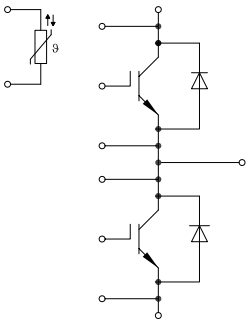
PrimePACK™3+ B-series 模块 采用第五代沟槽栅/场终止IGBT5和第五代发射极控制二极管 带有温度检测NTC
PrimePACK™3+ B-series module with Trench/Fieldstop IGBT5, Emitter Controlled 5 diode and NTC





V_{CES} = 1700V
$I_{C\ nom}$ = 1500A / I_{CRM} = 3000A

潜在应用
- 大功率变流器
- 牵引变流器
- 电机传动
- 风力发电机

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

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

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

机械特性
- 封装的 CTI > 400
- 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

Mechanical Features
- Package with CTI > 400
- High power density
- High power and thermal cycling capability
- High creepage and clearance distances

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

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°C	V_{CES}		1700	V
连续集电极直流电流 Continuous DC collector current	T_C = 90°C, $T_{vj\,max}$ = 175°C	I_{CDC}		1500	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}		3000	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 = 1500 A, V_{GE} = 15 V	$V_{CE\,sat}$		1,75 2,10 2,30	2,20 2,65 2,90	V V V
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
栅极阈值电压 Gate threshold voltage	I_C = 54,0 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		7,50		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C	R_{Gint}		1,0		Ω
输入电容 Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		88,0		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}		2,70		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} = 25°C	I_{CES}			5,0	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}			400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	I_C = 1500 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Gon} = 0,51 Ω	$t_{d\,on}$		0,30 0,31 0,32		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
上升时间(电感负载) Rise time, inductive load	I_C = 1500 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Gon} = 0,51 Ω	t_r		0,15 0,16 0,16		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 1500 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Goff} = 0,82 Ω	$t_{d\,off}$		0,66 0,74 0,80		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
下降时间(电感负载) Fall time, inductive load	I_C = 1500 A, V_{CE} = 900 V V_{GE} = -15 / 15 V R_{Goff} = 0,82 Ω	t_f		0,11 0,16 0,17		µs µs µs
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 1500 A, V_{CE} = 900 V, Lσ = 30 nH di/dt = 8550 A/µs (T_{vj} = 175°C) V_{GE} = -15 / 15 V, R_{Gon} = 0,51 Ω	E_{on}		335 500 595		mJ mJ mJ
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 1500 A, V_{CE} = 900 V, Lσ = 30 nH du/dt = 2750 V/µs (T_{vj} = 175°C) V_{GE} = -15 / 15 V, R_{Goff} = 0,82 Ω	E_{off}		330 465 545		mJ mJ mJ
	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C					
短路数据 SC data	$V_{GE} \le$ 15 V, V_{CC} = 1000 V $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_P \le$ 10 µs, T_{vj} = 175°C	I_{SC}		6000		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT	R_{thJC}			19,0	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		15,5		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	1500	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	3000	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	I²t	580 485	kA²s kA²s
最大损耗功率 Maximum power dissipation	T_{vj} = 175°C	P_{RQM}	1500	kW

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 1500 A, V_{GE} = 0 V T_{vj} = 25°C I_F = 1500 A, V_{GE} = 0 V T_{vj} = 125°C I_F = 1500 A, V_{GE} = 0 V T_{vj} = 175°C	V_F		1,75 1,70 1,70	2,10 2,05 2,05	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 1500 A, - di_F/dt = 8560 A/µs (T_{vj}=175°C) T_{vj} = 25°C V_R = 900 V T_{vj} = 125°C V_{GE} = -15 V T_{vj} = 175°C	I_{RM}		1250 1450 1550		A A A
恢复电荷 Recovered charge	I_F = 1500 A, - di_F/dt = 8560 A/µs (T_{vj}=175°C) T_{vj} = 25°C V_R = 900 V T_{vj} = 125°C V_{GE} = -15 V T_{vj} = 175°C	Q_r		325 550 700		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 1500 A, - di_F/dt = 8560 A/µs (T_{vj}=175°C) T_{vj} = 25°C V_R = 900 V T_{vj} = 125°C V_{GE} = -15 V T_{vj} = 175°C	E_{rec}		185 325 425		mJ mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode	R_{thJC}			35,0	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		18,5		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

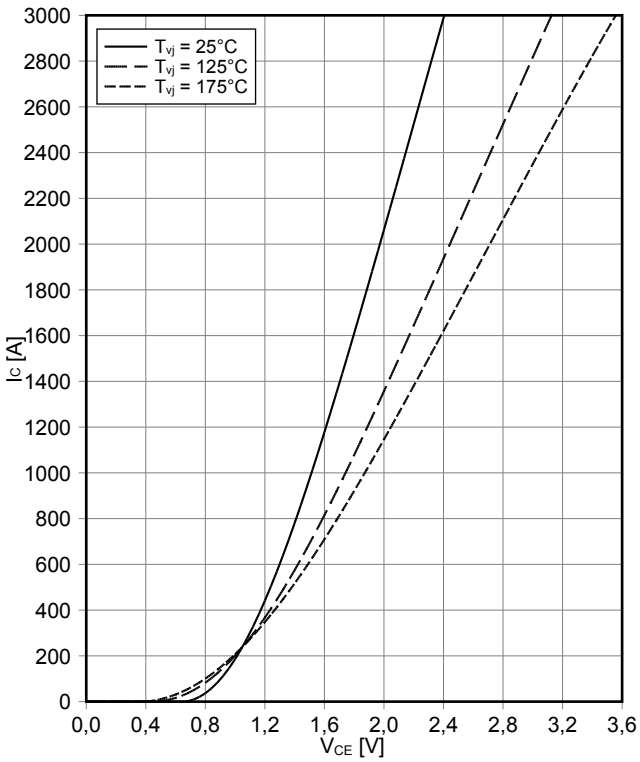
			min.	typ.	max.	
额定电阻值 Rated resistance	T_{NTC} = 25°C	R_{25}		5,00		kΩ
R100 偏差 Deviation of R100	T_{NTC} = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
耗散功率 Power dissipation	T_{NTC} = 25°C	P_{25}			20,0	mW
B-值 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298{,}15\ K))]$	$B_{25/50}$		3375		K
B-值 B-value	$R_2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

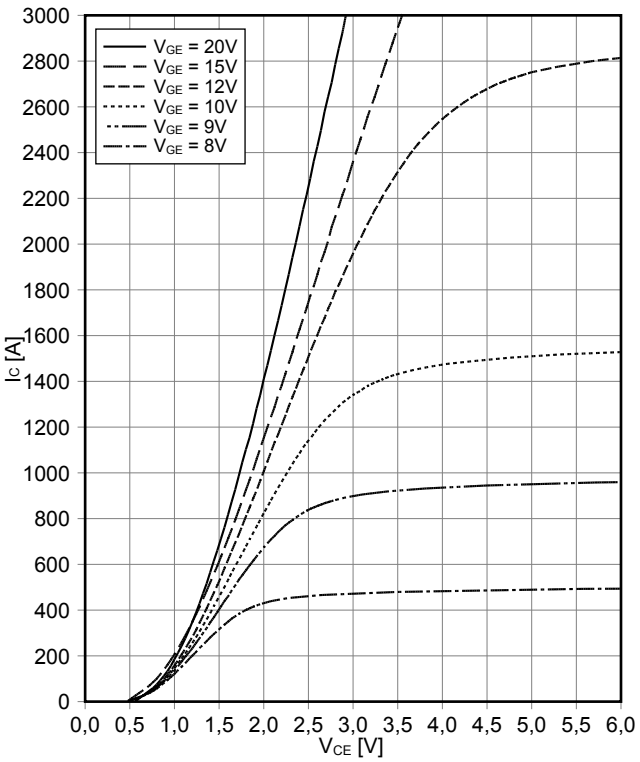
模块 / Module

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			36,0 28,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			21,0 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}		10		nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	T_C = 25°C, 每个开关 / per switch	$R_{CC'+EE'}$ $R_{AA'+CC'}$		0,10 0,09		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		1400		g

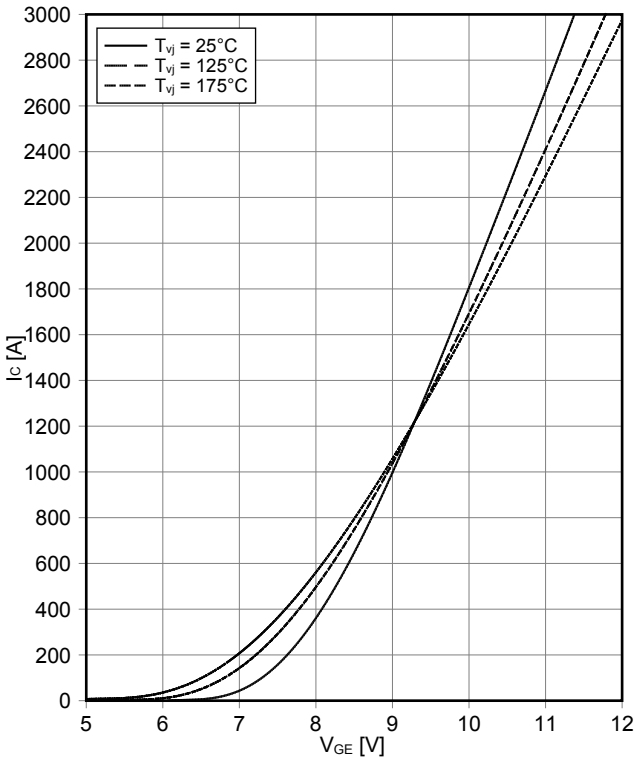
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



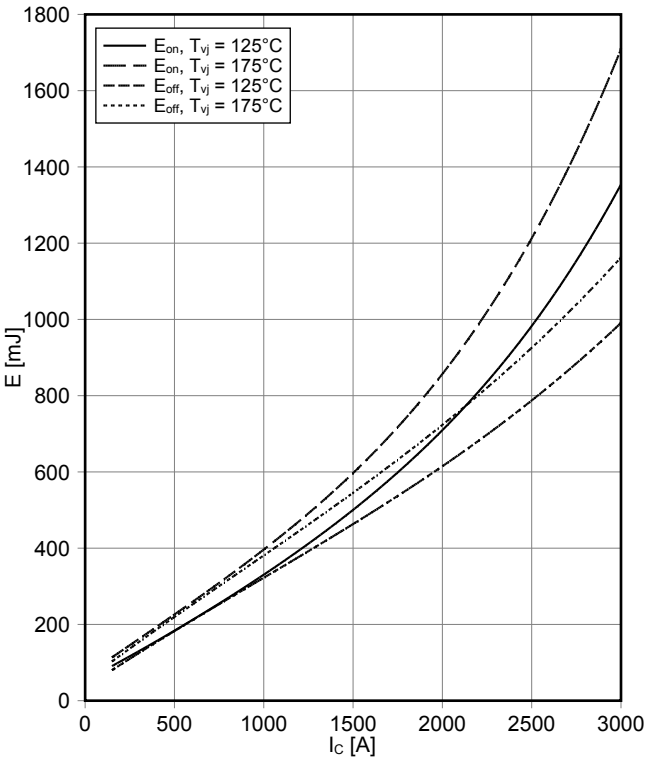
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 175°C



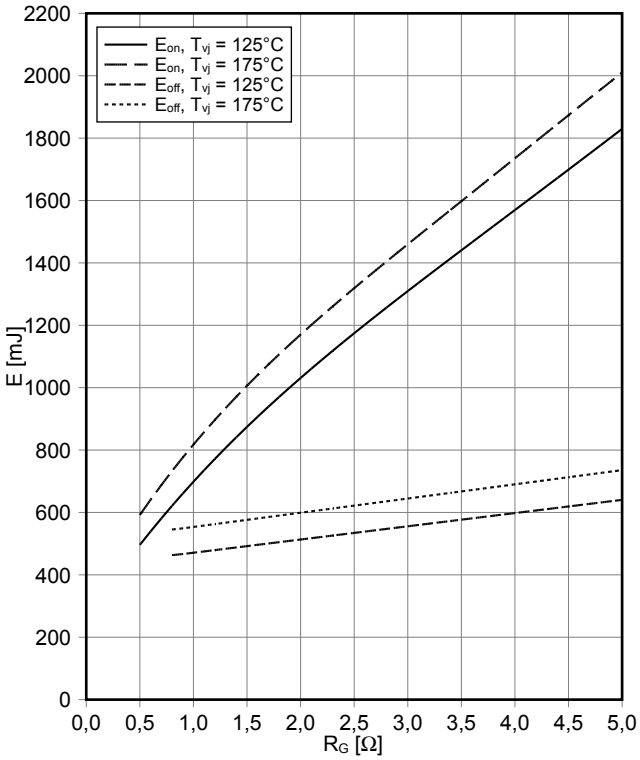
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



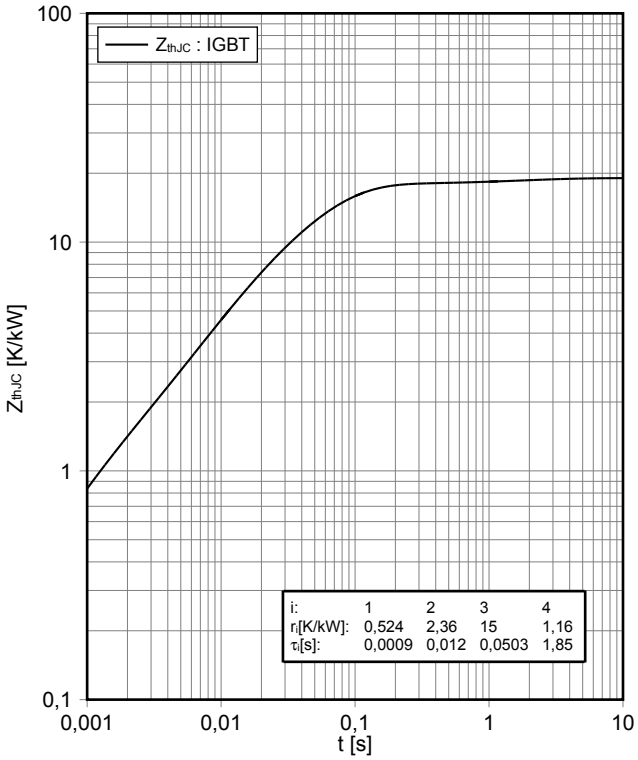
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 0.51 Ω, R_{Goff} = 0.82 Ω, V_{CE} = 900 V



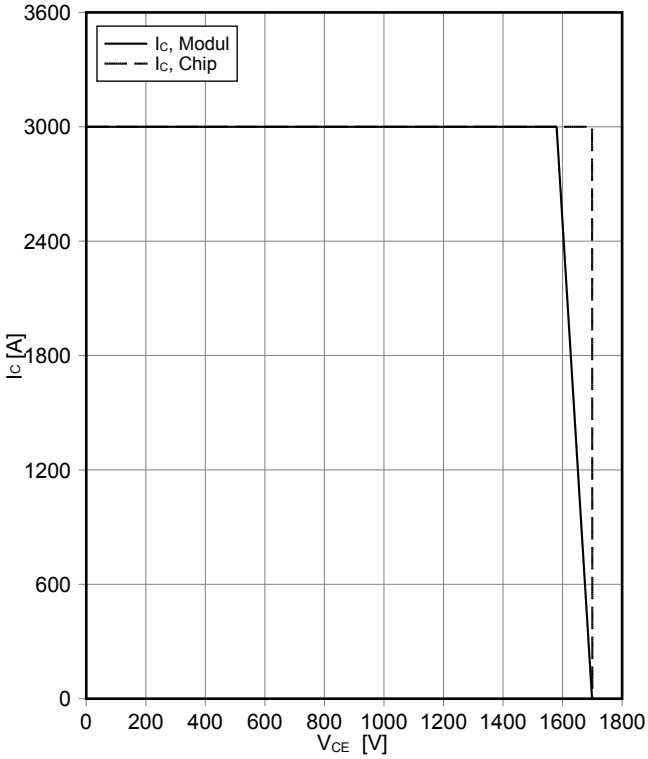
开关损耗 IGBT, 逆变器（典型）
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 1500 A, V_{CE} = 900 V



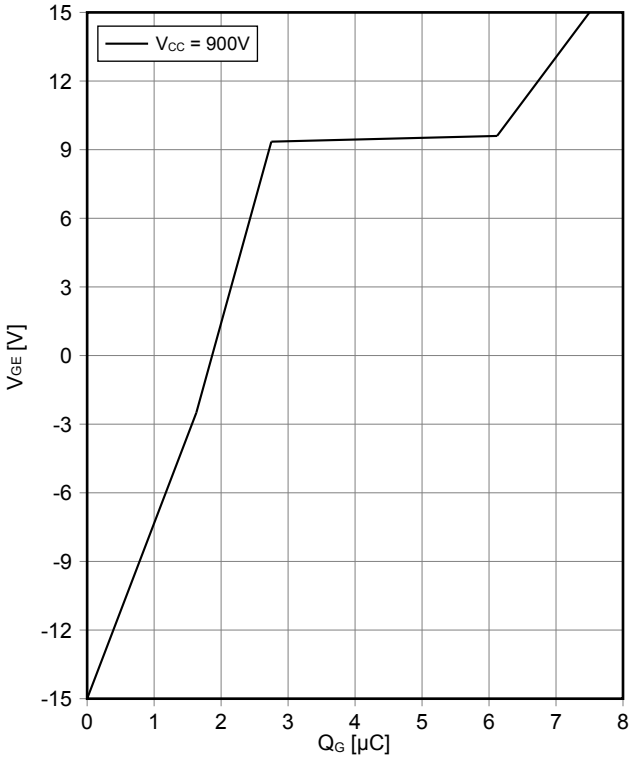
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT,Inverter
$Z_{thJC} = f(t)$



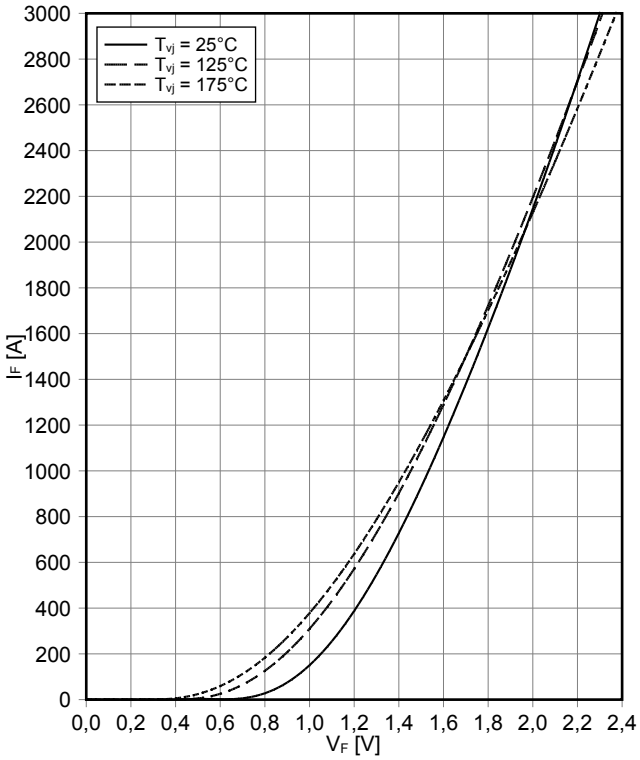
反偏安全工作区 IGBT, 逆变器（RBSOA）
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 0.82 Ω, T_{vj} = 175°C



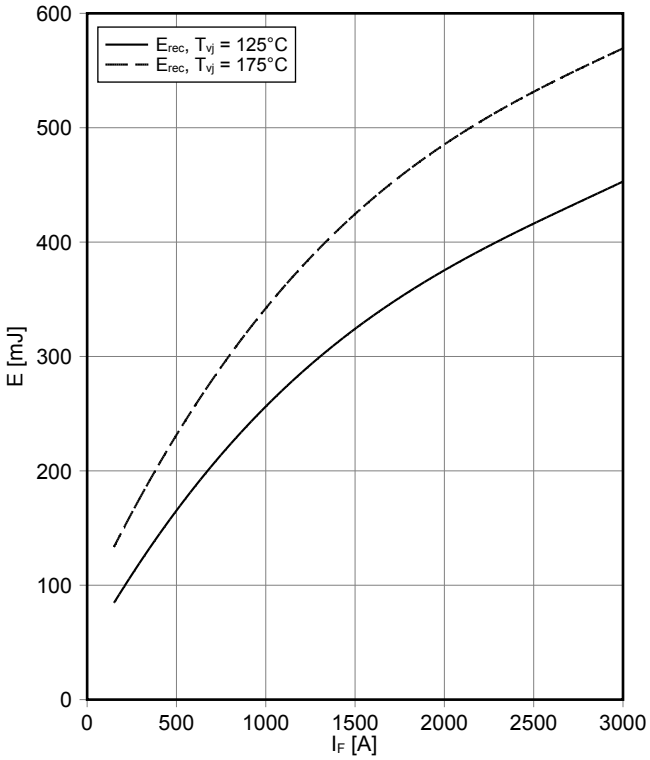
栅极电荷特性 IGBT, 逆变器（典型）
gate charge characteristic IGBT,Inverter (typical)
$V_{GE} = f(Q_G)$
I_C = 1500 A, T_{vj} = 25°C



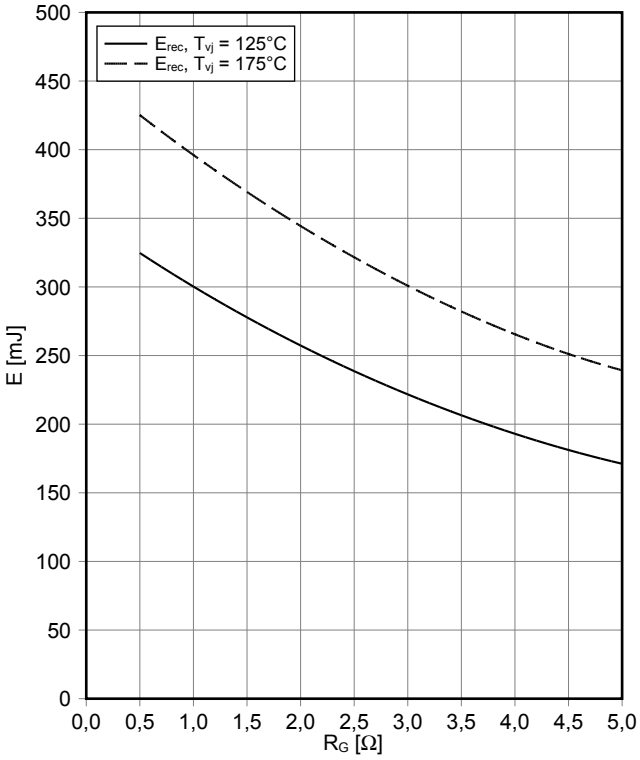
正向偏压特性 二极管,逆变器 （典型)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



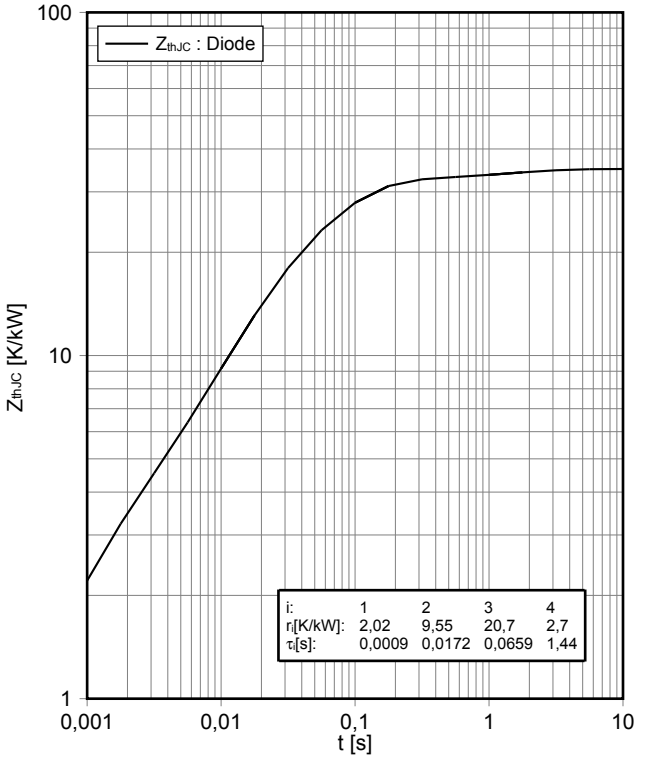
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 0.51\ \Omega$, $V_{CE} = 900$ V



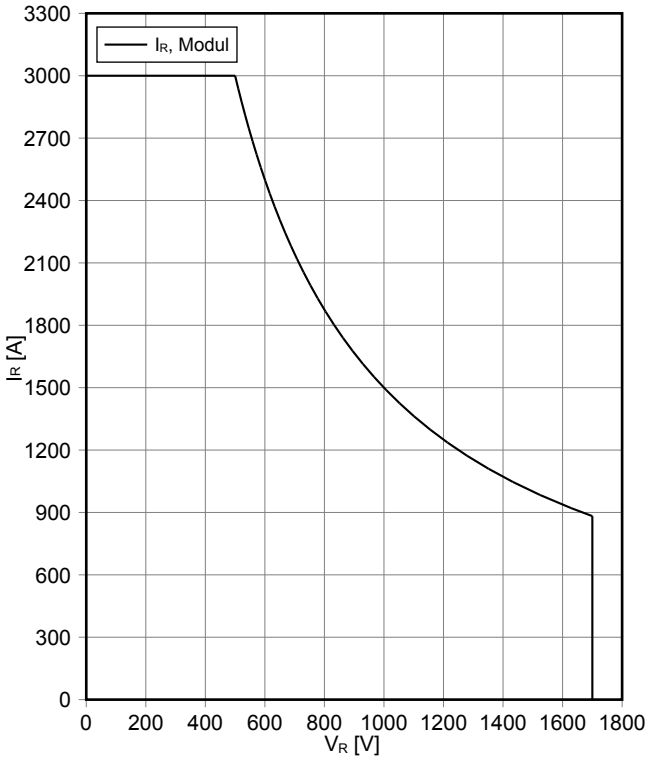
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 1500$ A, $V_{CE} = 900$ V



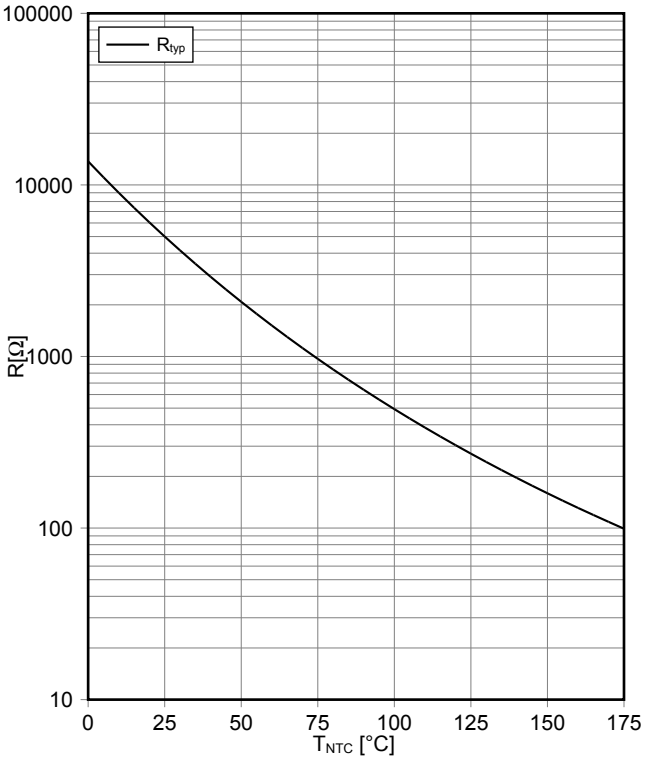
瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter
$Z_{thJC} = f(t)$



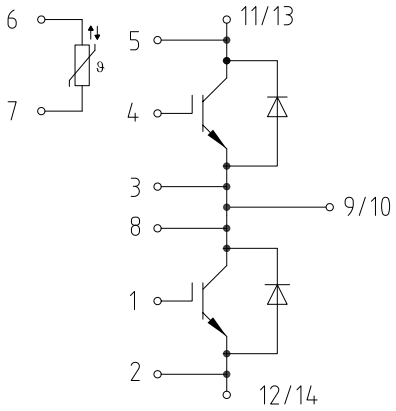
安全工作区 二极管,逆变器 (SOA)
safe operation area Diode, Inverter (SOA)
$I_R = f(V_R)$
$T_{vj} = 175°C$



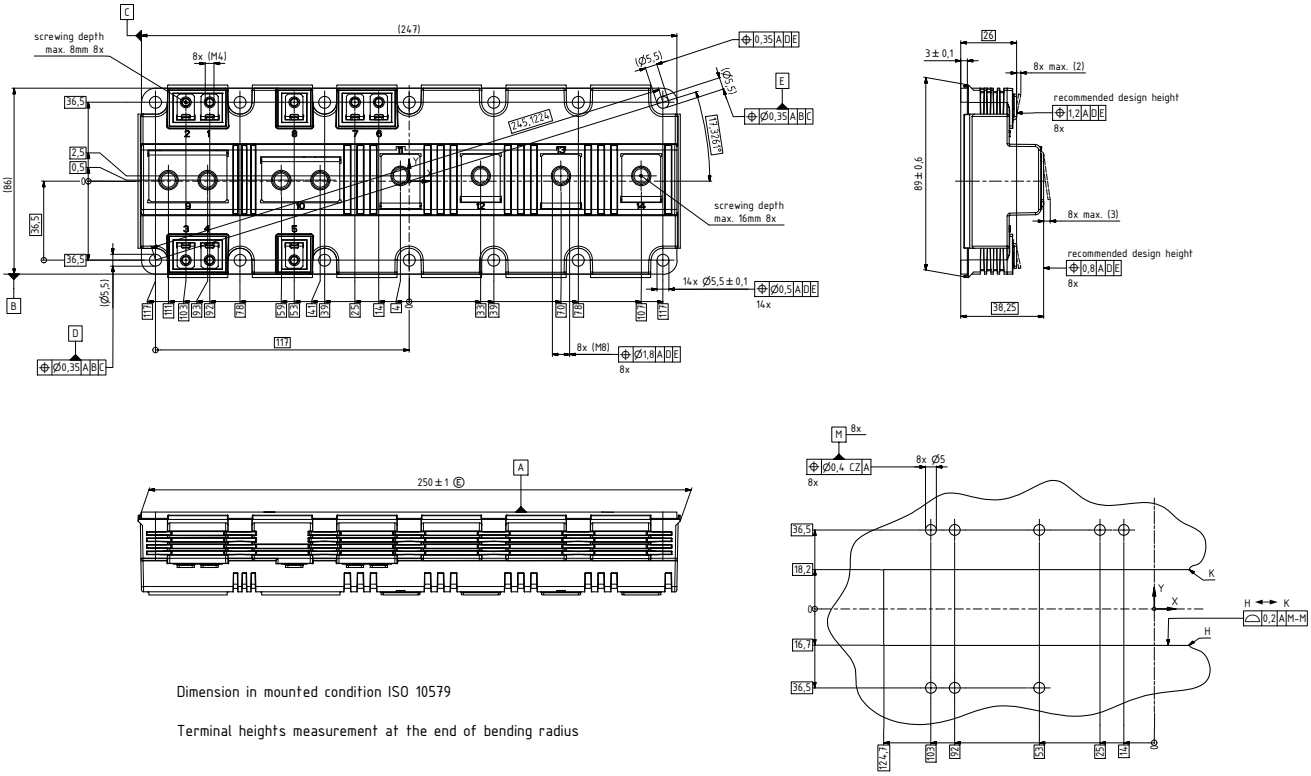
负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)



接线图 / Circuit diagram



封装尺寸 / Package outlines



Dimension in mounted condition ISO 10579

Terminal heights measurement at the end of bending radius

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