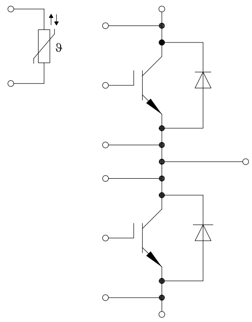
FF1800R12IE5

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} = 1200V
$I_{C\ nom}$ = 1800A / I_{CRM} = 3600A

潜在应用
- UPS系统
- 大功率变流器
- 太阳能应用
- 电机传动

Potential Applications
- UPS systems
- High power converters
- Solar applications
- Motor drives

电气特性
- $T_{vj\ op}$ = 175°C
- 提高工作结温 $T_{vj\ op}$
- 无与伦比的坚固性
- 沟槽栅IGBT5
- 高短路能力

Electrical Features
- $T_{vj\ op}$ = 175°C
- Extended operating temperature $T_{vj\ op}$
- Unbeatable robustness
- Trench IGBT 5
- High short-circuit capability

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

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

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_C = 95°C, $T_{vj\,max}$ = 175°C	I_{CDC}	1800	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	3600	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 = 1800 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	$V_{CE\,sat}$		1,70 2,00 2,15	2,15 2,45 2,60	V V V
栅极阈值电压 Gate threshold voltage	I_C = 49,2 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, V_{CE} = 600 V		Q_G		8,65		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0,5		Ω
输入电容 Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		98,5		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}		3,90		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}			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 = 1800 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Gon} = 0,82 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	$t_{d\,on}$		0,24 0,29 0,31		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 1800 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Gon} = 0,82 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	t_r		0,19 0,20 0,20		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 1800 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Goff} = 0,82 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	$t_{d\,off}$		0,57 0,63 0,66		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 1800 A, V_{CE} = 600 V V_{GE} = -15 / 15 V R_{Goff} = 0,82 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	t_f		0,10 0,12 0,14		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 1800 A, V_{CE} = 600 V, $L\sigma$ = 30 nH di/dt = 8150 A/µs (T_{vj} = 175°C) V_{GE} = -15 / 15 V, R_{Gon} = 0,82 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	E_{on}		130 195 235		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 1800 A, V_{CE} = 600 V, $L\sigma$ = 30 nH du/dt = 2350 V/µs (T_{vj} = 175°C) V_{GE} = -15 / 15 V, R_{Goff} = 0,82 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	E_{off}		210 260 290		mJ mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 900 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 175°C	I_{SC}		6800		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}			17,3	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}		11,4		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}	1200	V
连续正向直流电流 Continuous DC forward current		I_F	1800	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	3600	A
I2t-值 I^2t - 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	760 720	kA²s kA²s

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	I_F = 1800 A, V_{GE} = 0 V I_F = 1800 A, V_{GE} = 0 V I_F = 1800 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	V_F		1,90 1,75 1,70	2,35 2,20 2,15	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 1800 A, - di_F/dt = 8700 A/µs (T_{vj}=175°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	I_{RM}		810 1150 1300		A A A
恢复电荷 Recovered charge	I_F = 1800 A, - di_F/dt = 8700 A/µs (T_{vj}=175°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	Q_r		175 330 435		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 1800 A, - di_F/dt = 8700 A/µs (T_{vj}=175°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	E_{rec}		79,0 145 190		mJ mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			28,3	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}		13,2		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

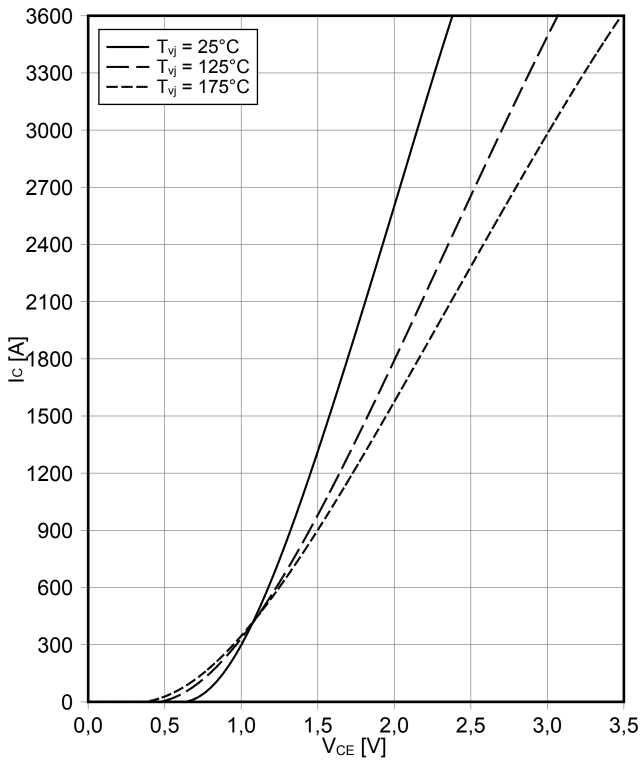
根据应用手册标定
Specification according to the valid application note.

模块 / Module

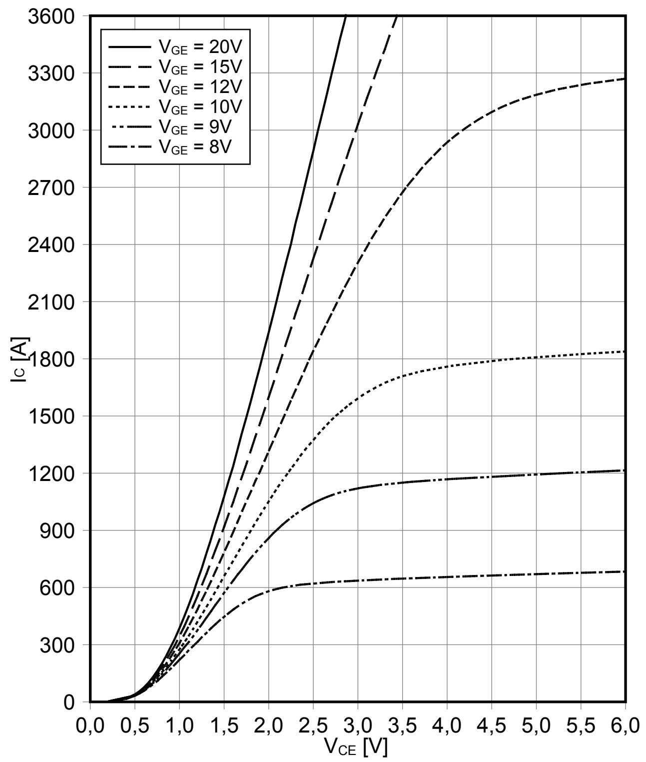
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	4,0	kV
模块基板材料 Material of module baseplate			Cu	
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)		Al_2O_3	
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		36,0 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

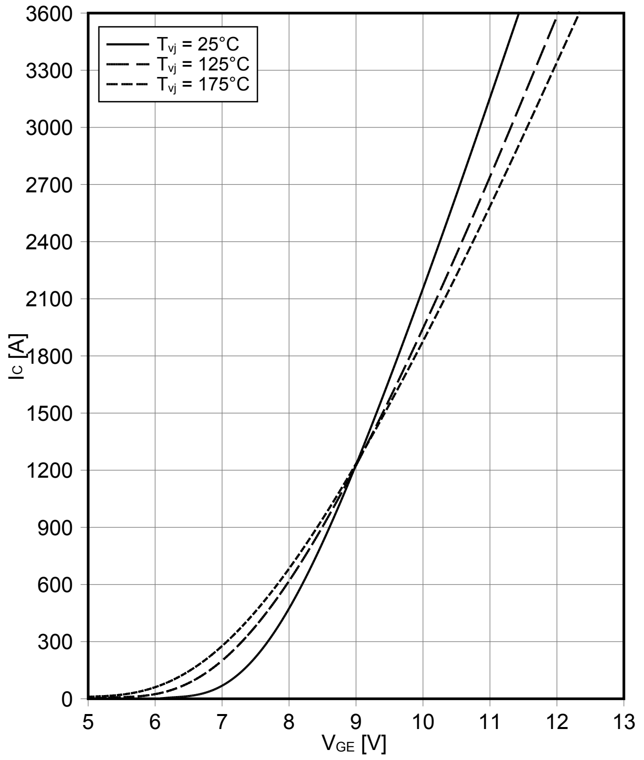
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



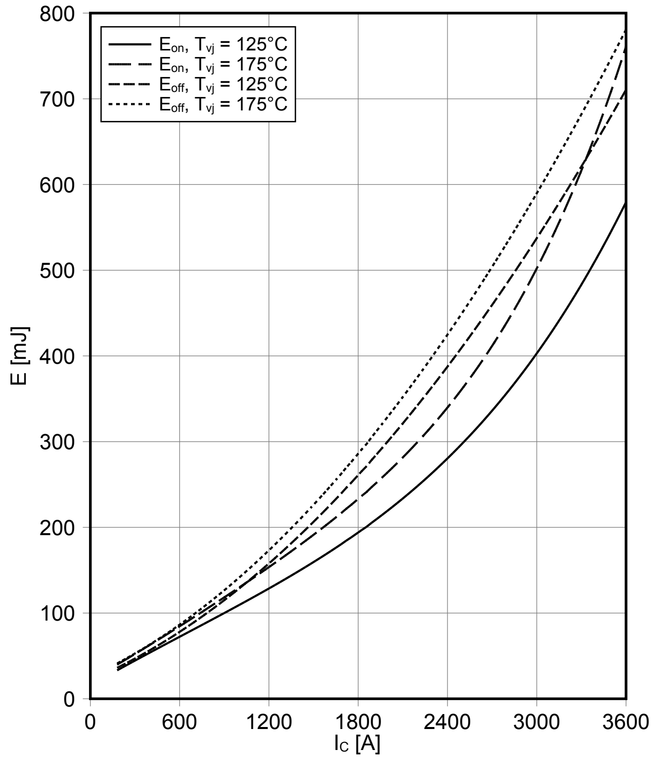
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 175°C$



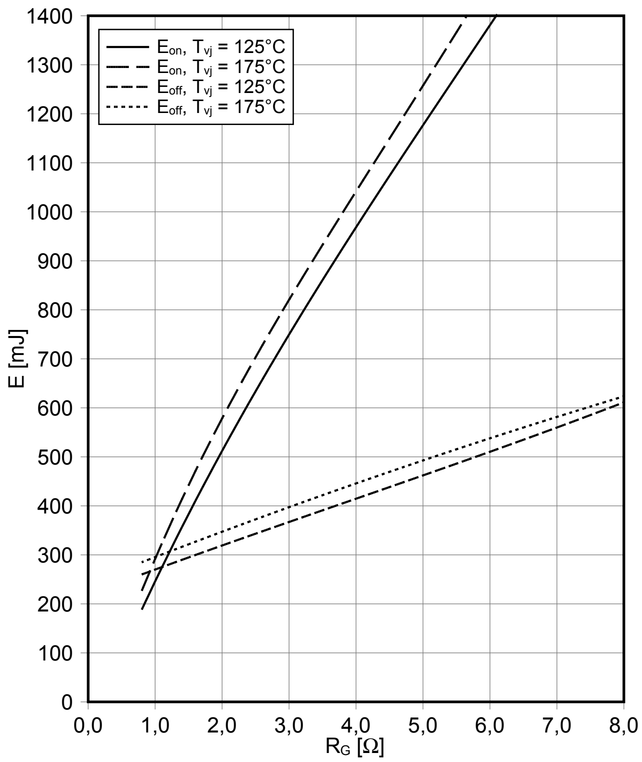
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



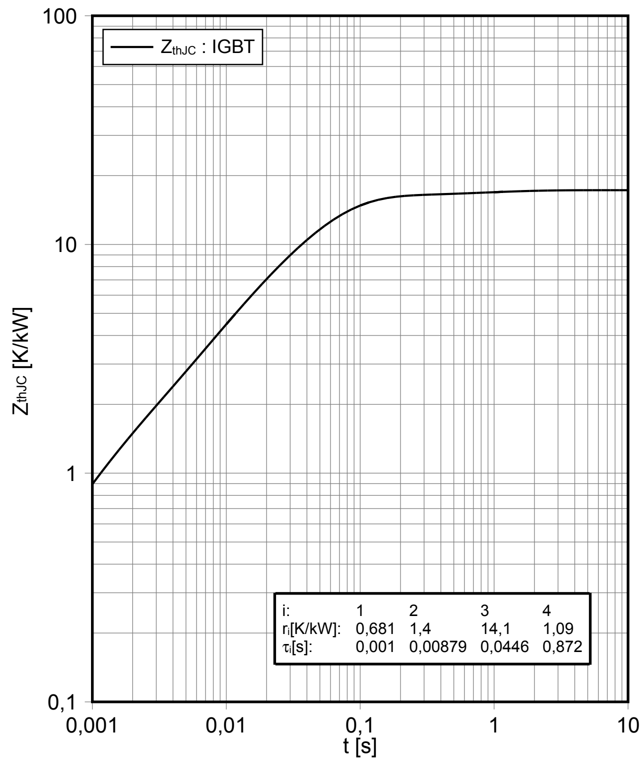
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 0.82\ \Omega$, $R_{Goff} = 0.82\ \Omega$, $V_{CE} = 600$ V



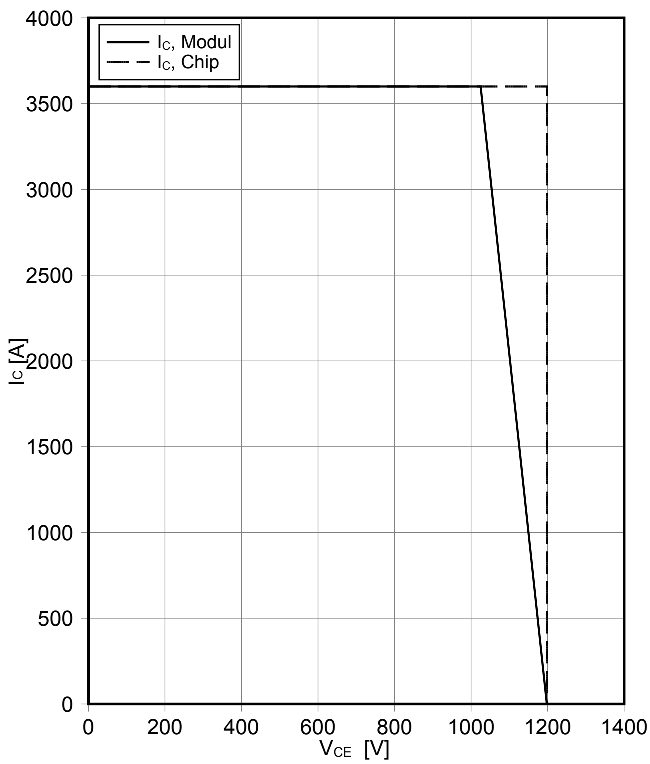
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 1800$ A, $V_{CE} = 600$ V



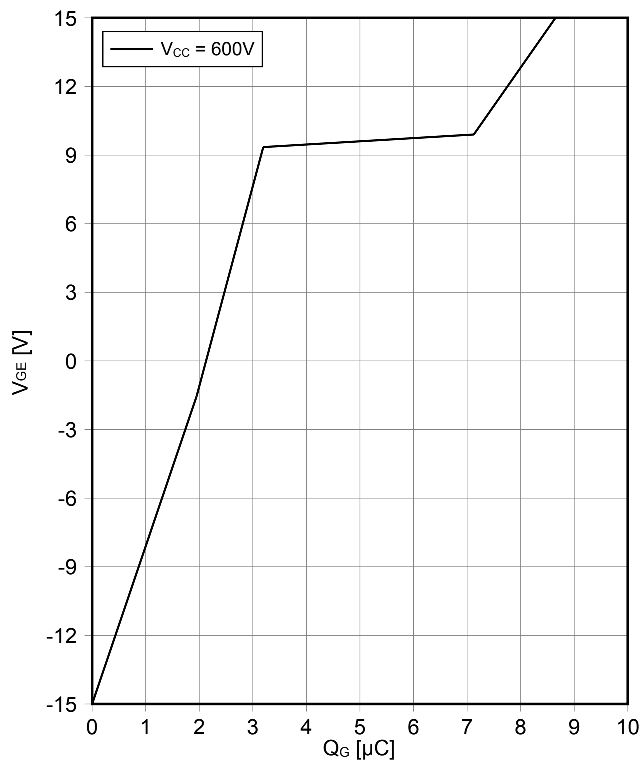
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT,Inverter
$Z_{thJC} = f(t)$



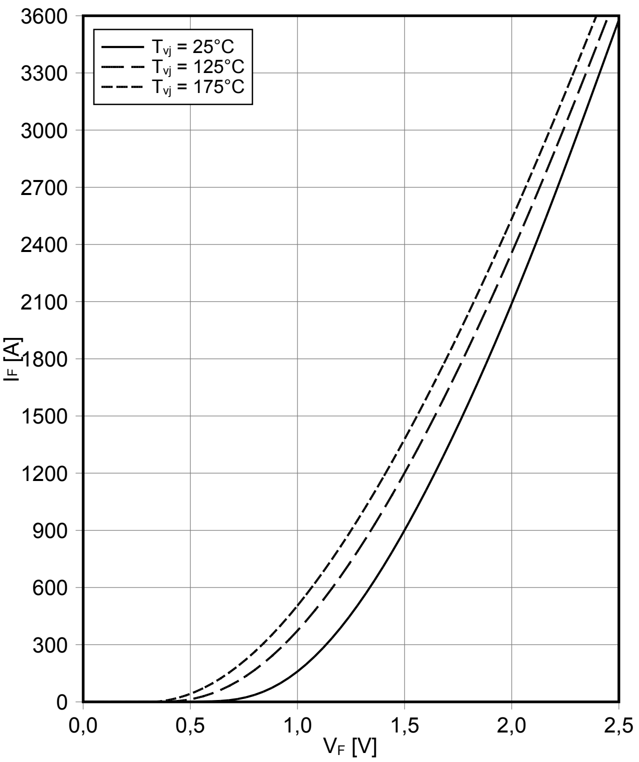
反偏安全工作区 IGBT, 逆变器 （RBSOA）
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 0.82$ Ω, $T_{vj} = 175$°C



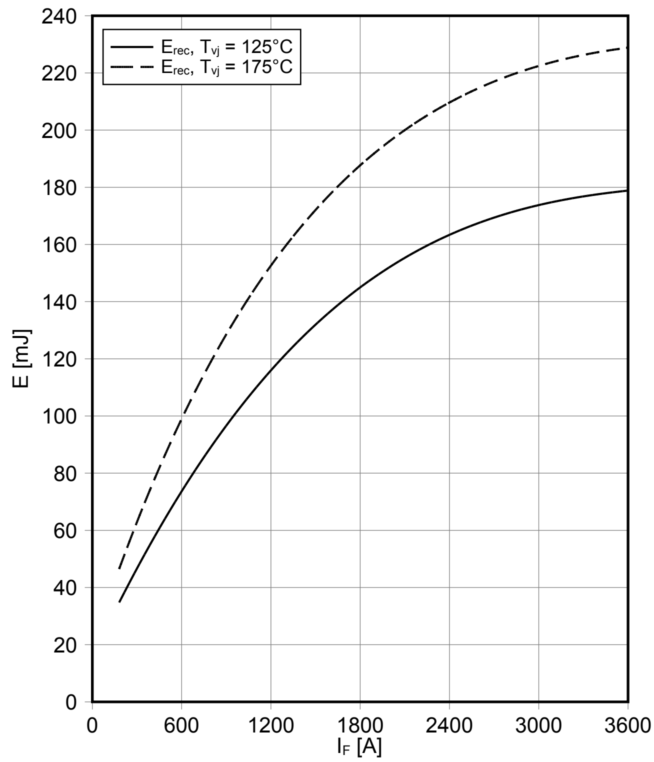
栅极电荷特性 IGBT, 逆变器 （典型)
gate charge characteristic IGBT,Inverter (typical)
$V_{GE} = f(Q_G)$
$I_C = 1800$ A, $T_{vj} = 25$°C



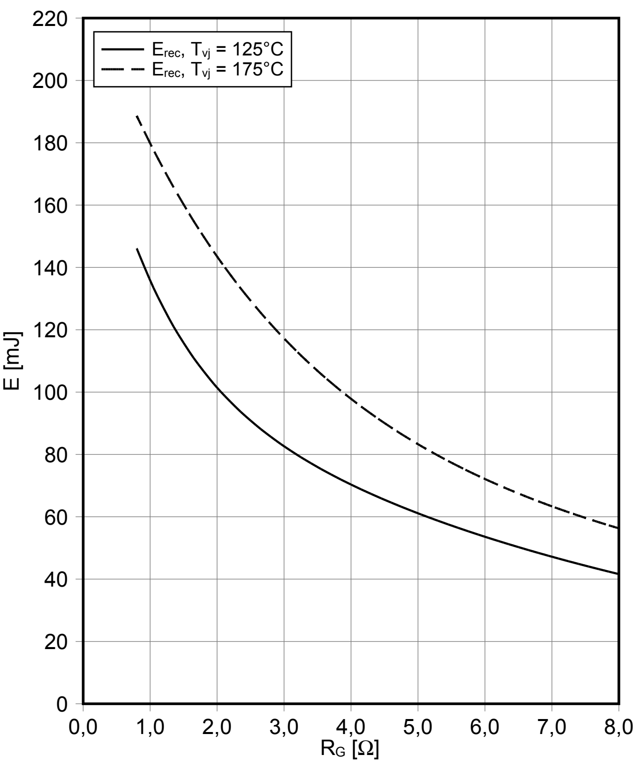
正向偏压特性 二极管,逆变器 （典型)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



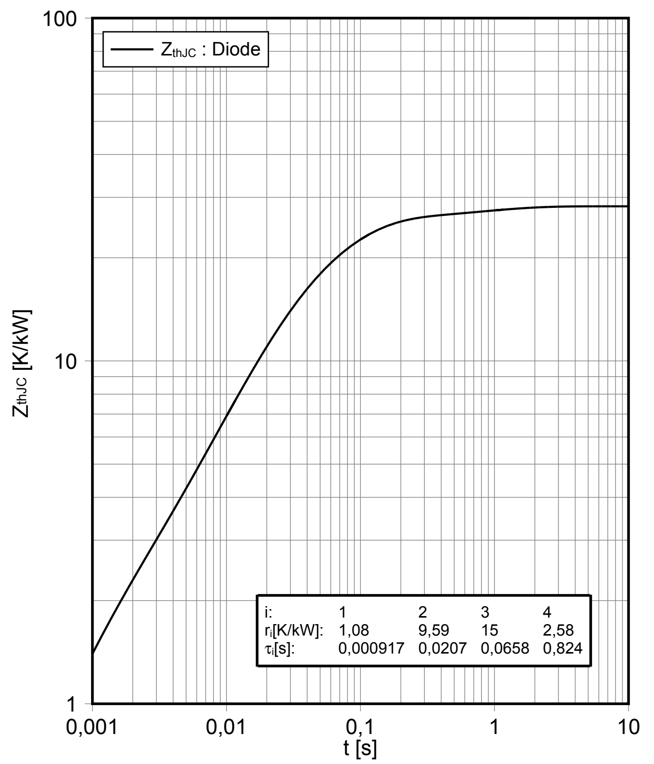
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 0.82\ \Omega$, $V_{CE} = 600$ V



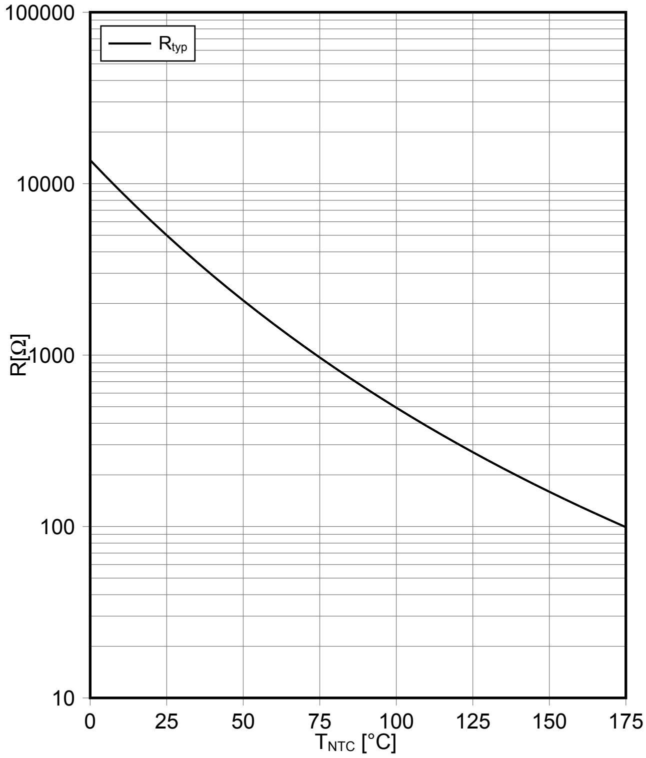
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 1800$ A, $V_{CE} = 600$ V



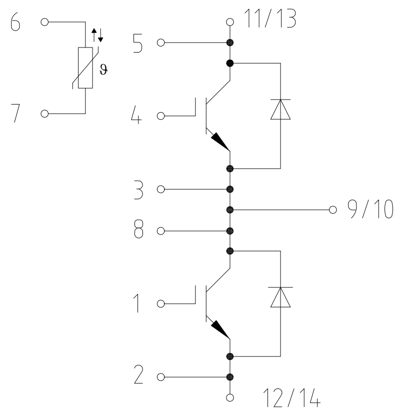
瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter
$Z_{thJC} = f(t)$



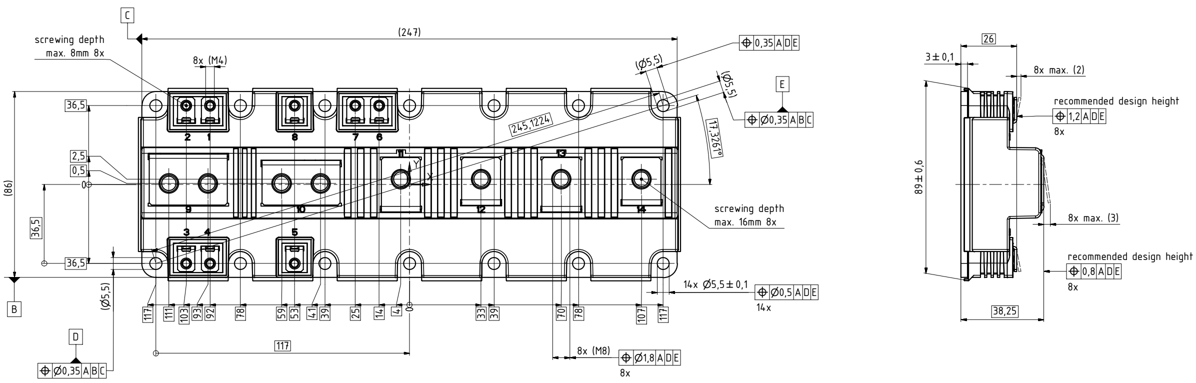
负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)

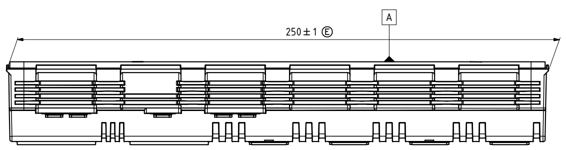


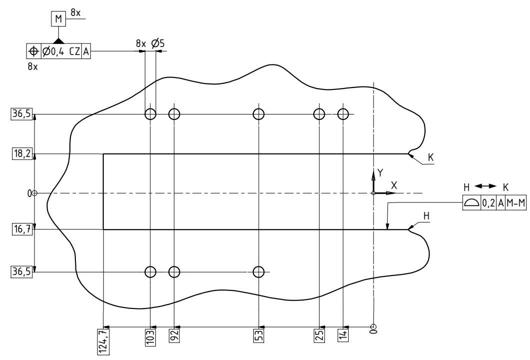
接线图 / Circuit diagram



封装尺寸 / Package outlines







Dimension in mounted condition ISO 10579

Terminal heights measurement at the end of bending radius

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