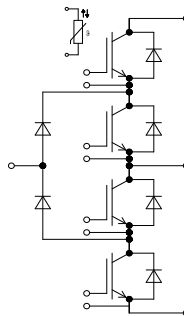
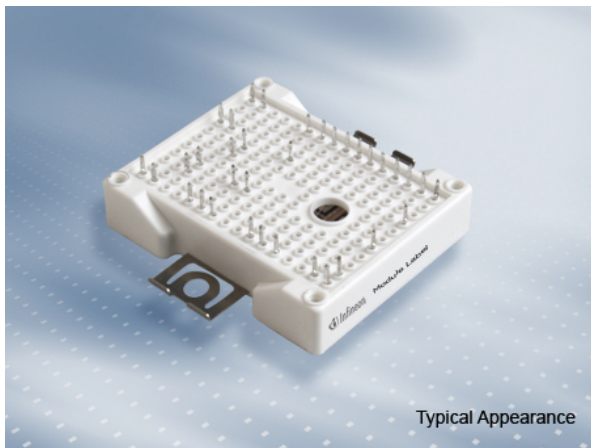


EasyPACK 模块 采用第三代沟槽栅/场终止IGBT3和第三代发射极控制二极管 带有pressfit压接管脚和温度检测NTC
EasyPACK module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode and PressFIT / NTC

初步数据 / Preliminary Data



$V_{CES} = 650V$
 $I_{C\ nom} = 75A / I_{CRM} = 150A$

典型应用

- 三电平应用
- 太阳能应用
- UPS系统

Typical Applications

- 3-Level-Applications
- Solar Applications
- UPS Systems

电气特性

- 增加阻断电压至650V
- 低电感设计
- 低开关损耗
- 低 V_{CEsat}

Electrical Features

- Increased blocking voltage capability to 650V
- Low inductive design
- Low Switching Losses
- Low V_{CEsat}

机械特性

- 低热阻的三氧化二铝 (Al_2O_3 衬底
- 紧凑型设计
- PressFIT 压接技术
- 集成的安装夹使安装坚固

Mechanical Features

- Al_2O_3 Substrate with Low Thermal Resistance
- Compact design
- PressFIT Contact Technology
- Rugged mounting due to integrated mounting clamps

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

prepared by: DK	date of publication: 2013-11-05	
approved by: MB	revision: 2.1	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}	650	V
连续集电极直流电流 Continuous DC collector current	$T_C = 75^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{nom}}$ I_C	75 95	A A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	150	A
总功率损耗 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	P_{tot}	250	W
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	$I_C = 75\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 75\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 75\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{sat}}$	1,45 1,60 1,70	1,90	V V V	
栅极阈值电压 Gate threshold voltage	$I_C = 1,20\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{GEth}	4,9	5,8	6,5	V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		Q_G	0,80			μC
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	0,0			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}	4,60			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}	0,145			nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		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	$I_C = 75\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}	0,025 0,025 0,025			μs μs μs
上升时间(电感负载) Rise time, inductive load	$I_C = 75\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,02 0,023 0,024			μs μs μs
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 75\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}	0,20 0,225 0,23			μs μs μs
下降时间(电感负载) Fall time, inductive load	$I_C = 75\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,085 0,12 0,14			μs μs μs
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 75\text{ A}, V_{CE} = 300\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 3100\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	0,45 0,60 0,70			mJ mJ mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 75\text{ A}, V_{CE} = 300\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 4000\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	1,70 2,30 2,40			mJ mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	I_{SC}	530 380			A A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}	0,55	0,60		K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	0,55			K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{op}}$	-40		150	$^{\circ}\text{C}$

prepared by: DK	date of publication: 2013-11-05
approved by: MB	revision: 2.1



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}	650	V
连续正向直流电流 Continuous DC forward current		I_F	75	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	150	A
I^2t -值 I^2t - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	490	A^2s
	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$		460	A^2s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$I_F = 75\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		1,55	1,95	V
	$I_F = 75\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		1,50		V
	$I_F = 75\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		1,45		V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 75\text{ A}, -di_F/dt = 3600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		95,0		A
		$T_{vj} = 125^{\circ}\text{C}$		105		A
		$T_{vj} = 150^{\circ}\text{C}$		110		A
恢复电荷 Recovered charge	$I_F = 75\text{ A}, -di_F/dt = 3600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		3,70		μC
		$T_{vj} = 125^{\circ}\text{C}$		6,40		μC
		$T_{vj} = 150^{\circ}\text{C}$		7,00		μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 75\text{ A}, -di_F/dt = 3600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$		0,90		mJ
		$T_{vj} = 125^{\circ}\text{C}$		1,50		mJ
		$T_{vj} = 150^{\circ}\text{C}$		1,75		mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode	R_{thJC}		0,70	0,80	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}		0,70		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, D5-D6 / Diode, D5-D6

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}	650	V
连续正向直流电流 Continuous DC forward current		I_F	75	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	150	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}	1500 1400	A^2s A^2s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$I_F = 75\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 75\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 75\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	1,45 1,35 1,30	1,85	V V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 75\text{ A}, -di_F/dt = 3100\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	82,0 100 105		A A A
恢复电荷 Recovered charge	$I_F = 75\text{ A}, -di_F/dt = 3100\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	3,70 7,00 8,00		μC μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 75\text{ A}, -di_F/dt = 3100\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	1,00 1,80 2,05		mJ mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}	0,60	0,65	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	0,50		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

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	$T_C = 25^{\circ}\text{C}$	R_{25}		5,00		$\text{k}\Omega$
R100 偏差 Deviation of R100	$T_C = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$	$\Delta R/R$	-5		5	%
耗散功率 Power dissipation	$T_C = 25^{\circ}\text{C}$	P_{25}			20,0	mW
B-值 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\text{ K}))]$	$B_{25/50}$		3375		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\text{ K}))]$	$B_{25/80}$		3411		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\text{ K}))]$	$B_{25/100}$		3433		K

根据应用手册标定

Specification according to the valid application note.

prepared by: DK	date of publication: 2013-11-05
approved by: MB	revision: 2.1



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
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- 散热片 / terminal to heatsink 端子- 端子 / terminal to terminal		11,5 6,3		mm
电气间隙 Clearance	端子- 散热片 / terminal to heatsink 端子- 端子 / terminal to terminal		10,0 5,0		mm
相对电痕指数 Comperative tracking index		CTI	> 200		
			min.	typ.	max.
杂散电感,模块 Stray inductance module		L _{sCE}		15	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'}		2,00	mΩ
储存温度 Storage temperature		T _{stg}	-40		125 °C
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	40	-	80 N
重量 Weight		G		39	g

Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt
The current under continuous operation is limited to 25 A rms per connector pin

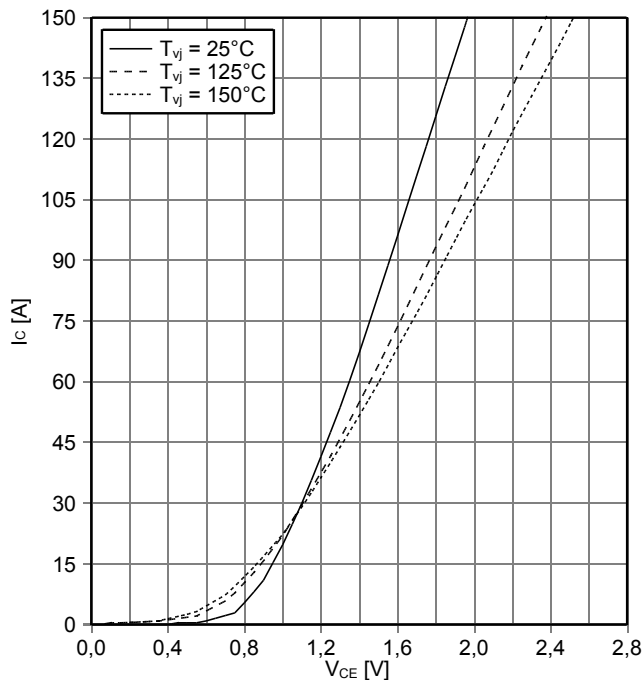
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初步数据
Preliminary Data

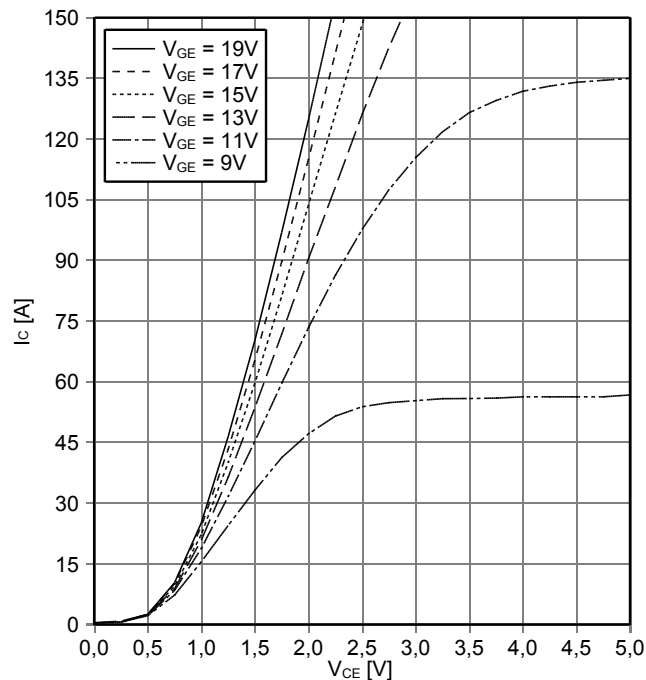
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)

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



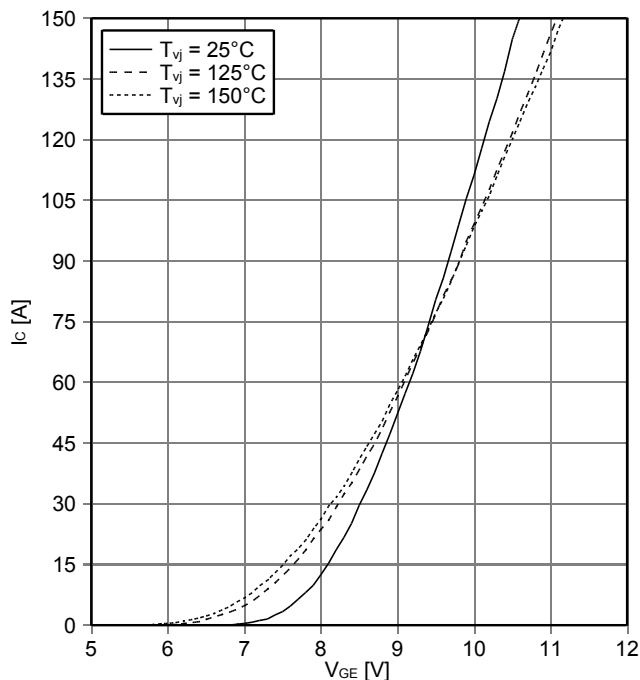
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)

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



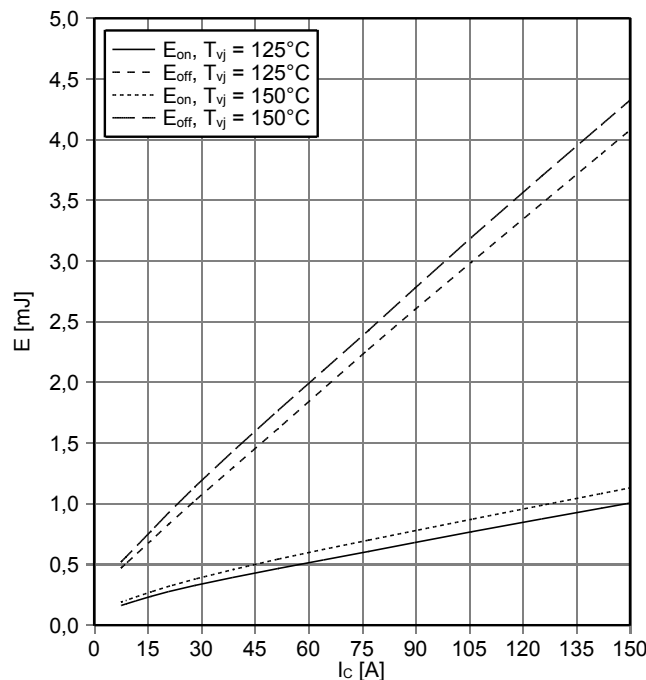
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 5.1\ \Omega$, $R_{Goff} = 5.1\ \Omega$, $V_{CE} = 300\text{ V}$



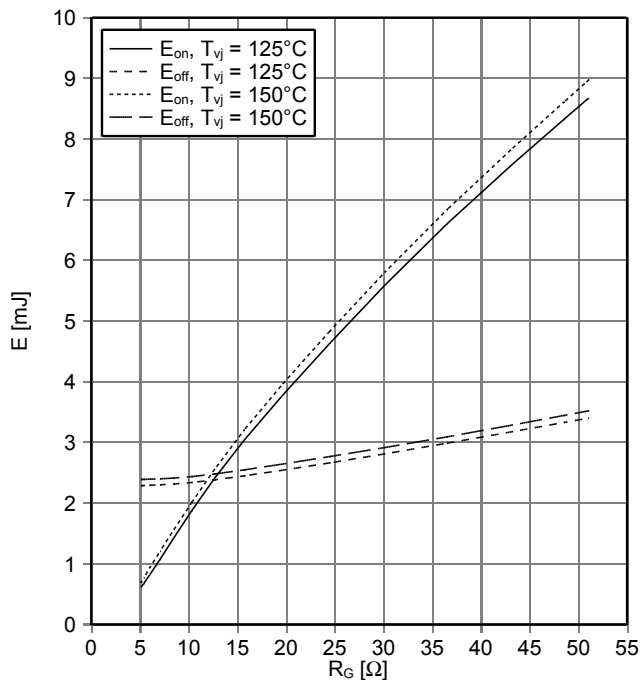
prepared by: DK	date of publication: 2013-11-05
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初步数据
Preliminary Data

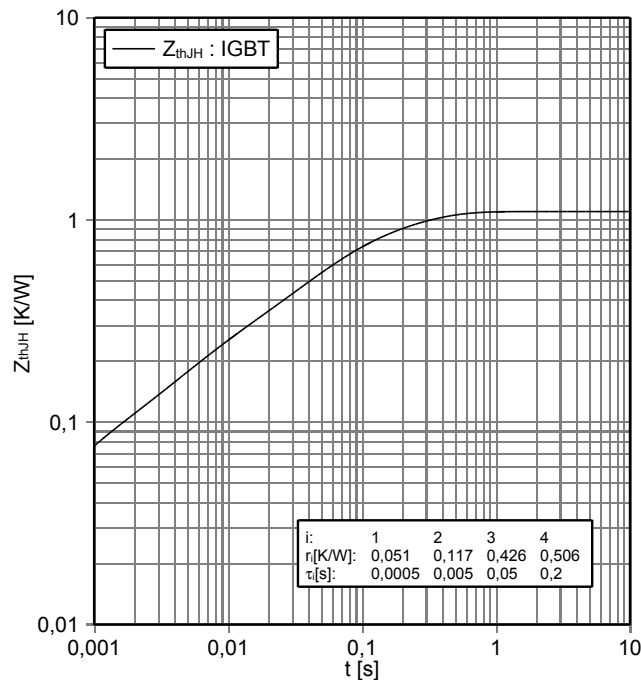
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$
 $V_{GE} = \pm 15 V, I_C = 75 A, V_{CE} = 300 V$



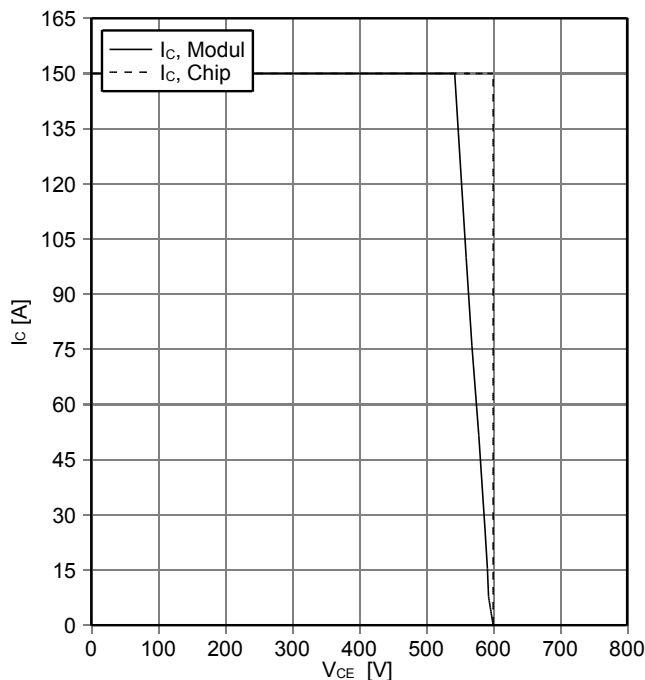
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT, Inverter

$Z_{thJH} = f(t)$



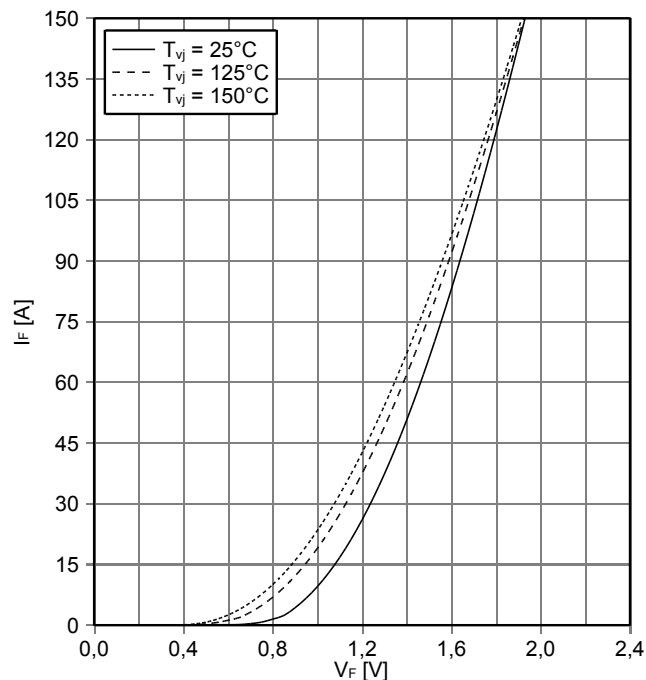
反偏安全工作区 IGBT, 逆变器 (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15 V, R_{Goff} = 5.1 \Omega, T_{vj} = 150^\circ C$



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

$I_F = f(V_F)$

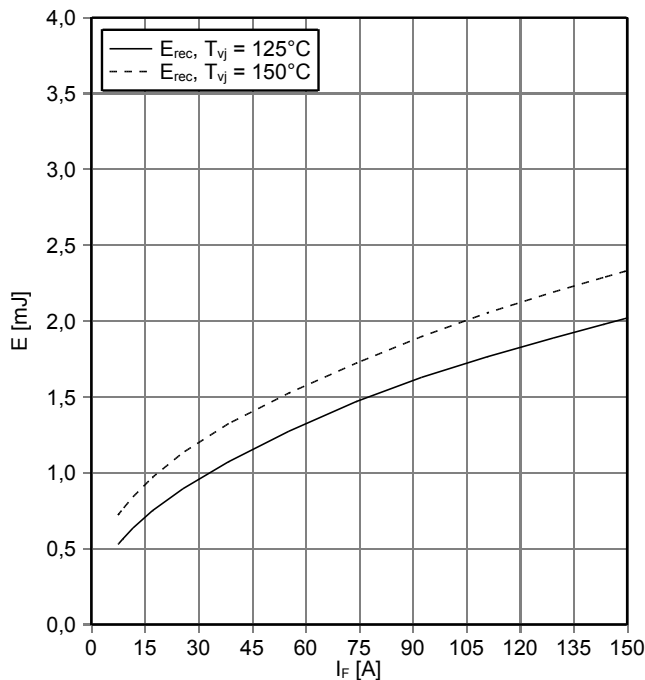


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初步数据
Preliminary Data

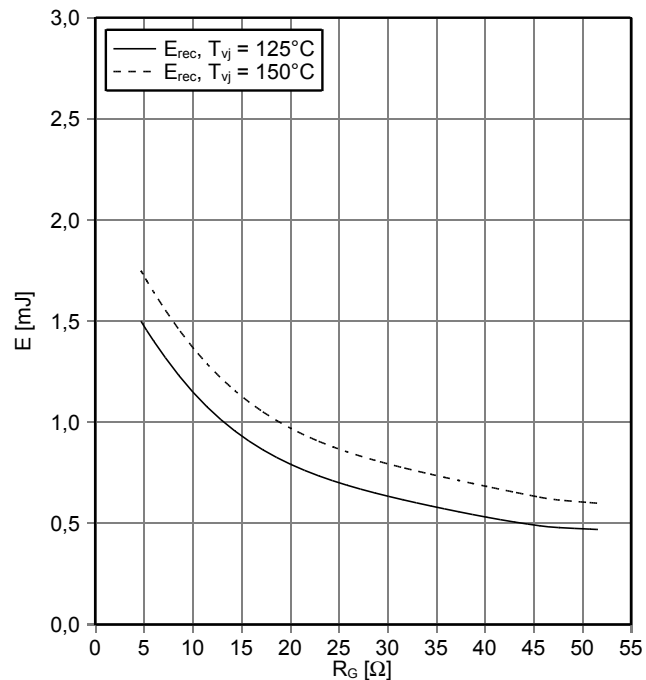
开关损耗 二极管, 逆变器 (典型)
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 5.1 \Omega, V_{CE} = 300 V$



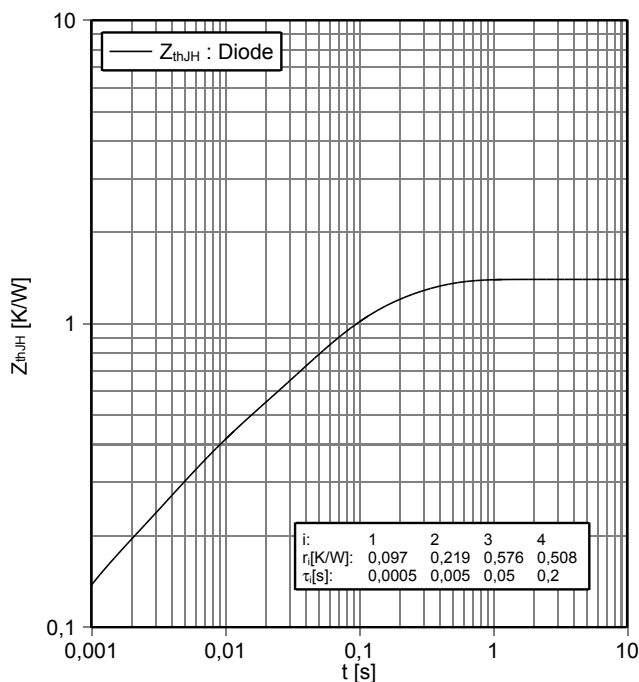
开关损耗 二极管, 逆变器 (典型)
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 75 A, V_{CE} = 300 V$



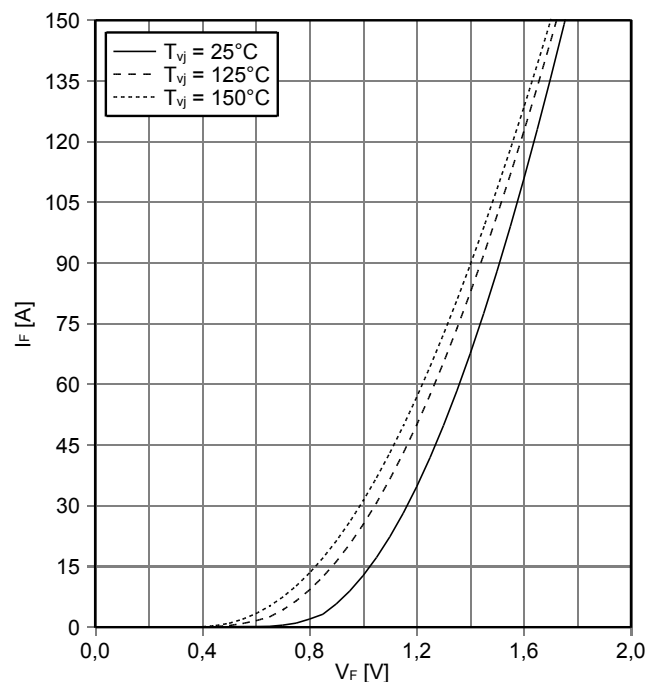
瞬态热阻抗 二极管, 逆变器
transient thermal impedance Diode, Inverter

$Z_{thJH} = f(t)$



正向偏压特性 二极管, D5-D6 (典型)
forward characteristic of Diode, D5-D6 (typical)

$I_F = f(V_F)$

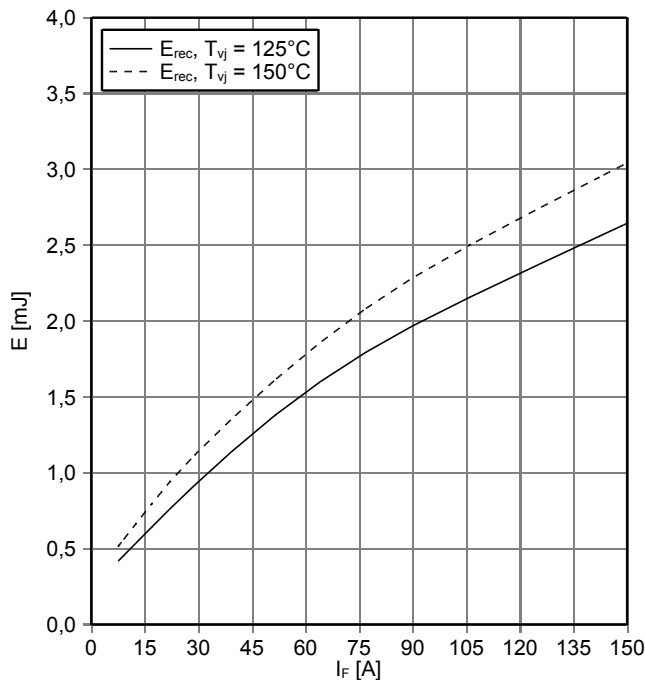


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初步数据
Preliminary Data

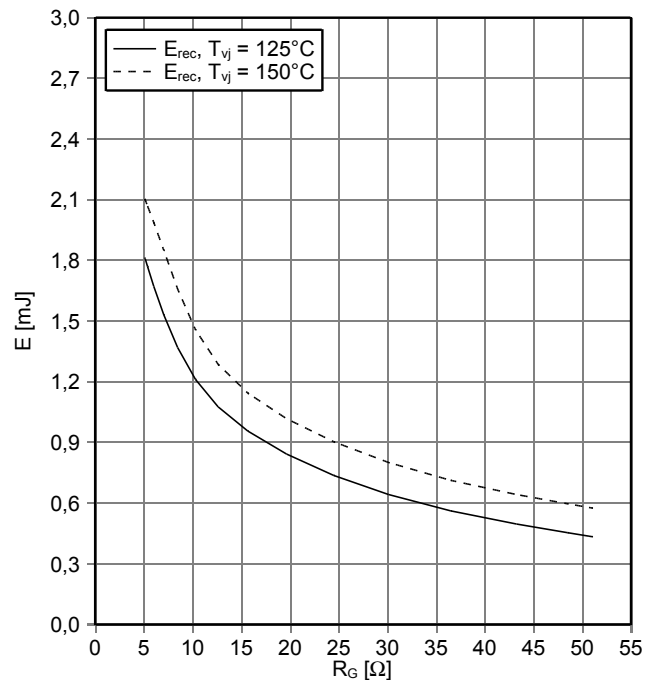
开关损耗 二极管, D5-D6 (典型)
switching losses Diode, D5-D6 (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 5.1 \Omega, V_{CE} = 300 V$



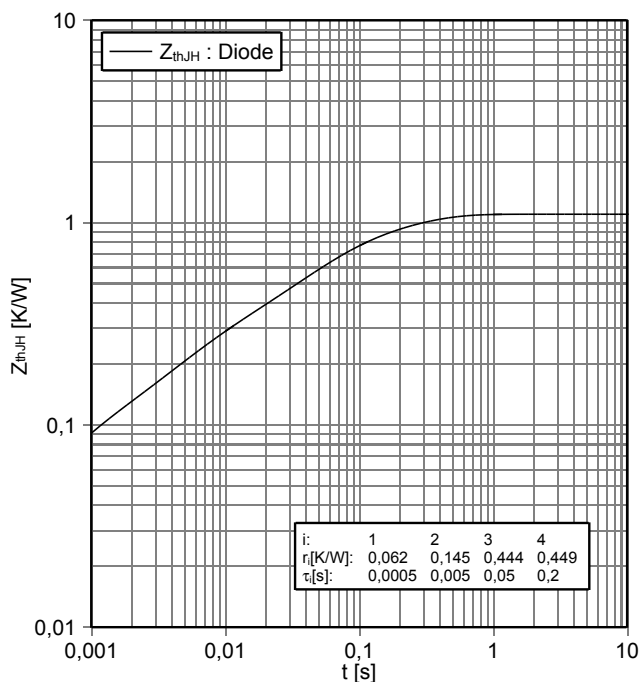
开关损耗 二极管, D5-D6 (典型)
switching losses Diode, D5-D6 (typical)

$E_{rec} = f(R_G)$
 $I_F = 75 A, V_{CE} = 300 V$



瞬态热阻抗 二极管, D5-D6
transient thermal impedance Diode, D5-D6

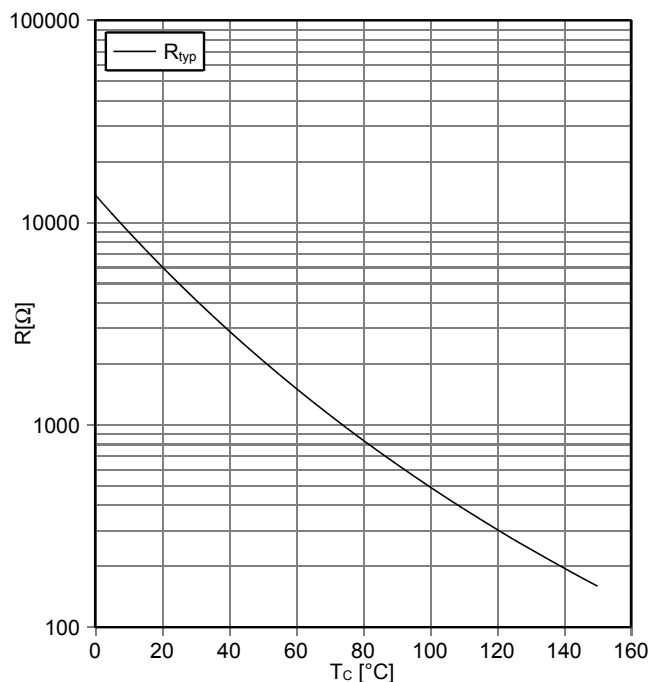
$Z_{thJH} = f(t)$



负温度系数热敏电阻 温度特性

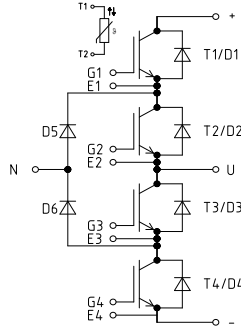
NTC-Thermistor-temperature characteristic (typical)

$R = f(T)$

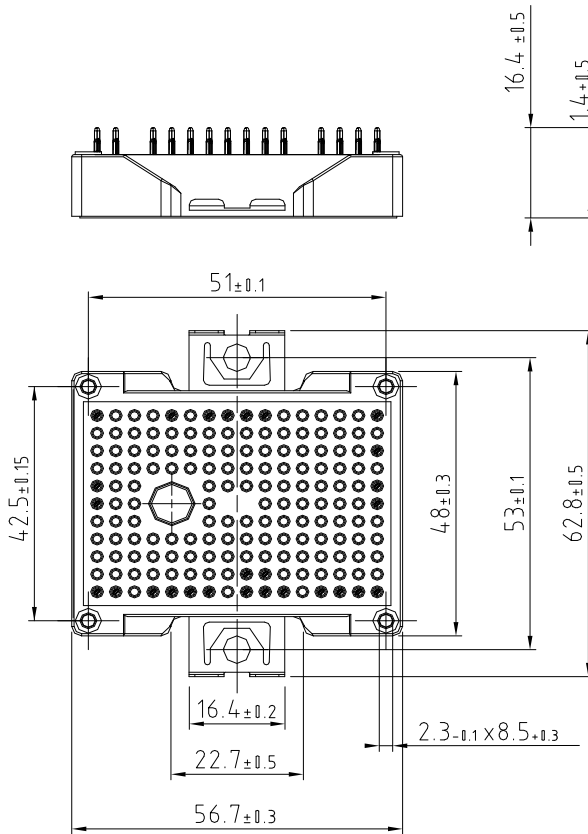


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接线图 / circuit_diagram_headline

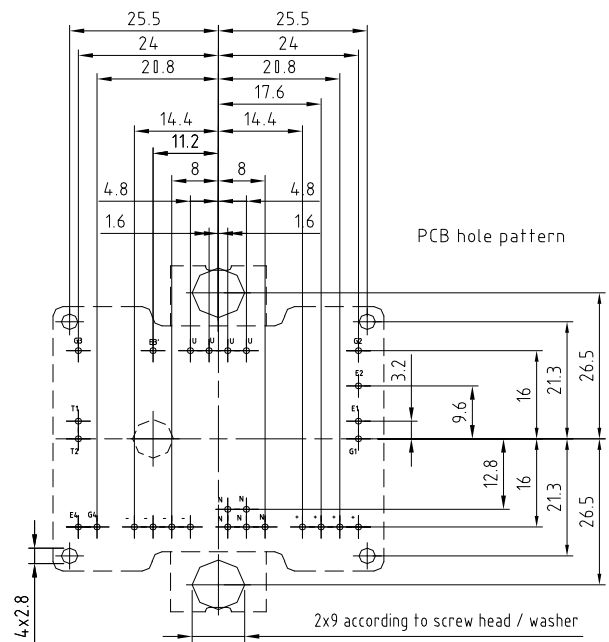


封装尺寸 / package outlines



- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern $\boxed{\oplus} \phi 0.1$
- Hole specification for contacts see AN 2009-01:

Diameters of drill $\phi 1.15\text{mm}$
and copper thickness in hole 25-50 μm



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**初步数据
Preliminary Data**

使用条件和条款

使用条件和条款

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-得到质量协议的结论

-建立联合的测试和出厂产品检查，我们可以根据测试的实际情况供货

如果有必要，请根据实际需要将类似的说明给你的客户

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- the conclusion of Quality Agreements;

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