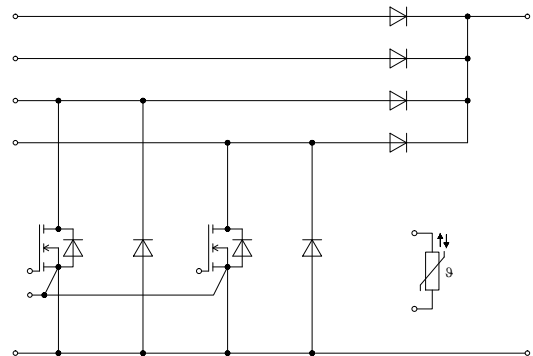
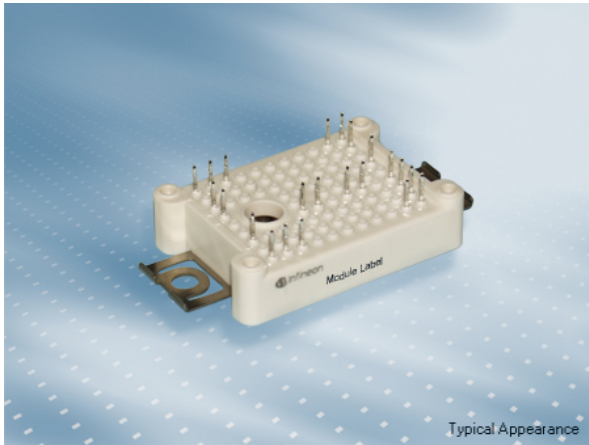


EasyPACK™ 模块 采用 CoolSiC™ Trench MOSFET 带有pressfit压接管脚和温度检测NTC
 EasyPACK™ module with CoolSiC™ Trench MOSFET and PressFIT / NTC

初步数据 / Preliminary Data



$V_{DSS} = 1200V$

$I_{D\ nom} = 25A / I_{DRM} = 50A$

潜在应用

- 太阳能应用

电气特性

- CoolSiC™ 碳化硅肖特基二极管第5代
- 低开关损耗
- 低电感设计
- 高电流密度

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

Potential Applications

- Solar applications

Electrical Features

- CoolSiC™ Schottky diode gen 5
- Low switching losses
- Low inductive design
- High current density

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

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

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	$T_{vj} = 175^{\circ}\text{C}, V_{GS} = 15\text{ V}$	$T_H = 70^{\circ}\text{C}$	$I_{D\text{ nom}}$	25
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
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 Ω		
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			μC
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	4,0			Ω
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			μJ
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		μA
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	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Gon} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ on}}$	11,3 10,6 10,1			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	7,20 7,20 7,20			ns
关断延迟时间(电感负载) Turn off delay time, inductive load	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}$ $V_{GS} = -5\text{ V} / 15\text{ V}$ $R_{Goff} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ off}}$	38,5 38,5 38,5			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	12,8 12,8 12,8			ns
开通损耗(每脉冲) Turn-on energy loss per pulse	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 6,80\text{ kA}/\mu\text{s}$ ($T_{vj} = 150^{\circ}\text{C}$) $V_{GS} = -5\text{ V} / 15\text{ V}, R_{Gon} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	0,222 0,227 0,227			mJ
关断损耗(每脉冲) Turn-off energy loss per pulse	$I_D = 25\text{ A}, V_{DS} = 600\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 62,0\text{ kV}/\mu\text{s}$ ($T_{vj} = 150^{\circ}\text{C}$) $V_{GS} = -5\text{ V} / 15\text{ V}, R_{Goff} = 1,00\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	0,045 0,045 0,045			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}	1,61			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	$T_{vj} = 175^{\circ}\text{C}, V_{GS} = -5\text{ V}$	$T_H = 70^{\circ}\text{C}$	I_{SD}	8	A
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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

Diode, 转换器 / Diode, Boost

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	20	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1\text{ ms}$	I_{FRM}	40	A
I ² t-值 I ² t - 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	50,0 55,0	A ² s A ² s

特征值 / Characteristic Values

		min.	typ.	max.	
正向电压 Forward voltage	$I_F = 20\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 20\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 20\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	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	$I_F = 20\text{ A}, -di_F/dt = 5600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	30,1 29,9 29,9	A A A
恢复电荷 Recovered charge	$I_F = 20\text{ A}, -di_F/dt = 5600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	0,242 0,248 0,248	μC μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 20\text{ A}, -di_F/dt = 5600\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	0,027 0,031 0,031	mJ mJ mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode		R_{thJH}	1,38	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150 $^{\circ}\text{C}$

旁路二极管 / Bypass-Diode

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
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	$T_H = 80^{\circ}\text{C}$	I_{FRMSM}	50	A
最大整流器输出均方根电流 Maximum RMS current at rectifier output	$T_H = 80^{\circ}\text{C}$	I_{RMSM}	50	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}	450 360	A A
I ² t-值 I ² t - 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	1010 648	A ² s A ² s

特征值 / Characteristic Values

		min.	typ.	max.	
正向电压 Forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 30\text{ A}$	V_F	0,95		V
反向电流 Reverse current	$T_{vj} = 150^{\circ}\text{C}, V_R = 1200\text{ V}$	I_R	0,10		mA
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode		R_{thJH}	1,37	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

反极性保护二极管A / Inverse-polarity protection diode A

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
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	$T_H = 80^{\circ}\text{C}$	I_{FRMSM}	50	A
最大整流器输出均方根电流 Maximum RMS current at rectifier output	$T_H = 80^{\circ}\text{C}$	I_{RMSM}	50	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}	450 360	A A
I ² t-值 I ² t - value	$t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I ² t	1010 648	A ² s A ² s

特征值 / Characteristic Values

		min. typ. max.		
正向电压 Forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 30\text{ A}$	V_F	0,95	V
反向电流 Reverse current	$T_{vj} = 150^{\circ}\text{C}, V_R = 1200\text{ V}$	I_R	0,10	mA
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode	R_{thJH}	1,37	K/W
在开关状态下温度 Temperature under switching conditions		$T_{vj\text{ op}}$	-40	150 °C

反极性保护二极管B / Inverse-polarity protection diode B

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
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	$T_H = 80^{\circ}\text{C}$	I_{FRMSM}	50	A
最大整流器输出均方根电流 Maximum RMS current at rectifier output	$T_H = 80^{\circ}\text{C}$	I_{RMSM}	50	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}	450 360	A A
I ² t-值 I ² t - value	$t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I ² t	1010 648	A ² s A ² s

特征值 / Characteristic Values

		min. typ. max.		
正向电压 Forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 30\text{ A}$	V_F	0,95	V
反向电流 Reverse current	$T_{vj} = 150^{\circ}\text{C}, V_R = 1200\text{ V}$	I_R	0,10	mA
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode	R_{thJH}	1,37	K/W
在开关状态下温度 Temperature under switching conditions		$T_{vj\text{ op}}$	-40	150 °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 Ω
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)			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			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}		10		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

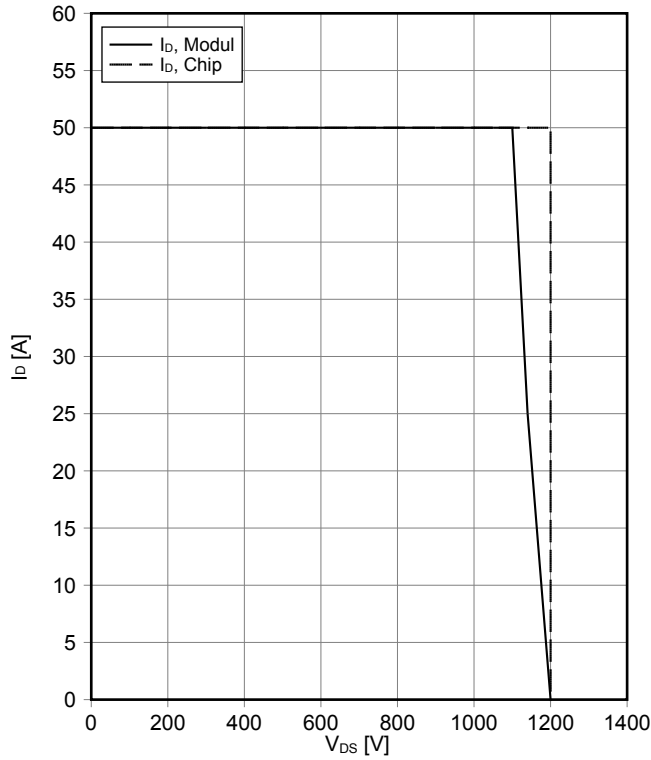
The current under continuous operation is limited to 25 A rms per connector pin.

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.

初步数据 Preliminary Data

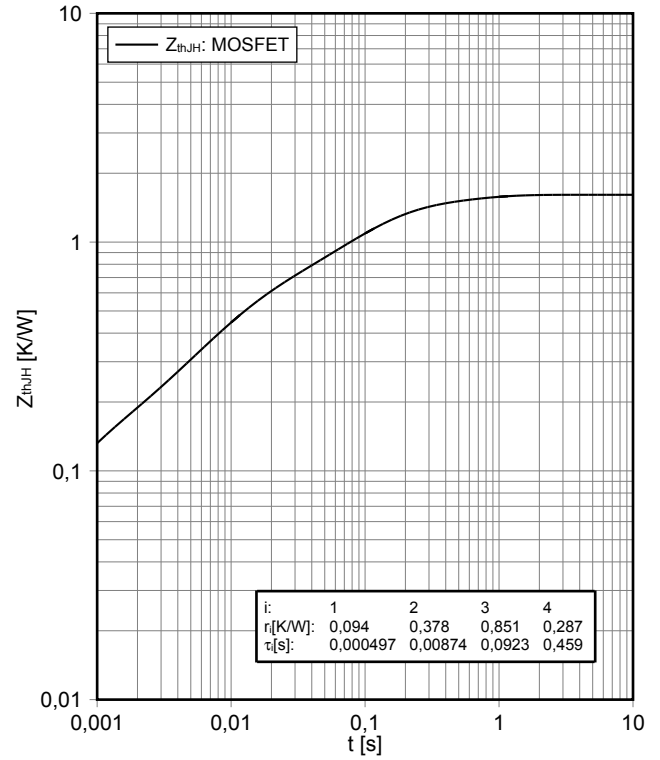
反偏安全工作区 MOSFET (RBSOA) reverse bias safe operating area MOSFET (RBSOA)

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



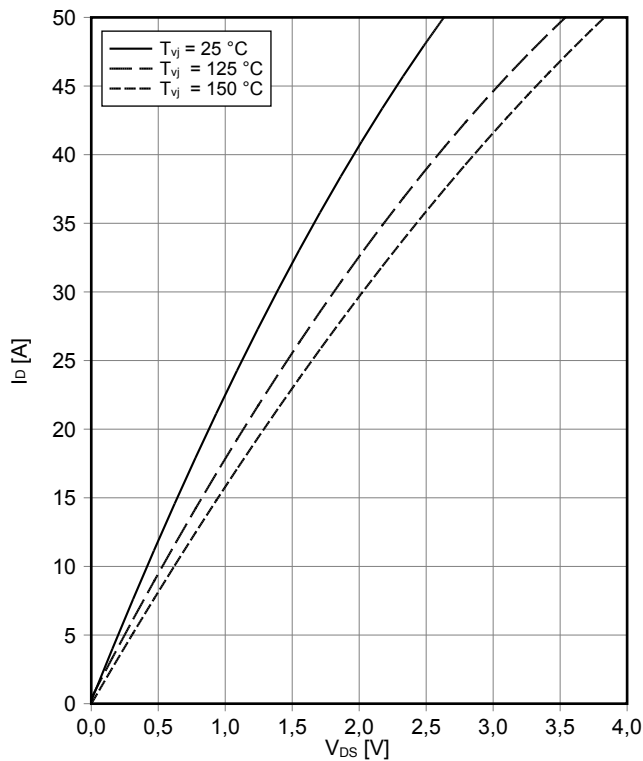
瞬态热阻抗 MOSFET transient thermal impedance MOSFET

$Z_{thJH} = f(t)$



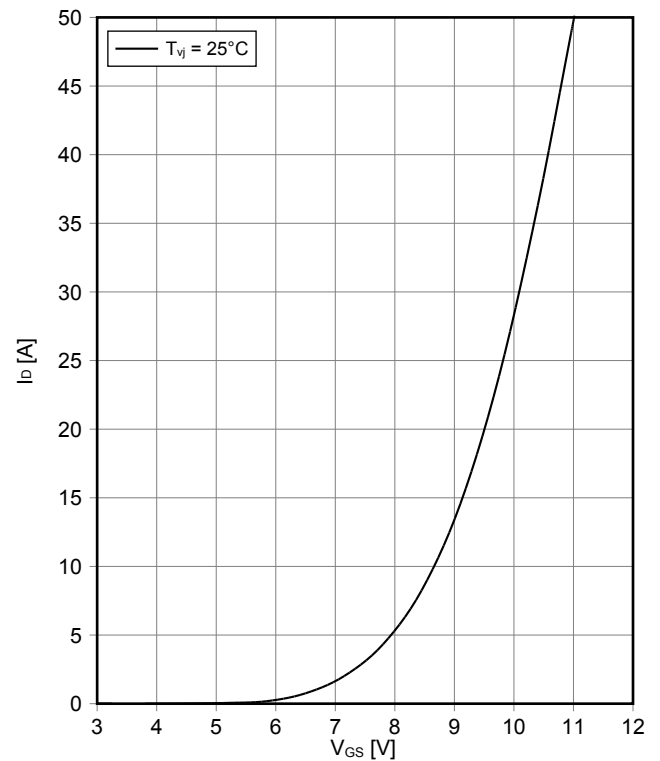
输出特性 MOSFET (典型) output characteristic MOSFET (typical)

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



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

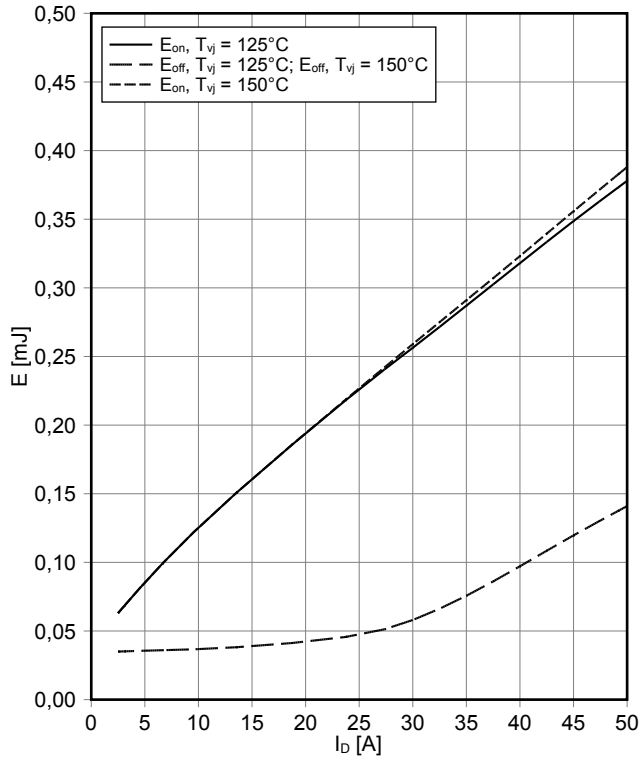
$I_D = f(V_{GS})$
 $V_{DS} = 20\text{ V}$



初步数据 Preliminary Data

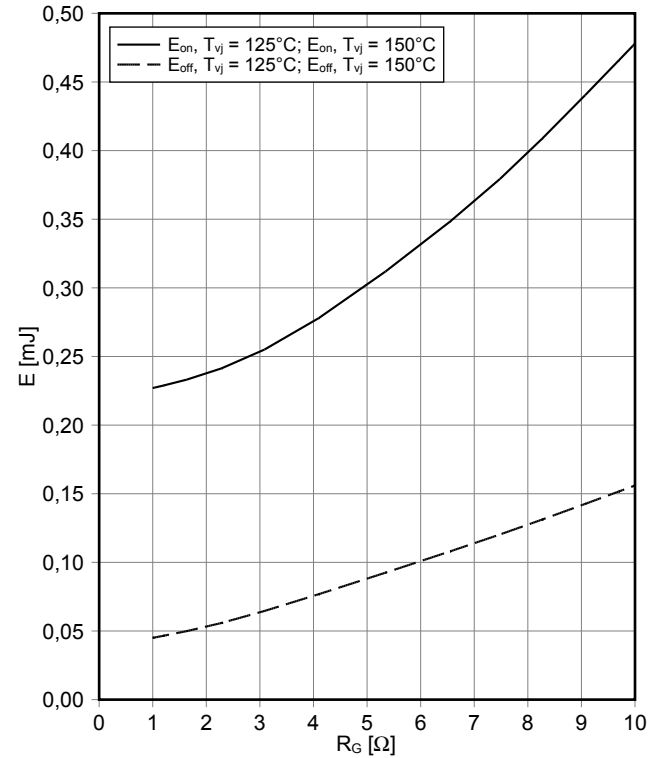
开关损耗 MOSFET (典型) switching losses MOSFET (typical)

$E_{on} = f(I_D)$, $E_{off} = f(I_D)$
 $V_{GS} = -5\text{ V} / 15\text{ V}$, $R_{Gon} = 1,0\ \Omega$, $R_{Goff} = 1,0\ \Omega$, $V_{DS} = 600\text{ V}$



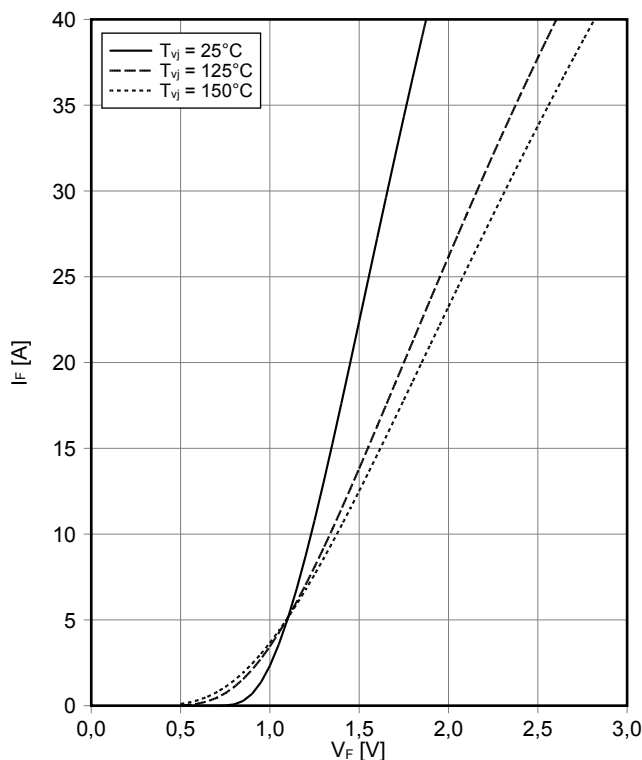
开关损耗 MOSFET (典型) switching losses MOSFET (typical)

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



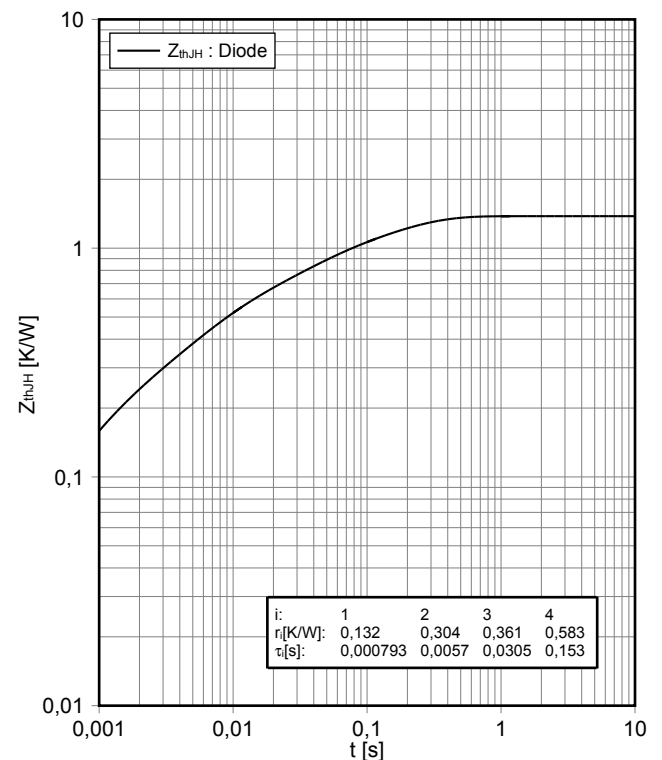
正向偏压特性 Diode, 转换器 (典型) forward characteristic of Diode, Boost (typical)

$I_F = f(V_F)$



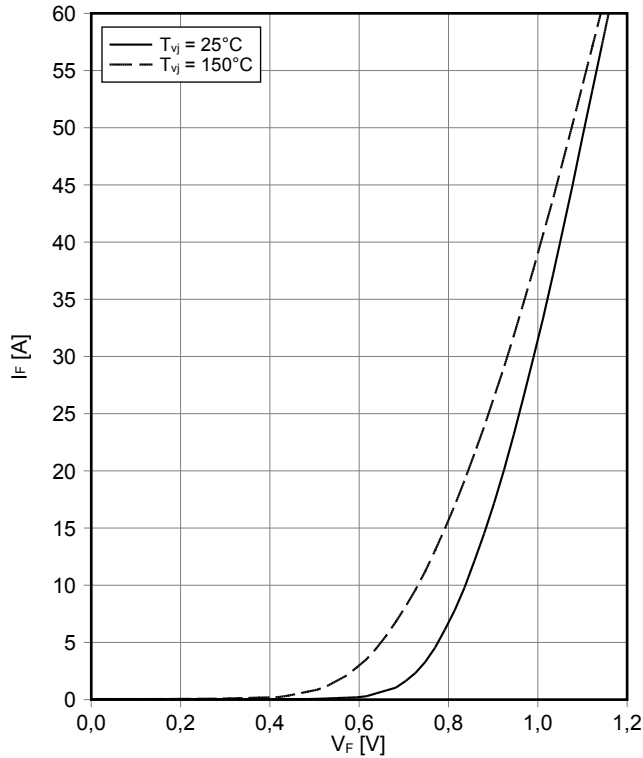
瞬态热阻抗 Diode, 转换器 transient thermal impedance Diode, Boost

$Z_{thJH} = f(t)$

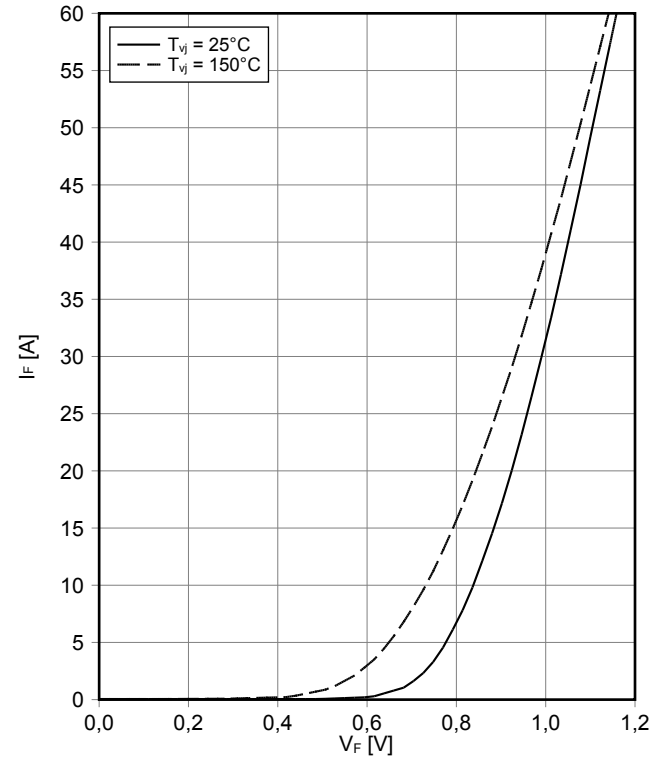


初步数据 Preliminary Data

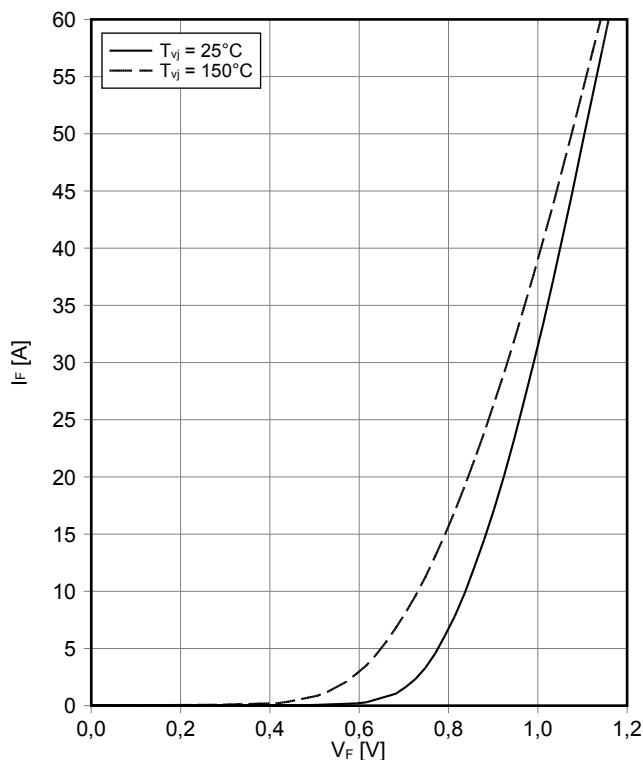
正向偏压特性 旁路二极管 (典型)
forward characteristic of Bypass-Diode (typical)
 $I_F = f(V_F)$



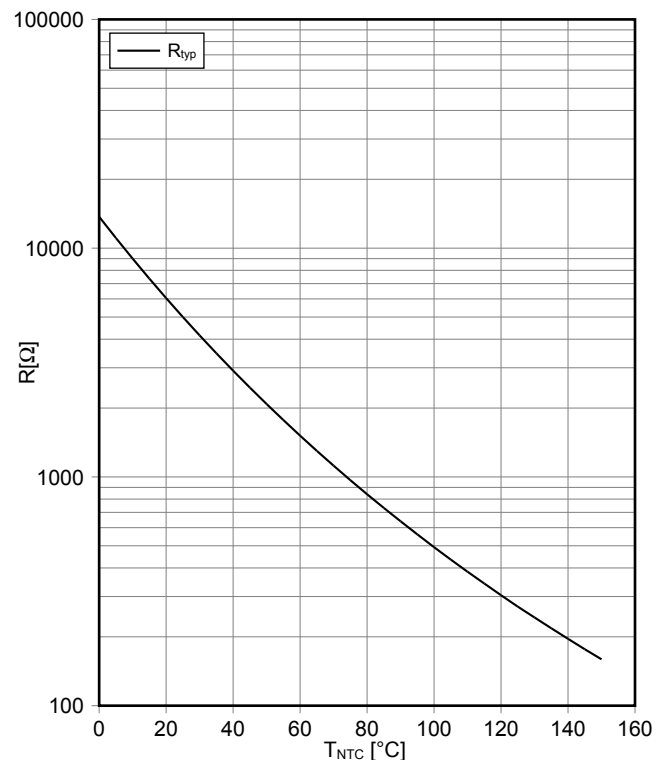
正向偏压特性 反极性保护二极管A (典型)
forward characteristic of Inverse-polarity protection diode A (typical)
 $I_F = f(V_F)$



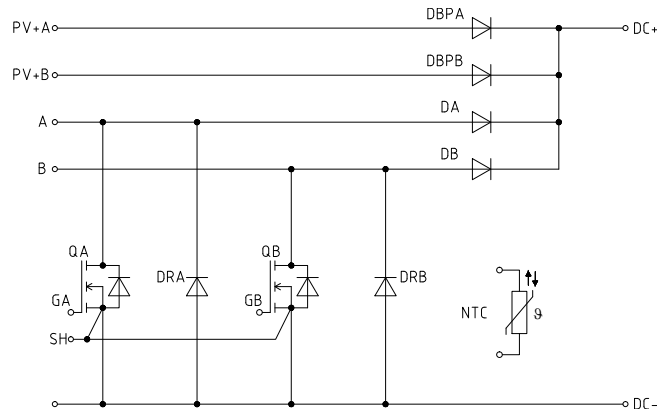
正向偏压特性 反极性保护二极管B (典型)
forward characteristic of Inverse-polarity protection diode B (typical)
 $I_F = f(V_F)$



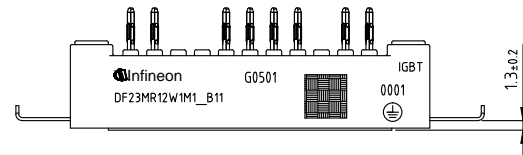
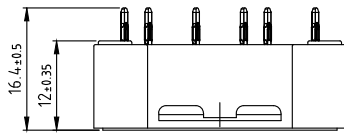
负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
 $R = f(T)$



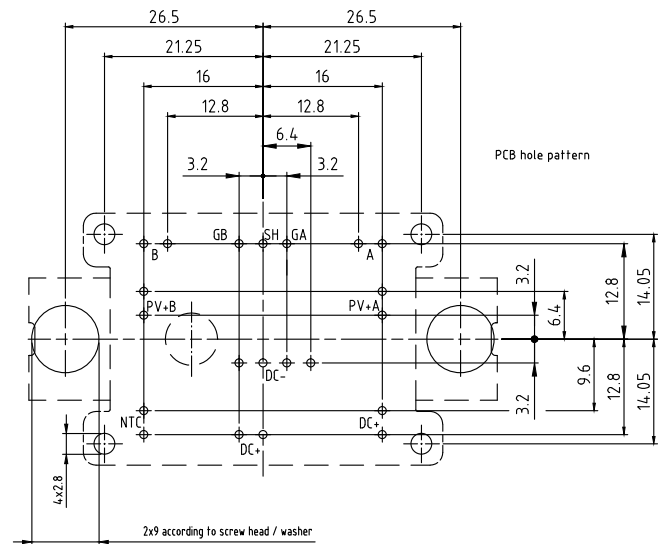
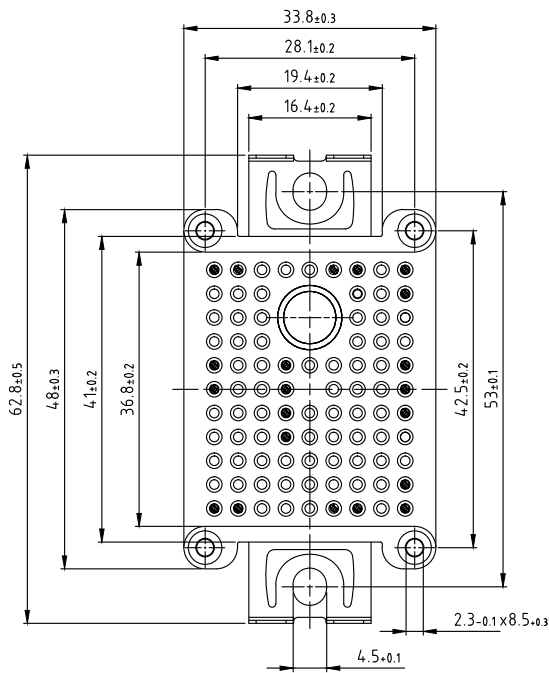
接线图 / Circuit diagram



封装尺寸 / Package outlines



- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern $\pm \phi 0.1$
- Hole specification for contacts see AN 2009-01:
Diameters of drill ϕ 1.15mm
and copper thickness in hole 25-50 μ m



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