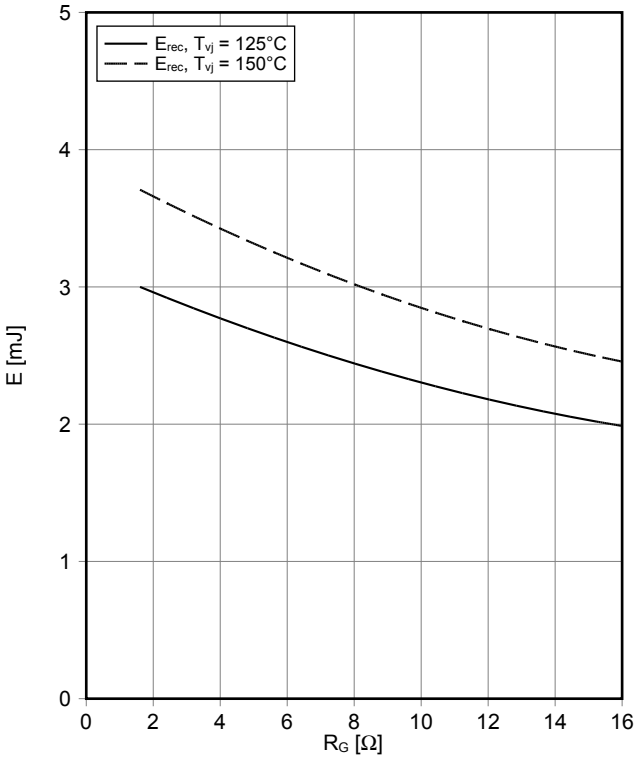
正向偏压特性 二极管，制动-斩波器 （典型）
forward characteristic of Diode, Brake-Chopper (typical)
$I_F = f(V_F)$



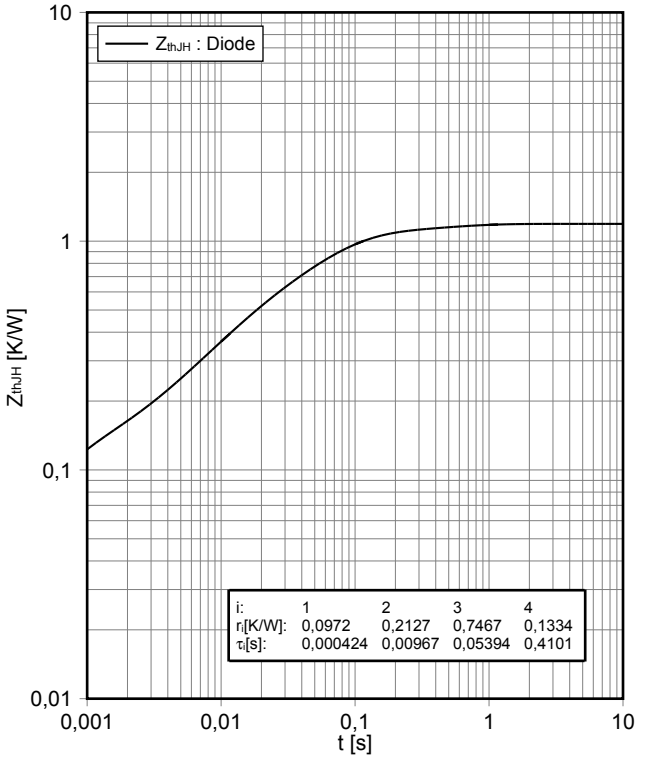
开关损耗 二极管，制动-斩波器 （典型）
switching losses Diode, Brake-Chopper (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 1.6\ \Omega$, $V_{CE} = 600$ V



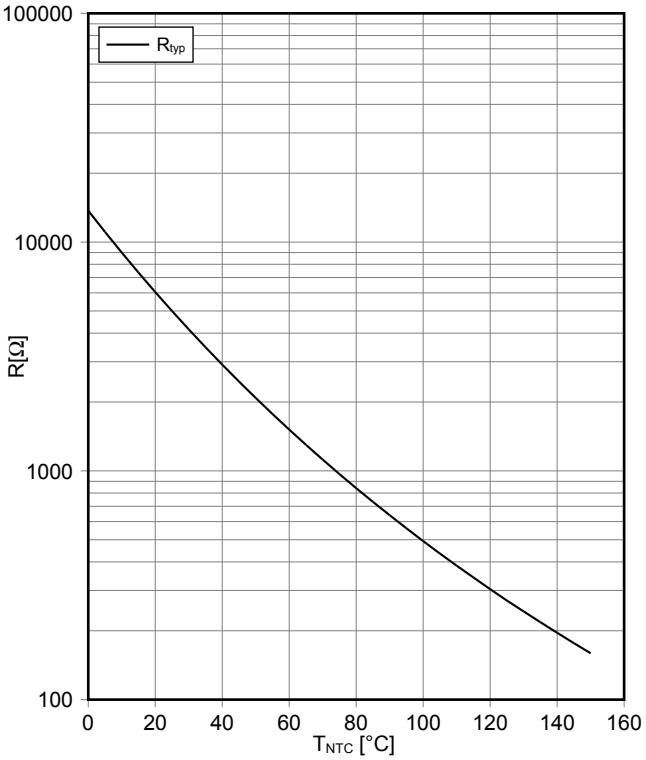
开关损耗 二极管，制动-斩波器 （典型）
switching losses Diode, Brake-Chopper (typical)
$E_{rec} = f(R_G)$
$I_F = 50$ A, $V_{CE} = 600$ V



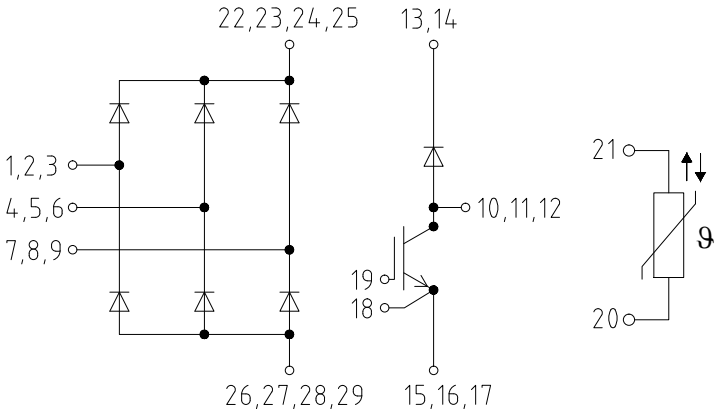
瞬态热阻抗 二极管，制动-斩波器
transient thermal impedance Diode, Brake-Chopper
$Z_{thJH} = f(t)$



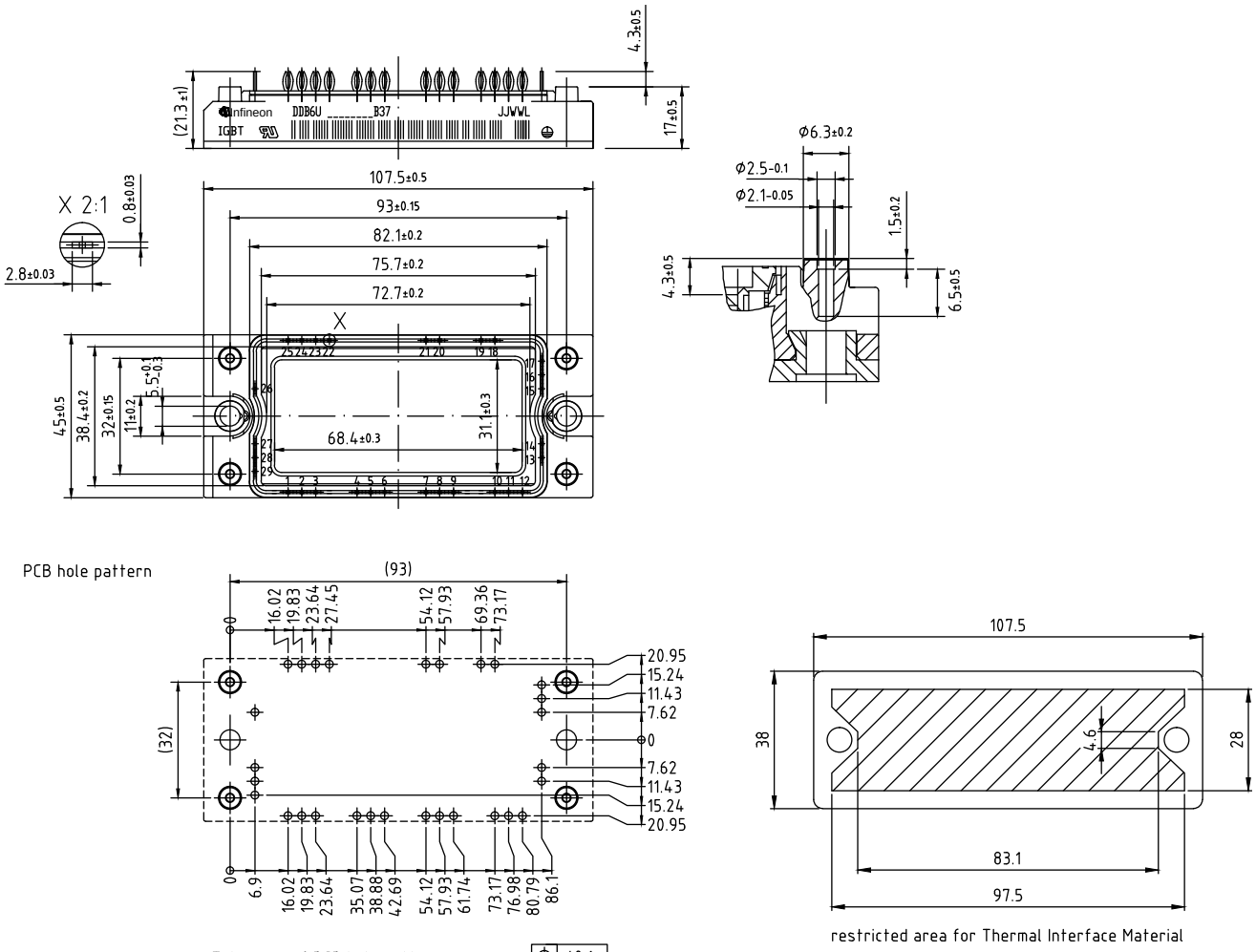
负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)



接线图 / Circuit diagram



封装尺寸 / Package outlines



PCB hole pattern

restricted area for Thermal Interface Material

- Tolerance of PCB hole pattern ⌖ Φ0.1
- hole specifications see AN 2007-09
- Diameters of plated holes Ø 2.14mm - 2.29mm
- Diameter of drill Ø 2.35mm

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