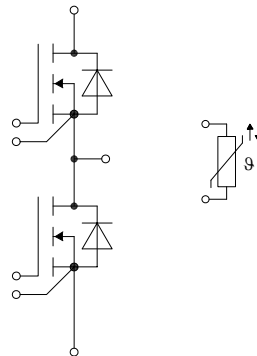
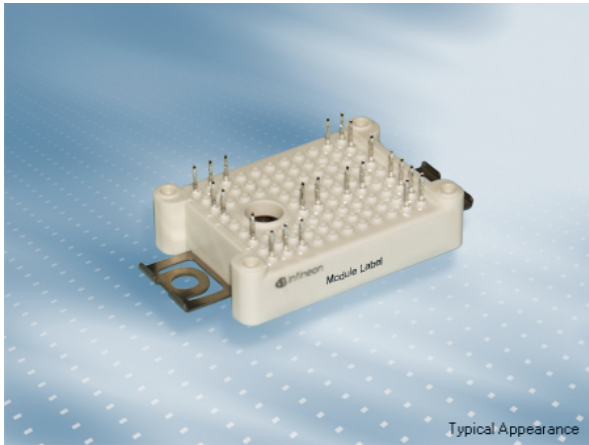


EasyDUAL 模块 采用 CoolSiC™ Trench MOSFET 带有pressfit压接管脚和温度检测NTC  
 EasyDUAL module with CoolSiC™ Trench MOSFET and PressFIT / NTC

初步数据 / Preliminary Data



$V_{DSS} = 1200V$   
 $I_{D\ nom} = 25A / I_{DRM} = 50A$

**潜在应用**

- DC/DC 变换器
- UPS系统
- 电机传动
- 高频开关应用

**Potential Applications**

- DC/DC converter
- UPS systems
- Motor drives
- High Frequency Switching application

**电气特性**

- 低开关损耗
- 低电感设计

**Electrical Features**

- Low switching losses
- Low inductive design

**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

初步数据  
 Preliminary Data

## 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	$T_{vj} = 175^{\circ}\text{C}, V_{GS} = 15\text{ V}$	$T_H = 75^{\circ}\text{C}$	$I_{D\text{ nom}}$	25 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 $T_{vj\text{ max}}$		$I_{D\text{ pulse}}$	50,0 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	$I_D = 25\text{ A}$ $V_{GS} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$R_{DS\text{ on}}$	45,0 59,0 66,0	m $\Omega$
栅极阈值电压 Gate threshold voltage	$I_D = 10,0\text{ mA}, V_{DS} = V_{GS}, T_{vj} = 25^{\circ}\text{C}$ (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	$V_{GS} = -5\text{ V} / 15\text{ V}, V_{DS} = 600\text{ V}$		$Q_G$	0,062	$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	4,0	$\Omega$
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, V_{AC} = 25\text{ mV}$		$C_{iss}$	1,84	nF
输出电容 Output capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, V_{AC} = 25\text{ mV}$		$C_{oss}$	0,11	nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, V_{AC} = 25\text{ mV}$		$C_{rss}$	0,014	nF
$C_{oss}$ stored energy	$T_{vj} = 25^{\circ}\text{C}$ $V_{DS} = 800\text{ V}, V_{GS} = -5\text{ V} / 15\text{ V}$		$E_{oss}$	44,0	$\mu\text{J}$
零栅电压漏极电流 Zero gate voltage drain current	$V_{DS} = 1200\text{ V}, V_{GS} = -5\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$I_{DSS}$	0,10 120	$\mu\text{A}$
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	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Gon} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ on}}$	8,20 7,40 7,40	ns
上升时间(电感负载) Rise time, inductive load	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Gon} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	6,30 6,70 6,70	ns
关断延迟时间(电感负载) Turn off delay time, inductive load	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Goff} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ off}}$	35,2 38,9 38,9	ns
下降时间(电感负载) Fall time, inductive load	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Goff} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	16,4 16,4 16,4	ns
开通损耗(每脉冲) Turn-on energy loss per pulse	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}, L\sigma = 30\text{ nH}$ $di/dt = 5,20\text{ kA}/\mu\text{s}$ ( $T_{vj} = 150^{\circ}\text{C}$ ) $V_{GS} = -5\text{ V} / 15\text{ V}, R_{Gon} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	0,30 0,37 0,37	mJ
关断损耗(每脉冲) Turn-off energy loss per pulse	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}, L\sigma = 30\text{ nH}$ $du/dt = 41,6\text{ kV}/\mu\text{s}$ ( $T_{vj} = 150^{\circ}\text{C}$ ) $V_{GS} = -5\text{ V} / 15\text{ V}, R_{Goff} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	0,033 0,035 0,035	mJ
短路数据 SC data	$V_{GS} = -5\text{ V} / 15\text{ V}, V_{DD} = 800\text{ V}$ $V_{DS\text{ max}} = V_{DSS} - L_{SDS} \cdot di/dt$ $R_G = 10,0\ \Omega$	$t_p \leq 2\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_p \leq 2\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	$I_{SC}$	210 205	A A
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个MOSFET / per MOSFET		$R_{thJH}$	1,54	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	$T_{vj} = 175^{\circ}\text{C}, V_{GS} = -5\text{ V}$	$T_H = 75^{\circ}\text{C}$	$I_{SD}$	8	A
-------------------------------	--	----------------------------	----------	---	---

## 特征值 / Characteristic Values

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

## 初步数据 Preliminary Data

### 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

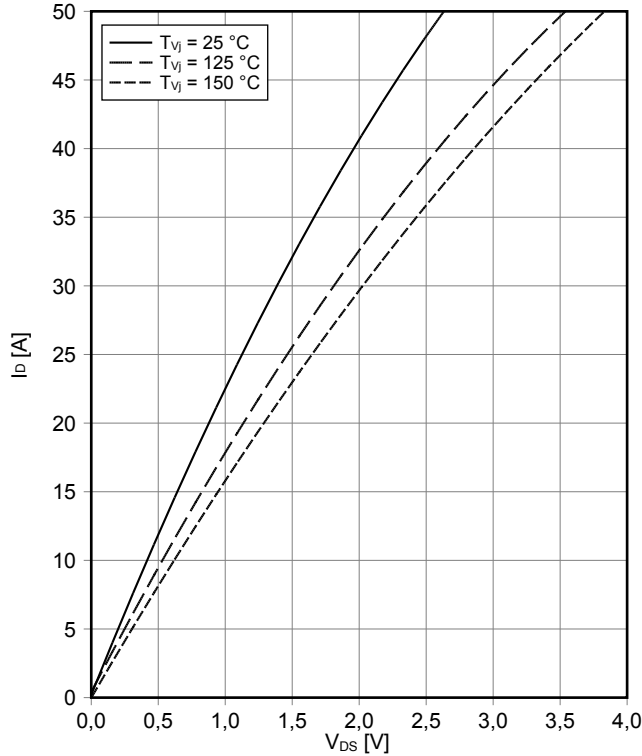
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	$V_{ISOL}$		3,0		kV
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)			$\text{Al}_2\text{O}_3$		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			11,5 6,3		mm
电气间隙 Clearance	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		$L_{sCE}$		18		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	20	-	50	N
重量 Weight		G		24		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.

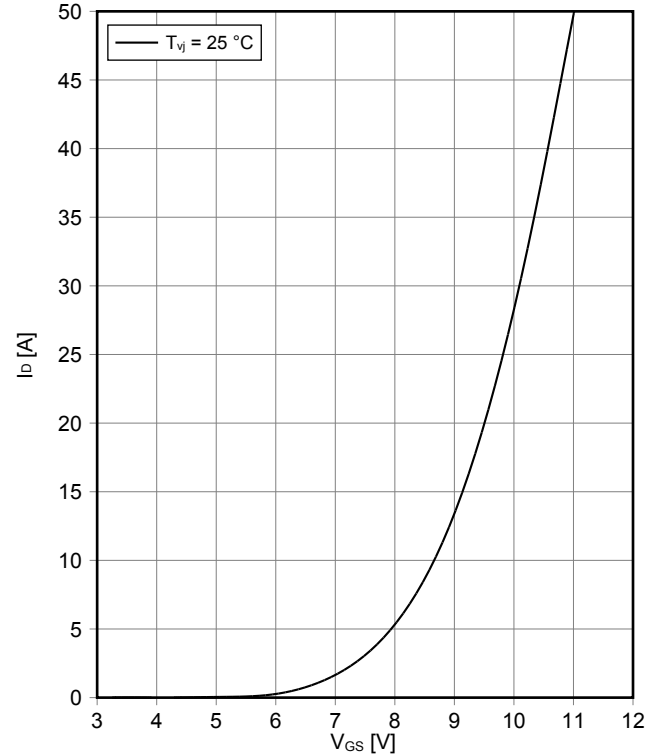
输出特性 MOSFET (典型)  
output characteristic MOSFET (typical)

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



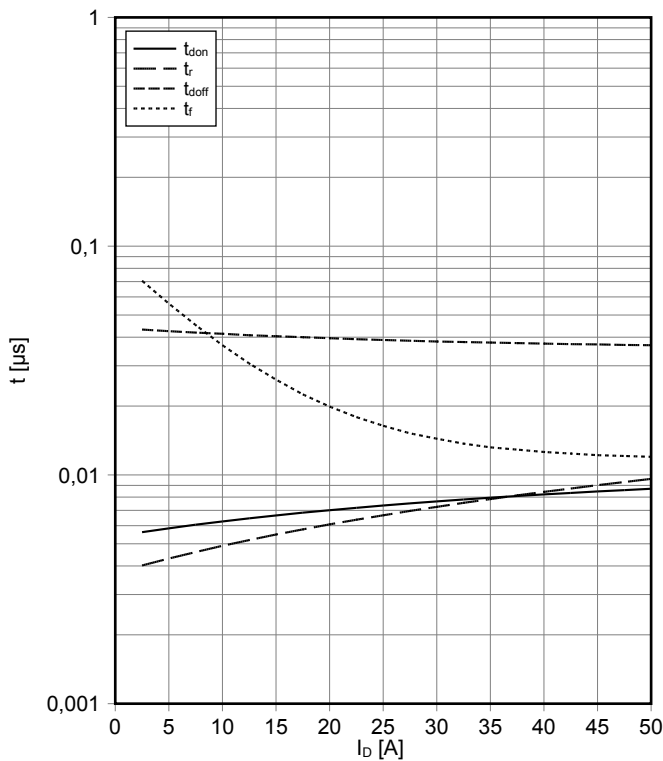
传输特性 MOSFET (典型)  
transfer characteristic MOSFET (typical)

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



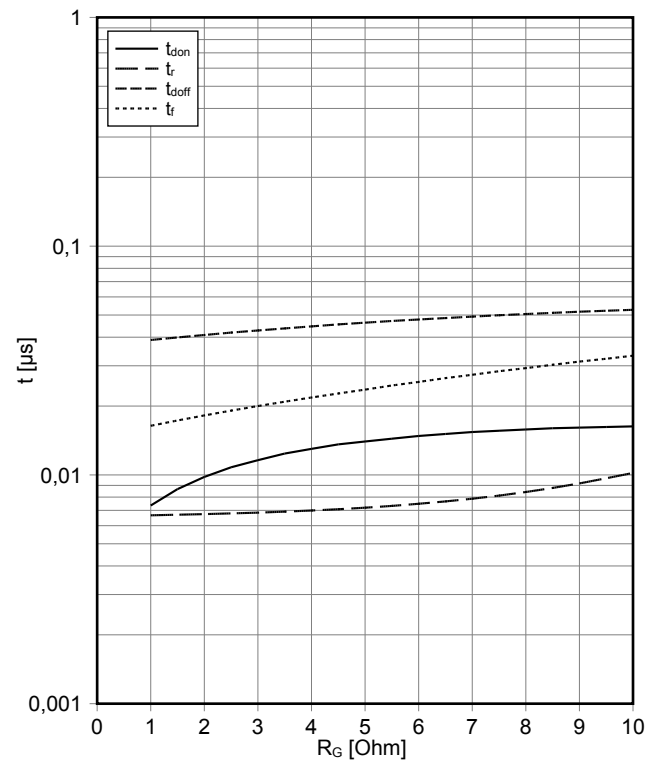
??? MOSFET (典型)  
switching times MOSFET (typical)

$t_{don} = f(I_D)$ ,  $t_r = f(I_D)$ ,  $t_{doff} = f(I_D)$ ,  $t_f = f(I_D)$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $R_{Gon} = 1\ \Omega$ ,  $R_{Goff} = 1\ \Omega$ ,  $V_{DS} = 600\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$



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

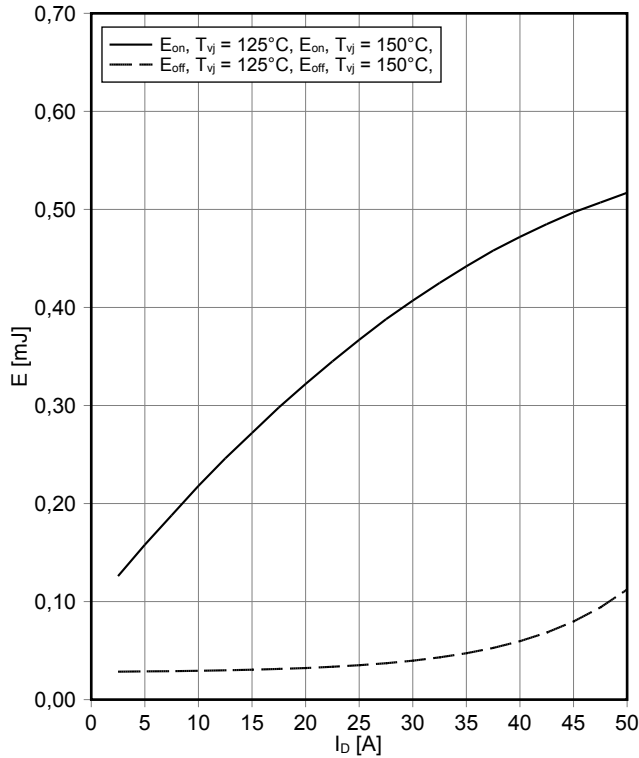
$t_{don} = f(R_G)$ ,  $t_r = f(R_G)$ ,  $t_{doff} = f(R_G)$ ,  $t_f = f(R_G)$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $I_D = 25\text{ A}$ ,  $V_{DS} = 600\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$



## 初步数据 Preliminary Data

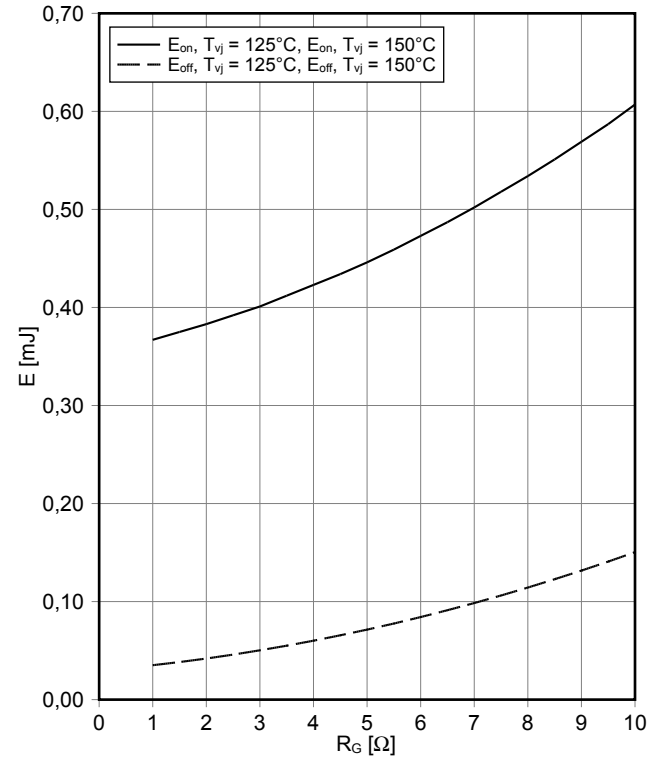
### 开关损耗 MOSFET (典型) switching losses MOSFET (typical)

$E_{on} = f(I_D)$ ,  $E_{off} = f(I_D)$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $R_{Gon} = 1\ \Omega$ ,  $R_{Goff} = 1\ \Omega$ ,  $V_{DS} = 600\text{ V}$



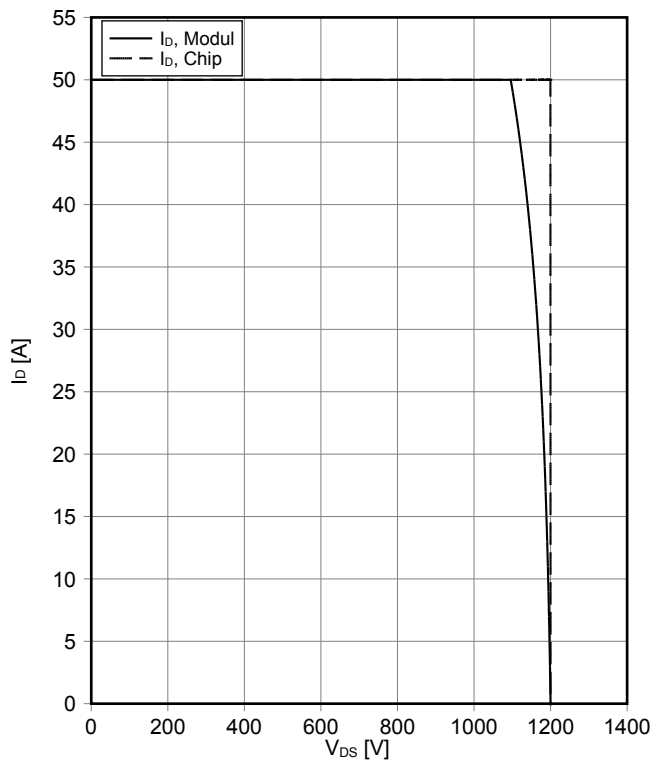
### 开关损耗 MOSFET (典型) switching losses MOSFET (typical)

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $I_D = 25\text{ A}$ ,  $V_{DS} = 600\text{ V}$



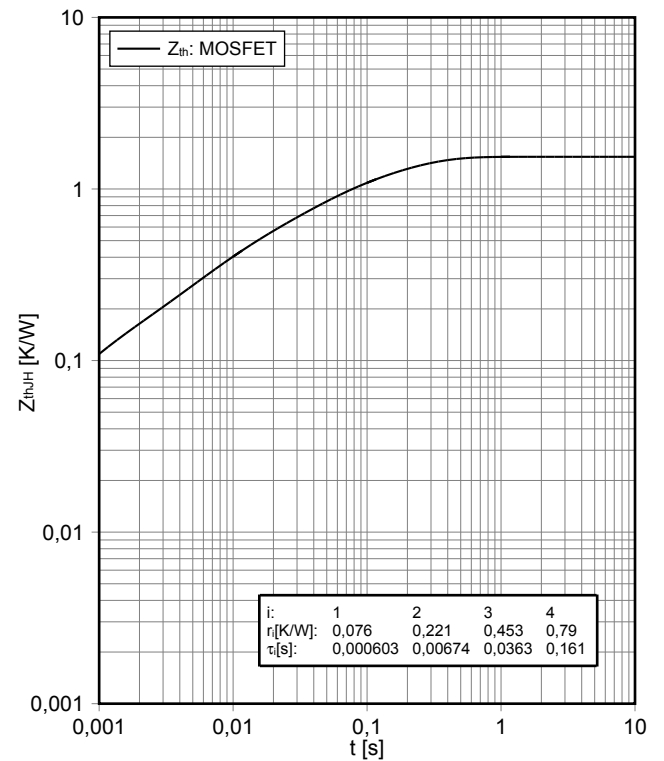
### 反偏安全工作区 MOSFET (RBSOA) reverse bias safe operating area MOSFET (RBSOA)

$I_D = f(V_{DS})$   
 $V_{GS} = -5\text{ V} / 15\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$ ,  $R_G = 1\ \Omega$



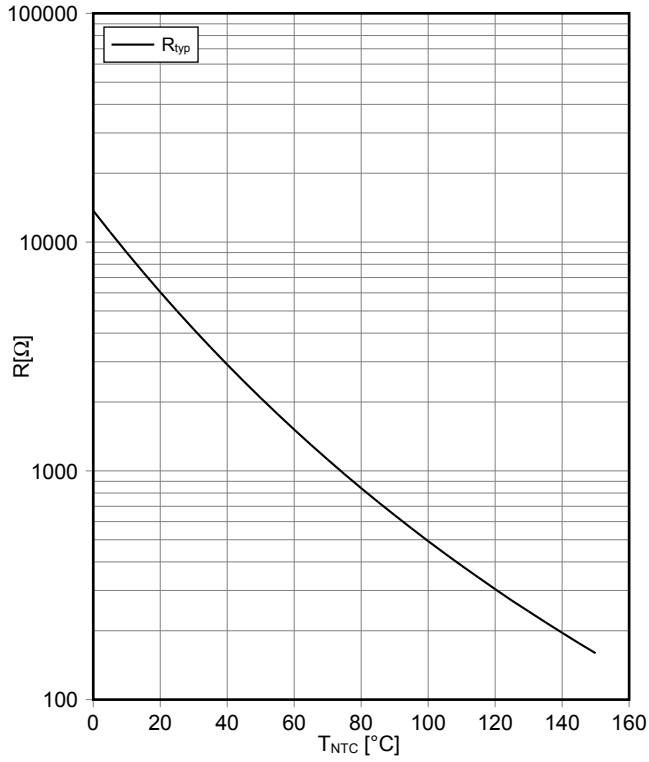
### 瞬态热阻抗 MOSFET transient thermal impedance MOSFET

$Z_{thJH} = f(t)$

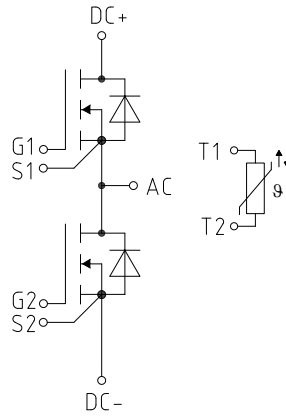


i:	1	2	3	4
$r_i$ [K/W]:	0,076	0,221	0,453	0,79
$\tau_i$ [s]:	0,000603	0,00674	0,0363	0,161

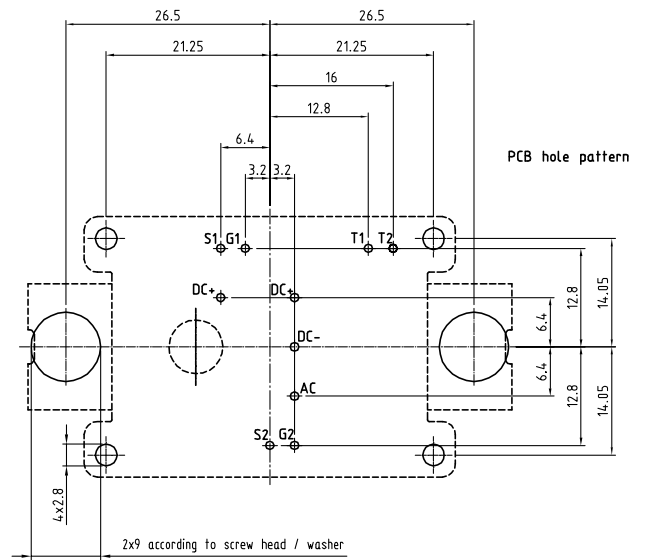
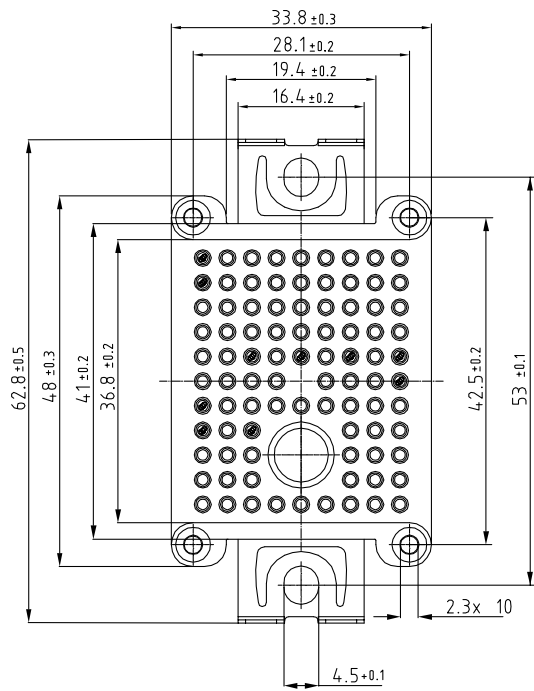
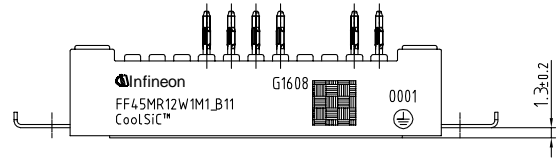
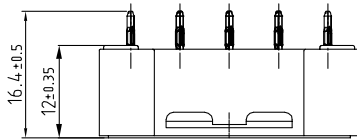
负温度系数热敏电阻 温度特性  
NTC-Thermistor-temperature characteristic (typical)  
 $R = f(T)$



## 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  $\varnothing 1.15$ mm and copper thickness in hole 25-50µm

#### Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2020-03-27

Published by  
Infineon Technologies AG  
81726 München, Germany

© 2020 Infineon Technologies AG.  
All Rights Reserved.

Do you have a question about this document?  
Email: [erratum@infineon.com](mailto:erratum@infineon.com)

#### 重要提示

本文档所提供的任何信息绝不当被视为针对任何条件或者品质而做出的保证（质量保证）。英飞凌对于本文档中所提及的任何事例、提示或者任何特定数值及/或任何关于产品应用方面的信息均在此明确声明其不承担任何保证或者责任，包括但不限于其不侵犯任何第三方知识产权的保证均在此排除。

此外，本文档所提供的任何信息均取决于客户履行本文档所载明的义务和客户遵守适用于客户产品以及与客户对于英飞凌产品的应用所相关的任何法律要求、规范和标准。

本文档所含的数据仅供经过专业技术培训的人员使用。客户自身的技术部门有义务对于产品是否适宜于其预期的应用和针对该等应用而言本文档中所提供的信息是否充分自行予以评估。

如需产品、技术、交付条款和条件以及价格等进一步信息，请向离您最近的英飞凌科技办公室接洽（[www.infineon.com](http://www.infineon.com)）。

#### 警告事项

由于技术所需产品可能含有危险物质。如需了解该等物质的类型，请向离您最近的英飞凌科技办公室接洽。

除非由经英飞凌科技授权代表签署的书面文件中做出另行明确批准的情况外，英飞凌科技的产品不当被用于任何一项一旦产品失效或者产品使用的后果可被合理地预料到可能导致人身伤害的任何应用领域。

#### IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

#### WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.