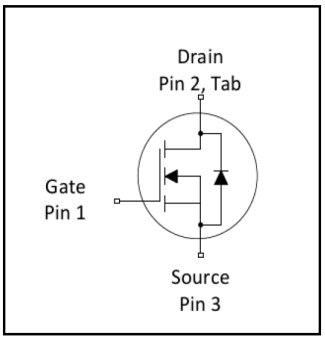
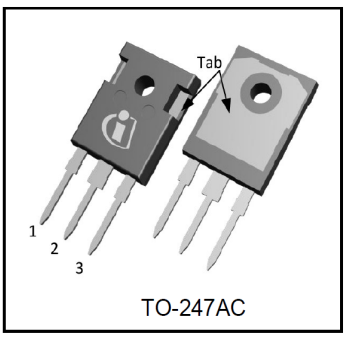
英飞凌PDP SWITCH

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Key Parameters		
V_{DS} max	200	V
$V_{DS\ (Avalanche)}$ typ.	240	V
$R_{DS(ON)}$ typ. @ 10V	21	mΩ
I_{RP} max @ T_C= 100°C	130	A
T_J max	175	°C





特性

- 先进工艺技术
- 针对PDP维持、能量回收和传导开关应用而优化的关键参数
- 采用低$E_{脉冲}$额定值，以减少PDP维持、能量回收和传导开关应用中的功耗
- 低QG，响应迅速
- 高重复峰值电流能力，确保可靠运行
- 快速开关的短暂下降与上升时间
- 175°C的工作结温，可提高耐受性
- 重复雪崩处理能力，确保系统稳健性和可靠性

描述

英飞凌这款 HEXFET® 功率 MOSFET 专为等离子显示面板中的维持、能量回收 与 通断开关应用而设计。该 MOSFET 采用最新的工艺技术，实现了单位硅面积低导通电阻和低 E_{PULSE} 额定值。 该MOSFET的其他特点还包括175°C的工作结温以及高重复峰值电流能力。这些特点相结合，使该MOSFET成为适用于PDP驱动应用的高效、坚固且可靠的器件。

Absolute Maximum Ratings			
Symbol	**Parameter**	**Max.**	**Units**
V_{GS}	Gate-to-Source Voltage	± 30	V
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	65	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	46	
I_{DM}	Pulsed Drain Current ①	260	
I_{RP} @ T_C = 100°C	Repetitive Peak Current ⑤	130	
P_D @T_C = 25°C	Maximum Power Dissipation	330	W
P_D @T_C = 100°C	Maximum Power Dissipation	190	
	Linear Derating Factor	2.2	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-40 to + 175	°C
	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

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	---	0.45	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	---	
$R_{\theta JA}$	Junction-to-Ambient ④	---	62	

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）。

电气特性 @T_J = 25°C（除非另有说明）

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	---	---	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	---	170	---	mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	---	21	25	mΩ	V_{GS} = 10V, I_D = 46A ③
$V_{GS(th)}$	Gate Threshold Voltage	3.0	---	5.0	V	V_{DS} = V_{GS}, I_D = 250μA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	---	-13	---	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	---	---	20	μA	V_{DS} = 200V, V_{GS} = 0V
		---	---	1.0	mA	V_{DS} = 200V,V_{GS} = 0V,T_J =125°C
I_{GSS}	Gate-to-Source Forward Leakage	---	---	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	---	---	-100		V_{GS} = -20V
gfs	Forward Trans conductance	49	---	---	S	V_{DS} = 25V, I_D = 46A
Q_g	Total Gate Charge	---	70	98	nC	I_D = 46A,V_{DS} = 100V 10V ③
Q_{gd}	Gate-to-Drain Charge	---	23	---		V_{GS} = 10V
$t_{d(on)}$	Turn-On Delay Time	---	33	---	ns	V_{DD} = 100V, V_{GS} = 10V ③
t_r	Rise Time	---	20	---		I_D = 46A
$t_{d(off)}$	Turn-Off Delay Time	---	21	---		R_G= 2.5Ω
t_f	Fall Time	---	31	---		See Fig. 22
t_{st}	Shoot Through Blocking Time	100	---	---	ns	V_{DD} = 160V,V_{GS} = 15V,R_G= 4.7Ω
E_{PULSE}	Energy per Pulse	---	570	---	μJ	L = 220nH, C = 0.4μF, V_{GS} = 15V V_{DD} = 160V, R_G= 4.7Ω, T_J = 25°C
		---	910	---		L = 220nH, C = 0.4μF, V_{GS} = 15V V_{DD} = 160V, R_G= 4.7Ω, T_J = 100°C
C_{iss}	Input Capacitance	---	4600	---	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	---	460	---		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	---	91	---		f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	---	360	---		V_{GS} = 0V, V_{DS} = 0V to 160V
L_D	Internal Drain Inductance	---	5.0	---	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	---	13	---		

雪崩特性

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	---	140	mJ
E_{AR}	Repetitive Avalanche Energy ①	---	33	
$V_{DS(Avalanche)}$	Repetitive Avalanche Voltage ①	240	---	V
I_{AS}	Avalanche Current ②	---	39	A

二极管特性

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S @ T_C = 25°C	Continuous Source Current (Body Diode)	---	---	65	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	---	---	260		
V_{SD}	Diode Forward Voltage	---	---	1.3	V	T_J = 25°C,I_S = 46A,V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	---	100	150	ns	T_J = 25°C ,I_F = 46A, V_{DD} = 50V
Q_{rr}	Reverse Recovery Charge	---	430	640	nC	di/dt = 100A/μs ③

注：

① 重复额定值；脉冲宽度受最高结温限制。

② starting T_J = 25°C, L = 0.18mH, R_G = 25Ω, I_{AS} = 38A.

② 脉冲宽度 ≤ 400μs; 占空比 ≤ 2%。

④ R_θ在 T_J 约 90°C 时测得。

⑤ 占空比为 0.25、上升时间（ton）为 1 微秒的半正弦波。

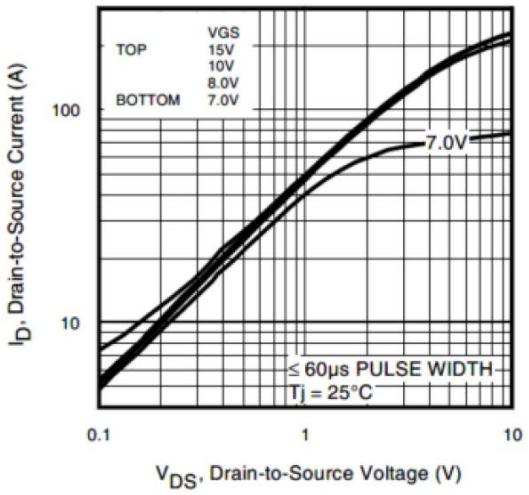


图1. 典型输出特性

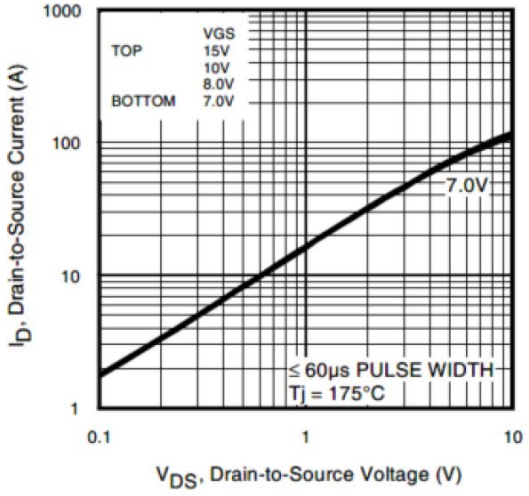


图2. 典型输出特性

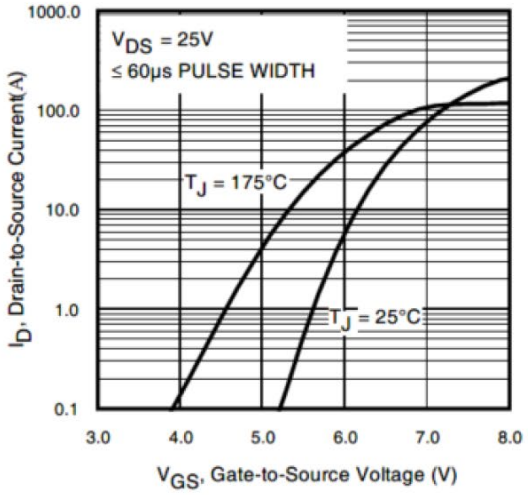


图3.典型转移特性

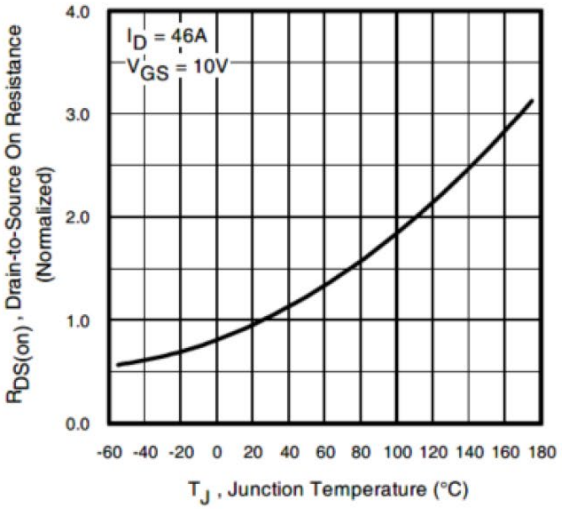


图 4.归一化导通电阻与温度的关系曲线

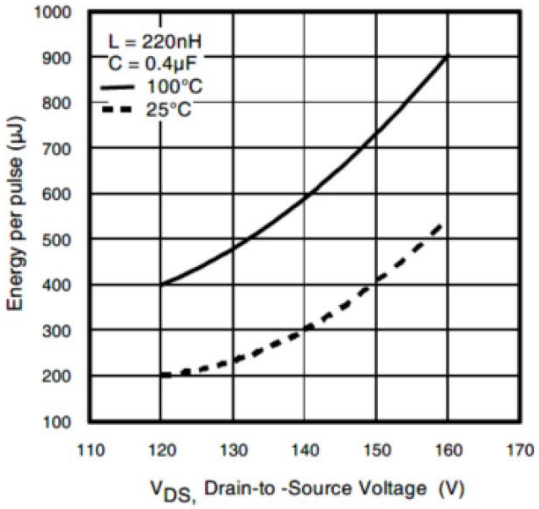


图 5. 典型 E_{PULSE} 与漏源电压的关系

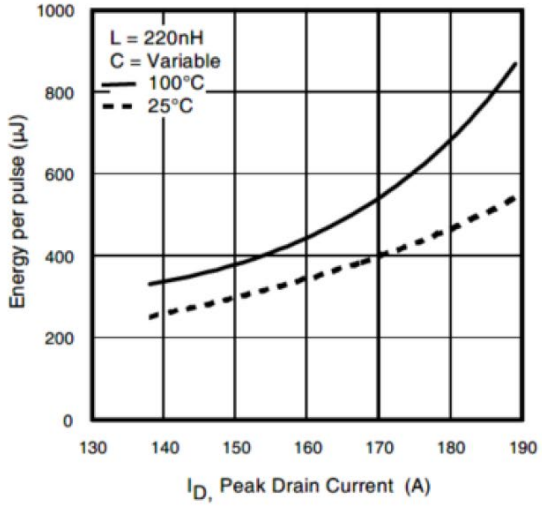


图 **6.** 典型 E_{PULSE} 与漏极电流的关系

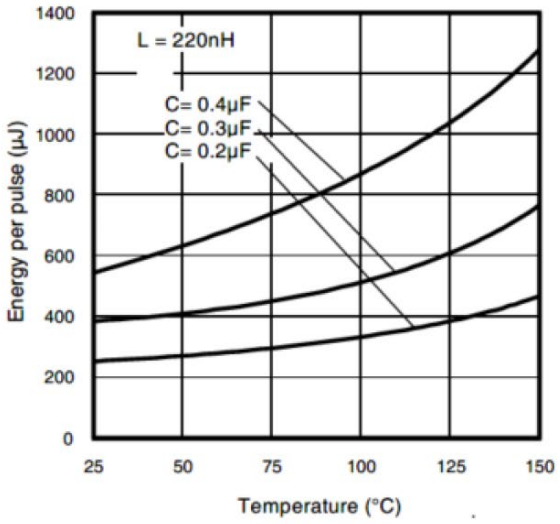


图7. E_{PULSE}与温度的关系示意图

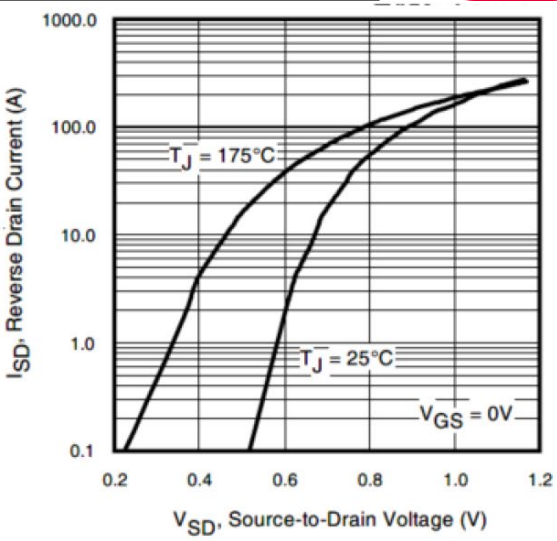


图**8.** 源漏二极管正向电压示意图

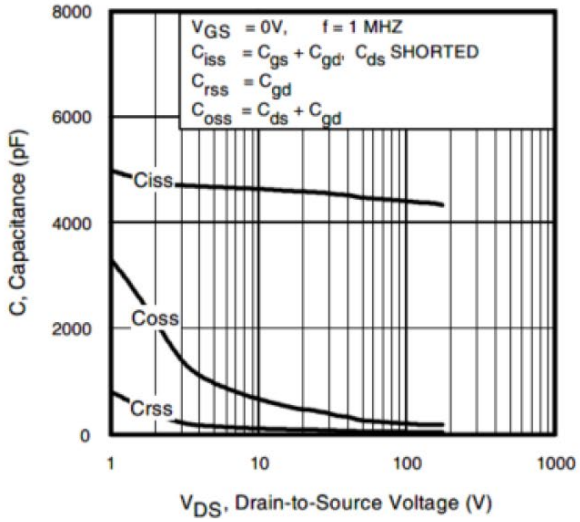


图 9.典型电容值与漏源电压的关系

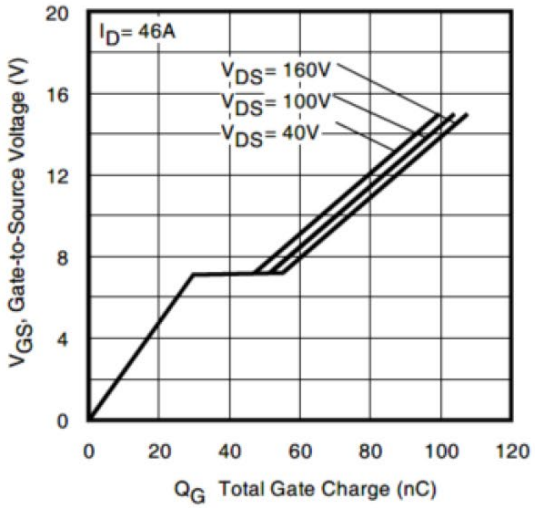


图 10.典型栅极电荷与栅源电压的关系

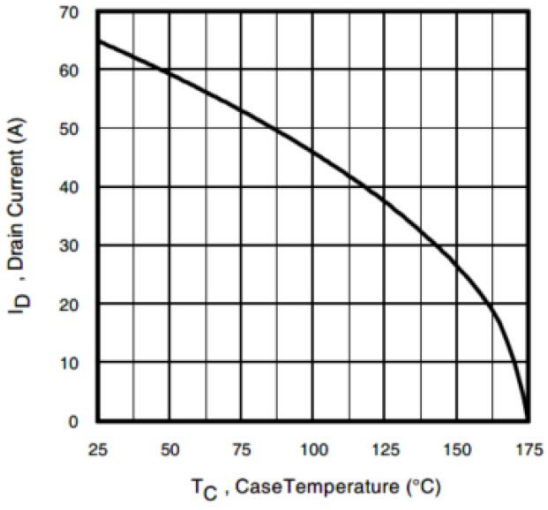


图 11. 最大漏极电流与外壳温度的关系

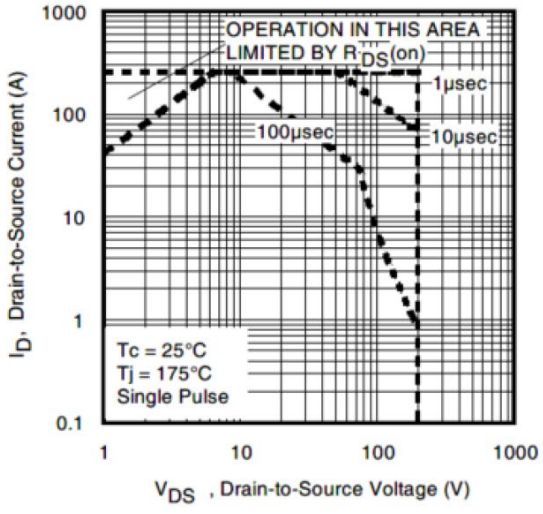


图 **12.** 最大安全工作区

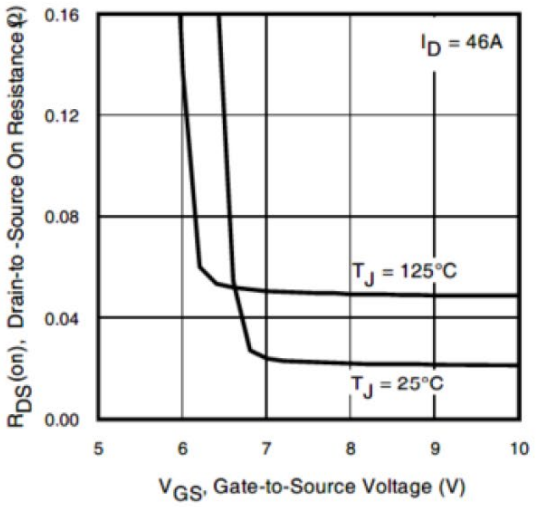


图 13.典型导通电阻与栅极电压的关系

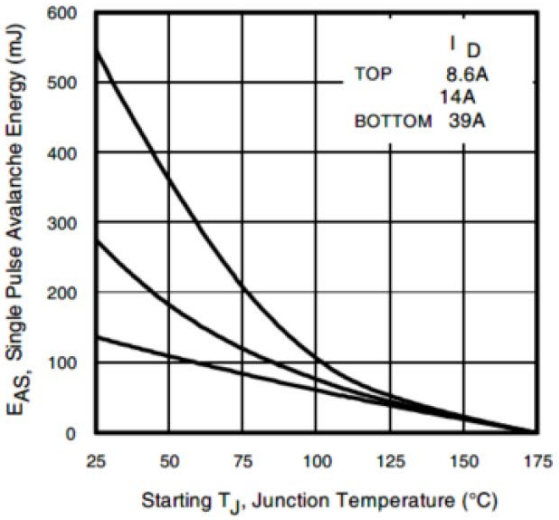


图 14.最大雪崩能量与温度的关系曲线

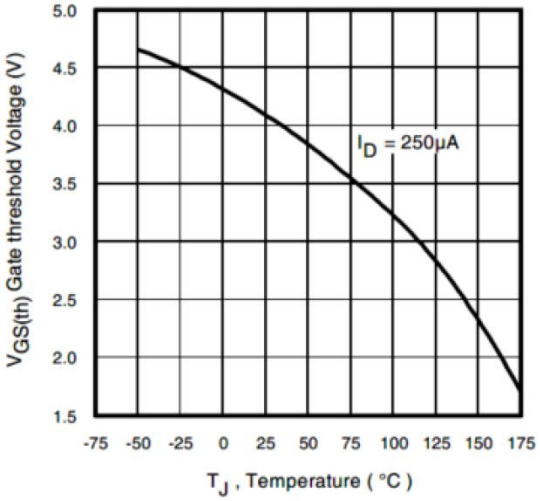


图 15.阈值电压与温度的关系曲线

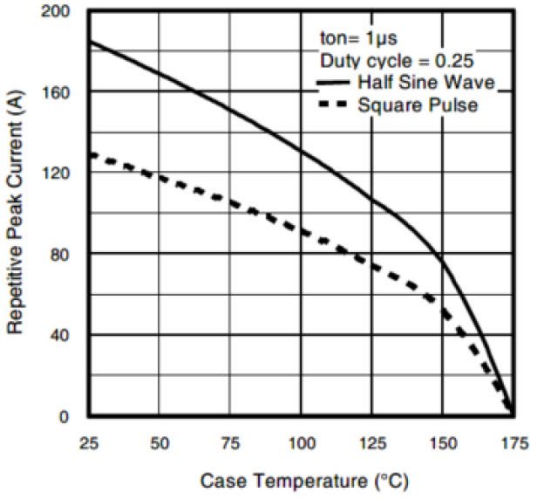


图16. 典型的重复峰值电流与机箱温度

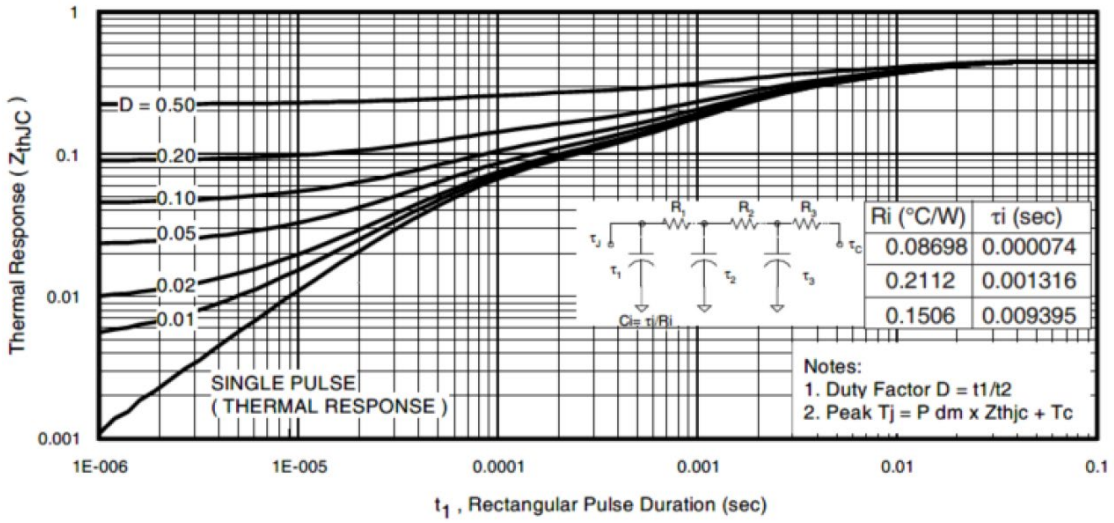


图 17.最大有效瞬态热阻，结到壳

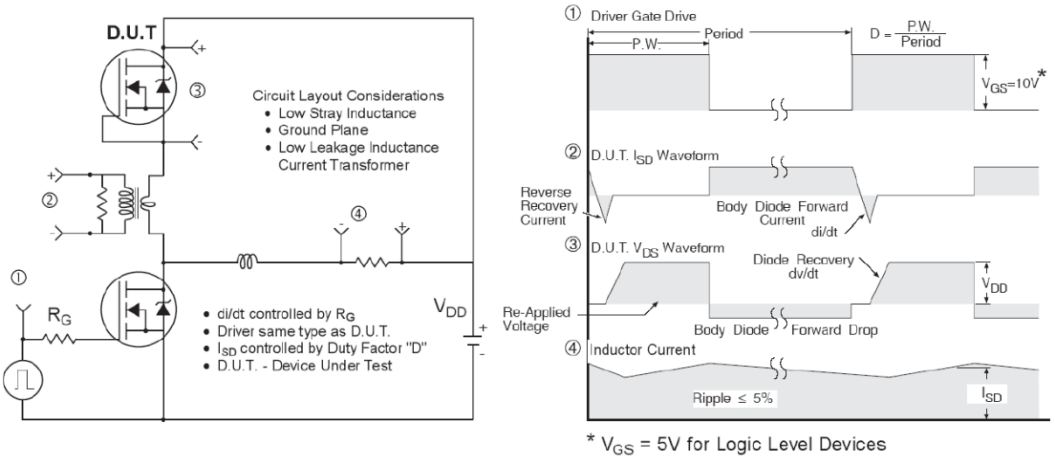


图18. 用于N沟道HEXFET®功率MOSFET的二极管反向恢复测试电路

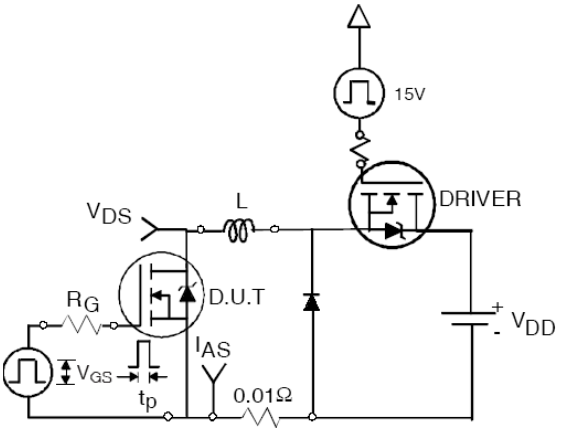


图 19a.未钳位电感测试电路

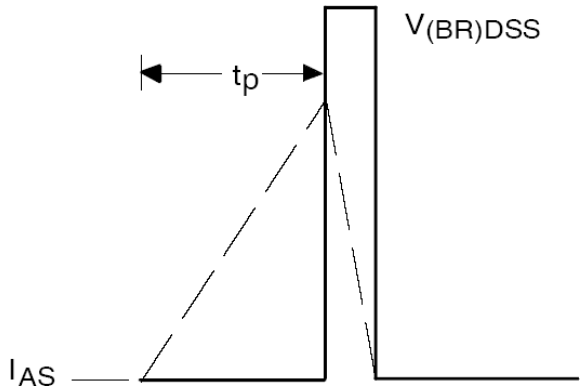


图 19b.未钳位电感波形

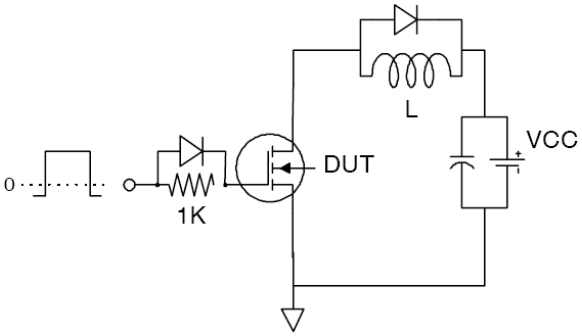


图 20a.栅极电荷测试电路

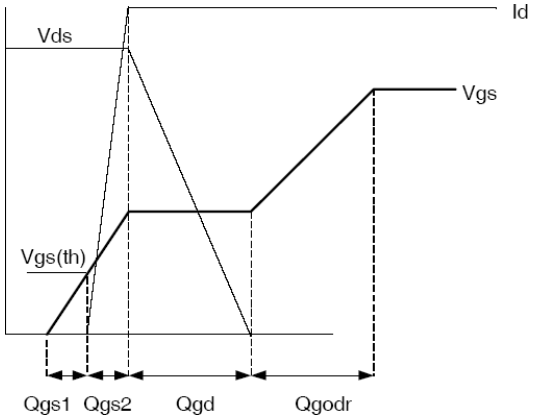
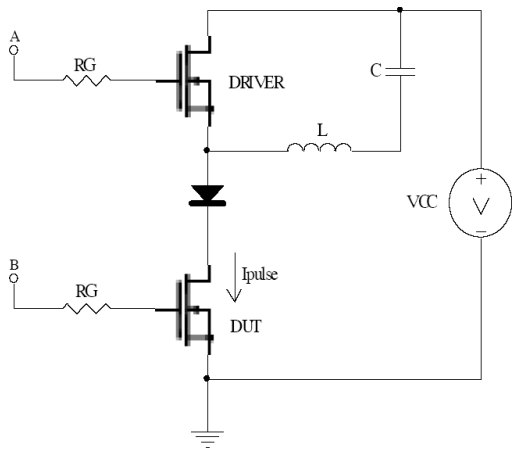


图 20b.栅极电荷波形



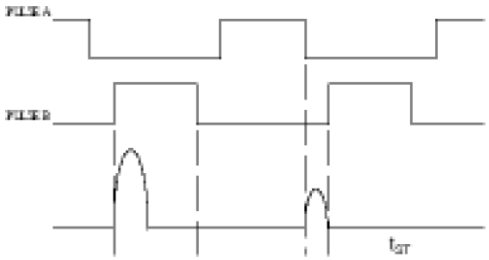


图 21a. tst和 E_{PULSE} 测试电路　**图 21b.** tst 测试波形

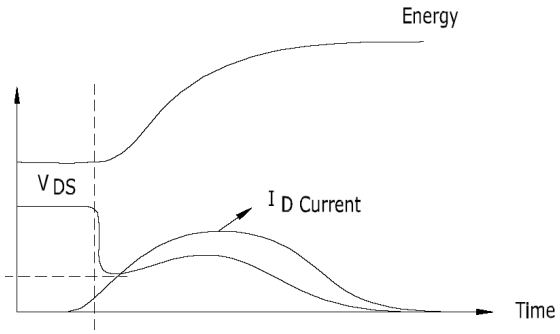


图 21c. E_{PULSE} 测试波形

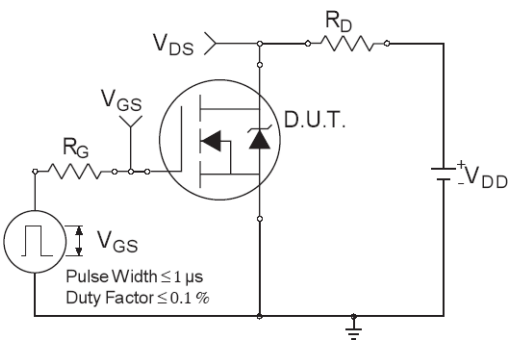


图 22a.开关时间测试电路

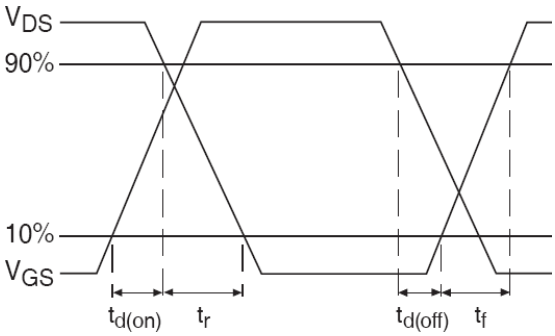
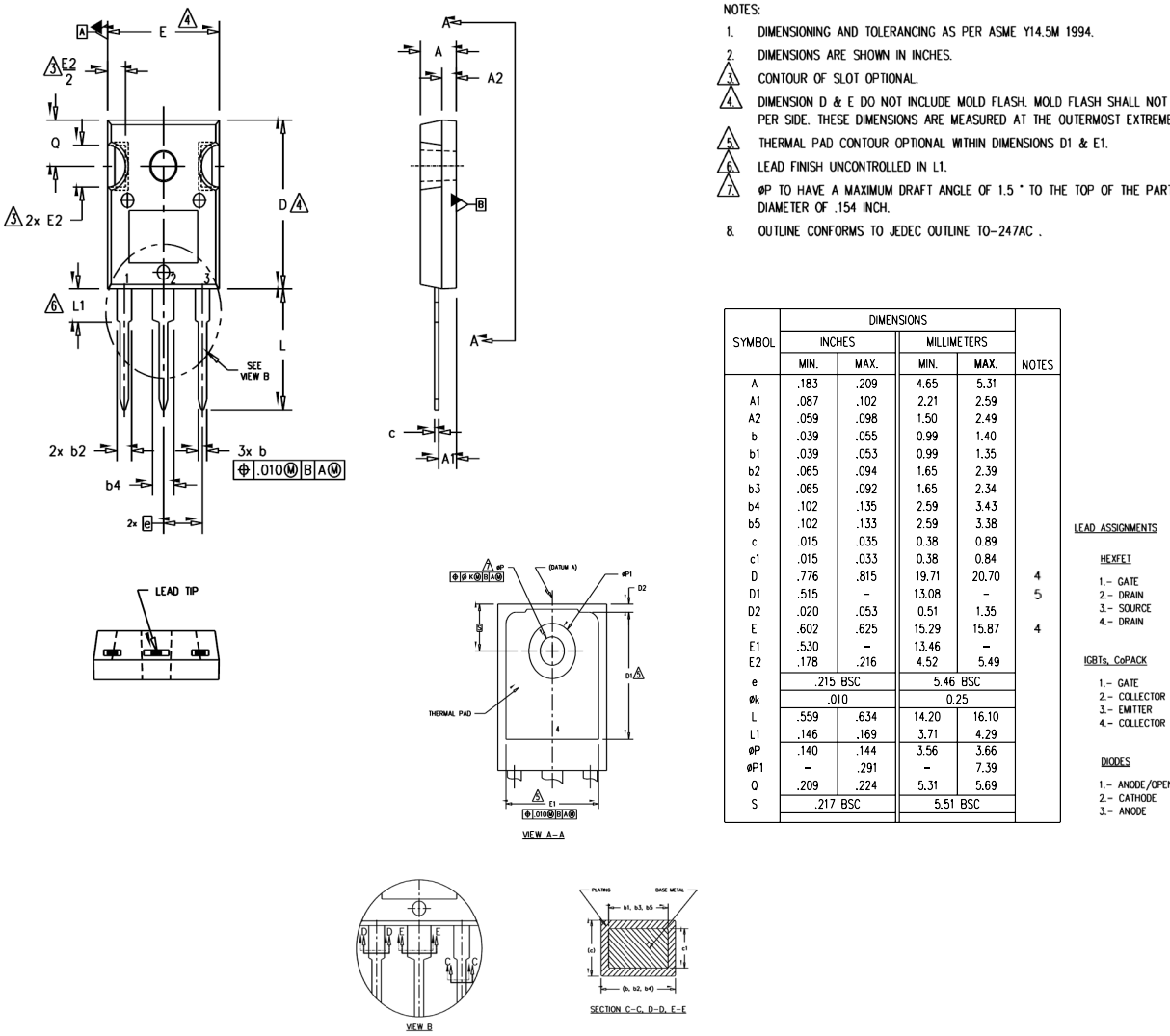


图 22b.开关时间波形

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	
c	.015	.035	0.38	0.89	
c1	.015	.033	0.38	0.84	
D	.776	.815	19.71	20.70	4
D1	.515	–	13.08	–	5
D2	.020	.053	0.51	1.35	
E	.602	.625	15.29	15.87	4
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

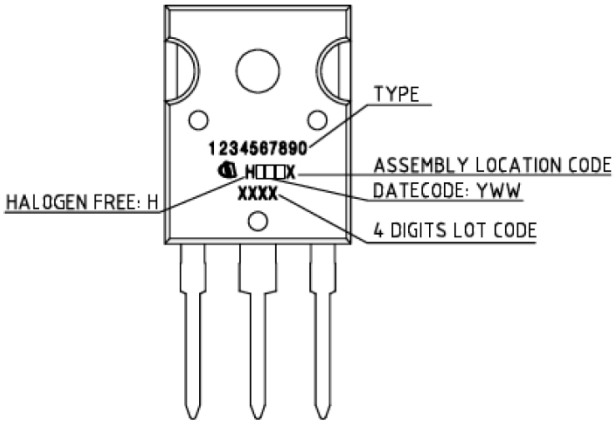
IGBTs, CoPACK

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 封装不建议用于表面贴装应用。

修订记录

Date	Rev.	Comments
2013-09-06	2.0	• Final data sheet
2024-12-05	2.1	• Update datasheet to Infineon format • Updated Part marking –page 8 • Added disclaimer on last page.

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修订记录

IRFP4227PbF

Revision 2025 - 01 - 13 , Rev. 1 . 0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-01-13	Update datasheet to Infineon format, Updated Part marking –page 8

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