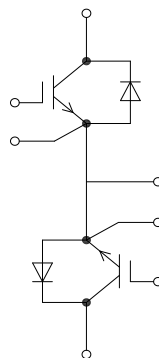
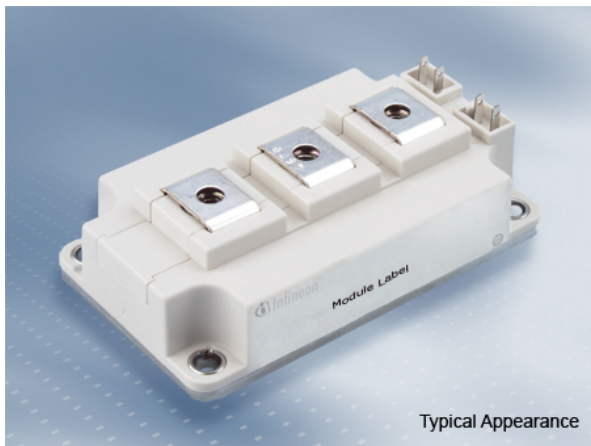


62mm C-Series 模块 采用第四代沟槽栅/场终止IGBT4和第三代发射极控制二极管
62mm C-Series module with Trench/Fieldstop IGBT4 and Emitter Controlled 3 diode

初步数据 / Preliminary Data



$V_{CES} = 1700V$
 $I_{C\ nom} = 400A / I_{CRM} = 800A$

典型应用

- 大功率变流器
- 电机传动
- UPS系统
- 风力发电机

Typical Applications

- High power converters
- Motor drives
- UPS systems
- Wind turbines

电气特性

- 提高工作结温 $T_{vj\ op}$
- 低 V_{CESat}
- 无与伦比的坚固性
- V_{CESat} 带正温度系数

Electrical Features

- Extended operating temperature $T_{vj\ op}$
- Low V_{CESat}
- Unbeatable robustness
- V_{CESat} with positive temperature coefficient

机械特性

- 4 kV 交流 1分钟 绝缘
- 封装的 CTI > 400
- 高爬电距离和电气间隙
- 绝缘的基板
- 标准封装

Mechanical Features

- 4 kV AC 1min insulation
- Package with CTI > 400
- High creepage and clearance distances
- Isolated base plate
- Standard housing

Module Label Code

Barcode Code 128



DMX - Code



Content of the 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

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approved by: MK	revision: V2.0	UL approved (E83335)

初步数据
Preliminary Data

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	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1700	V
连续集电极直流电流 Continuous DC collector current	$T_C = 95^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$	400	A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	800	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	$I_C = 400\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 400\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 400\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,95 2,35 2,45	2,30	V V V
栅极阈值电压 Gate threshold voltage	$I_C = 16,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{GEth}	5,35	5,80	6,25 V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		Q_G	4,10		μC
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	1,9		Ω
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	36,0		nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}	1,15		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 1700\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}		1,0	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}		400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$I_C = 400\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 0,82\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}	0,24 0,26 0,27		μs μs μs
上升时间(电感负载) Rise time, inductive load	$I_C = 400\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 0,82\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,04 0,05 0,05		μs μs μs
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 400\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 0,82\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}	0,50 0,64 0,68		μs μs μs
下降时间(电感负载) Fall time, inductive load	$I_C = 400\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 0,82\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,09 0,15 0,17		μs μs μs
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 400\text{ A}, V_{CE} = 900\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 8000\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 0,82\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	89,0 125 140		mJ mJ mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 400\text{ A}, V_{CE} = 900\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3200\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 0,82\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	73,0 120 130		mJ mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 1000\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		I_{SC}	1800		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}		0,0632	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	0,0271		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

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初步数据
Preliminary Data

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	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1700	V
连续正向直流电流 Continuous DC forward current		I_F	400	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	800	A
I_{2t} -值 I_{2t} - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I_{2t}	33000 28500	A^2s A^2s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$I_F = 400\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 400\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 400\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F		1,80 1,90 1,95	2,20 V V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 400\text{ A}, -di_F/dt = 8000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}		605 630 640	A A A
恢复电荷 Recovered charge	$I_F = 400\text{ A}, -di_F/dt = 8000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r		105 170 190	μC μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 400\text{ A}, -di_F/dt = 8000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}		55,5 97,0 110	mJ mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			0,106 K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}		0,0260	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40		150 $^{\circ}\text{C}$

初步数据
Preliminary Data

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 ₂ O ₃	
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		29,0 23,0	mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		23,0 11,0	mm
相对电痕指数 Comperative tracking index		CTI	> 400	
杂散电感, 模块 Stray inductance module		L _{sCE}	min. 20	typ. max. 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'}	0,41	mΩ
储存温度 Storage temperature		T _{stg}	-40	125 °C
模块安装的安装扭矩 Mounting torque for modul mounting	螺丝 M6 根据相应的应用手册进行安装 Screw M6 - Mounting according to valid application note	M	3,00	6,00 Nm
端子联接扭矩 Terminal connection torque	螺丝 M6 根据相应的应用手册进行安装 Screw M6 - Mounting according to valid application note	M	2,5	- 5,0 Nm
重量 Weight		G	340	g

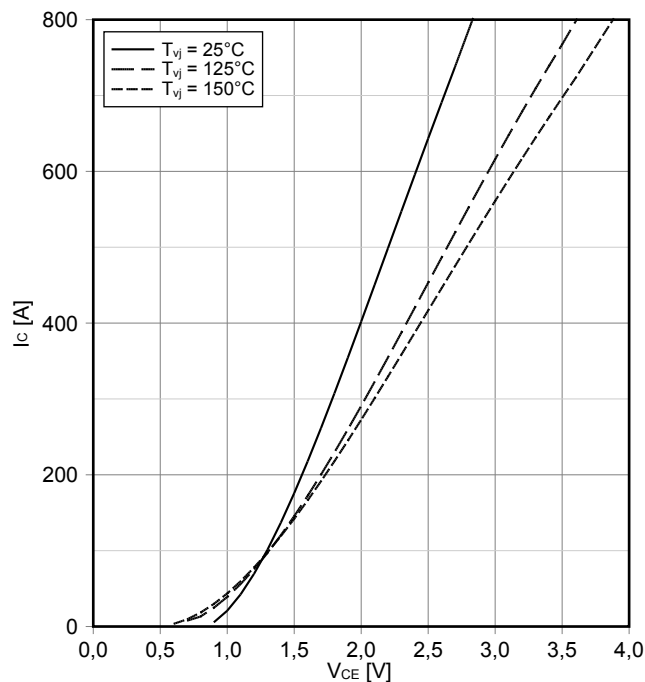
prepared by: AKB	date of publication: 2016-07-15
approved by: MK	revision: V2.0

初步数据
Preliminary Data

输出特性 IGBT, 逆变器 (典型)

output characteristic IGBT, Inverter (typical)

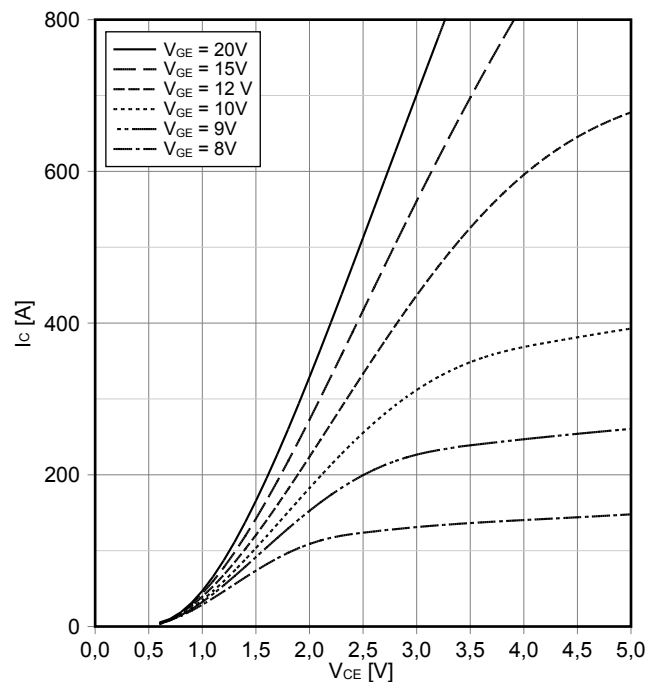
$I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



输出特性 IGBT, 逆变器 (典型)

output characteristic IGBT, Inverter (typical)

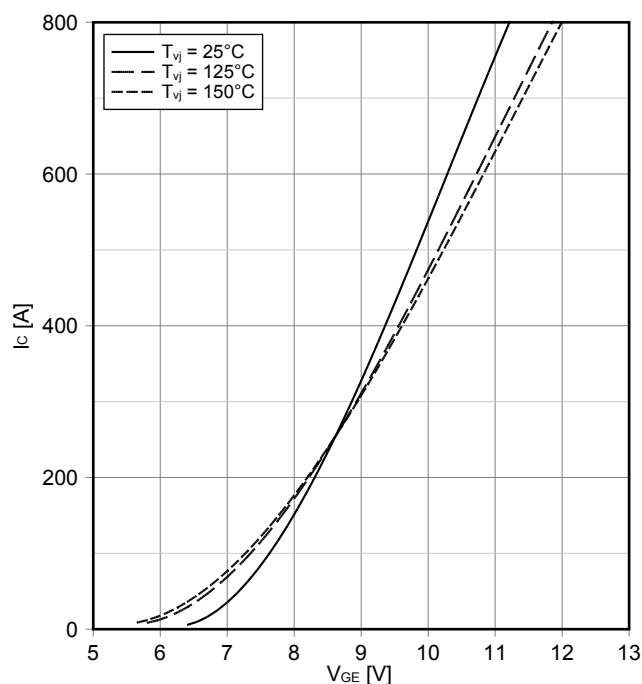
$I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



传输特性 IGBT, 逆变器 (典型)

transfer characteristic IGBT, Inverter (typical)

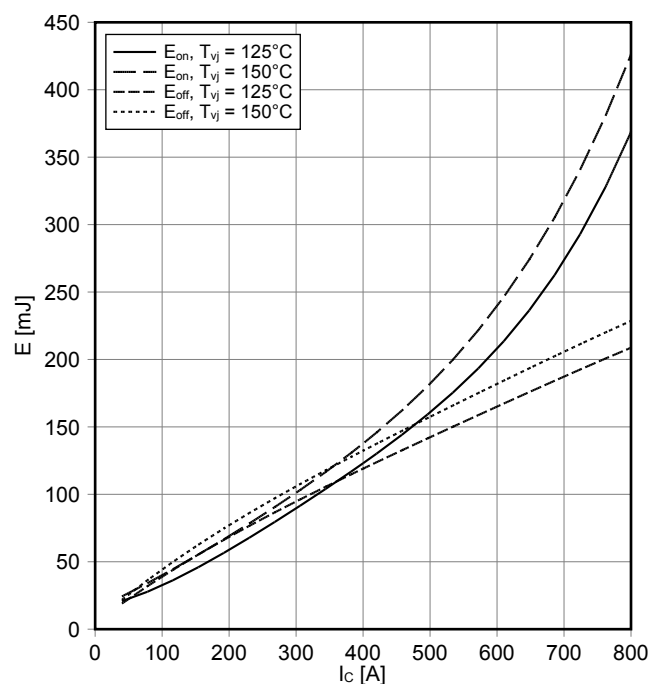
$I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$



开关损耗 IGBT, 逆变器 (典型)

switching losses IGBT, Inverter (typical)

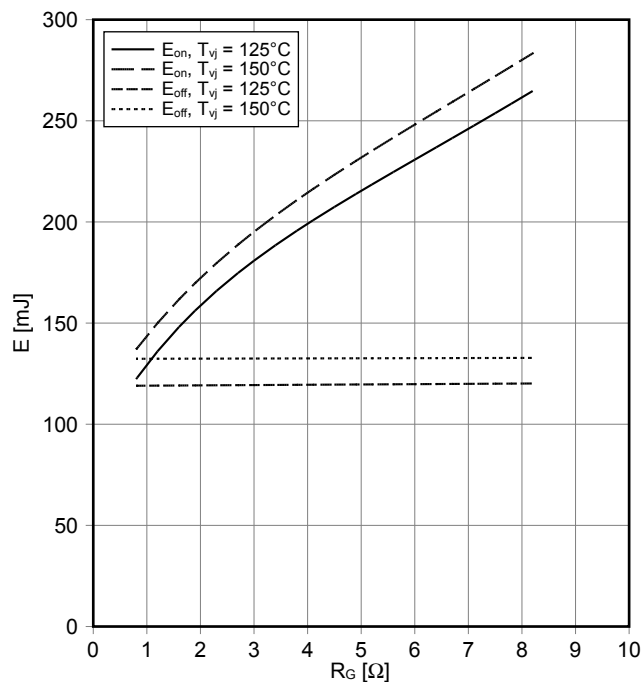
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 0.82\ \Omega$, $R_{Goff} = 0.82\ \Omega$, $V_{CE} = 900\text{ V}$



初步数据
Preliminary Data

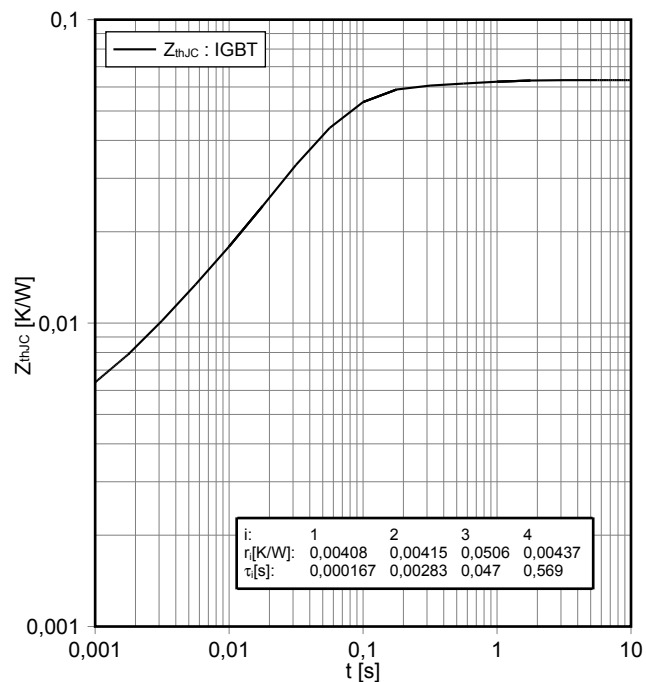
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 400 \text{ A}$, $V_{CE} = 900 \text{ V}$



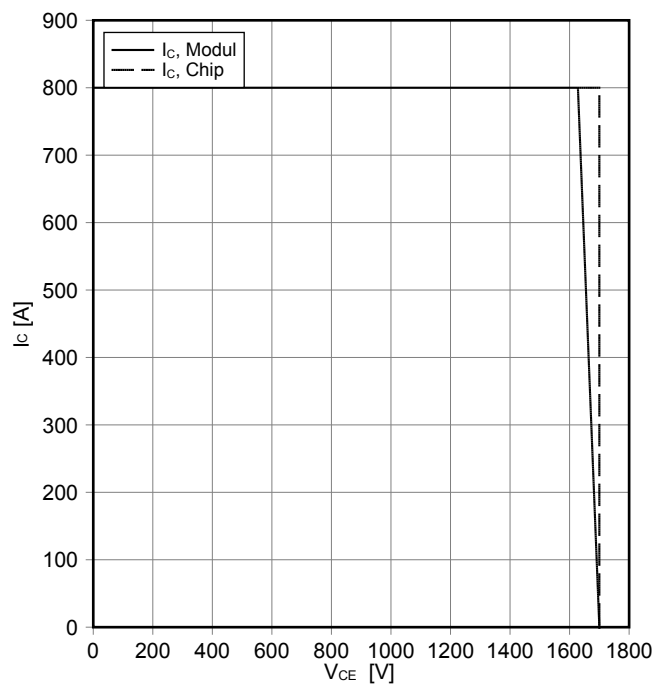
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT, Inverter

$Z_{thJC} = f(t)$



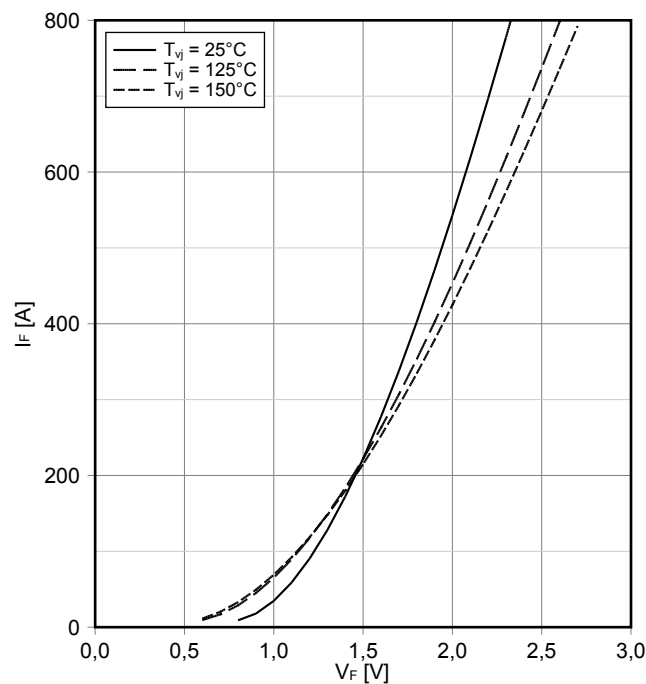
反偏安全工作区 IGBT, 逆变器 (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 0.82 \Omega$, $T_{vj} = 150^\circ\text{C}$



正向偏压特性 二极管, 逆变器 (典型)
forward characteristic of Diode, Inverter (typical)

$I_F = f(V_F)$

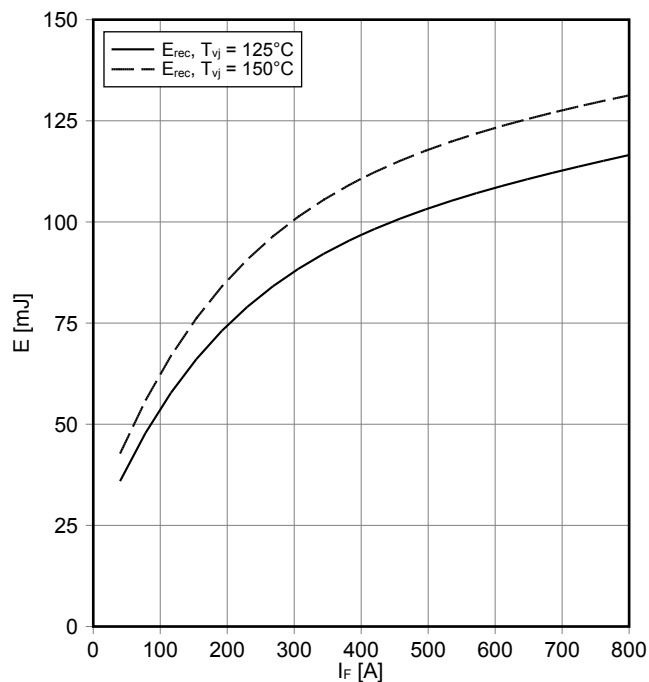


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初步数据
Preliminary Data

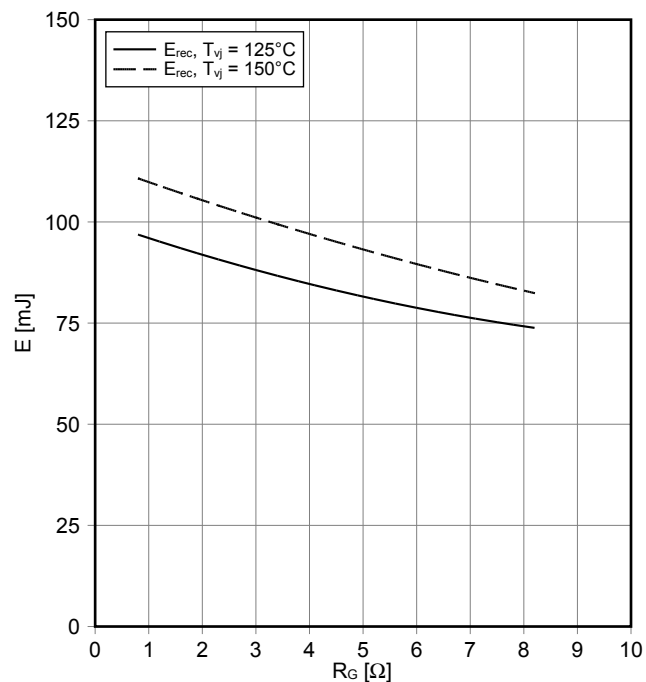
开关损耗 二极管,逆变器 (典型)
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 0.82 \Omega$, $V_{CE} = 900 V$



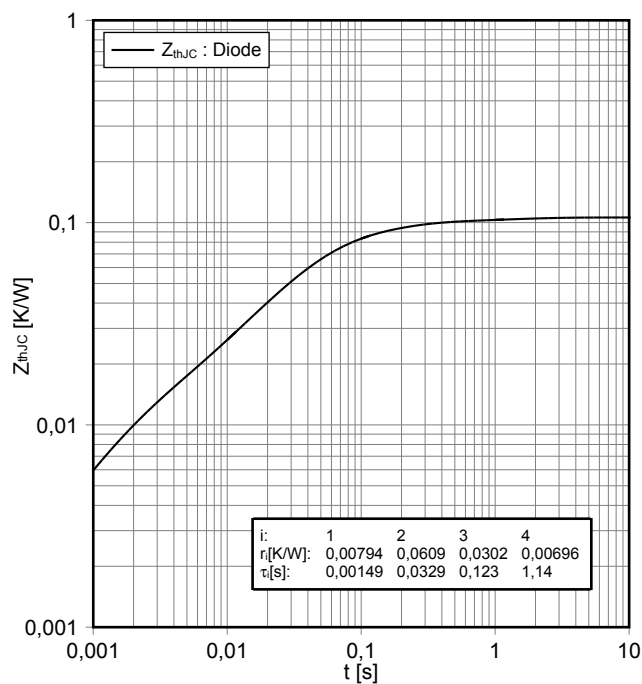
开关损耗 二极管,逆变器 (典型)
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 400 A$, $V_{CE} = 900 V$



瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter

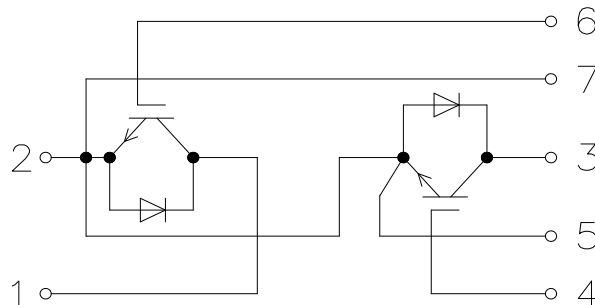
$Z_{thJC} = f(t)$



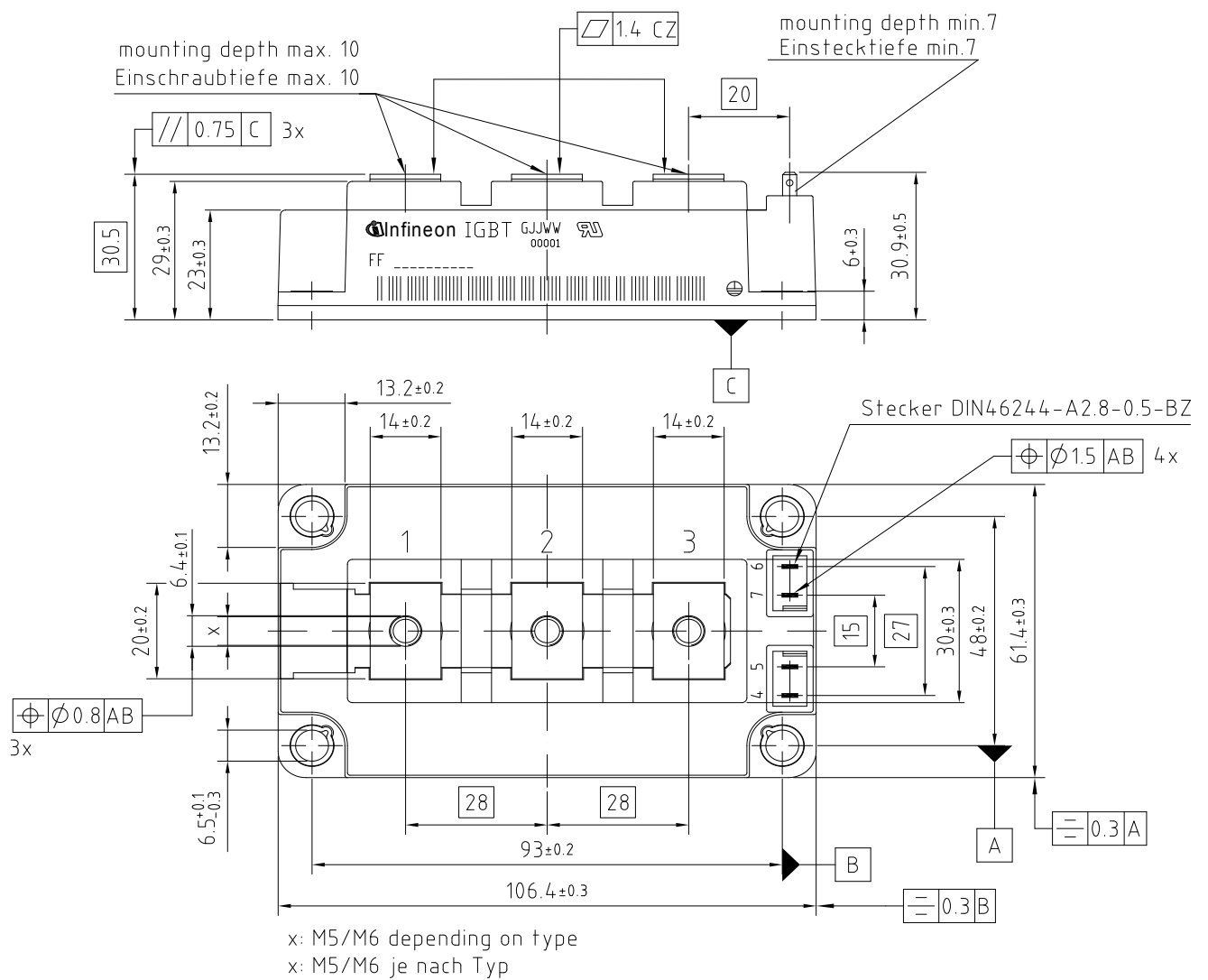
i:	1	2	3	4
r[K/W]:	0,00794	0,0609	0,0302	0,00696
τ[s]:	0,00149	0,0329	0,123	1,14

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接线图 / Circuit diagram



封装尺寸 / Package outlines



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