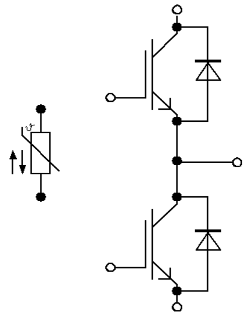
FF1200R17IP5P

PrimePACK™2 模块 采用第五代沟槽栅/场终止IGBT5和第五代发射极控制二极管 带有温度检测NTC 和预涂导热介质
PrimePACK™2 module with Trench/Fieldstop IGBT5, Emitter Controlled 5 diode and NTC / pre-applied Thermal Interface Material



V_{CES} = 1700V
$I_{C\ nom}$ = 1200A / I_{CRM} = 2400A

潜在应用
- 大功率变流器
- 牵引变流器
- 电机传动
- 风力发电机

电气特性
- $T_{vj\ op}$ = 175°C
- 低 V_{CEsat}
- 低开关损耗
- 提高工作结温 $T_{vj\ op}$
- 高电流密度

机械特性
- 封装的 CTI > 400
- 预涂导热介质
- 高功率密度
- 高功率循环和温度循环能力
- 高爬电距离和电气间隙

Potential Applications
- High power converters
- Traction drives
- Motor drives
- Wind turbines

Electrical Features
- $T_{vj\ op}$ = 175°C
- Low V_{CEsat}
- Low switching losses
- Extended operating temperature $T_{vj\ op}$
- High current density

Mechanical Features
- Package with CTI > 400
- Pre-applied Thermal Interface Material
- High power density
- High power and thermal cycling capability
- High creepage and clearance distances

Module Label Code

Barcode Code 128

00000123456000000000000

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

IGBT, 逆变器 / IGBT,Inverter

最大额定值 / Maximum Rated Values

Parameter	Conditions	Symbol	Value	Unit
集电极 - 发射极电压 Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1700	V
连续集电极直流电流 Continuous DC collector current	T_H = 30°C, $T_{vj\,max}$ = 175°C	I_{CDC}	1200	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	2400	A
栅极 - 发射极峰值电压 Gate-emitter peak voltage		V_{GES}	+/-20	V

特征值 / Characteristic Values

Parameter	Conditions		Symbol	min.	typ.	max.	Unit
集电极 - 发射极饱和电压 Collector-emitter saturation voltage	I_C = 1200 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	$V_{CE\,sat}$		1,75 2,15 2,35	2,30 2,75 3,00	V V V
栅极阈值电压 Gate threshold voltage	I_C = 43,0 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,35	5,80	6,25	V
栅极电荷 Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 900 V		Q_G		6,00		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,2		Ω
输入电容 Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		68,0		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}		2,10		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 1700 V, V_{GE} = 0 V	T_{vj} = 125°C	I_{CES}			10	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}			400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Gon} = 0,56 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	$t_{d\,on}$		0,27 0,28 0,29		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Gon} = 0,56 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	t_r		0,15 0,17 0,17		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Goff} = 1,0 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	$t_{d\,off}$		0,64 0,71 0,76		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Goff} = 1,0 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	t_f		0,15 0,20 0,21		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 1200 A, V_{CE} = 900 V, L_σ = 45 nH di/dt = 6450 A/µs (T_{vj} = 175°C) V_{GE} = -15 / 15 V, R_{Gon} = 0,56 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	E_{on}		265 400 485		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 1200 A, V_{CE} = 900 V, L_σ = 45 nH du/dt = 2800 V/µs (T_{vj} = 175°C) V_{GE} = -15 / 15 V, R_{Goff} = 1,0 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	E_{off}		295 400 470		mJ mJ mJ
短路数据 SC data	$V_{GE} \leq$ 15 V, V_{CC} = 1000 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	$t_P \leq$ 10 µs, T_{vj} = 175°C	I_{SC}		4200		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}			40,7	K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		175	°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_{vj} = 25°C	V_{RRM}	1700	V
连续正向直流电流 Continuous DC forward current		I_F	1200	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	2400	A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 175°C	I^2t	340 275	kA²s kA²s
最大损耗功率 Maximum power dissipation	T_{vj} = 175°C	P_{RQM}	1200	kW

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	I_F = 1200 A, V_{GE} = 0 V I_F = 1200 A, V_{GE} = 0 V I_F = 1200 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	V_F		1,80 1,75 1,75	2,20 2,15 2,15	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 1200 A, - di_F/dt = 6450 A/µs (T_{vj}=175°C) V_R = 900 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	I_{RM}		945 1100 1200		A A A
恢复电荷 Recovered charge	I_F = 1200 A, - di_F/dt = 6450 A/µs (T_{vj}=175°C) V_R = 900 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	Q_r		230 410 540		µC µC µC
反向恢复损耗(每脉冲) Reverse recovery energy	I_F = 1200 A, - di_F/dt = 6450 A/µs (T_{vj}=175°C) V_R = 900 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	E_{rec}		130 245 325		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}			64,8	K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		175	°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

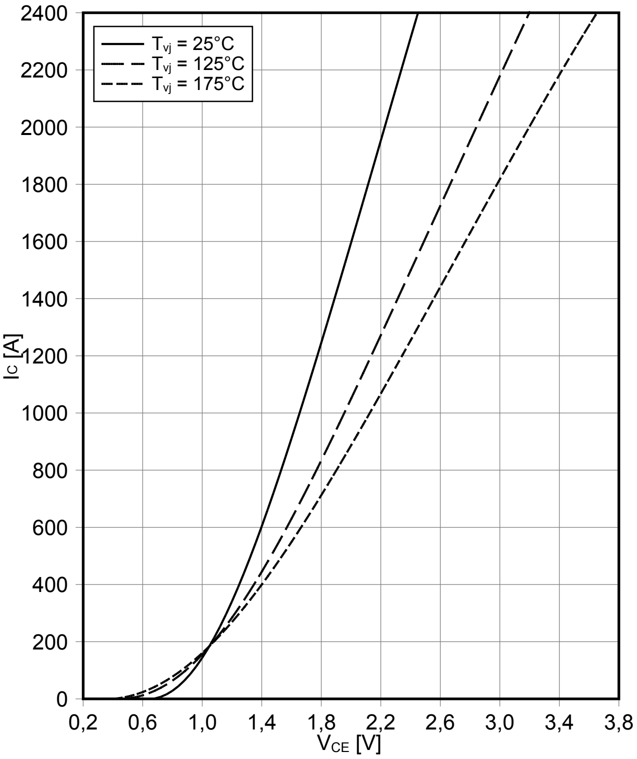
根据应用手册标定
Specification according to the valid application note.

模块 / Module

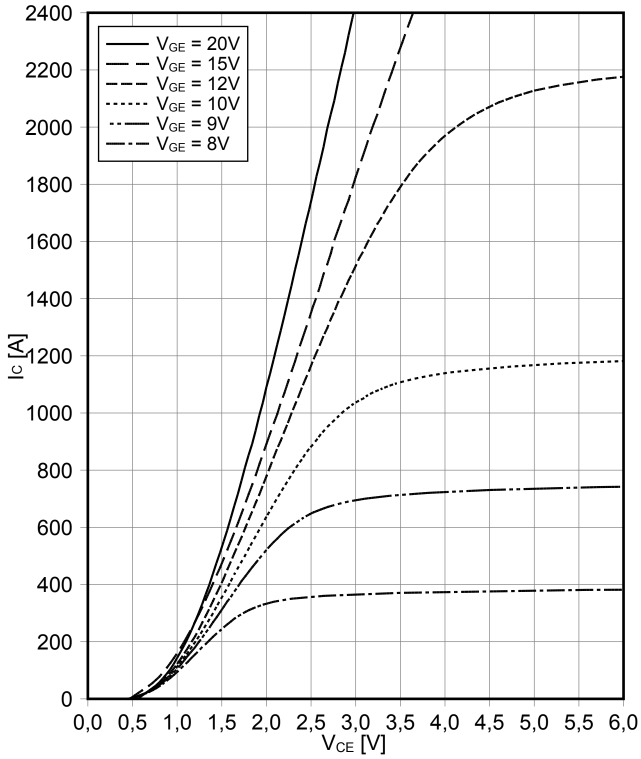
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		4,0		kV
模块基板材料 Material of module baseplate				Cu		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			33,0 33,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			19,0 19,0		mm
相对电痕指数 Comperative tracking index		CTI		> 400		
			min.	typ.	max.	
杂散电感,模块 Stray inductance module		L_{sCE}		18		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	$R_{CC'+EE'}$ $R_{AA'+CC'}$		0,30 0,22		mΩ
储存温度 Storage temperature		T_{stg}	-40		150	°C
最高基板工作温度 Maximum baseplate operation temperature		T_{BPmax}			150	°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
端子联接扭距 Terminal connection torque	螺丝 M4 根据相应的应用手册进行安装 Screw M4 - Mounting according to valid application note 螺丝 M8 根据相应的应用手册进行安装 Screw M8 - Mounting according to valid application note	M	1,8 8,0	- -	2,1 10	Nm Nm
重量 Weight		G		825		g

Lagerung und Transport von Modulen mit TIM: siehe AN2012-07
Storage and shipment of modules with TIM: see AN2012-07

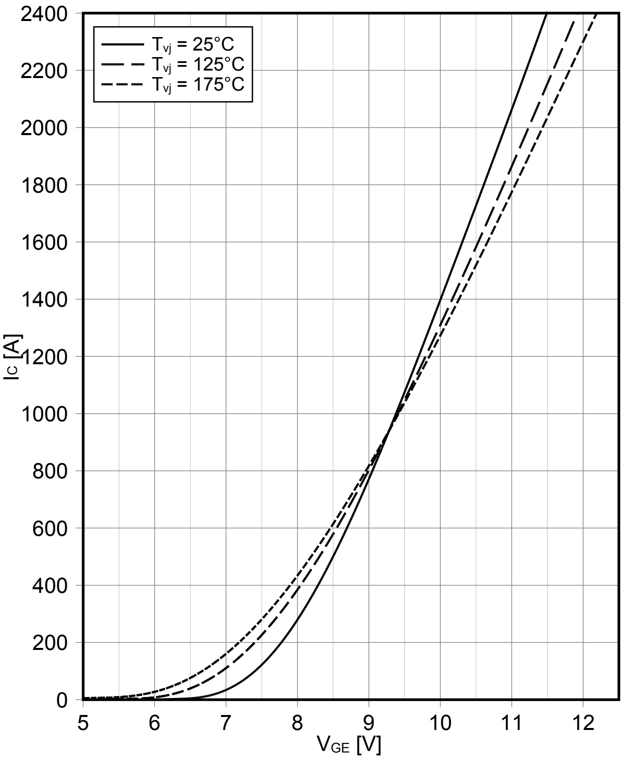
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



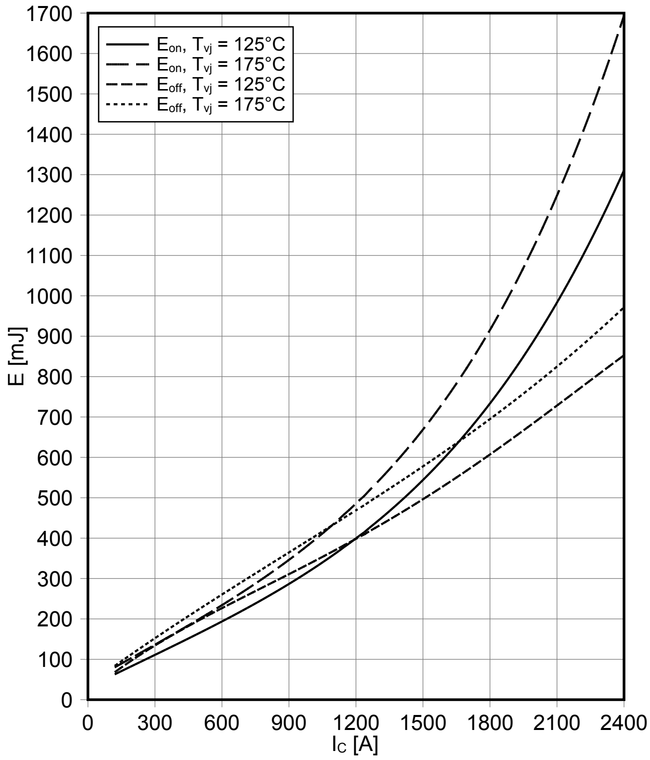
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 175$°C



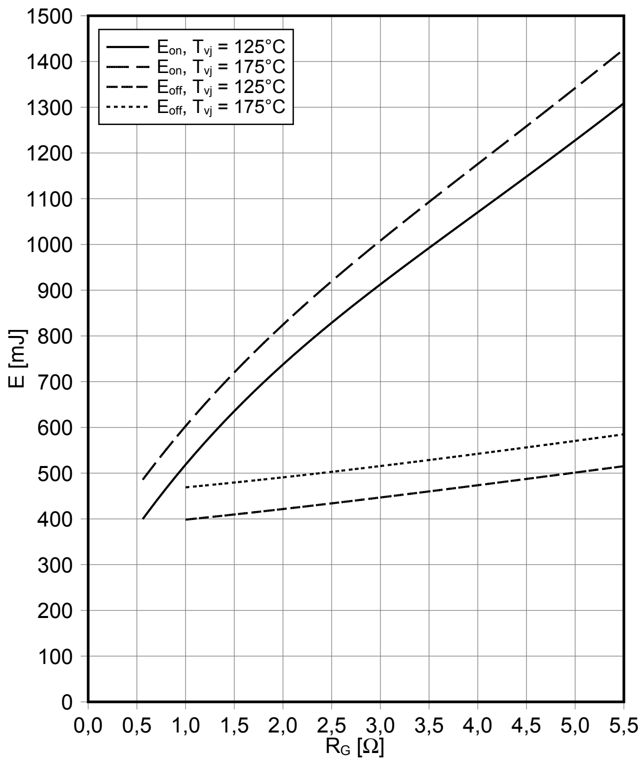
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



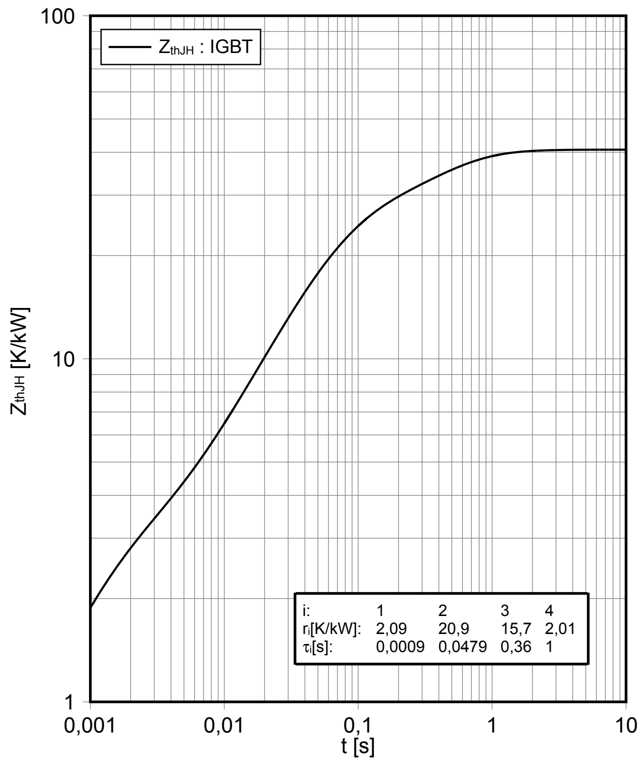
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 0.56\ \Omega$, $R_{Goff} = 1\ \Omega$, $V_{CE} = 900$ V



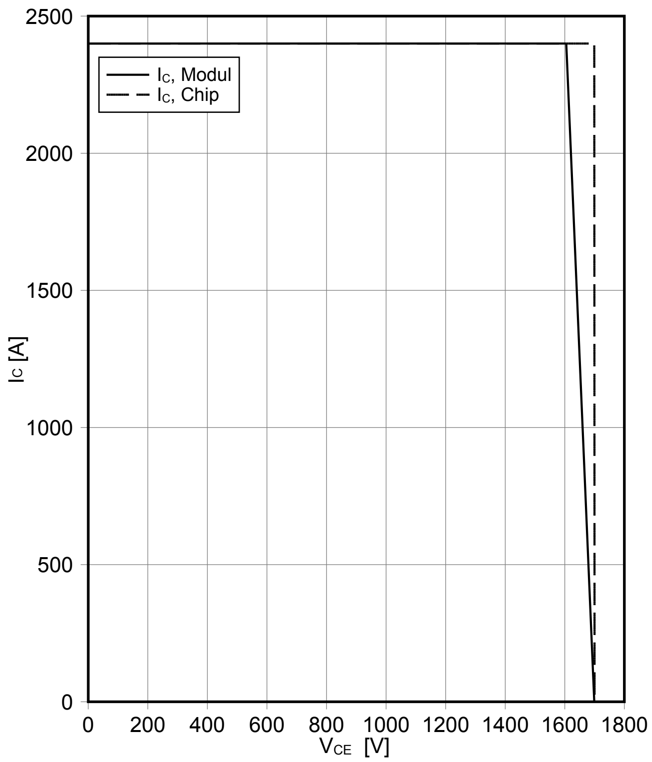
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm15$ V, $I_C = 1200$ A, $V_{CE} = 900$ V



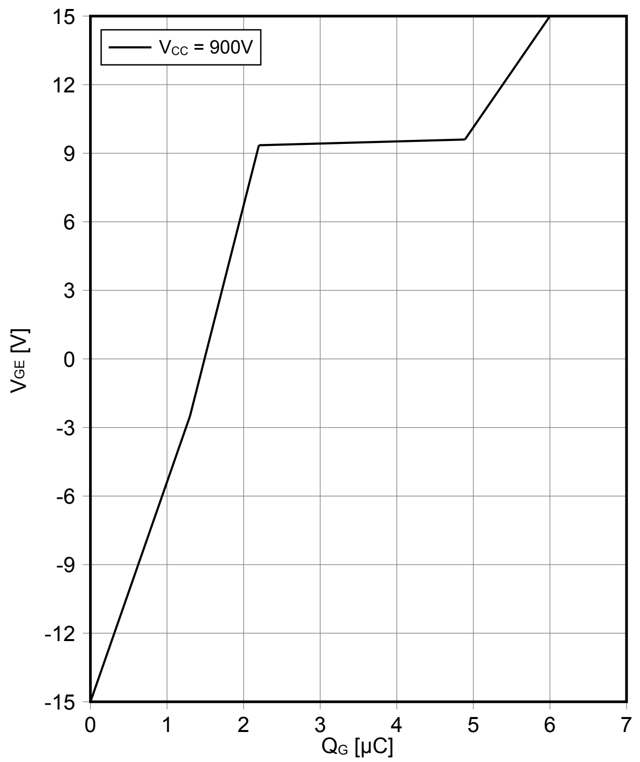
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT,Inverter
$Z_{thJH} = f(t)$



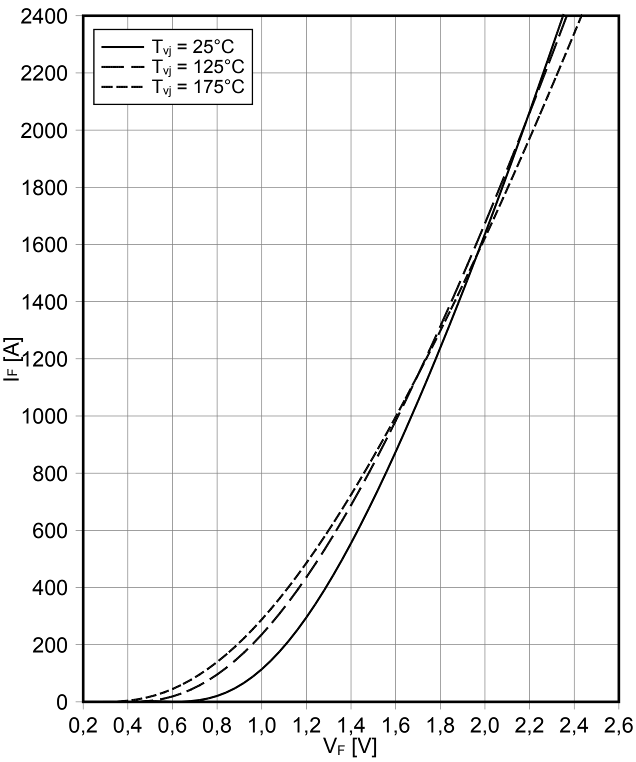
反偏安全工作区 IGBT, 逆变器 （RBSOA）
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm15$ V, $R_{Goff} = 1\ \Omega$, $T_{vj} = 175°C$



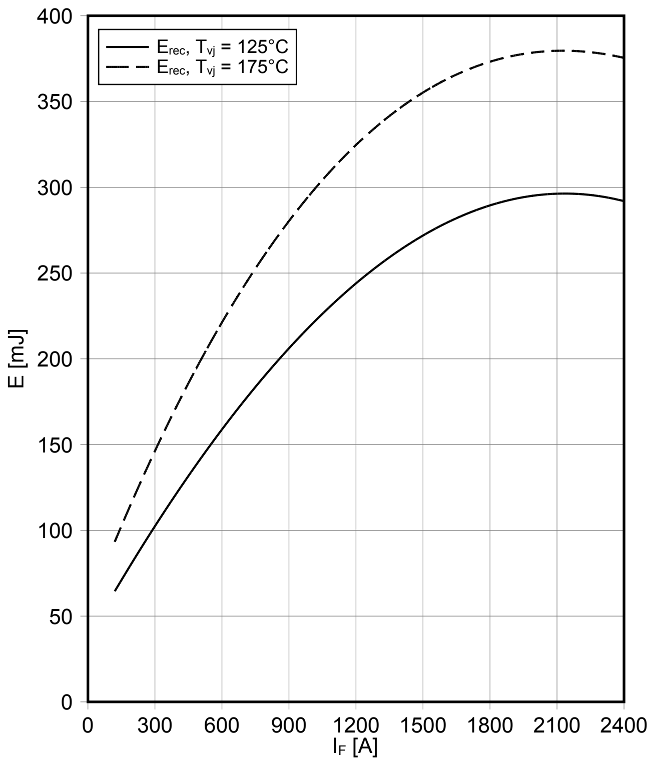
栅极电荷特性 IGBT, 逆变器 （典型)
gate charge characteristic IGBT,Inverter (typical)
$V_{GE} = f(Q_G)$
$I_C = 1200$ A, $T_{vj} = 25°C$



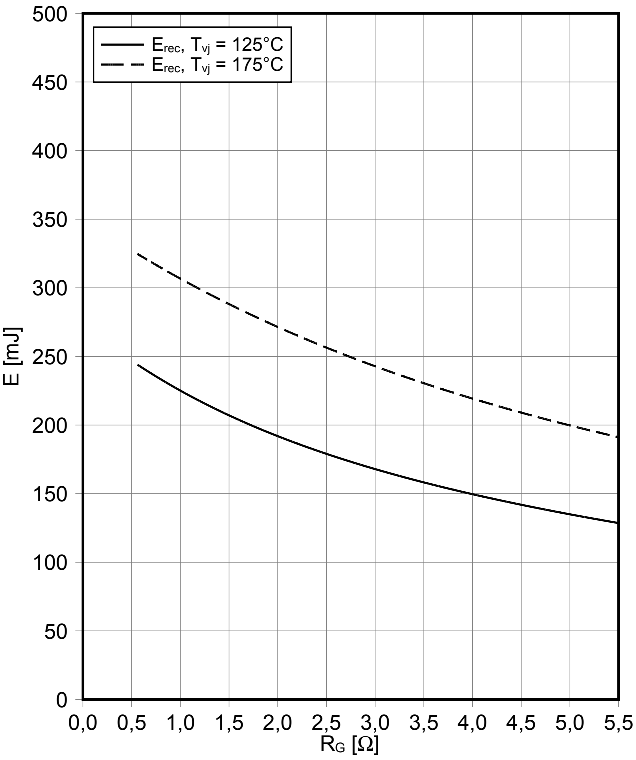
正向偏压特性 二极管,逆变器 （典型)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



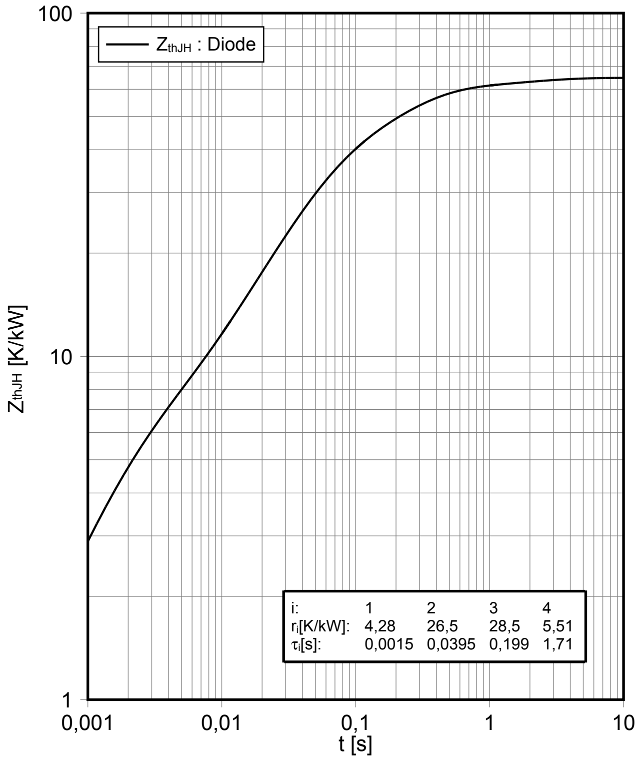
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
R_{Gon} = 0.56 Ω, V_{CE} = 900 V



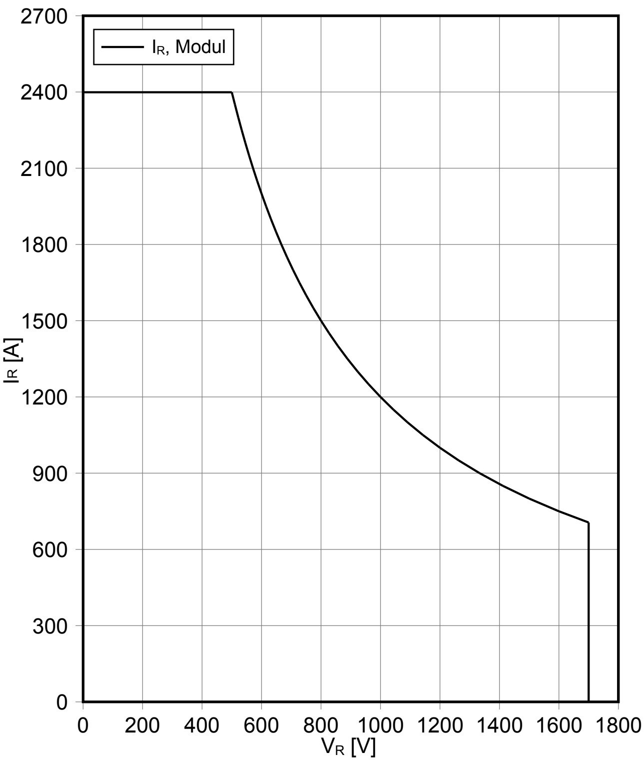
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
I_F = 1200 A, V_{CE} = 900 V



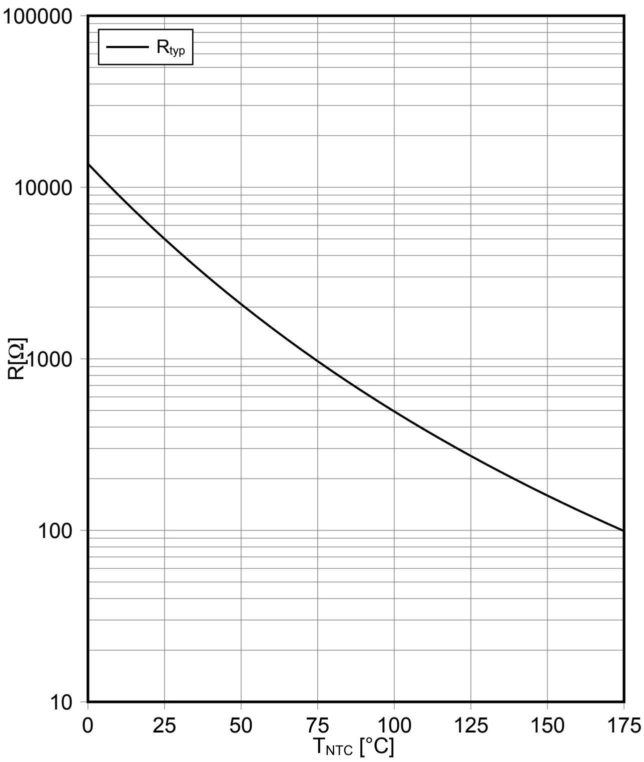
瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter
$Z_{thJH} = f(t)$



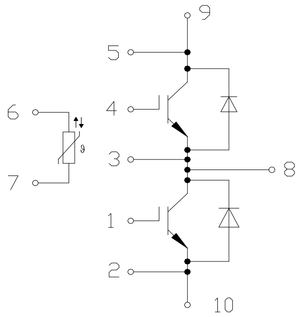
安全工作区 二极管,逆变器 (SOA)
safe operation area Diode, Inverter (SOA)
$I_R = f(V_R)$
$T_{vj} = 175°C$



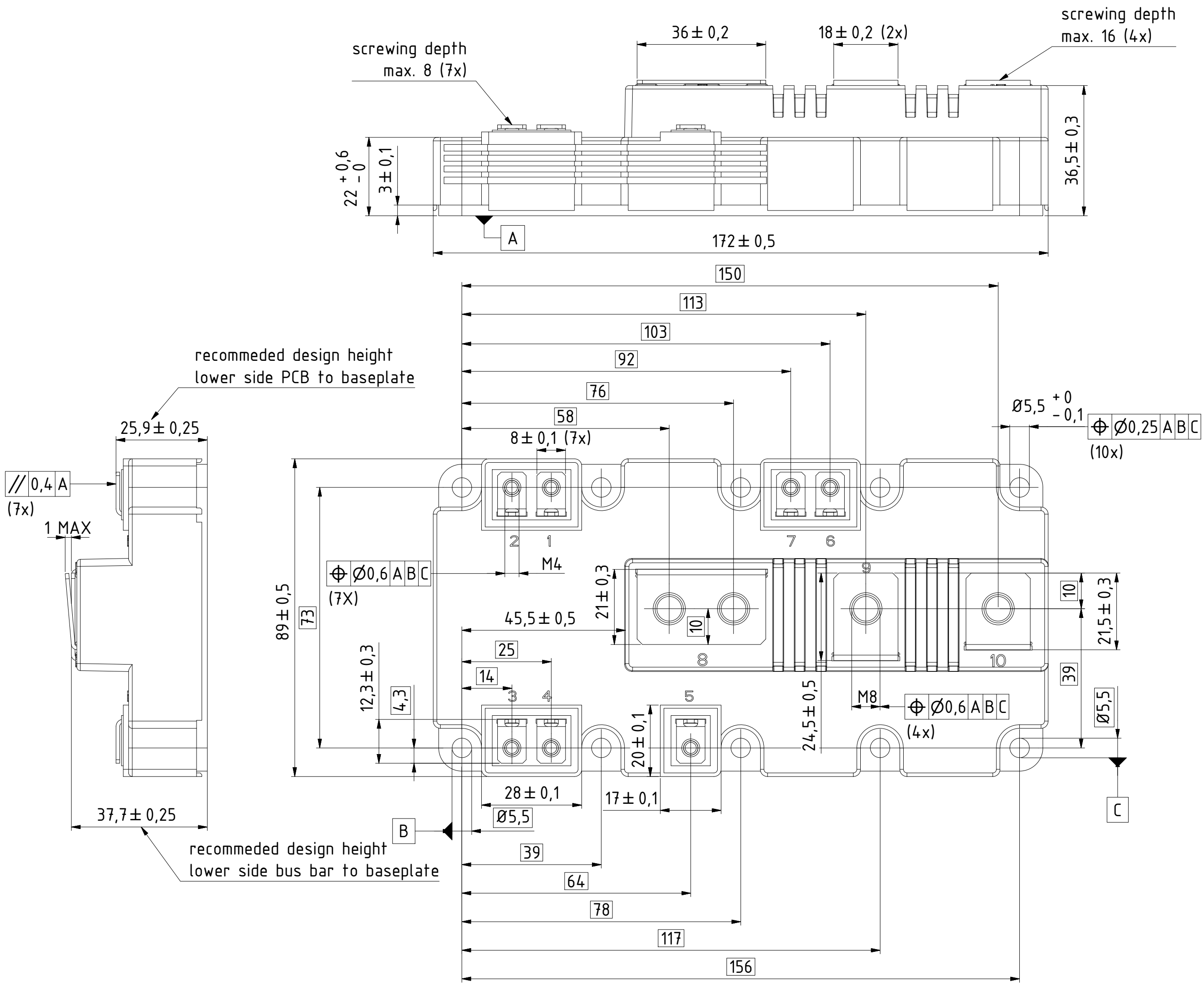
负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)



接线图 / Circuit diagram



封装尺寸 / Package outlines



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Email: erratum@infineon.com