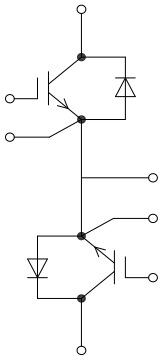
技术信息 / Technical Information

IGBT-模块
IGBT-Module

FF300R12KT3P_E

62mm C-Series 模块 采用第三代沟槽栅/场终止IGBT和HE型发射机控制二极管
62mm C-Series module with Trench/Fieldstop IGBT3 and Emitter Controlled HE diode

初步数据 / Preliminary Data



V_{CES} = 1200V
$I_{C\ nom}$ = 300A / I_{CRM} = 600A

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
- 低开关损耗
- 无与伦比的坚固性
- V_{CEsat} 带正温度系数

Electrical Features
- Low switching losses
- Unbeatable robustness
- V_{CEsat} with positive temperature coefficient

机械特性
- 封装的 CTI > 400
- 高爬电距离和电气间隙
- 高功率密度
- 绝缘的基板
- 标准封装
- 预涂导热介质

Mechanical Features
- Package with CTI > 400
- High creepage and clearance distances
- High power density
- Isolated base plate
- Standard housing
- Pre-applied Thermal Interface Material

Module Label Code

Barcode Code 128

Sample
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

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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°C	V_{CES}	1200		V
连续集电极直流电流 Continuous DC collector current	T_H = 65°C, $T_{vj\,max}$ = 150°C	$I_{C\,nom}$	300		A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	600		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 = 300 A, V_{GE} = 15 V I_C = 300 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C	$V_{CE\,sat}$		1,70 1,90	2,15	V V
栅极阈值电压 Gate threshold voltage	I_C = 12,0 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,00	5,80	6,50	V
栅极电荷 Gate charge	V_{GE} = -15 V ... +15 V		Q_G		2,80		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		2,5		Ω
输入电容 Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		21,0		nF
反向传输电容 Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,85		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 = 300 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 2,4 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,on}$		0,16 0,17		µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 300 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 2,4 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_r		0,04 0,045		µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 300 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Goff} = 2,4 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,off}$		0,45 0,52		µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 300 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Goff} = 2,4 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_f		0,10 0,16		µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 300 A, V_{CE} = 600 V, L_S = 30 nH V_{GE} = ±15 V, di/dt = 6000 A/µs R_{Gon} = 2,4 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{on}		16,5 25,0		mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 300 A, V_{CE} = 600 V, L_S = 30 nH V_{GE} = ±15 V, du/dt = 4500 V/µs R_{Goff} = 2,4 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{off}		24,5 37,0		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} = 125°C	I_{SC}		1200		A
??? Thermal resistance, junction to heatsink	每个 IGBT / per IGBT valid with IFX pre-applied thermal interface material		R_{thJH}			0,116	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		125	°C

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°C	V_{RRM}	1200		V
连续正向直流电流 Continuous DC forward current		I_F	300		A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	600		A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I²t	19000		A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 300 A, V_{GE} = 0 V I_F = 300 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C	V_F		1,65 1,65	2,15	V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 300 A, - di_F/dt = 6000 A/µs (T_{vj}=125°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	I_{RM}		210 270		A A
恢复电荷 Recovered charge	I_F = 300 A, - di_F/dt = 6000 A/µs (T_{vj}=125°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	Q_r		30,0 56,0		µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 300 A, - di_F/dt = 6000 A/µs (T_{vj}=125°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	E_{rec}		14,0 26,0		mJ mJ
??? Thermal resistance, junction to heatsink	每个二极管 / per diode valid with IFX pre-applied thermal interface material		R_{thJH}			0,183	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		125	°C

初步数据
Preliminary Data

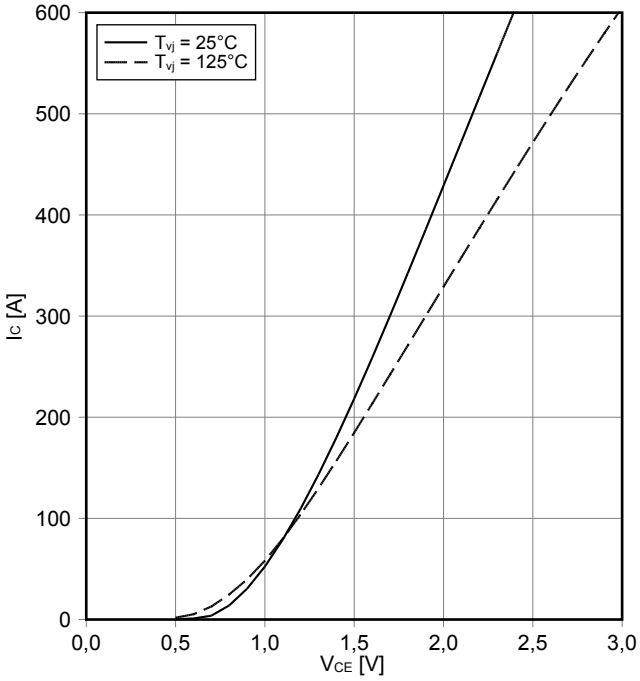
模块 / Module

绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		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			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		
			min.	typ.	max.	
杂散电感,模块 Stray inductance module		L_{sCE}		20		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	$R_{CC'+EE'}$		0,70		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 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
端子联接扭距 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

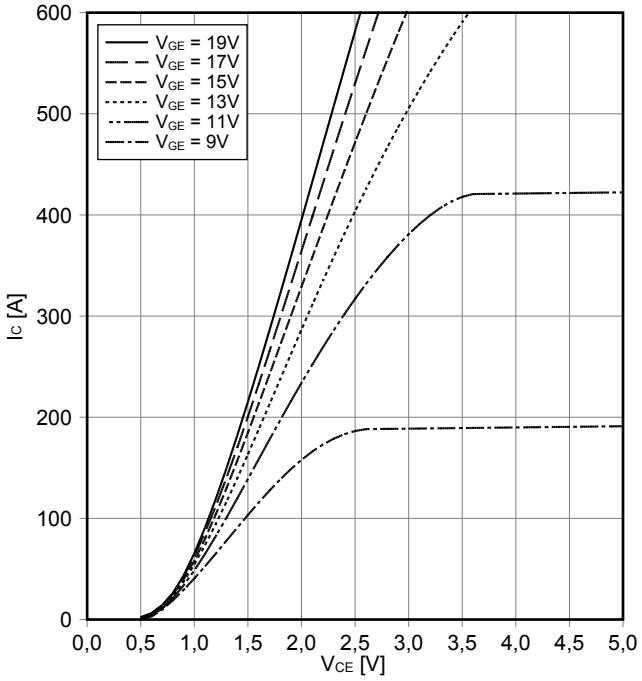
Lagerung und Transport von Modulen mit TIM => siehe AN2012-07
Storage and shipment of modules with TIM => see AN2012-07

初步数据
Preliminary Data

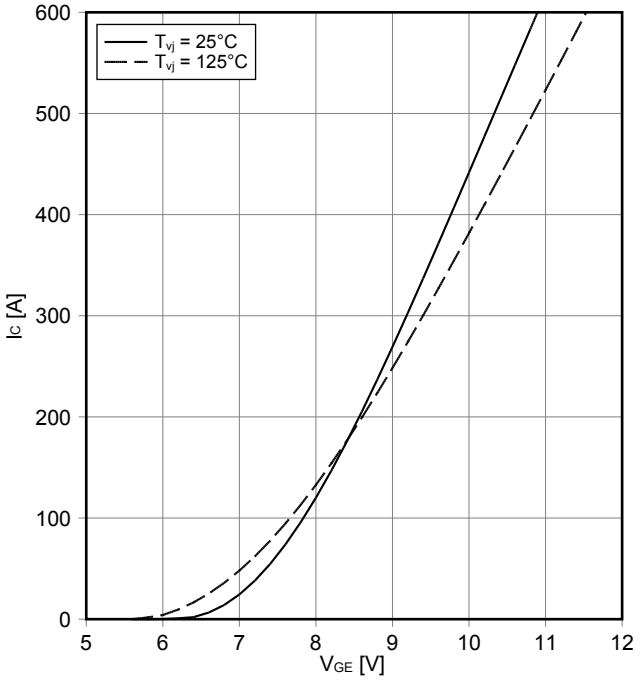
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



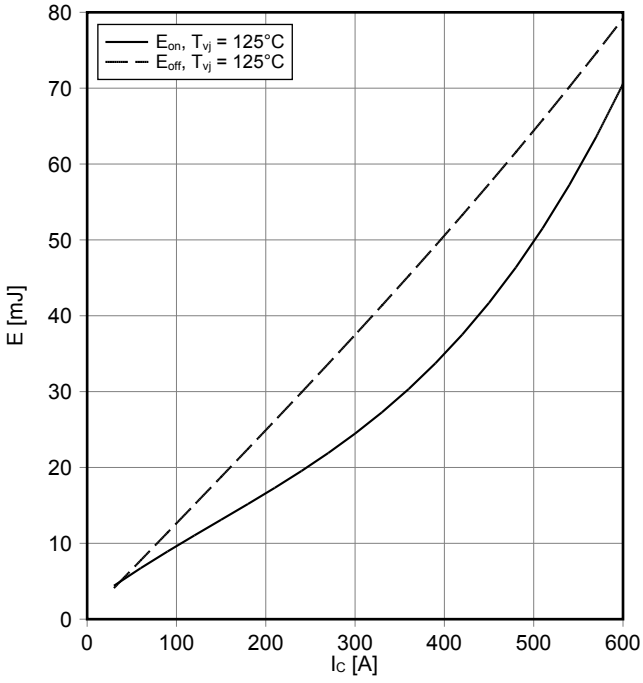
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 125°C



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} = 2.4 Ω, R_{Goff} = 2.4 Ω, V_{CE} = 600 V



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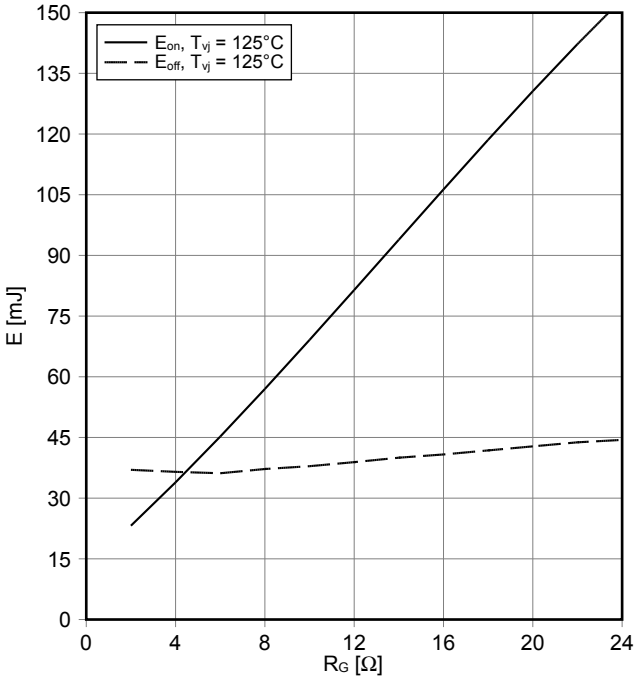
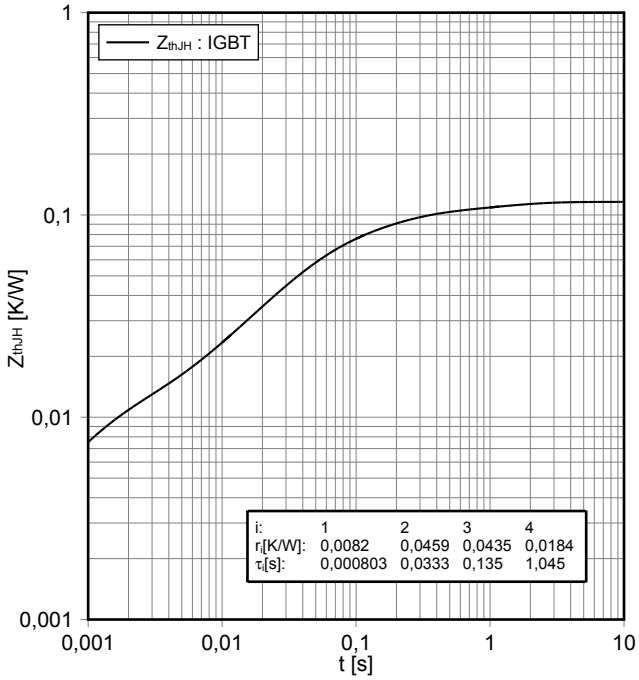
Preliminary Data

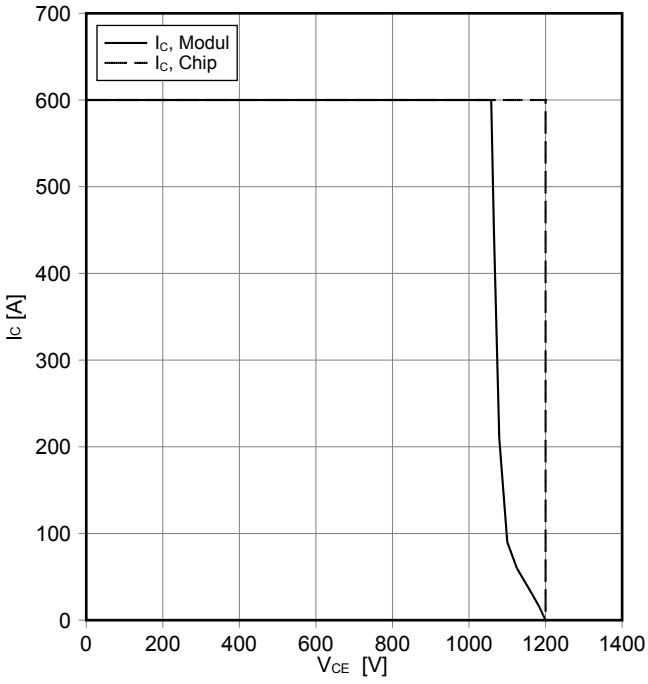
开关损耗 IGBT, 逆变器 （典型）
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 300 A, V_{CE} = 600 V



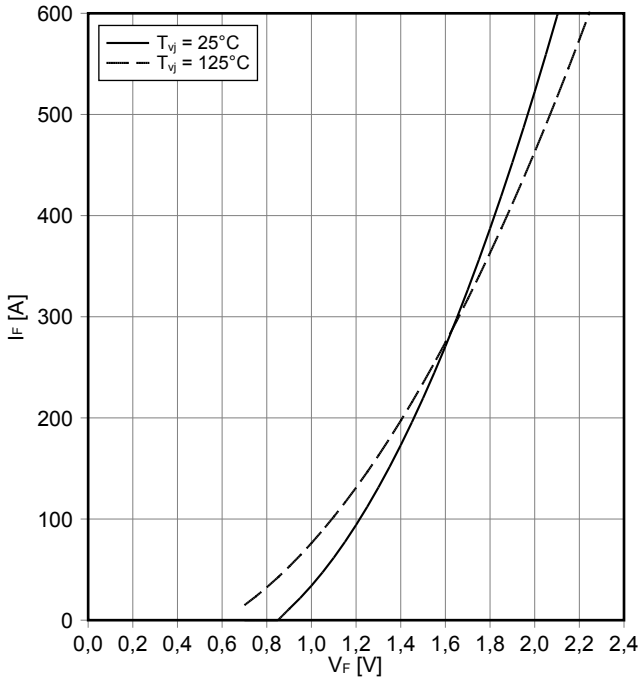
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT,Inverter
$Z_{thJH} = f(t)$



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} = ±15 V, R_{Goff} = 2.4 Ω, T_{vj} = 125°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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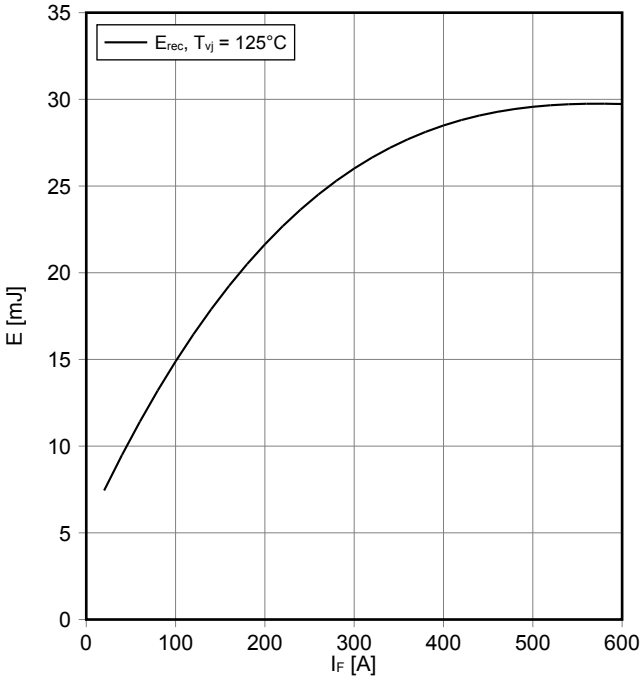
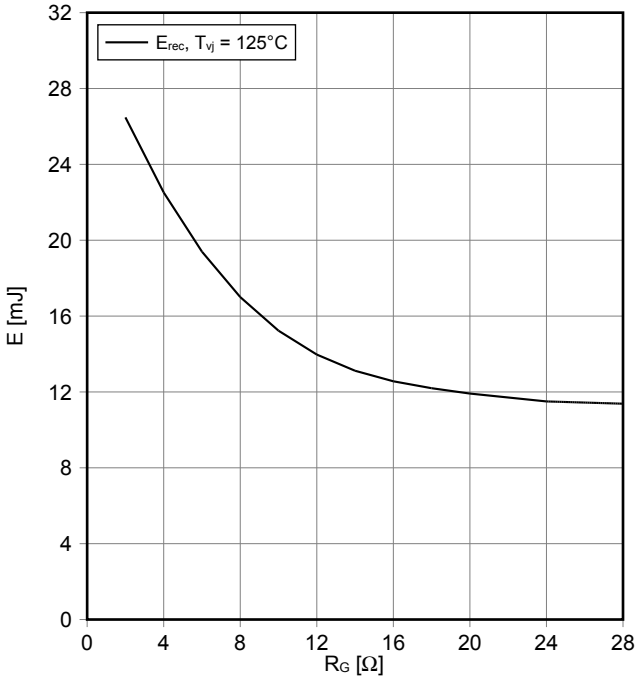
初步数据
Preliminary Data

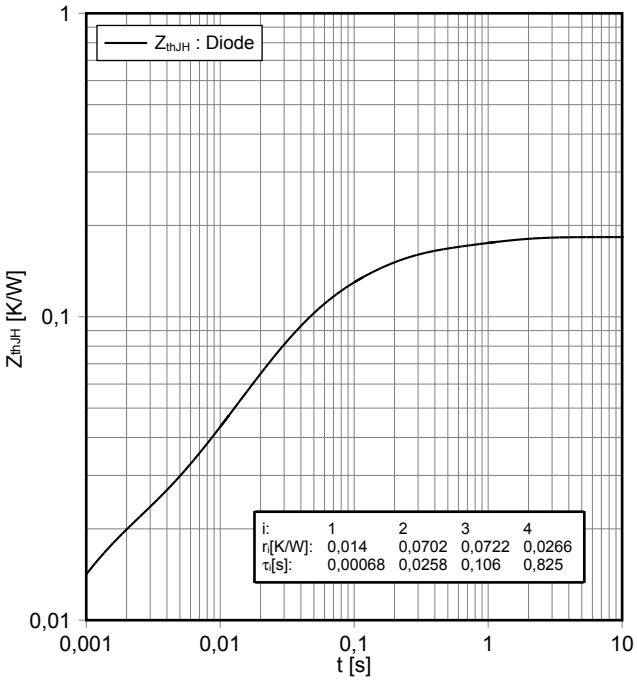
开关损耗 二极管,逆变器 (典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 2.4\ \Omega$, $V_{CE} = 600$ V



开关损耗 二极管,逆变器 (典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 300$ A, $V_{CE} = 600$ V



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



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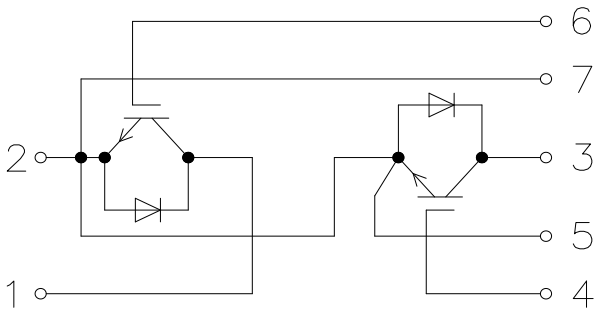
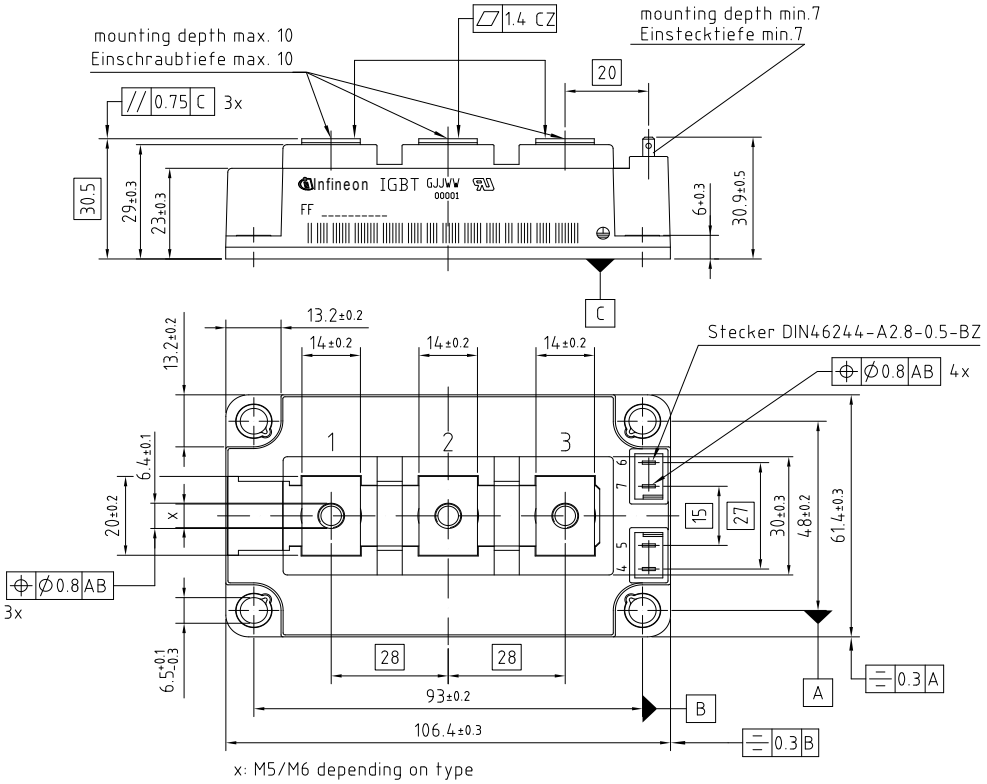
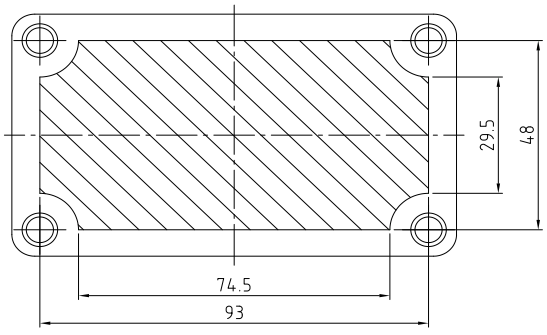
初步数据
Preliminary Data

接线图 / Circuit diagram



封装尺寸 / Package outlines





Sperrfläche für Thermisches Interface Material
restricted area for Thermal Interface Material

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初步数据
Preliminary Data

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