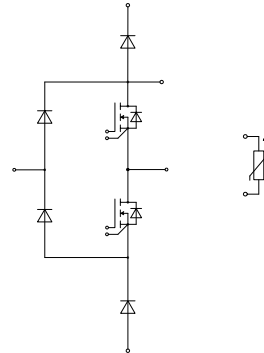
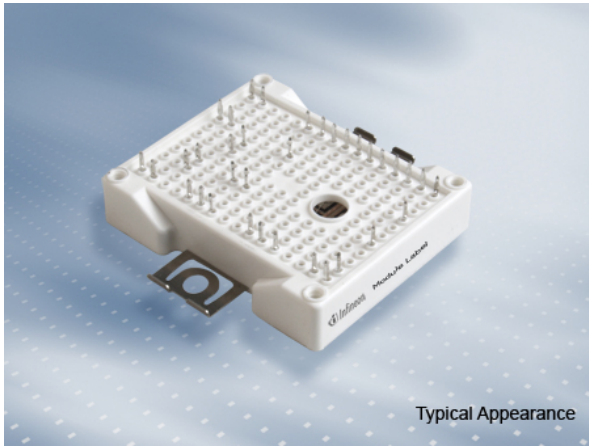


EasyPACK™ 模块 采用 CoolSiC™ Trench MOSFET 带有pressfit压接管脚和温度检测NTC  
 EasyPACK™ module with CoolSiC™ Trench MOSFET and PressFIT / NTC

初步数据 / Preliminary Data



$V_{DSS} = 1200V$   
 $I_{D\ nom} = 75A / I_{DRM} = 150A$

**潜在应用**

- DC/DC 变换器
- UPS系统
- 太阳能应用
- 高频开关应用

**Potential Applications**

- DC/DC converter
- UPS systems
- Solar applications
- High Frequency Switching application

**电气特性**

- 低开关损耗
- 低电感设计
- 高电流密度

**Electrical Features**

- Low switching losses
- Low inductive design
- High current density

**机械特性**

- PressFIT 压接技术
- 集成NTC温度传感器
- 集成的安装夹使安装坚固

**Mechanical Features**

- PressFIT contact technology
- Integrated NTC temperature sensor
- Rugged mounting due to integrated mounting clamps

**Module Label Code**

Barcode Code 128



DMX - Code



**Content of the Code**

	<b>Digit</b>
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

## MOSFET / MOSFET

### 最大额定值 / Maximum Rated Values

漏源极电压 Drain-source voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{DSS}$	1200	V
直流漏极电流 DC drain current	$T_{vj} = 175^{\circ}\text{C}, V_{GS} = 15\text{ V}$	$T_H = 35^{\circ}\text{C}$	$I_{D\text{ nom}}$	75 A
脉冲漏极电流 Pulsed drain current	经设计验证, $t_p$ 由 $T_{vj\text{ max}}$ 限定 verified by design, $t_p$ limited by $T_{vj\text{ max}}$		$I_{D\text{ pulse}}$	150 A
栅源峰值电压 Gate-source voltage		$V_{GSS}$	-10 / 20	V

### 特征值 / Characteristic Values

			min.	typ.	max.	
漏源通态电阻 Drain-source on resistance	$I_D = 75\text{ A}$ $V_{GS} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$R_{DS\text{ on}}$	15,0 19,7 22,0		m $\Omega$
栅极阈值电压 Gate threshold voltage	$I_D = 30,0\text{ mA}, V_{DS} = V_{GS}, T_{vj} = 25^{\circ}\text{C}$ (tested after 1ms pulse at $V_{GS} = +20\text{ V}$ )		$V_{GS(th)}$	3,45	4,50	5,55 V
总的栅极电荷 Total gate charge	$V_{GS} = -5\text{ V} / 15\text{ V}, V_{DS} = 800\text{ V}$		$Q_G$	0,186		$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	1,3		$\Omega$
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, V_{AC} = 25\text{ mV}$		$C_{iss}$	5,52		nF
输出电容 Output capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, V_{AC} = 25\text{ mV}$		$C_{oss}$	0,33		nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, V_{AC} = 25\text{ mV}$		$C_{rss}$	0,042		nF
$C_{oss}$ stored energy	$T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = -5 / 15\text{ V}$		$E_{oss}$	132		$\mu\text{J}$
零栅电压漏极电流 Zero gate voltage drain current	$V_{DS} = 1200\text{ V}, V_{GS} = -5\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$I_{DSS}$	0,30	300	$\mu\text{A}$
栅极漏电流 Gate-source leakage current	$V_{DS} = 0\text{ V}$ $T_{vj} = 25^{\circ}\text{C}$	$V_{GS} = 20\text{ V}$ $V_{GS} = -10\text{ V}$	$I_{GSS}$		400	nA
开通延迟时间(电感负载) Turn on delay time, inductive load	$I_D = 75\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Gon} = 3,30\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ on}}$	24,0 24,0 24,0		ns
上升时间(电感负载) Rise time, inductive load	$I_D = 75\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Gon} = 3,30\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	13,0 13,0 13,0		ns
关断延迟时间(电感负载) Turn off delay time, inductive load	$I_D = 75\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Goff} = 3,30\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ off}}$	64,0 64,0 64,0		ns
下降时间(电感负载) Fall time, inductive load	$I_D = 75\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Goff} = 3,30\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	18,0 18,0 18,0		ns
开通损耗(每脉冲) Turn-on energy loss per pulse	$I_D = 75\text{ A}, V_{DS} = 600\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 6,70\text{ kA}/\mu\text{s}$ ( $T_{vj} = 150^{\circ}\text{C}$ ) $V_{GS} = -5\text{ V} / 15\text{ V}, R_{Gon} = 3,30\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	0,55 0,55 0,55		mJ
关断损耗(每脉冲) Turn-off energy loss per pulse	$I_D = 75\text{ A}, V_{DS} = 600\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 32,5\text{ kV}/\mu\text{s}$ ( $T_{vj} = 150^{\circ}\text{C}$ ) $V_{GS} = -5\text{ V} / 15\text{ V}, R_{Goff} = 3,30\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	0,44 0,44 0,44		mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个MOSFET / per MOSFET		$R_{thJH}$	0,734		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

## Body diode

### 最大额定值 / Maximum Rated Values

DC body diode forward current	$T_{vj} = 175^{\circ}\text{C}, V_{GS} = -5\text{ V}$	$T_H = 35^{\circ}\text{C}$	$I_{SD}$	24	A
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### 特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$I_{SD} = 75\text{ A}, V_{GS} = -5\text{ V}$ $I_{SD} = 75\text{ A}, V_{GS} = -5\text{ V}$ $I_{SD} = 75\text{ A}, V_{GS} = -5\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{SD}$	4,60 4,35 4,30	5,65	V

初步数据  
 Preliminary Data

 二极管, 三电平 / Diode, 3-Level  
 最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	60	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1 \text{ ms}$	$I_{FRM}$	120	A
$I^2t$ -值 $I^2t$ - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	330 270	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

## 特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$I_F = 60 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 60 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 60 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_F$	1,45 1,75 1,85	1,75	V V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 60 \text{ A}, -di_F/dt = 5700 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$I_{RM}$	58,8 58,8 58,8		A A A
恢复电荷 Recovered charge	$I_F = 60 \text{ A}, -di_F/dt = 5700 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$Q_r$	0,539 0,539 0,539		$\mu\text{C}$ $\mu\text{C}$ $\mu\text{C}$
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 60 \text{ A}, -di_F/dt = 5700 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{rec}$	0,195 0,195 0,195		mJ mJ mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode		$R_{thJH}$	0,719		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj op}$	-40	150	$^{\circ}\text{C}$

 二极管, 整流器 / Diode, Rectifier  
 最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1600	V
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	$T_H = 35^{\circ}\text{C}$	$I_{FRMSM}$	75	A
最大整流器输出均方根电流 Maximum RMS current at rectifier output	$T_H = 35^{\circ}\text{C}$	$I_{RMSM}$	75	A
正向浪涌电流 Surge forward current	$t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I_{FSM}$	1150 880	A A
$I^2t$ -值 $I^2t$ - value	$t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	6610 3870	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

## 特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 75 \text{ A}$		$V_F$	0,95		V
反向电流 Reverse current	$T_{vj} = 150^{\circ}\text{C}, V_R = 1600 \text{ V}$		$I_R$	1,00		mA
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode		$R_{thJH}$	0,978		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj op}$	-40	150	$^{\circ}\text{C}$

## 初步数据 Preliminary Data

### 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	$T_{NTC} = 25^{\circ}\text{C}$	$R_{25}$		5,00		k $\Omega$
R100 偏差 Deviation of R100	$T_{NTC} = 100^{\circ}\text{C}, R_{100} = 493 \Omega$	$\Delta R/R$	-5		5	%
耗散功率 Power dissipation	$T_{NTC} = 25^{\circ}\text{C}$	$P_{25}$			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.

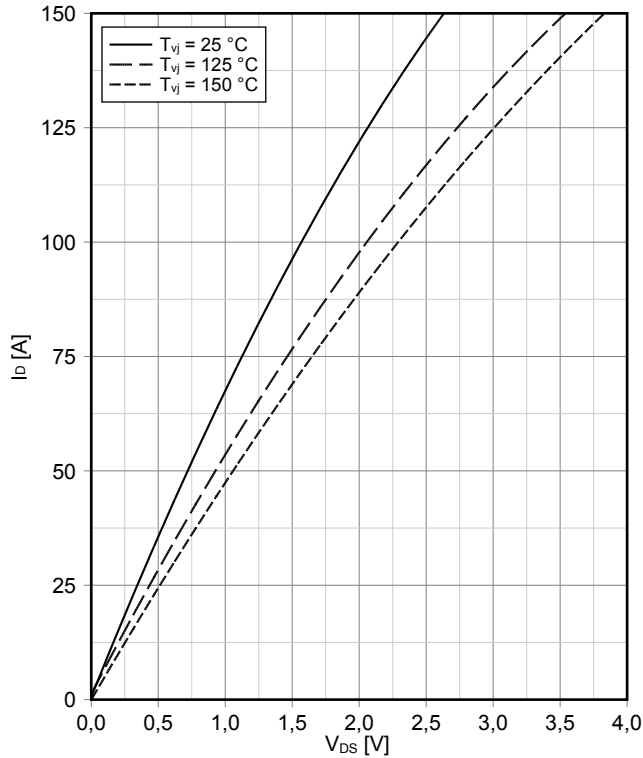
### 模块 / Module

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)			$\text{Al}_2\text{O}_3$		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			11,5 6,3		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			10,0 5,0		mm
相对电痕指数 Comperative tracking index		CTI		> 200		
相对温度指数 (电) RTI Elec.	住房 housing	RTI		140		$^{\circ}\text{C}$
min. typ. max.						
杂散电感, 模块 Stray inductance module		$L_{sCE}$		12		nH
储存温度 Storage temperature		$T_{stg}$	-40		125	$^{\circ}\text{C}$
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	40	-	80	N
重量 Weight		G		39		g

The current under continuous operation is limited to 25 A rms per connector pin.  
Important note: The selection of positive and negative gate-source voltages impacts the long-term behavior of the device. The design guidelines described in Application Note AN 2018-09 must be considered to ensure sound operation of the device over the planned lifetime.

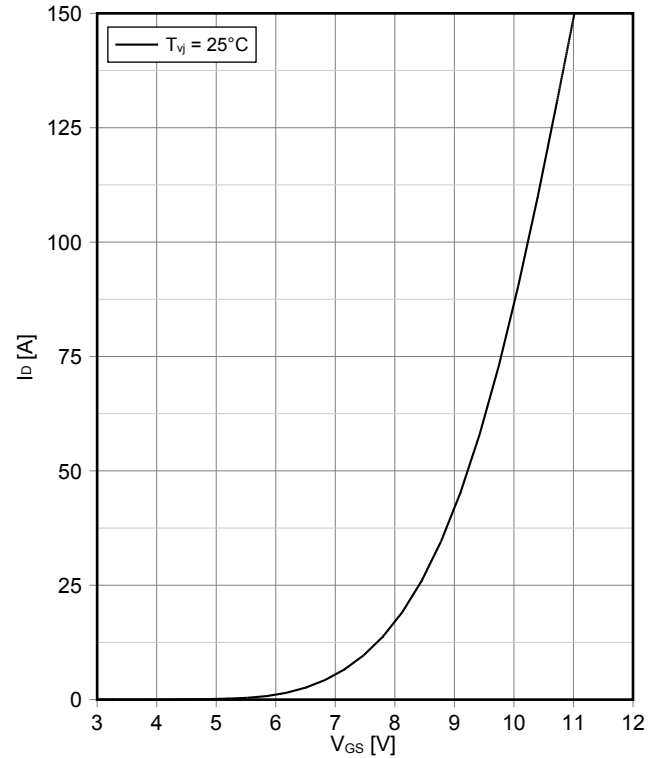
输出特性 MOSFET (典型)  
output characteristic MOSFET (typical)

$I_D = f(V_{DS})$   
 $V_{GS} = 15\text{ V}$



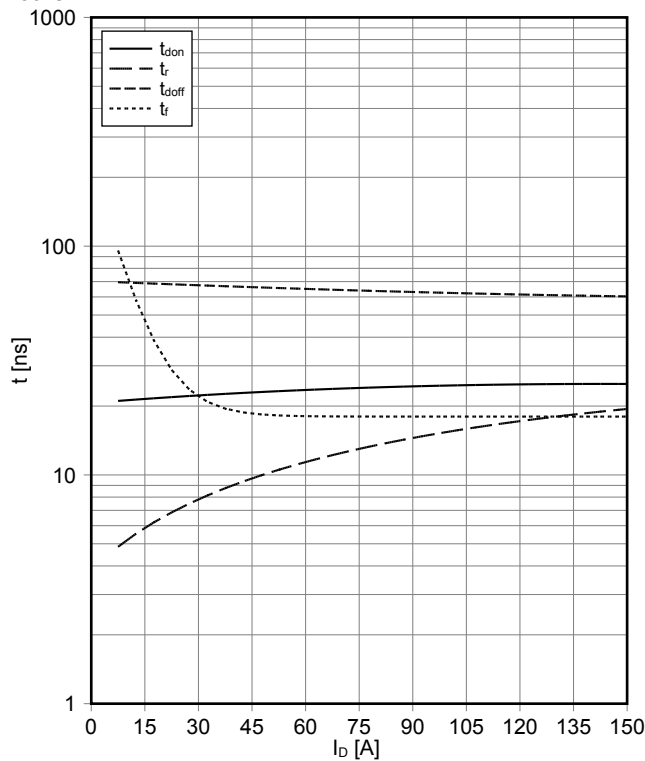
传输特性 MOSFET (典型)  
transfer characteristic MOSFET (typical)

$I_D = f(V_{GS})$   
 $V_{DS} = 20\text{ V}$



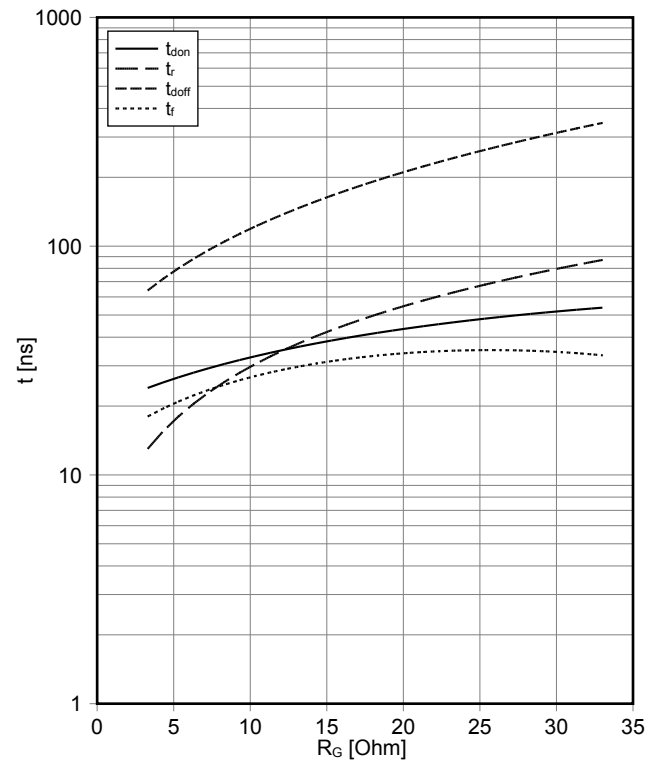
??? MOSFET (典型)  
switching times MOSFET (typical)

$t_{don} = f(I_D)$ ,  $t_r = f(I_D)$ ,  $t_{doff} = f(I_D)$ ,  $t_f = f(I_D)$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $R_{Gon} = 3.3\ \Omega$ ,  $R_{Goff} = 3.3\ \Omega$ ,  $V_{CE} = 600\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$



??? MOSFET (典型)  
switching times MOSFET (typical)

$t_{don} = f(R_G)$ ,  $t_r = f(R_G)$ ,  $t_{doff} = f(R_G)$ ,  $t_f = f(R_G)$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $I_C = 75\text{ A}$ ,  $V_{CE} = 600\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$



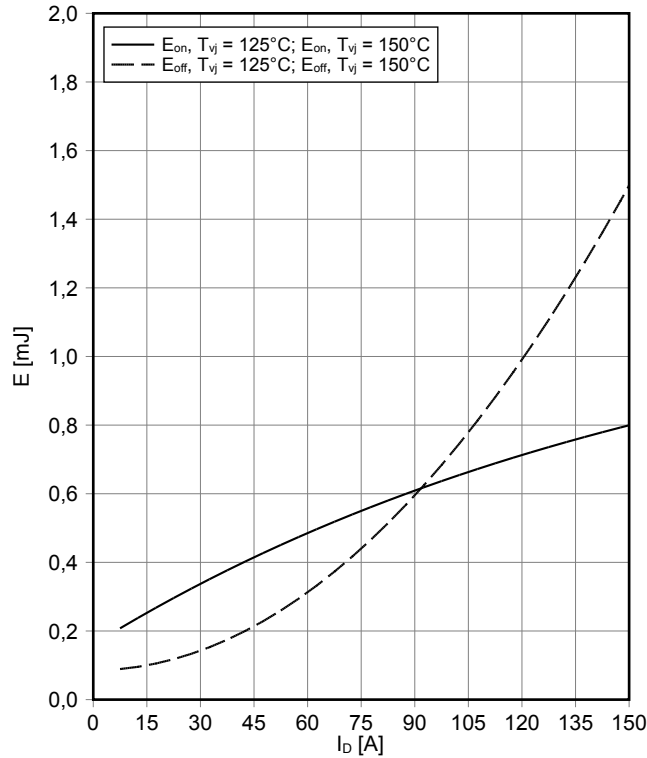
## 初步数据 Preliminary Data

### 开关损耗 MOSFET (典型)

#### switching losses MOSFET (typical)

$$E_{on} = f(I_D), E_{off} = f(I_D)$$

$$V_{GS} = +15\text{ V} / -5\text{ V}, R_{Gon} = 3,3\ \Omega, R_{Goff} = 3,3\ \Omega, V_{DS} = 600\text{ V}$$

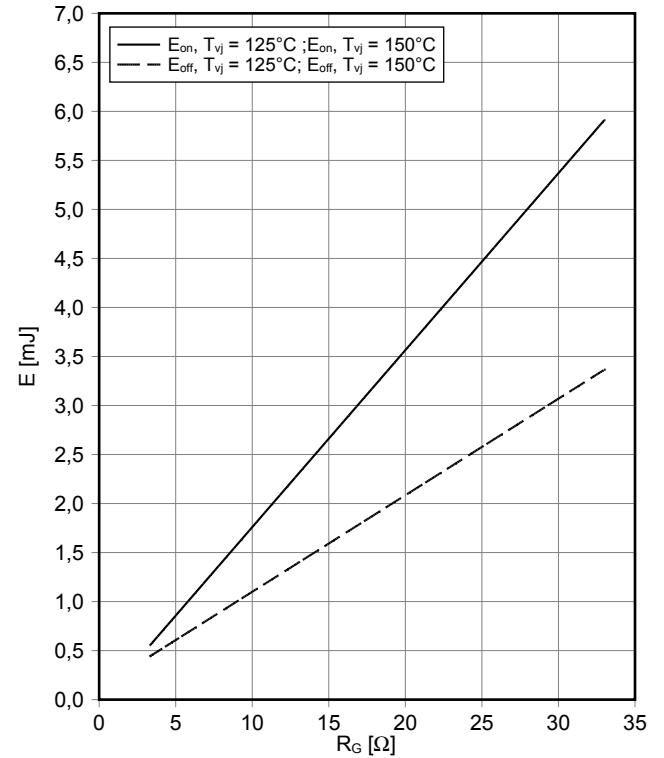


### 开关损耗 MOSFET (典型)

#### switching losses MOSFET (typical)

$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GS} = +15\text{ V} / -5\text{ V}, I_D = 75\text{ A}, V_{DS} = 600\text{ V}$$

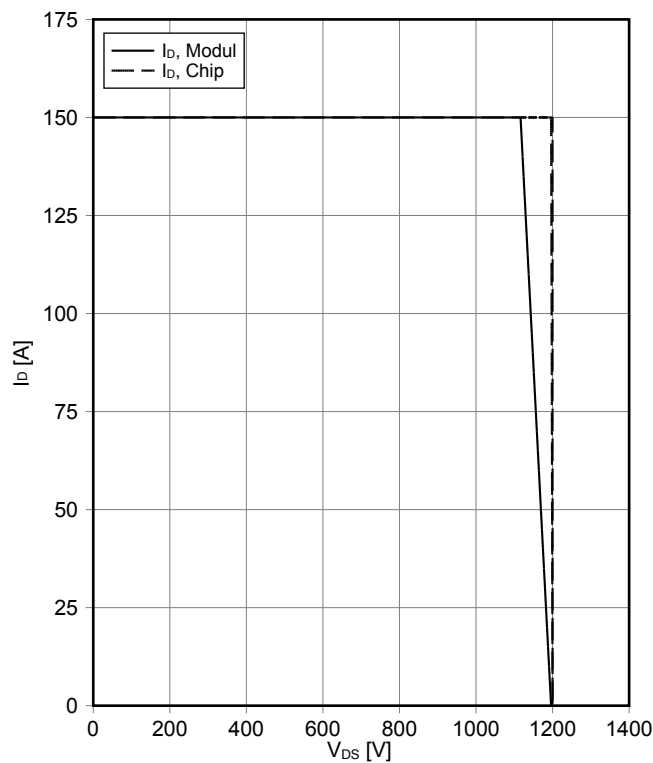


### 反偏安全工作区 MOSFET (RBSOA)

#### reverse bias safe operating area MOSFET (RBSOA)

$$I_D = f(V_{DS})$$

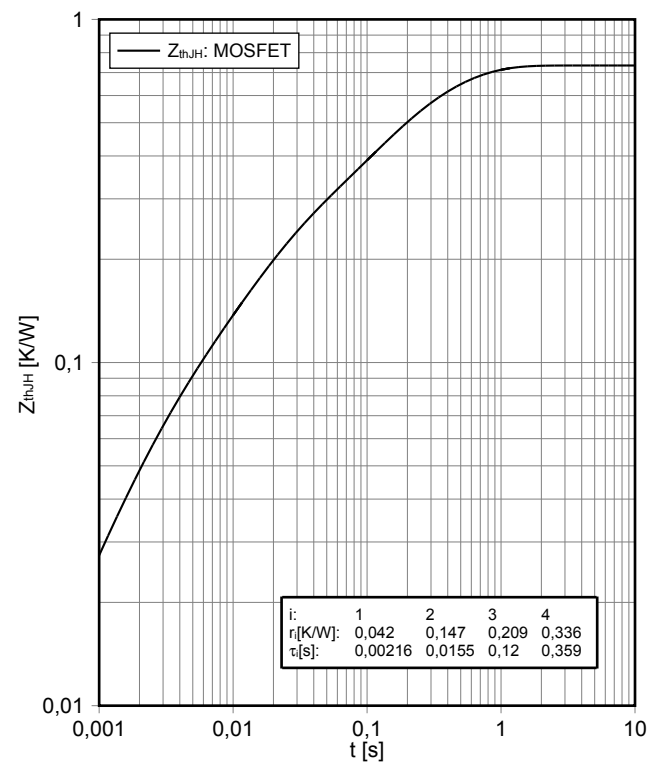
$$V_{GS} = -5\text{ V} / +15\text{ V}, T_{vj} = 150^\circ\text{C}, R_G = 3.3\ \Omega$$



### 瞬态热阻抗 MOSFET

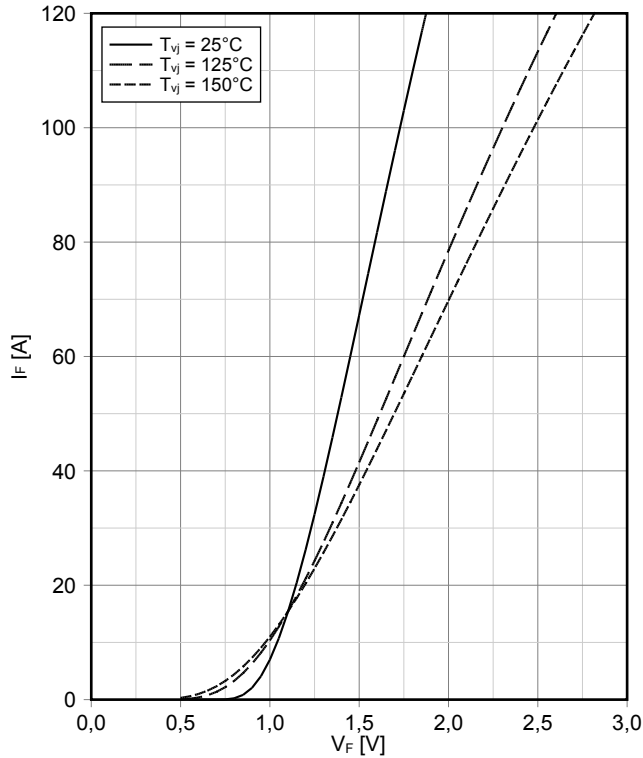
#### transient thermal impedance MOSFET

$$Z_{thJH} = f(t)$$

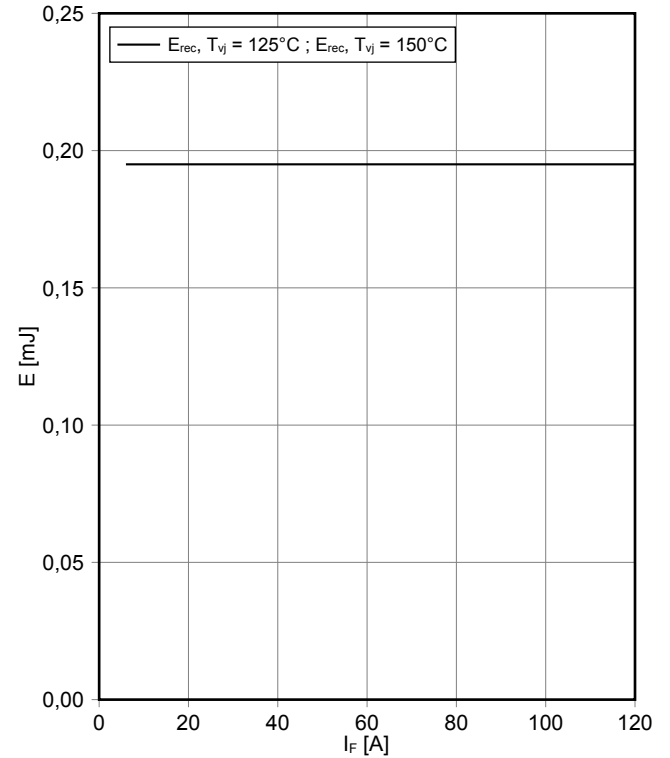


## 初步数据 Preliminary Data

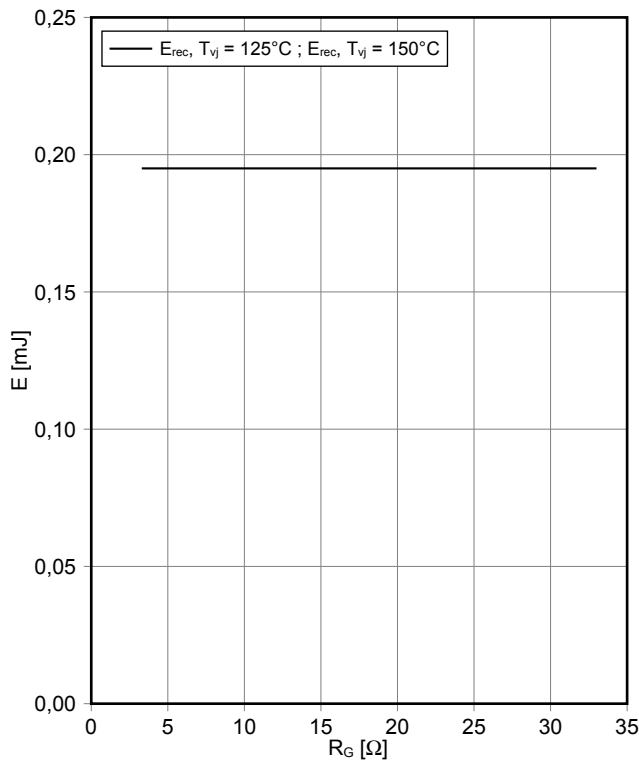
正向偏压特性 二极管, 三电平 (典型)  
forward characteristic of Diode, 3-Level (typical)  
 $I_F = f(V_F)$



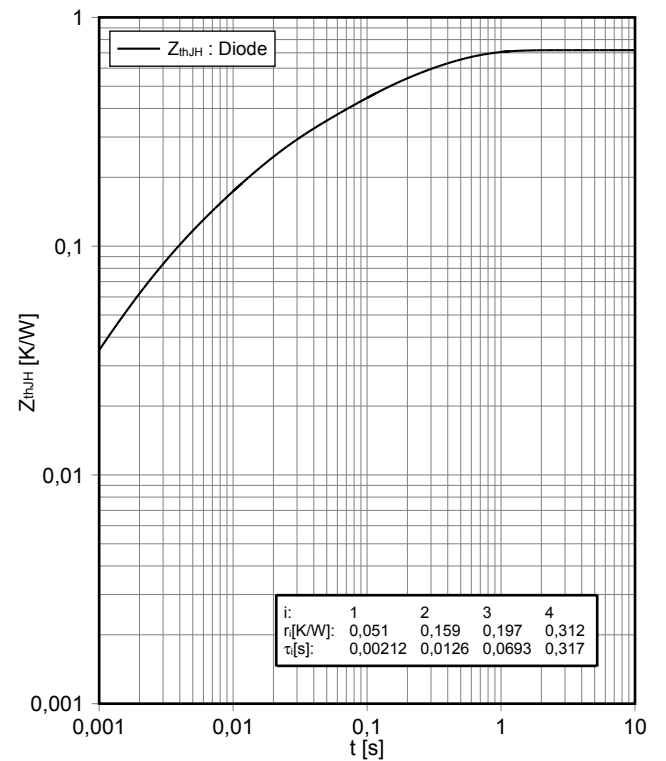
开关损耗 二极管, 三电平 (典型)  
switching losses Diode, 3-Level (typical)  
 $E_{rec} = f(I_F)$   
 $R_{Gon} = 3,3 \Omega, V_{CE} = 600 V$



开关损耗 二极管, 三电平 (典型)  
switching losses Diode, 3-Level (typical)  
 $E_{rec} = f(R_G)$   
 $I_F = 60 A, V_{CE} = 600 V$

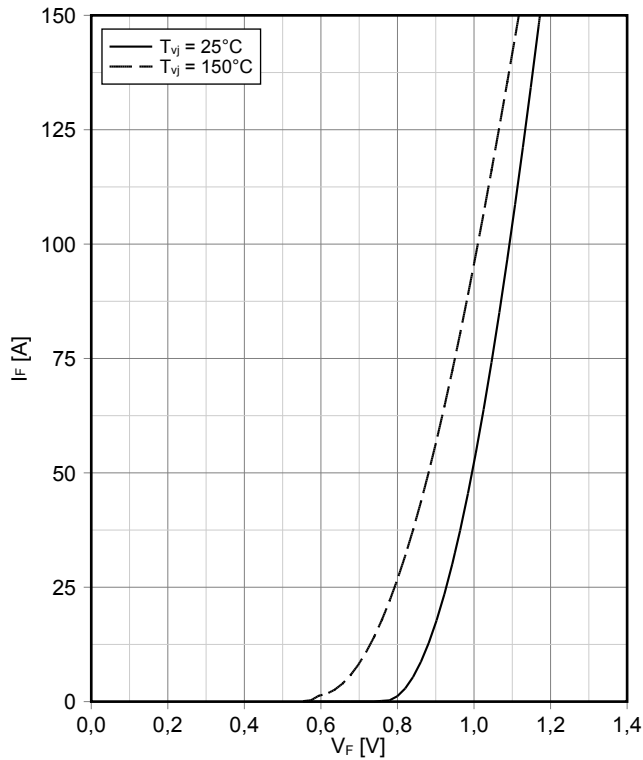


瞬态热阻抗 二极管, 三电平  
transient thermal impedance Diode, 3-Level  
 $Z_{thJH} = f(t)$

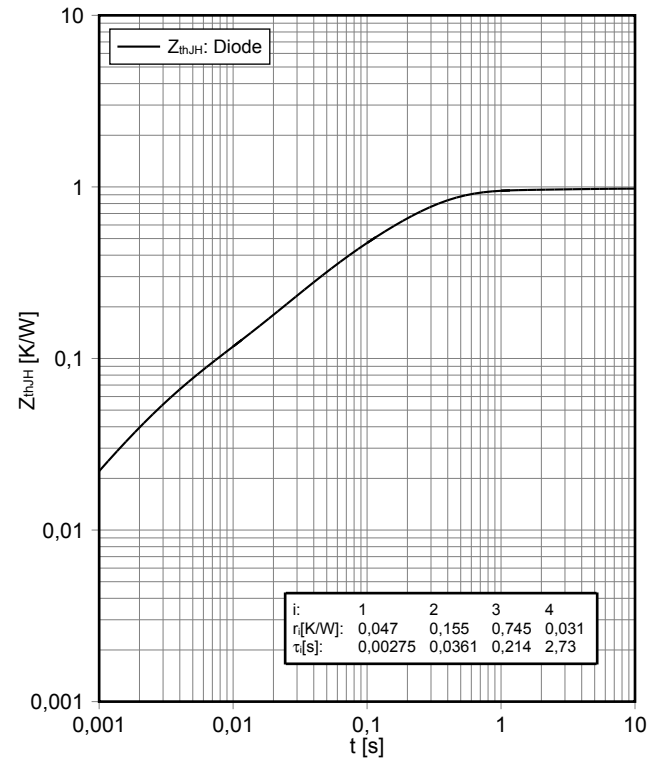


## 初步数据 Preliminary Data

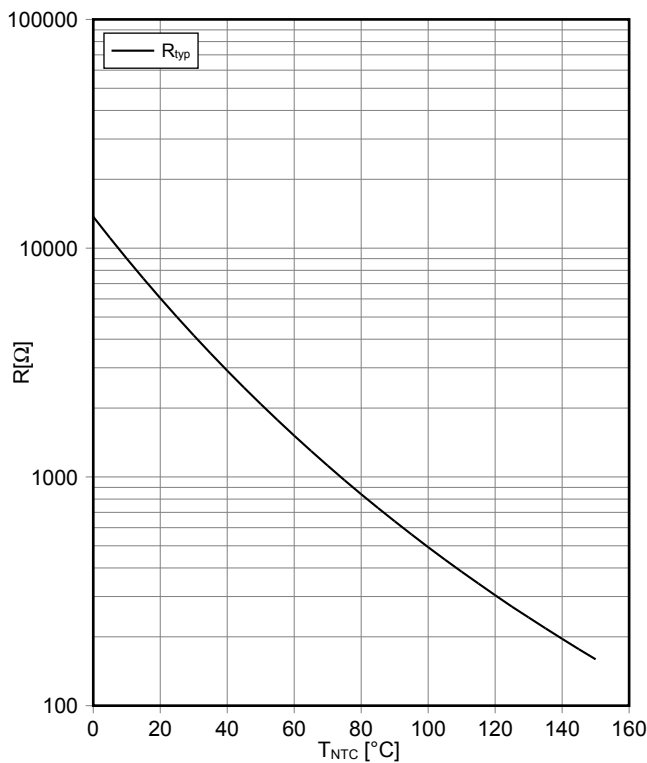
正向偏压特性 二极管,整流器 (典型)  
forward characteristic of Diode, Rectifier (typical)  
 $I_F = f(V_F)$



瞬态热阻抗 二极管,整流器  
transient thermal impedance Diode, Rectifier  
 $Z_{thJH} = f(t)$

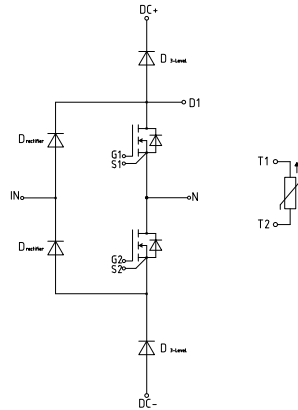


负温度系数热敏电阻 温度特性  
NTC-Thermistor-temperature characteristic (typical)  
 $R = f(T)$

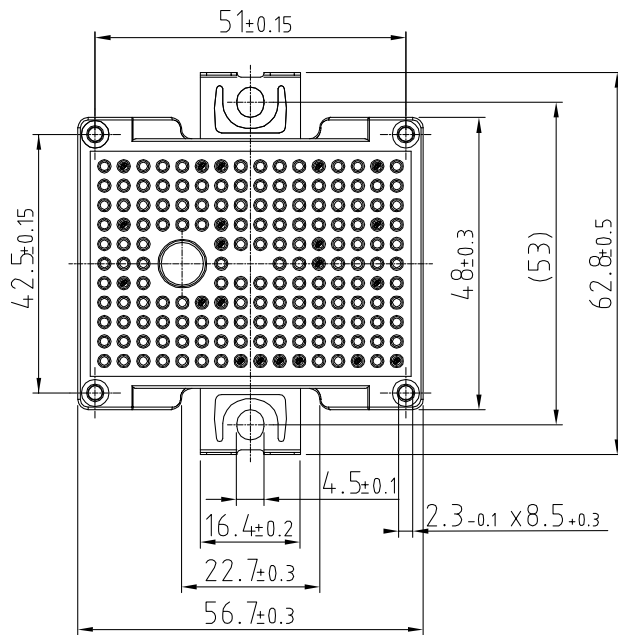
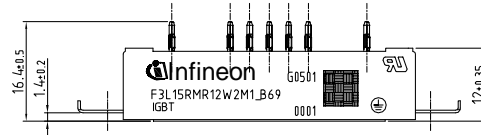
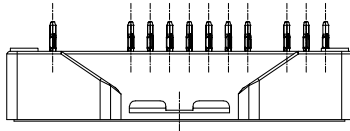




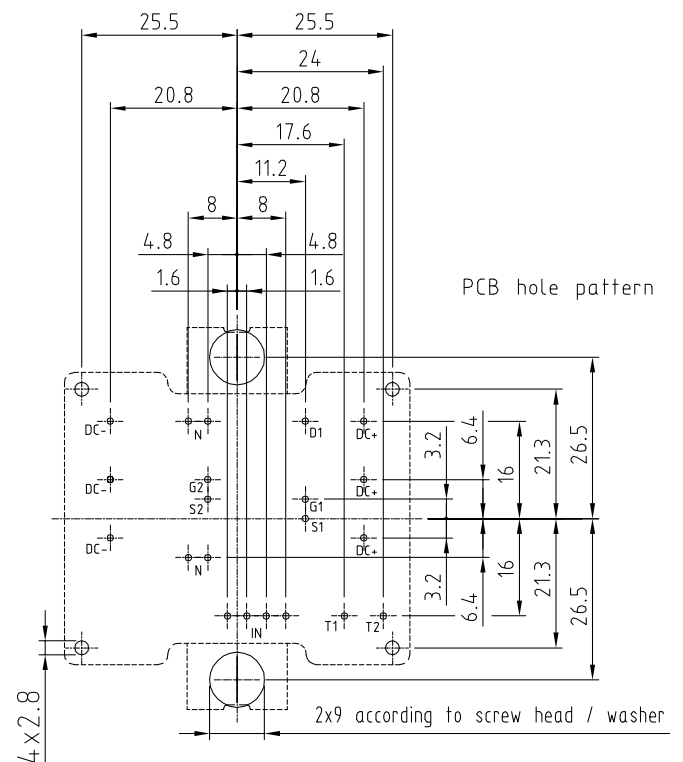
接线图 / Circuit diagram



封装尺寸 / Package outlines



- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern  $\varnothing 0.1$
- Hole specification for contacts see AN 2009-01:  
Diameters of drill  $\varnothing 1.15\text{mm}$   
and copper thickness in hole 25-50 $\mu\text{m}$



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