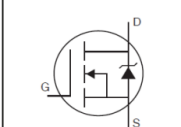


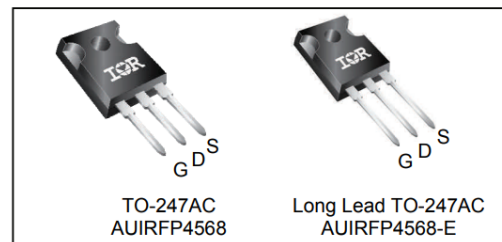
特性

- 先进平面技术
- 超低导通电阻
- 动态 dv/dt 额定值
- 工作温度 175°C
- 快速开关
- 允许达到 T_{jmax} 的重复雪崩
- 无铅, 符合 RoHS 要求
- 汽车认证 *

描述

这款 HEXFET® 功率 MOSFET 专为汽车应用而设计, 采用最新的工艺技术实现单位硅面积极低的导通电阻。该设计的其他特点包括 175°C 工作结温、开关速度快和提高重复雪崩额定值。通过结合以上特点, 使该设计成为一种极其高效和可靠的器件, 可用于汽车应用和各种其他应用。

	V_{DS}	150V
	$R_{DS(on)}$ typ.	4.8mΩ
	max.	5.9mΩ
I_D		171A



G	D	S
Gate	Drain	Source

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRFP4568	TO-247AC	Tube	25	AUIRFP4568
AUIRFP4568-E	Long Lead TO-247AC	Tube	25	AUIRFP4568-E

绝对最大额定值

超过“绝对最大额定值”所列值的应力可能会对器件造成永久性损坏。这些仅仅是应力额定值, 并不意味着器件在这些或任何其他超过该规范所示的条件下能够正常运行。延长暴露在绝对最大额定值条件的时间可能会影响器件的可靠性。热阻抗和功率耗散额定值是在装板和静止空气条件下测得的。环境温度 (T_A) 为 25°C, 除非

Symbol	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	171	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	121	
I_{DM}	Pulsed Drain Current ①	684	
P_D @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation	517	W
	Linear Derating Factor	3.45	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	763	mJ
I_{AR}	Avalanche Current ①	See Fig.14,15, 22a, 22b	A
E_{AR}	Repetitive Avalanche Energy ④		mJ
dv/dt	Peak Diode Recovery dv/dt ③	18.5	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10 lbf·in (1.1N·m)	

热阻抗

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑦	---	0.29	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	---	
$R_{\theta JA}$	Junction-to-Ambient	---	40	

HEXFET® 是英飞凌的注册商标。

*认证标准可在 www.infineon.com 上找到

本数据手册的原文使用英文撰写。为方便起见, 英飞凌提供了译文; 由于翻译过程中可能使用了自动化工具, 英飞凌不保证译文的准确性。为确认准确性, 请务必访问 infineon.com 参考最新的英文版本 (控制文档)。

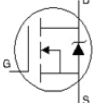
静态参数特性在 $T_J = 25^\circ\text{C}$ 时测得（除非另有规定）

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	150	---	---	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	---	0.17	---	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 5mA$ ①
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	---	4.8	5.9	m Ω	$V_{GS} = 10V, I_D = 103A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	---	5.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Trans conductance	162	---	---	S	$V_{DS} = 50V, I_D = 103A$
R_G	Internal Gate Resistance	---	1.0	---	Ω	
I_{DSS}	Drain-to-Source Leakage Current	---	---	20	μA	$V_{DS} = 150V, V_{GS} = 0V$
		---	---	250		$V_{DS} = 150V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	---	---	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	---	---	-100		$V_{GS} = -20V$

动态电气特性在 $T_J = 25^\circ\text{C}$ 时测得（除非另有规定）

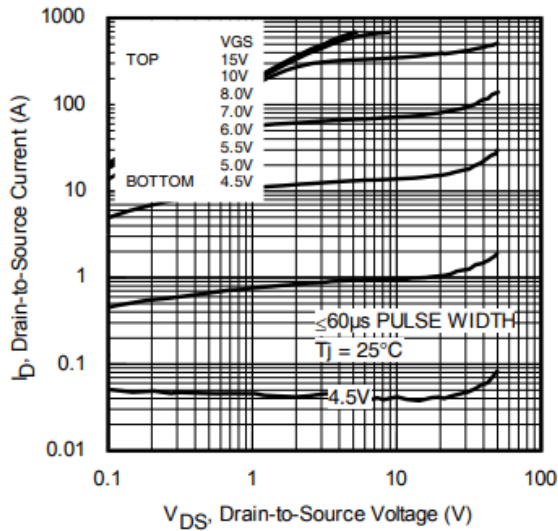
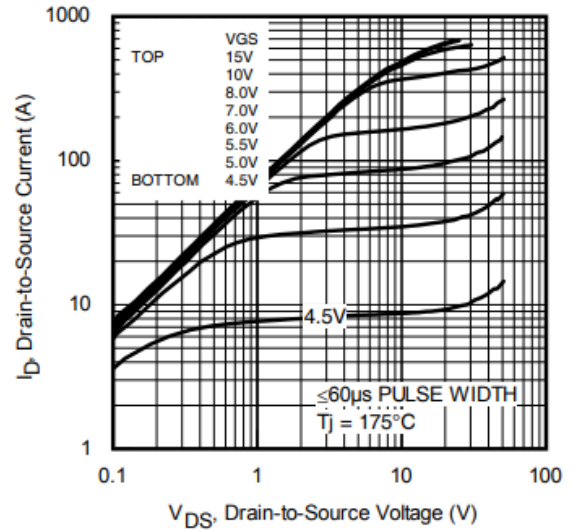
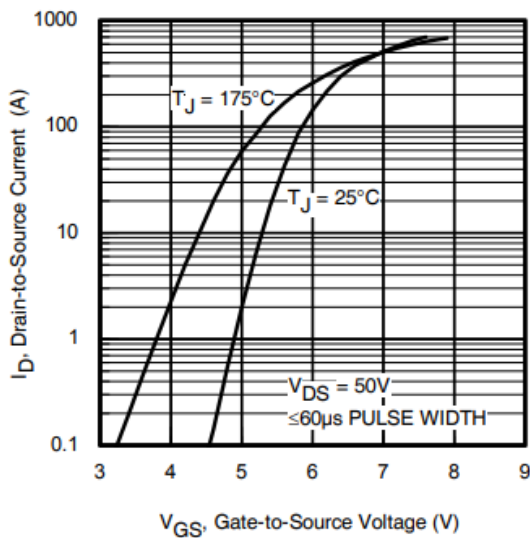
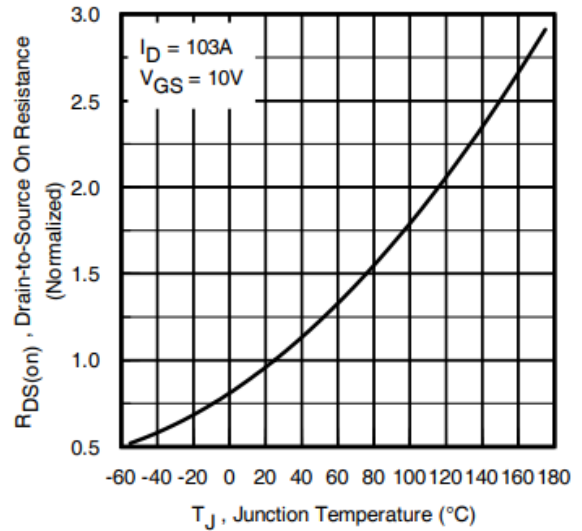
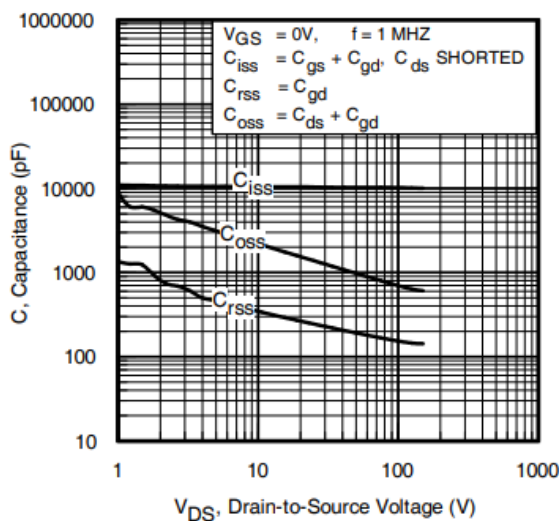
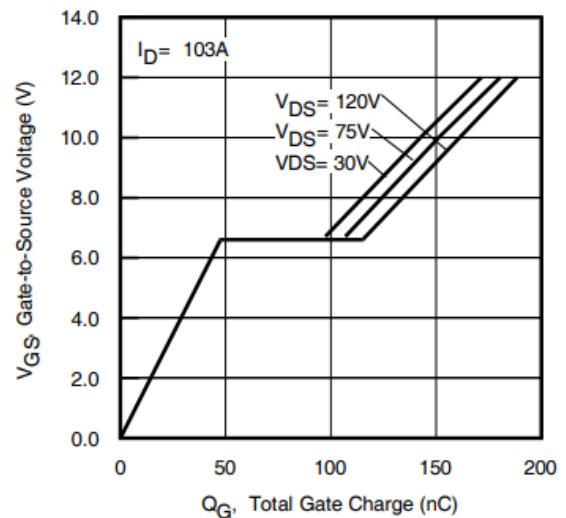
Q_g	Total Gate Charge	---	151	227	nC	$I_D = 103A, V_{DS} = 75V, V_{GS} = 10V$ ④
Q_{gs}	Gate-to-Source Charge	---	52	---		
Q_{gd}	Gate-to-Drain Charge	---	55	---		
Q_{sync}	Total Gate Charge Sync. ($Q_g - Q_{gd}$)	---	96	---		
$t_{d(on)}$	Turn-On Delay Time	---	27	---	ns	$V_{DD} = 98V, I_D = 103A, R_G = 1.0\Omega, V_{GS} = 10V$ ④
t_r	Rise Time	---	119	---		
$t_{d(off)}$	Turn-Off Delay Time	---	47	---		
t_f	Fall Time	---	84	---		
C_{iss}	Input Capacitance	---	10470	---	pF	$V_{GS} = 0V, V_{DS} = 50V, f = 1.0MHz$, See Fig. 5 $V_{GS} = 0V, V_{DS} = 0V$ to $120V$ (see fig.11) ⑥ $V_{GS} = 0V, V_{DS} = 0V$ to $120V$ ⑤
C_{oss}	Output Capacitance	---	977	---		
C_{rss}	Reverse Transfer Capacitance	---	203	---		
$C_{oss \text{ eff. (ER)}}$	Effective Output Capacitance (Energy Related)	---	897	---		
$C_{oss \text{ eff. (TR)}}$	Effective Output Capacitance (Time Related)	---	1272	---		

二极管特性

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	---	---	171	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	---	---	684		
V_{SD}	Diode Forward Voltage	---	---	1.3	V	$T_J = 25^\circ\text{C}, I_S = 103A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	---	110	---	ns	$T_J = 25^\circ\text{C}$
		---	133	---		$T_J = 125^\circ\text{C}$
Q_{rr}	Reverse Recovery Charge	---	515	---	nC	$T_J = 25^\circ\text{C}$
		---	758	---		$T_J = 125^\circ\text{C}$
I_{RRM}	Reverse Recovery Current	---	8.8	---	A	$T_J = 25^\circ\text{C}$
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$)				

注：

- ① 重复额定值；脉冲宽度受最高结温限制。
- ② 受 T_{Jmax} 限制，初始 $T_J = 25^\circ\text{C}$ 、 $L = 0.144mH$ 、 $R_G = 25\Omega$ 、 $I_{AS} = 103A$ 、 $V_{GS} = 10V$ 。不建议在高于此值的情况运行器件。
- ③ $I_{SD} \leq 103A$ ， $di/dt \leq 360A/\mu s$ ， $V_{DD} \leq V_{(BR)DSS}$ ， $T_J \leq 175^\circ\text{C}$ 。
- ④ 脉冲宽度 $\leq 400\mu s$ ；占空比 $\leq 2\%$ 。
- ⑤ $C_{oss \text{ eff. (TR)}}$ 是一个固定电容值，当 V_{DS} 从 0 上升至 $80\% V_{DSS}$ 时，其充电时间与 C_{oss} 相同。
- ⑥ $C_{oss \text{ eff. (ER)}}$ 是一个固定电容值，当 V_{DS} 从 0 上升至 $80\% V_{DSS}$ 时，其产生与 C_{oss} 相同的热量。
- ⑦ R_θ 在 T_J 约为 90°C 时测得。


Fig. 1 Typical Output Characteristics

Fig. 2 Typical Output Characteristics

Fig. 3 Typical Transfer Characteristics

Fig. 4 Normalized On-Resistance vs. Temperature

Fig. 5. Typical Capacitance vs. Drain-to-Source Voltage

Fig. 6. Typical Gate Charge vs. Gate-to-Source Voltage

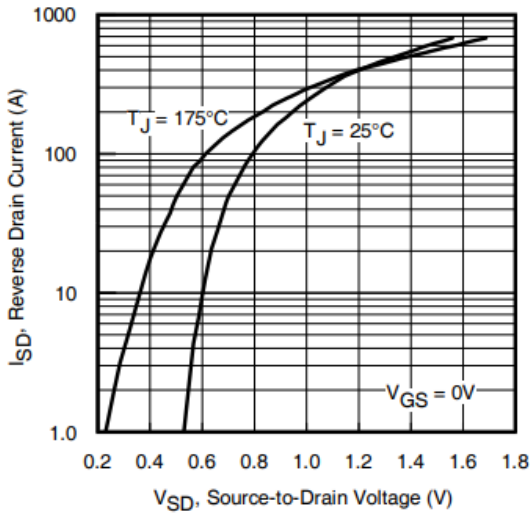


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

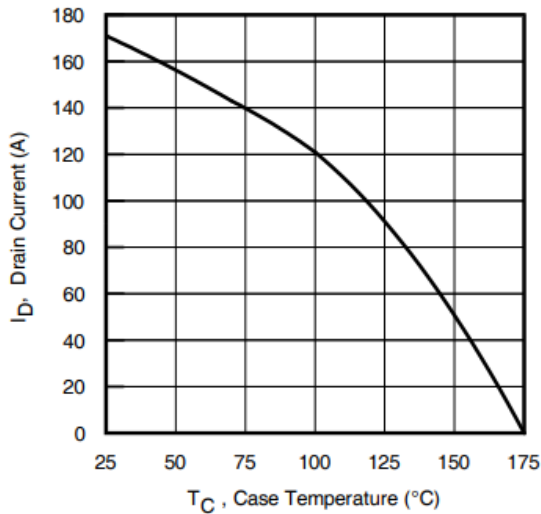


Fig 9. Maximum Drain Current vs. Case Temperature

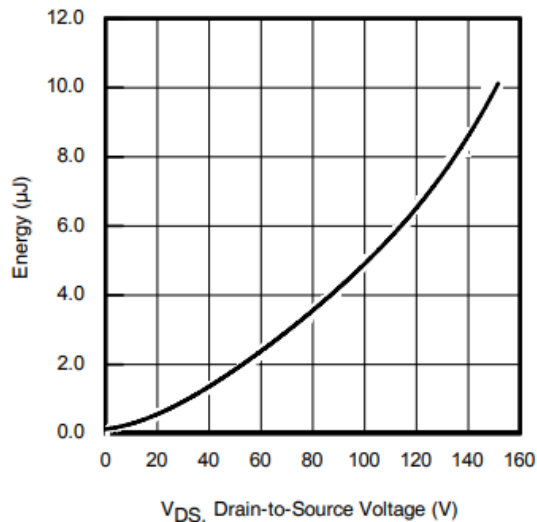


Fig 11. Typical Coss Stored Energy

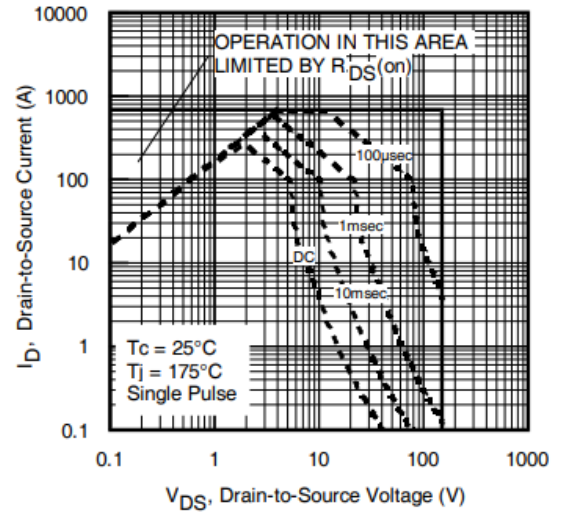


Fig 8. Maximum Safe Operating Area

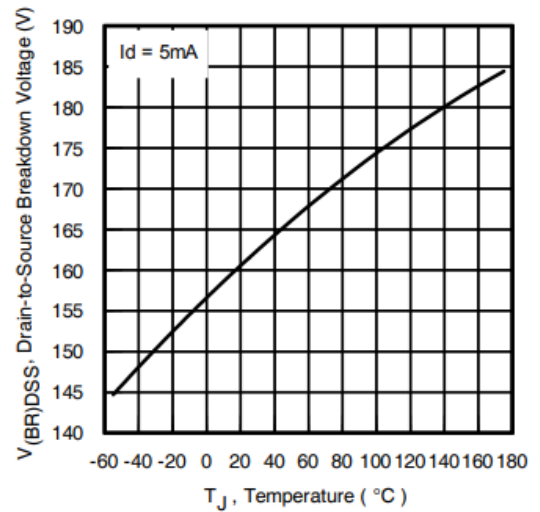


Fig 10. Drain-to-Source Breakdown Voltage

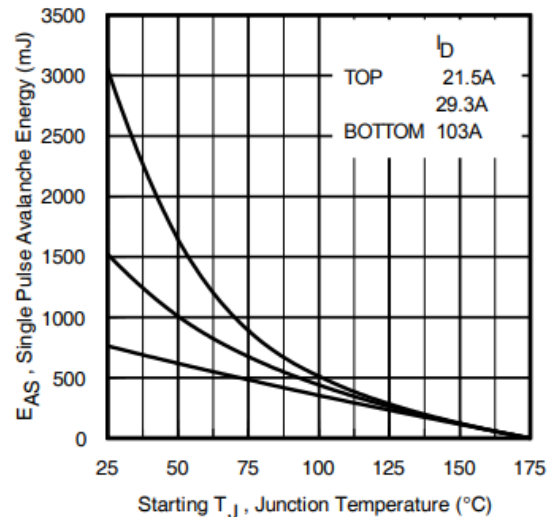


Fig 12. Maximum Avalanche Energy vs. Drain Current

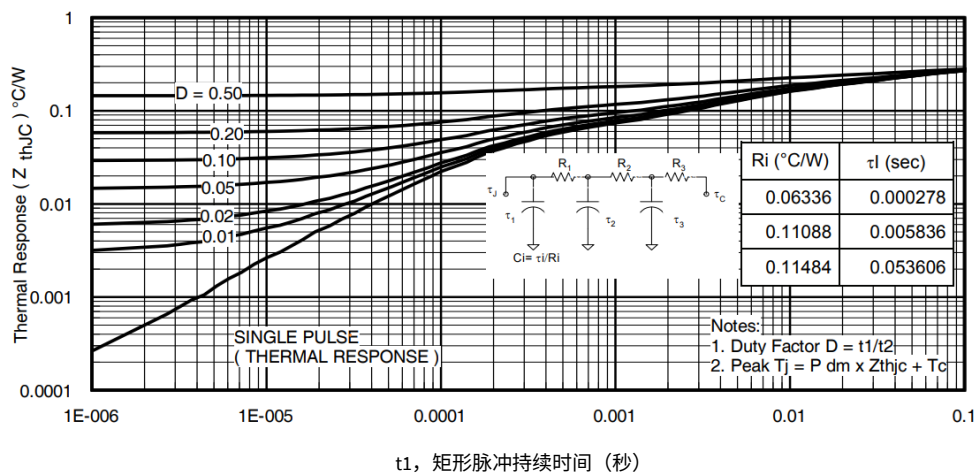


图 13.最大有效瞬态热阻，结到壳

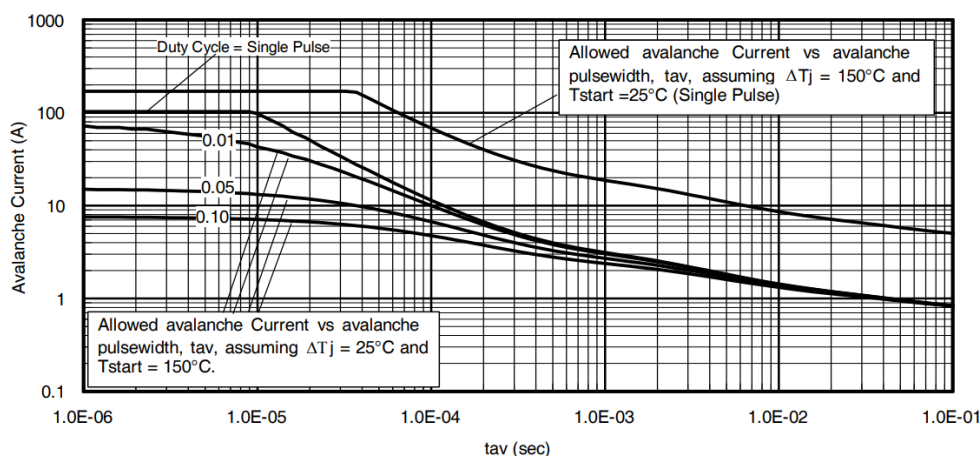


图 14.典型雪崩电流与脉冲宽度

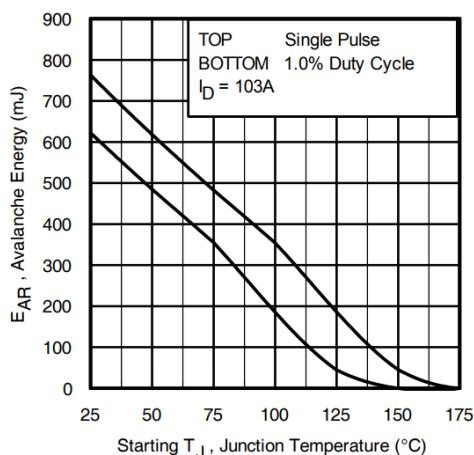


图 15.最大雪崩能量与温度的关系曲线

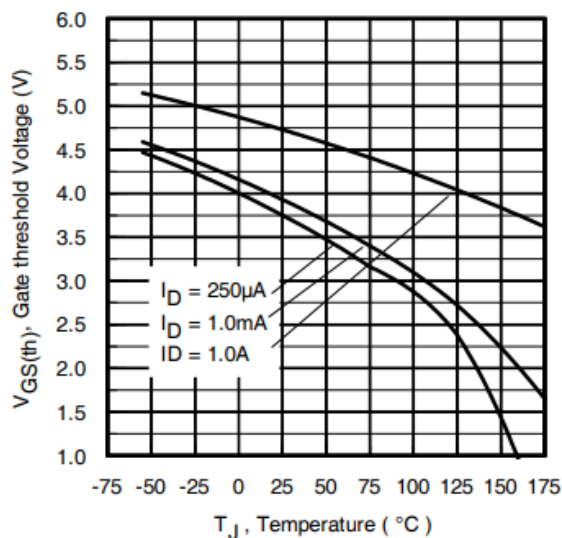
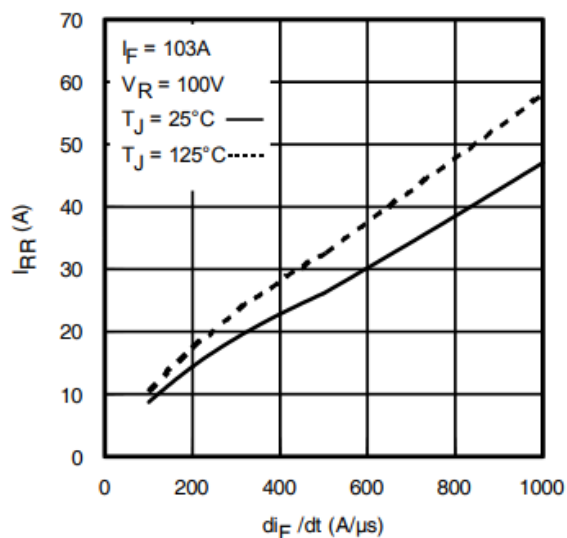
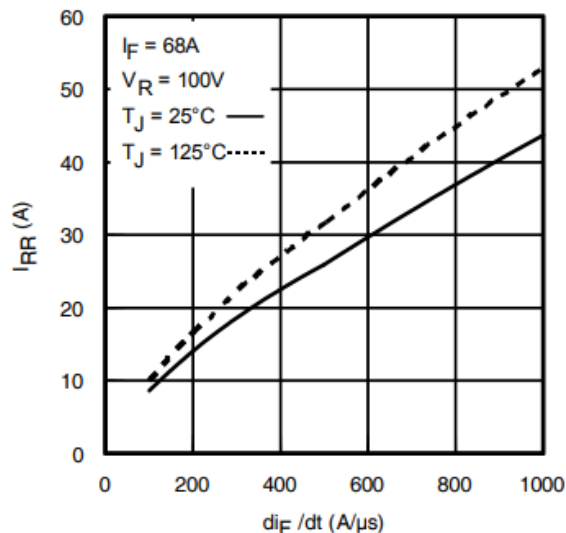
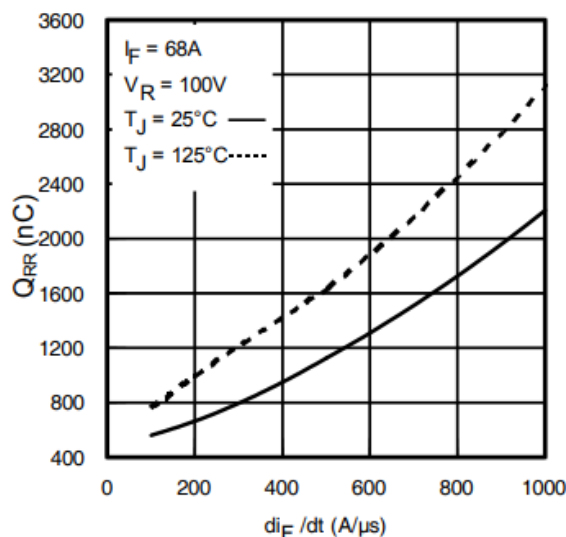
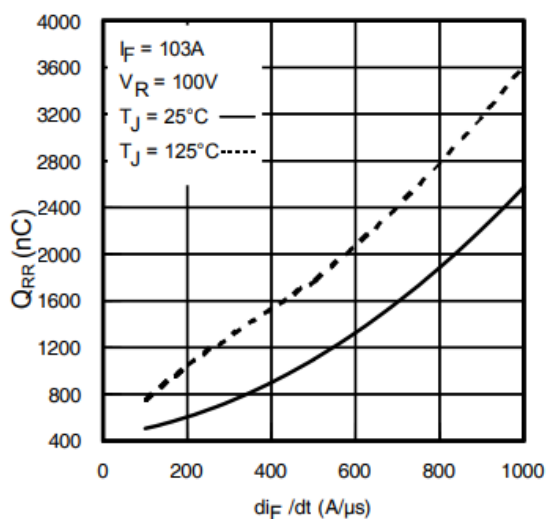
关于重复的雪崩曲线的注释，图 14、15：（有关更多信息，请参阅www.infineon.com 上的 AN-1005）

- 雪崩失效假设：
纯粹的热现象和失效发生在结温远超 T_{jmax} 的情况下。这对每种零件类型都是有效的。
- 只要不超过 T_{jmax} ，就可以在雪崩中安全运行。
- 如下公式基于图 22a、22b 所示的电路和波形。
- $P_D(ave)$ = 每个雪崩脉冲的平均功率耗散。
- BV = 额定击穿电压（1.3 倍系数，考虑雪崩期间的电压增加）。
- I_{av} = 可允许的雪崩电流。
- ΔT = 可允许的结温上升，不得超过 T_{jmax} （图 14、15 中假设为 25°C）。
 t_{av} = 雪崩的平均时间。
 D = 雪崩占比 = $t_{av} \cdot f$
 $Z_{thJC}(D, t_{av})$ = 瞬态热阻抗，见图 13)

$$P_D(ave) = \frac{1}{2} (1.3 \cdot BV \cdot I_{av}) = \frac{\Delta T}{Z_{thJC} I_{av}}$$

$$= \frac{2\Delta T}{[1.3 \cdot BV \cdot Z_{th}]}$$

$$EAS(AR) = P_D(ave) \cdot t_{av}$$


Fig 16. Threshold Voltage vs. Temperature

Fig. 18 - Typical Recovery Current vs. di_F/dt

Fig. 17 - Typical Recovery Current vs. di_F/dt

Fig. 19 - Typical Stored Charge vs. di_F/dt

Fig. 20 - Typical Stored Charge vs. di_F/dt

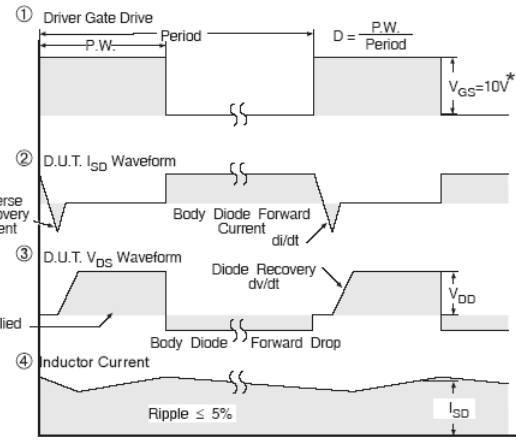
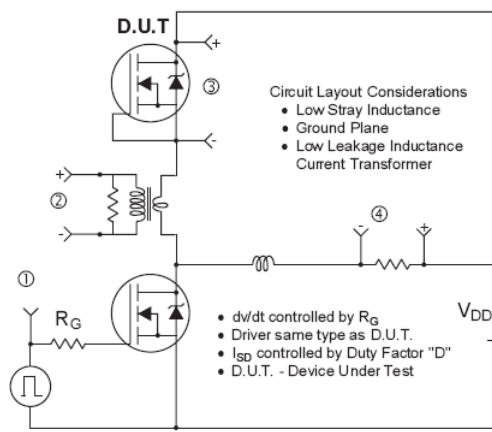


图 21. N 沟道 HEXFET® 功率 MOSFET 体内二极管峰值恢复 dv/dt 测试电路

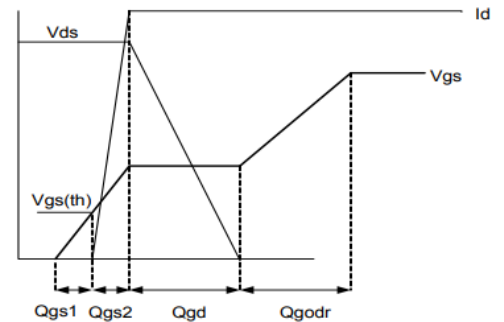
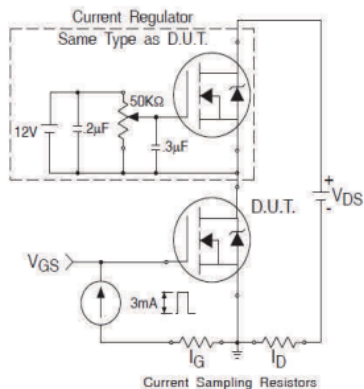
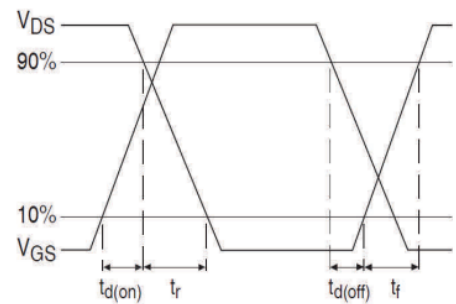
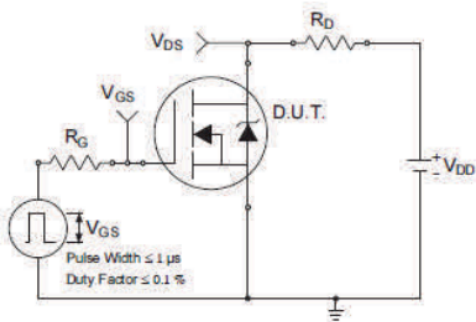
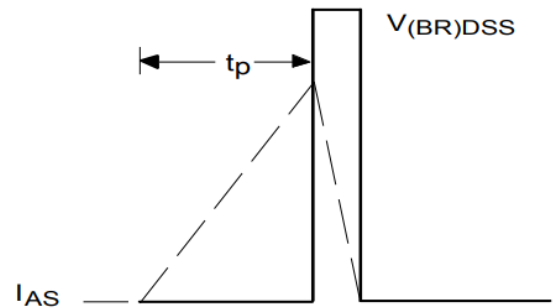
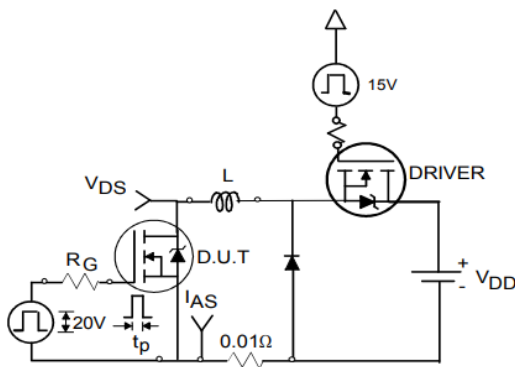
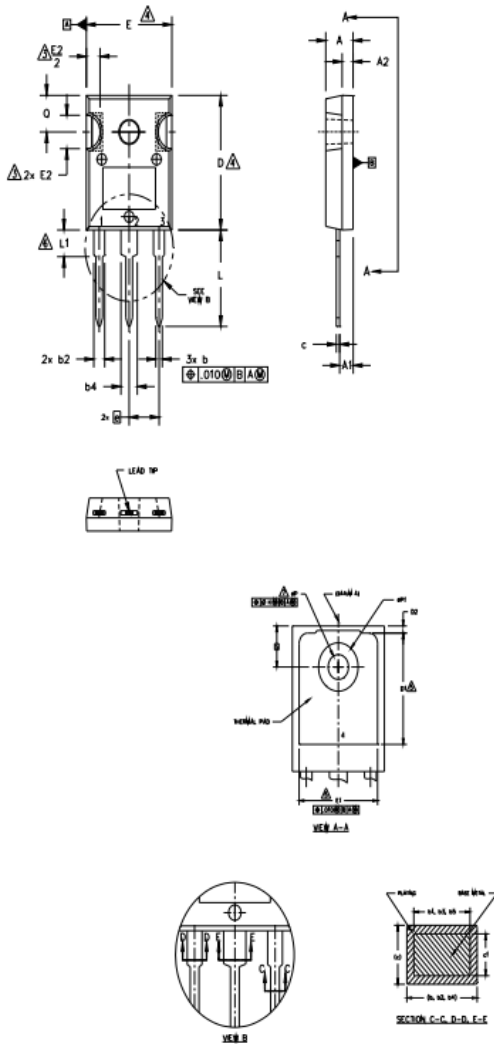


Fig 24a. Gate Charge Test Circuit

Fig 24b. Gate Charge Waveform

TO-247AC 封装外形 (尺寸以毫米 (英寸) 为单位)

NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M 1994.
2. DIMENSIONS ARE SHOWN IN INCHES.
3. CONTOUR OF SLOT OPTIONAL.
4. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS D1 & E1.
6. LEAD FINISH UNCONTROLLED IN L1.
7. ØP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154 INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-247AC.

SYMBOL	DIMENSIONS				NOTES
	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	.183	.209	4.65	5.31	
A1	.087	.102	2.21	2.59	
A2	.059	.098	1.50	2.49	
b	.039	.055	0.99	1.40	
b1	.039	.053	0.99	1.35	
b2	.065	.094	1.65	2.39	
b3	.065	.092	1.65	2.34	
b4	.102	.135	2.59	3.43	
b5	.102	.133	2.59	3.38	4
c	.015	.035	0.38	0.89	
c1	.015	.033	0.38	0.84	
D	.776	.815	19.71	20.70	
D1	.515	—	13.08	—	5
D2	.020	.053	0.51	1.35	4
E	.602	.625	15.29	15.87	
E1	.530	—	13.46	—	
E2	.178	.216	4.52	5.49	
e	.215 BSC		5.46 BSC		
Øk	.010		0.25		
L	.559	.634	14.20	16.10	
L1	.146	.169	3.71	4.29	
ØP	.140	.144	3.56	3.66	
ØP1	—	.291	—	7.39	
Q	.209	.224	5.31	5.69	
S	.217 BSC		5.51 BSC		

LEAD ASSIGNMENTS
HEXFET

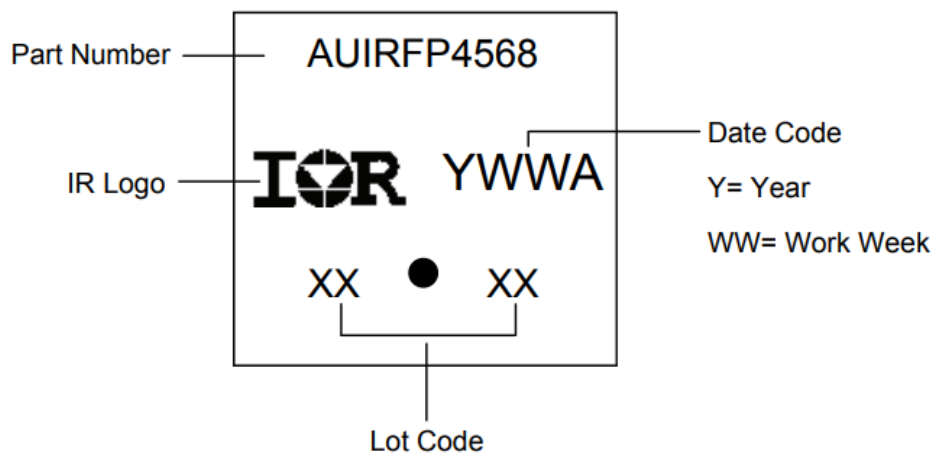
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

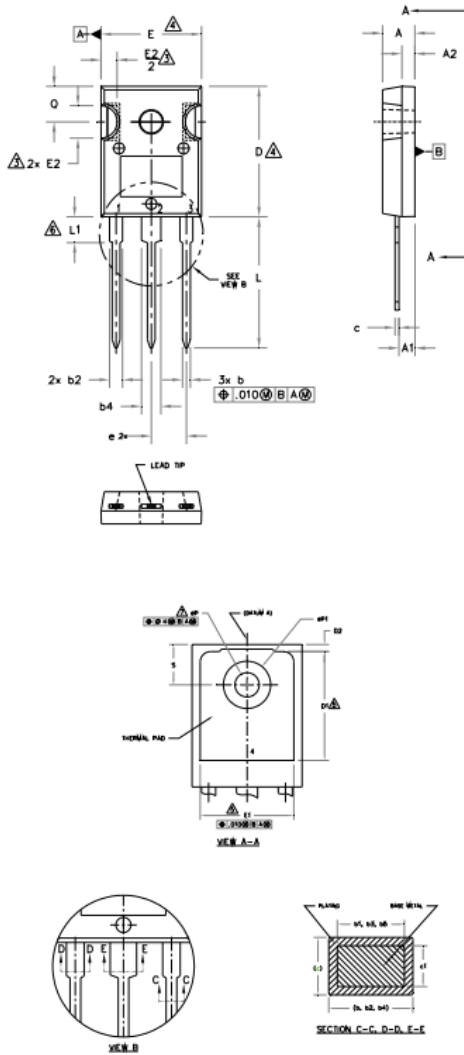
IGBTs, CoPACK

- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

DIODES

- 1.- ANODE/OPEN
- 2.- CATHODE
- 3.- ANODE

TO-247AC 零件标识信息


TO-247AC 封装外形 (尺寸以毫米 (英寸) 为单位)

NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M 1994.
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3. CONTOUR OF SLOT OPTIONAL.
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5. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS D1 & E1.
6. LEAD FINISH UNCONTROLLED IN L1.
7. ϕP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154 INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-247AD.

SYMBOL	DIMENSIONS				NOTES
	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	.190	.203	4.83	5.13	4 5 4
A1	.087	.102	2.21	2.59	
A2	.059	.098	1.50	2.49	
b	.039	.055	0.99	1.40	
b1	.039	.053	0.99	1.35	
b2	.065	.094	1.65	2.39	
b3	.065	.092	1.65	2.34	
b4	.102	.135	2.59	3.43	
b5	.102	.133	2.59	3.38	
c	.015	.035	0.38	0.89	
c1	.015	.033	0.38	0.84	
D	.776	.815	19.71	20.70	
D1	.515	—	13.08	—	
D2	.020	.053	0.51	1.35	
E	.602	.625	15.29	15.87	
E1	.530	—	13.46	—	
E2	.178	.216	4.52	5.49	
e	.215 BSC		5.46 BSC		
ϕk	.010		0.25		
L	.780	.827	19.57	21.00	
L1	.146	.169	3.71	4.29	
ϕP	.140	.144	3.56	3.66	
ϕP1	—	.291	—	7.39	
Q	.209	.224	5.31	5.69	
S	.217 BSC		5.51 BSC		

LEAD ASSIGNMENTS
HEXFET

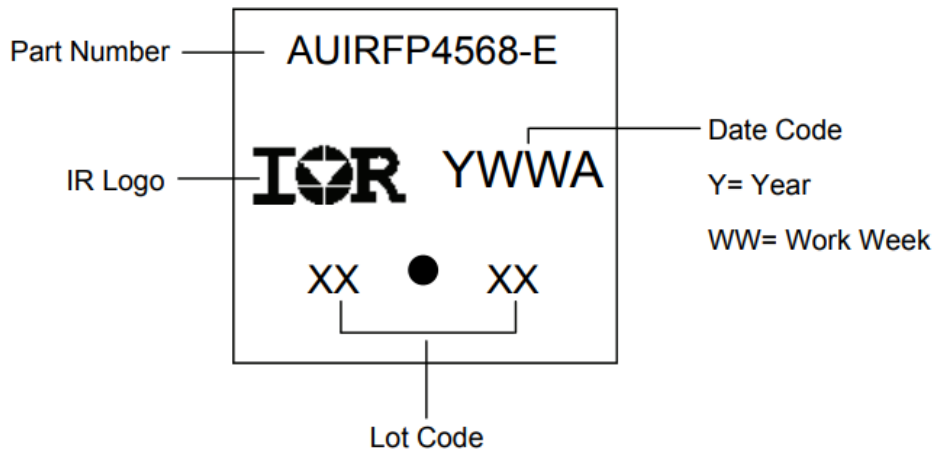
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

IGBTs, CoPACK

- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

DIODES

- 1.- ANODE/OPEN
- 2.- CATHODE
- 3.- ANODE

Long Lead TO-247AC 零件标识信息


Qualification Information

Qualification Level		Automotive (per AEC-Q101)	
		Comments: This part number(s) passed Automotive qualification. Infineon’s Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		TO-247AC	N/A
		Long Lead TO-247AC	
ESD	Machine Model	Class M4 (+/- 800V) [†] AEC-Q101-002	
	Human Body Model	Class H3A (+/- 6000V) [†] AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 2000V) [†] AEC-Q101-005	
RoHS Compliant		Yes	

† 最高通过电压。

修订记录

Date	Comments
10/21/2015	- Updated datasheet with corporate template - Removed obsolete parts "AUIRFP4568E" on all pages - Corrected ordering table on page 1.
4/29/2019	Added AUIRFP4568-E (Long Lead TO-247AC) package –all pages

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