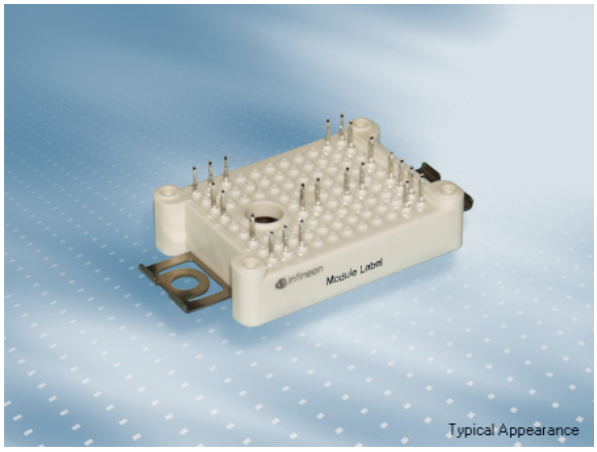
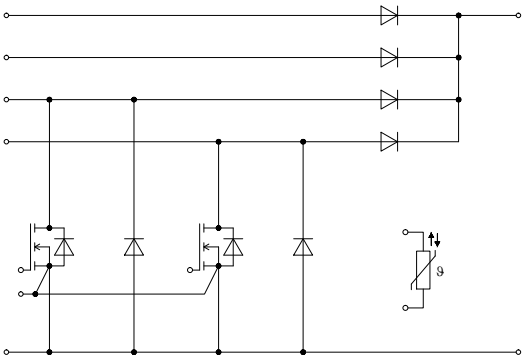
EasyPACK™ 模块 采用 CoolSiC™ Trench MOSFET 带有pressfit压接管脚和温度检测NTC
EasyPACK™ module with CoolSiC™ Trench MOSFET and PressFIT / NTC

初步数据 / Preliminary Data





V_{DSS} = 1200V
$I_{D\ nom}$ = 50A / I_{DRM} = 100A

潜在应用
- 太阳能应用

Potential Applications
- Solar applications

电气特性
- 低电感设计
- 高电流密度

Electrical Features
- 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

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

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°C	V_{DSS}	1200		V
直流漏极电流 DC drain current	T_{vj} = 175°C, V_{GS} = 15 V, T_H = 30°C	$I_{D\ nom}$	50		A
脉冲漏极电流 Pulsed drain current	经设计验证，tp由Tvjmax限定 verified by design, t_p limited by T_{vjmax}	$I_{D\ pulse}$	100		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 = 50 A, V_{GS} = 15 V T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$R_{DS\ on}$		22,5 29,5 33,0		mΩ
栅极阈值电压 Gate threshold voltage	I_D = 20,0 mA, V_{DS} = V_{GS}, T_{vj} = 25°C (tested after 1ms pulse at V_{GS} = +20 V)	$V_{GS(th)}$	3,45	4,50	5,55	V
总的栅极电荷 Total gate charge	V_{GS} = -5 V / 15 V, V_{DS} = 800 V	Q_G		0,124		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C	R_{Gint}		2,0		Ω
输入电容 Input capacitance	f = 1 MHz, T_{vj} = 25°C V_{DS} = 800 V, V_{GS} = 0 V, V_{AC} = 25 mV	C_{iss}		3,68		nF
输出电容 Output capacitance	f = 1 MHz, T_{vj} = 25°C V_{DS} = 800 V, V_{GS} = 0 V, V_{AC} = 25 mV	C_{oss}		0,22		nF
反向传输电容 Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C V_{DS} = 800 V, V_{GS} = 0 V, V_{AC} = 25 mV	C_{rss}		0,028		nF
C_{OSS} stored energy	T_{vj} = 25°C V_{DS} = 800 V, V_{GS} = -5 V / 15 V	E_{oss}		88,0		µJ
零栅电压漏极电流 Zero gate voltage drain current	V_{DS} = 1200 V, V_{GS} = -5 V, T_{vj} = 25°C	I_{DSS}		0,20	210	µA
栅极漏电流 Gate-source leakage current	V_{DS} = 0 V, T_{vj} = 25°C V_{GS} = 20 V V_{GS} = -10 V	I_{GSS}			400	nA
开通延迟时间(电感负载) Turn on delay time, inductive load	I_D = 50 A, V_{DS} = 600 V, V_{GS} = -5 V / 15 V, R_{Gon} = 1,00 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\ on}$		10,0 10,0 10,0		ns
上升时间(电感负载) Rise time, inductive load	I_D = 50 A, V_{DS} = 600 V, V_{GS} = -5 V / 15 V, R_{Gon} = 1,00 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		9,60 9,60 9,60		ns
关断延迟时间(电感负载) Turn off delay time, inductive load	I_D = 50 A, V_{DS} = 600 V, V_{GS} = -5 V / 15 V, R_{Goff} = 1,00 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\ off}$		43,5 43,5 43,5		ns
下降时间(电感负载) Fall time, inductive load	I_D = 50 A, V_{DS} = 600 V, V_{GS} = -5 V / 15 V, R_{Goff} = 1,00 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		12,0 12,0 12,0		ns
开通损耗 (每脉冲) Turn-on energy loss per pulse	I_D = 50 A, V_{DS} = 600 V, Lσ = 35 nH, di/dt = 11,0 kA/µs (T_{vj} = 150°C), V_{GS} = -5 V / 15 V, R_{Gon} = 1,00 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		0,385 0,385 0,385		mJ
关断损耗 (每脉冲) Turn-off energy loss per pulse	I_D = 50 A, V_{DS} = 600 V, Lσ = 35 nH, du/dt = 55,0 kV/µs (T_{vj} = 150°C), V_{GS} = -5 V / 15 V, R_{Goff} = 1,00 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		0,10 0,10 0,10		mJ
短路数据 SC data	V_{GS} = -5 V / 15 V, V_{DD} = 800 V, V_{DSmax} = V_{DSS} -L_{sDS} ·di/dt, R_G = 10,0 Ω t_P ≤ 2 µs, T_{vj} = 25°C t_P ≤ 2 µs, T_{vj} = 150°C	I_{SC}		420 410		A A
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个MOSFET / per MOSFET	R_{thJH}		1,12		K/W
在开关状态下温度 Temperature under switching conditions		$T_{vj\ op}$	-40		150	°C

Body diode

最大额定值 / Maximum Rated Values

DC body diode forward current	T_{vj} = 175°C, V_{GS} = -5 V, T_H = 30°C	I_{SD}	16		A

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_{SD} = 50 A, V_{GS} = -5 V I_{SD} = 50 A, V_{GS} = -5 V I_{SD} = 50 A, V_{GS} = -5 V T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_{SD}		4,60 4,35 4,30	5,65	V

初步数据
Preliminary Data

Diode, 轉換器 / 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°C	V_{RRM}	1200		V
连续正向直流电流 Continuous DC forward current		I_F	40		A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	80		A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I²t	320 295		A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 40 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 40 A, V_{GE} = 0 V, T_{vj} = 125°C I_F = 40 A, V_{GE} = 0 V, T_{vj} = 150°C	V_F		1,40 1,70 1,85	1,85	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 40 A, - di_F/dt = 9500 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 600 V, T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		60,0 57,0 57,0		A A A
恢复电荷 Recovered charge	I_F = 40 A, - di_F/dt = 9500 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 600 V, T_{vj} = 125°C T_{vj} = 150°C	Q_r		0,523 0,531 0,531		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 40 A, - di_F/dt = 9500 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 600 V, T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		0,089 0,096 0,096		mJ mJ mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode	R_{thJH}		1,08		K/W
在开关状态下温度 Temperature under switching conditions		$T_{vj\,op}$	-40		150	°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°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°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°C	I_{RMSM}	50		A
正向浪涌电流 Surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	450 360		A A
I2t-值 I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I²t	1010 648		A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	T_{vj} = 150°C, I_F = 30 A	V_F		0,95		V
反向电流 Reverse current	T_{vj} = 150°C, V_R = 1200 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		$T_{vj\,op}$	-40		150	°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°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°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°C	I_{RMSM}	50	A
正向浪涌电流 Surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	450 360	A A
I2t-值 I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I²t	1010 648	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	T_{vj} = 150°C, I_F = 30 A	V_F		0,95		V
反向电流 Reverse current	T_{vj} = 150°C, V_R = 1200 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		$T_{vj\,op}$	-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°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°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°C	I_{RMSM}	50	A
正向浪涌电流 Surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	450 360	A A
I2t-值 I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I²t	1010 648	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	T_{vj} = 150°C, I_F = 30 A	V_F		0,95		V
反向电流 Reverse current	T_{vj} = 150°C, V_R = 1200 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		$T_{vj\,op}$	-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°C	R_{25}		5,00		kΩ
R100 偏差 Deviation of R100	T_{NTC} = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
耗散功率 Power dissipation	T_{NTC} = 25°C	P_{25}			20,0	mW
B-值 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\ K))]$	$B_{25/80}$		3411		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\ K))]$	$B_{25/100}$		3433		K

根据应用手册标定
Specification according to the valid application note.

模块 / Module

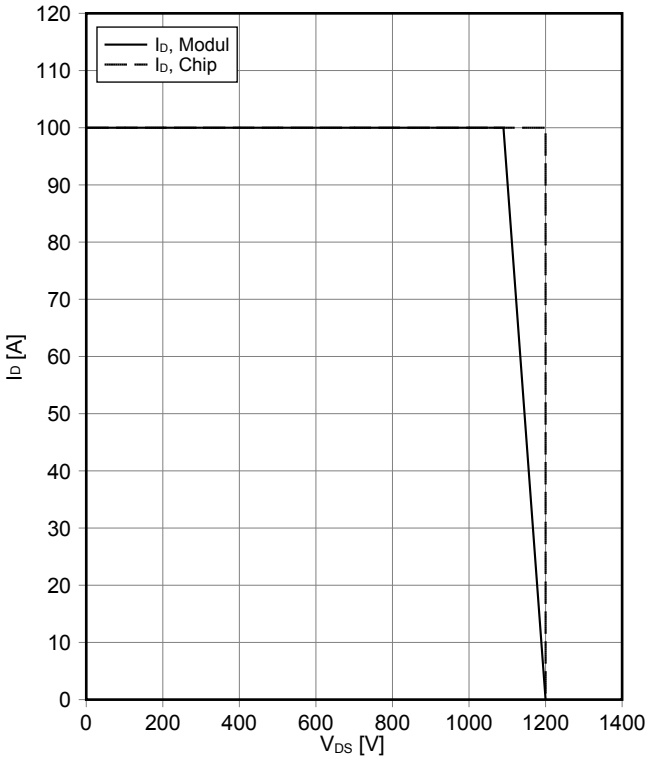
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	3,0		kV
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)		Al_2O_3		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		11,5 6,3		mm
电气间隙 Clearance	端子至散热器 / terminal 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		°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	°C
Anpresskraft für mech. Bef. pro Feder mountig force per clamp		F	20	-	50	N
重量 Weight		G		24		g

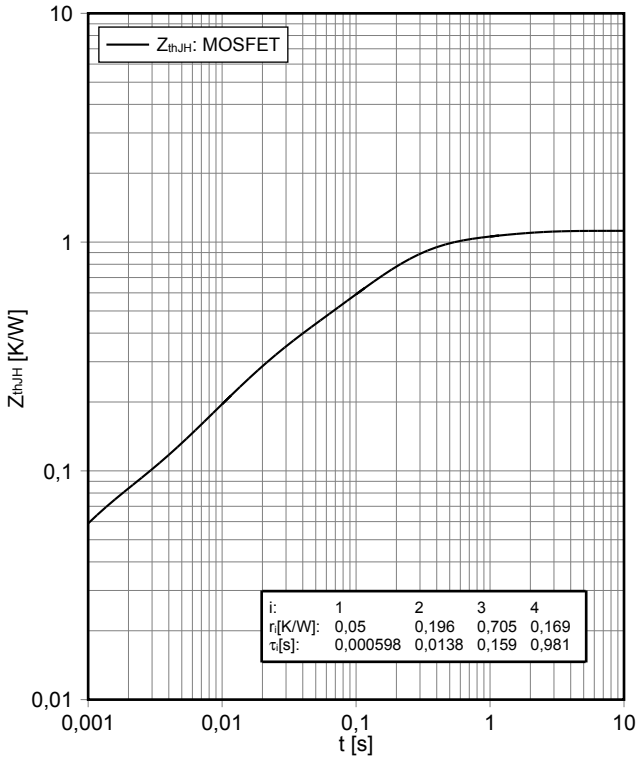
The current under continuous operation is limited to 25 A rms per connector pin.
Important note: The selection of positive and negative gate-source voltages impacts the long-term behavior of the device. The design guidelines described in Application Note AN 2018-09 must be considered to ensure sound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

初步数据
Preliminary Data

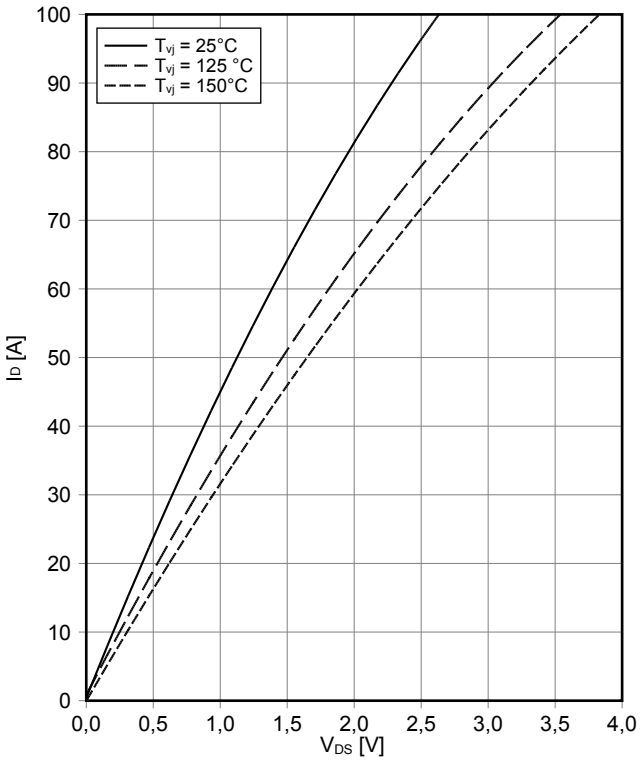
反偏安全工作区 MOSFET (RBSOA)
reverse bias safe operating area MOSFET (RBSOA)
$I_D = f(V_{DS})$
V_{GS} = -5 V / 15 V, R_G = 1 Ω, T_{vj} = 150°C



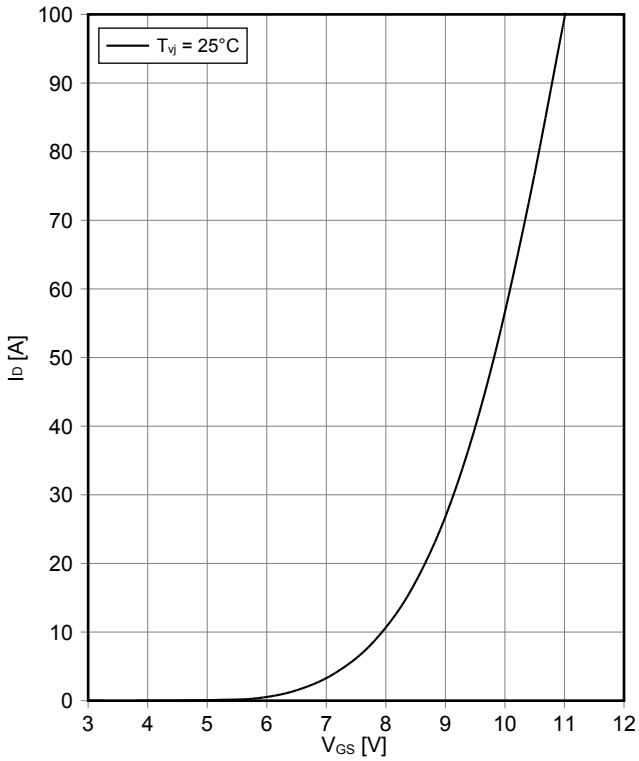
瞬态热阻抗 MOSFET
transient thermal impedance MOSFET
$Z_{thJH} = f(t)$



输出特性 MOSFET （典型）
output characteristic MOSFET (typical)
$I_D = f(V_{DS})$
V_{GS} = 15 V

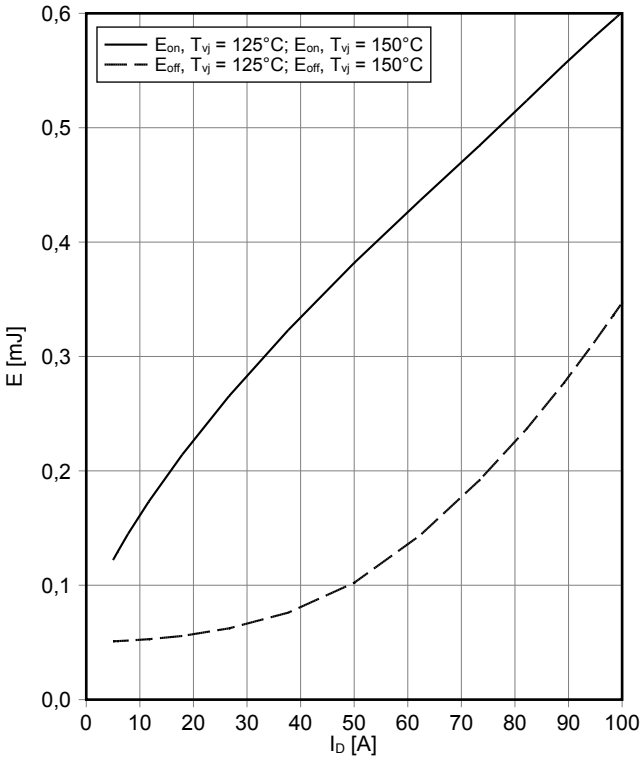


传输特性 MOSFET （典型）
transfer characteristic MOSFET (typical)
$I_D = f(V_{GS})$
V_{DS} = 20 V

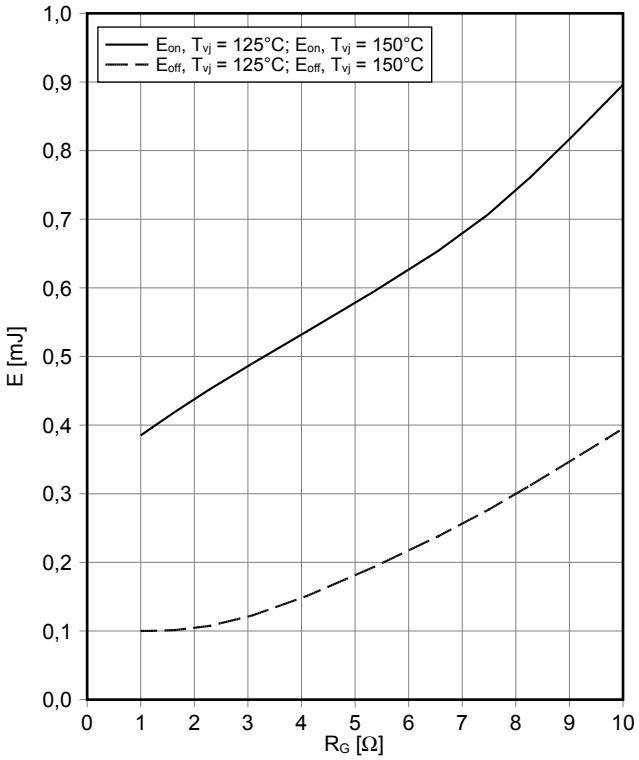


初步数据
Preliminary Data

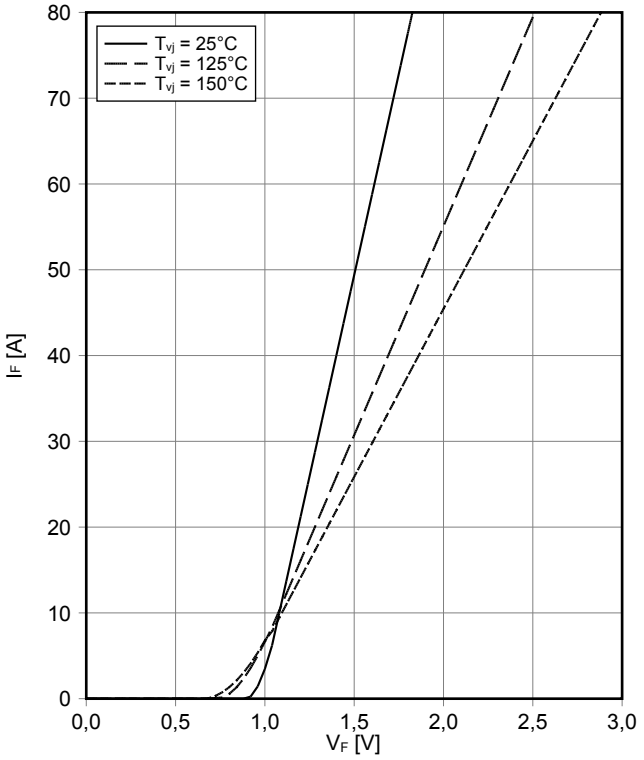
开关损耗 MOSFET （典型）
switching losses MOSFET (typical)
$E_{on} = f(I_D)$, $E_{off} = f(I_D)$
V_{GS} = - 5 V / 15 V, R_{Gon} = 1,0 Ω, R_{Goff} = 1,0 Ω, V_{DS} = 600 V



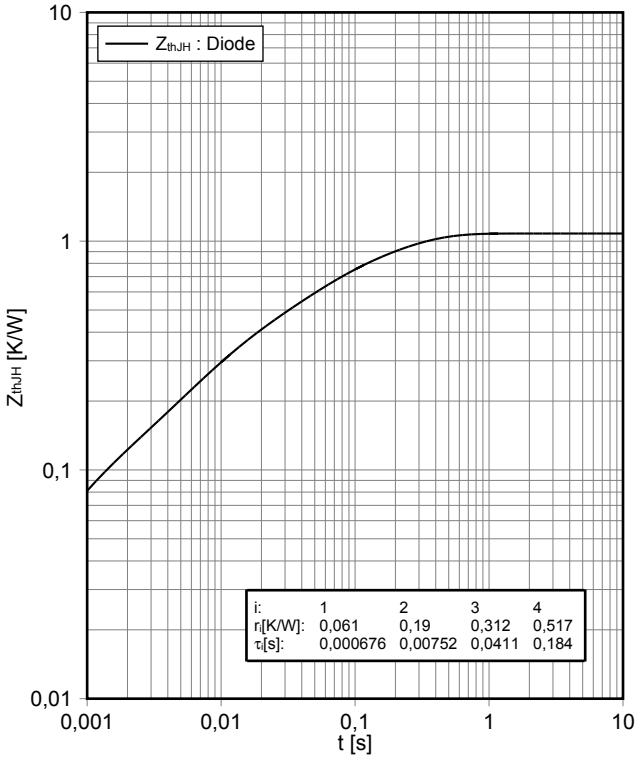
开关损耗 MOSFET （典型）
switching losses MOSFET (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GS} = - 5 V / 15 V , I_D = 50 A, V_{DS} = 600 V



正向偏压特性 Diode, 轉換器 （典型）
forward characteristic of Diode, Boost (typical)
$I_F = f(V_F)$

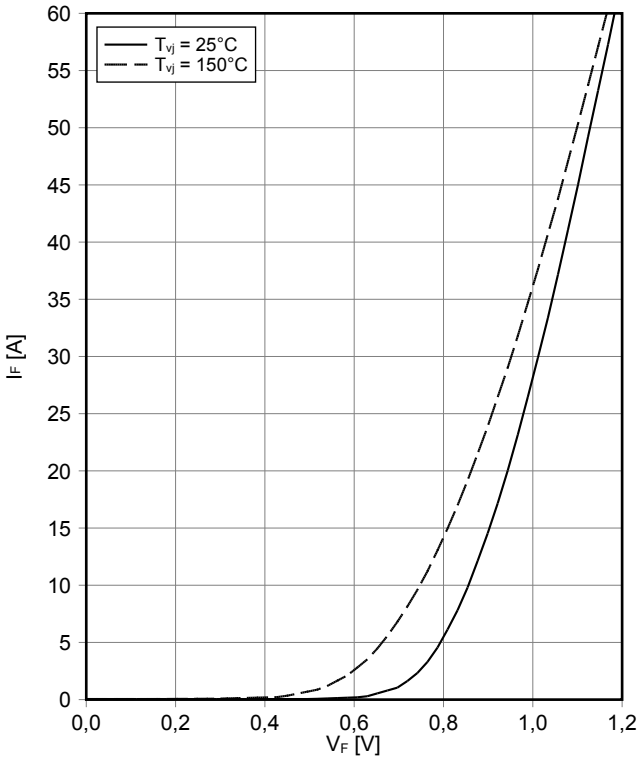


瞬态热阻抗 Diode, 轉換器
transient thermal impedance Diode, Boost
$Z_{thJH} = f(t)$

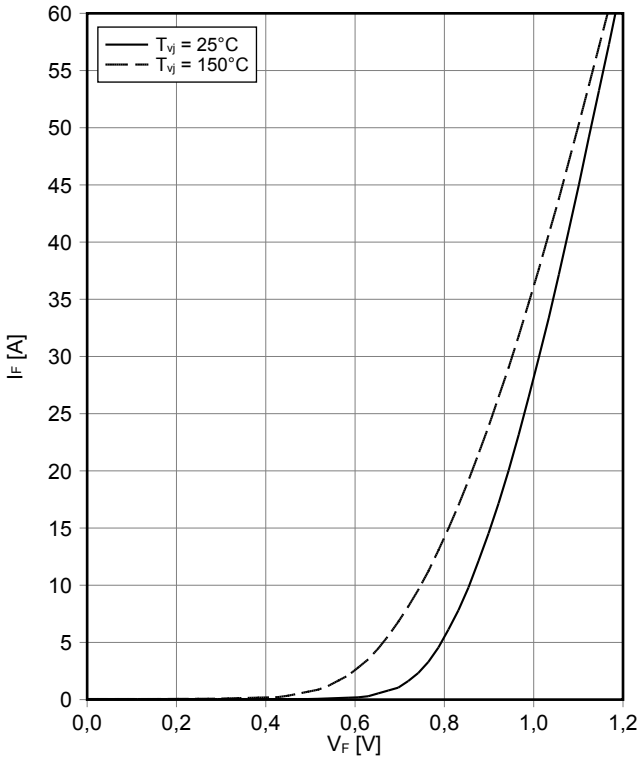


初步数据
Preliminary Data

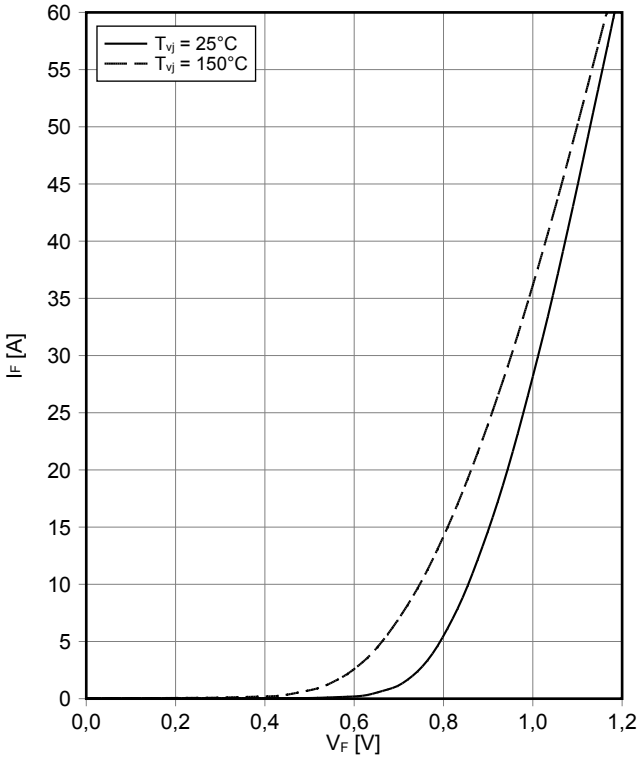
正向偏压特性 旁路二极管 （典型）
forward characteristic of Bypass-Diode (typical)
$I_F = f(V_F)$



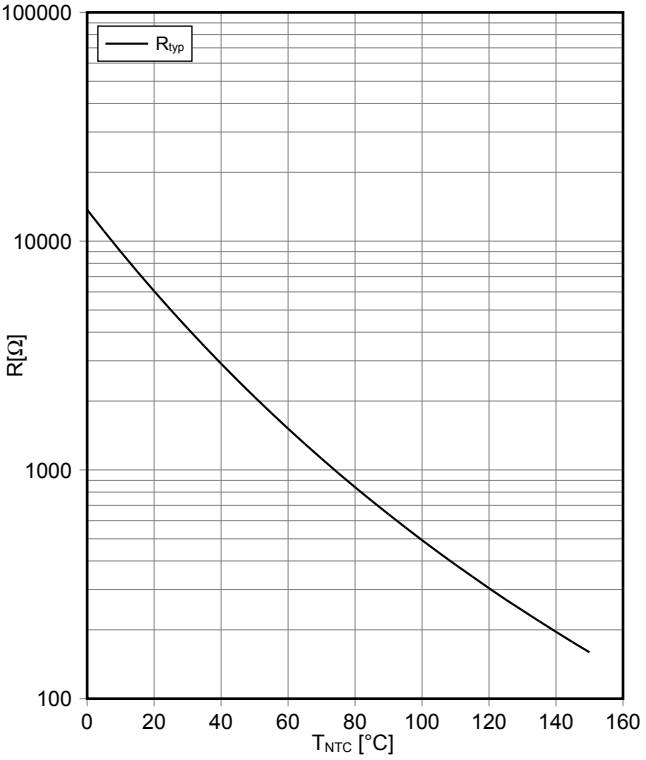
正向偏压特性 反极性保护二极管A （典型）
forward characteristic of Inverse-polarity protection diode A (typical)
$I_F = f(V_F)$



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)
$I_F = f(V_F)$

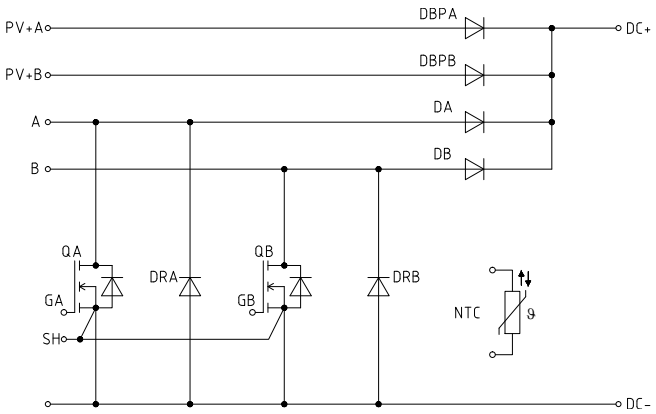


负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)

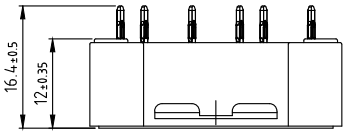


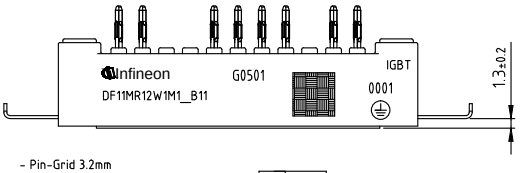
初步数据
Preliminary Data

接线图 / Circuit diagram

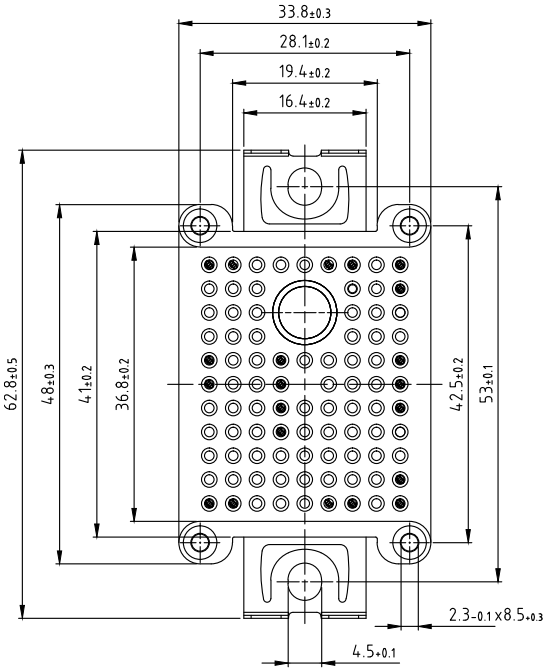


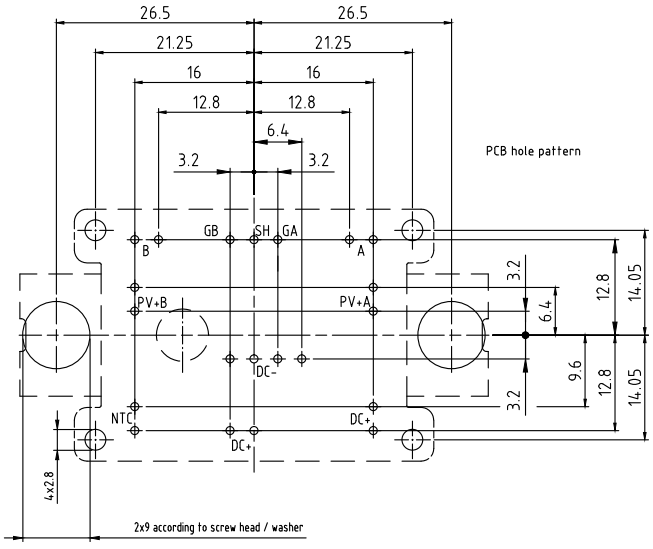
封装尺寸 / Package outlines





- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern ⌖ Ø0.1
- Hole specification for contacts see AN 2009-01:
  Diameters of drill Ø 1.15mm
  and copper thickness in hole 25-50µm





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