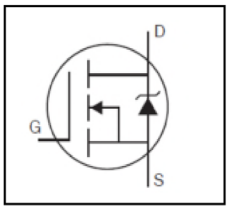
IRFR3710ZPbF

英飞凌HEXFET®功率MOSFET

特性

- 先进工艺技术
- 超低导通电阻
- 工作温度 175°C
- 快速开关
- 允许达到 Tjmax 的重复雪崩
- 无铅

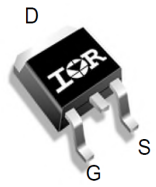


V_{DSS}	100V
$R_{DS(on)}$	18mΩ
I_D	42A

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说明

英飞凌HEXFET®功率MOSFET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。



D- Pak
IRFR3710ZPbF
Refer to page 9 for package outline

G	D	S
Gate	Drain	Source

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFR3710ZPbF	D-Pak	Tape and Reel Left	3000	IRFR3710ZTRLPbF
		Tape and Reel	2000	IRFR3710ZTRPbF

绝对最大额定值

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	56	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	39	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package Limited)	42	
I_{DM}	Pulsed Drain Current ①	220	
P_D @T_C = 25°C	Maximum Power Dissipation	140	W
	Linear Derating Factor	0.95	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy②	150	mJ
$E_{AS\ (Tested)}$	Single Pulse Avalanche Energy Tested Value⑥	200	
I_{AR}	Avalanche Current①	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy ⑤		mJ
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

热阻

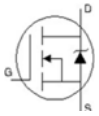
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	---	1.05	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑦	---	50	
$R_{\theta JA}$	Junction-to-Ambient	---	110	

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	100	---	---	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	---	0.088	---	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	---	15	18	mΩ	V_{GS} = 10V, I_D = 33A ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	---	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
gfs	Forward Trans conductance	39	---	---	S	V_{DS} = 25V, I_D = 33A
I_{DSS}	Drain-to-Source Leakage Current	---	---	20	µA	V_{DS} = 100V, V_{GS} = 0V
		---	---	250		V_{DS} = 100V,V_{GS} = 0V,T_J =125°C
I_{GSS}	Gate-to-Source Forward Leakage	---	---	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	---		-200		V_{GS} = -20V
Q_g	Total Gate Charge	---	69	100	nC	I_D = 33A V_{DS} = 80V V_{GS} = 10V ③
Q_{gs}	Gate-to-Source Charge	---	15	---		
Q_{gd}	Gate-to-Drain ('Miller') Charge	---	25	---		
$t_{d(on)}$	Turn-On Delay Time	---	14	---	ns	V_{DD} = 50V I_D = 33A R_G = 6.8Ω V_{GS} = 10V ③
t_r	Rise Time	---	43	---		
$t_{d(off)}$	Turn-Off Delay Time	---	53	---		
t_f	Fall Time	---	42	---		
L_D	Internal Drain Inductance	---	4.5	---	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	---	7.5	---		
C_{iss}	Input Capacitance	---	2930	---	pF	V_{GS} = 0V V_{DS} = 25V ƒ = 1.0MHz
C_{oss}	Output Capacitance	---	290	---		
C_{rss}	Reverse Transfer Capacitance	---	180	---		
C_{oss}	Output Capacitance	---	1200	---		V_{GS} = 0V, V_{DS} = 1.0V, ƒ = 1.0MHz
C_{oss}	Output Capacitance	---	180	---		V_{GS} = 0V, V_{DS} = 80V, ƒ = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	---	430	---		V_{GS} = 0V, V_{DS} = 0V to 80V

源极-漏极额定值与特性

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	---	---	56	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	---	---	220		
V_{SD}	Diode Forward Voltage	---	---	1.3	V	T_J = 25°C,I_S = 33A,V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	---	35	53	ns	T_J = 25°C ,I_F = 33A, V_{DS} = 50V di/dt = 100A/µs ③
Q_{rr}	Reverse Recovery Charge	---	41	62	nC	
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。（见图11）

② 起始温度 T_J = 25°C，L = 0.28mH，RG = 25Ω，I_{AS} = 33A，VGS = 10V。不建议在此值以上使用该器件。

③ 脉冲宽度≤ 1.0ms；占空比≤ 2%。

④ C_{oss} eff. 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 Coss 相同。

⑤ 受 T_{Jmax} 限制，典型重复的雪崩性能见图 12a、12b、15、16。

⑥ 该值由样片故障总数决定。生产环境100%按照此值进行测试。

⑦ 安装在 1 英寸方形PCB （FR-4 或 G-10 材料）上时。关于推荐的封装和焊接技术，请参阅应用笔记 #AN-994。

⑧ 有关零件标识、卷带信息，请参阅 D-Pak 封装

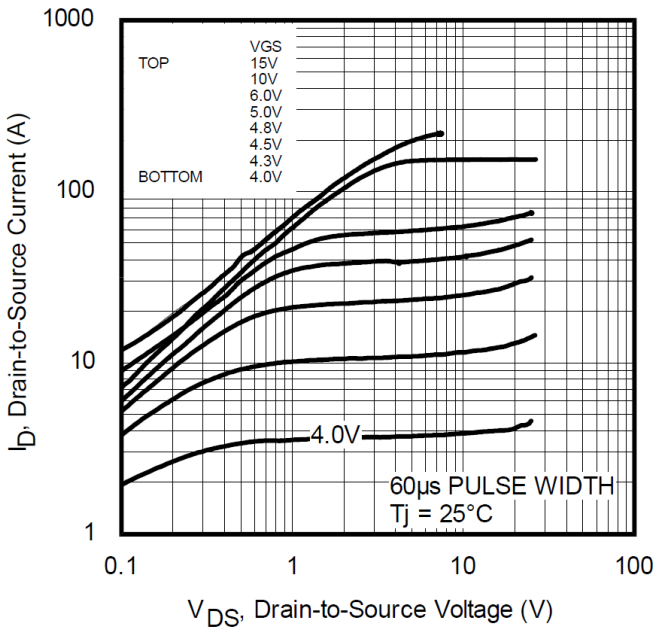


Fig. 1 Typical Output Characteristics

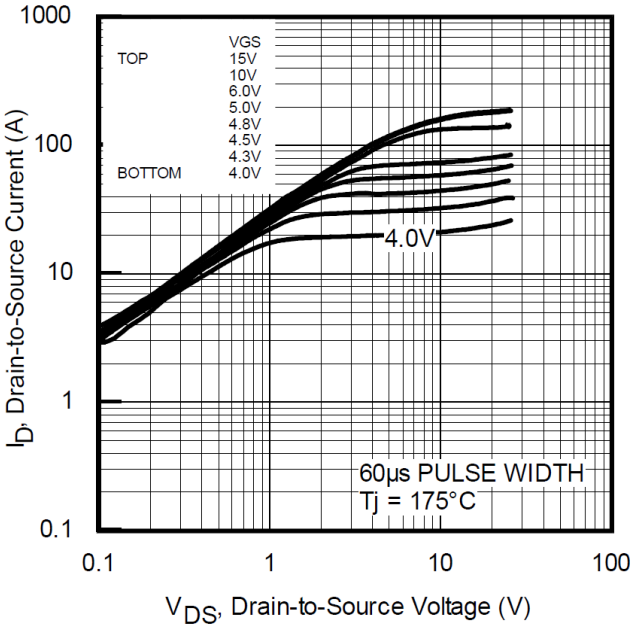


Fig. 2 Typical Output Characteristics

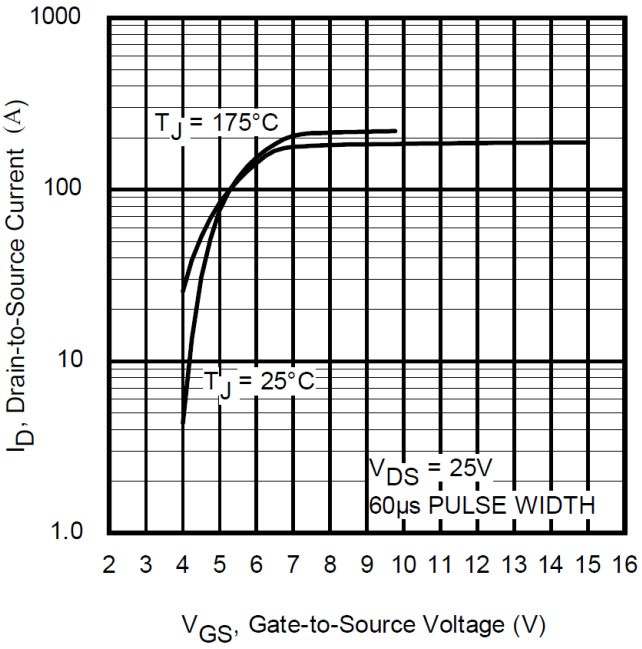


Fig. 3 Typical Transfer Characteristics

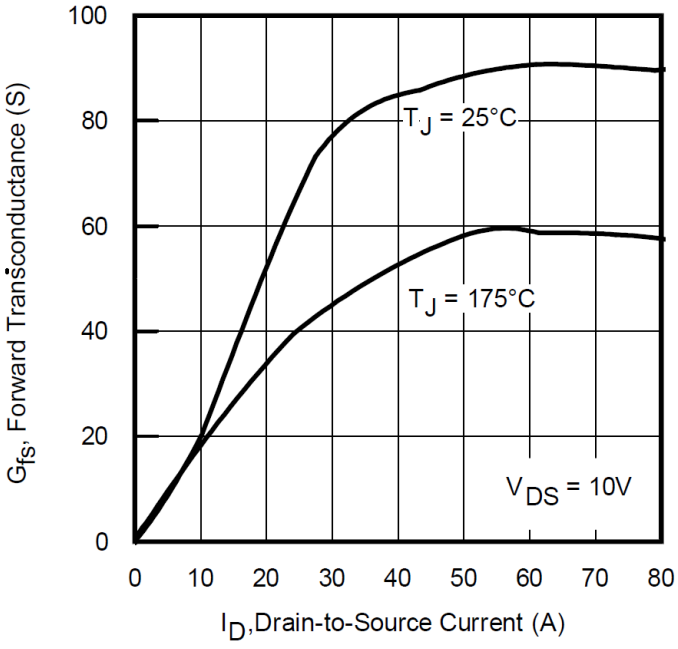


Fig. 4 Typical Forward Transconductance vs. Drain Current

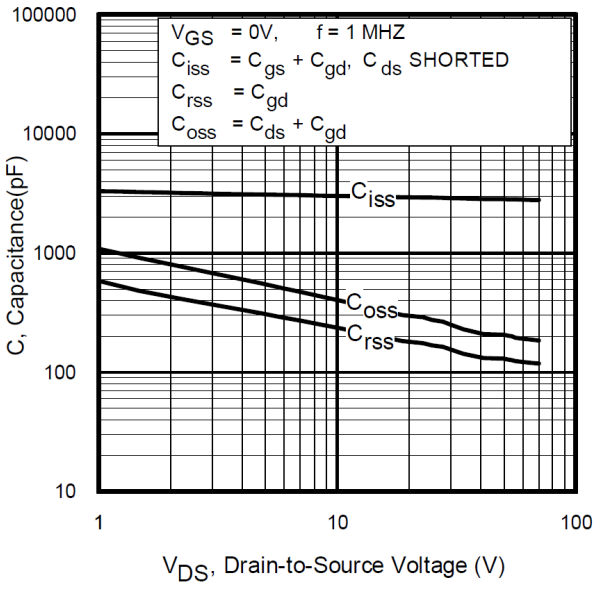


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

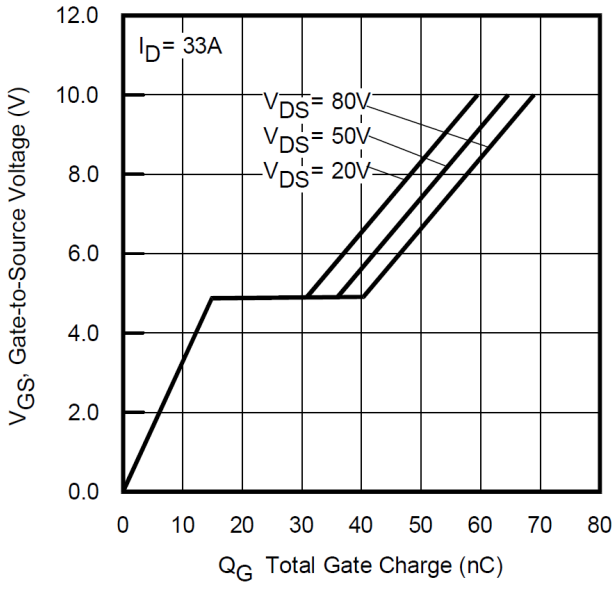


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

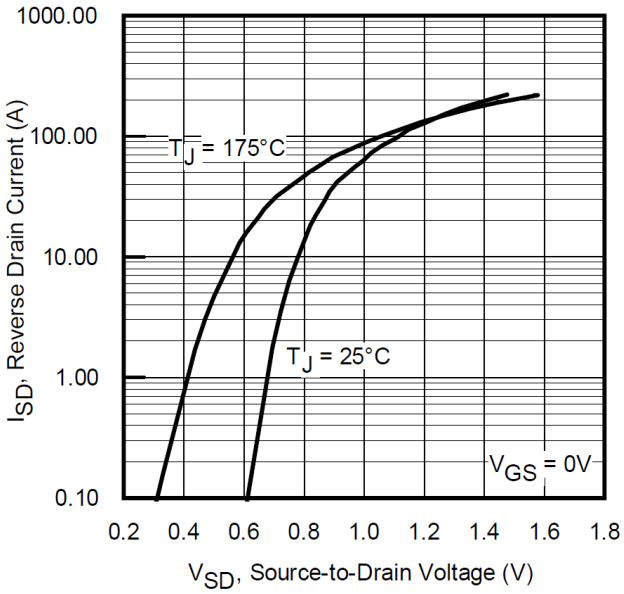


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

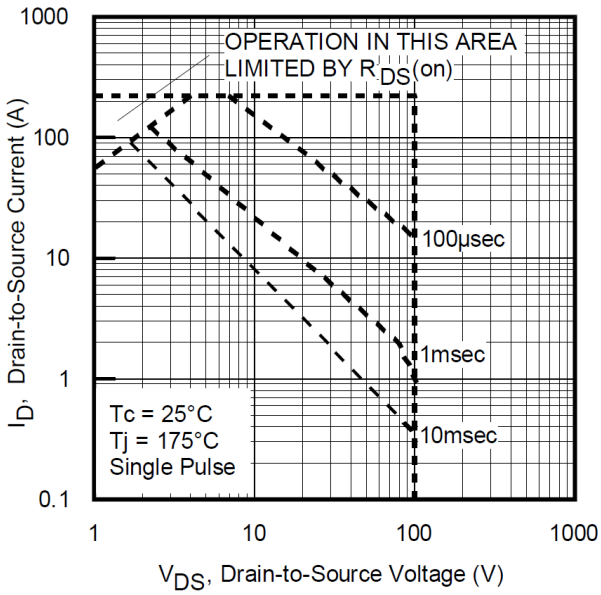


Fig 8. Maximum Safe Operating Area

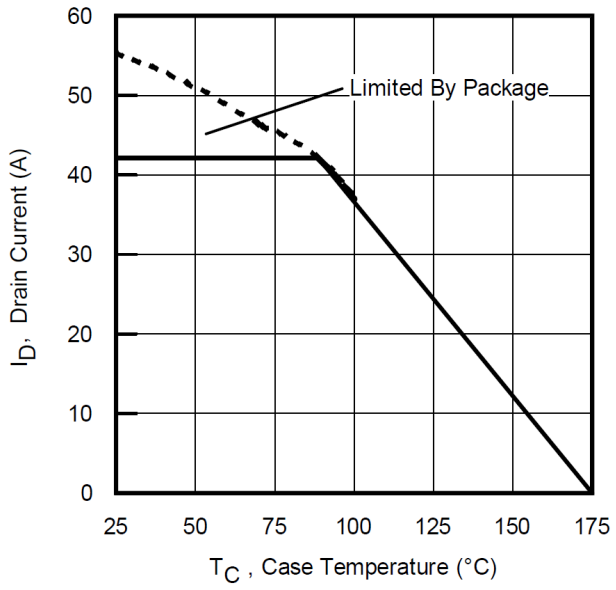


Fig 9. Maximum Drain Current vs. Case Temperature

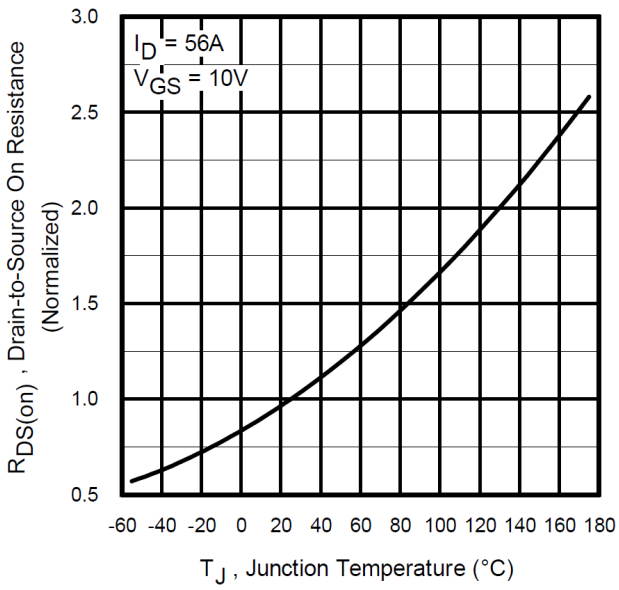
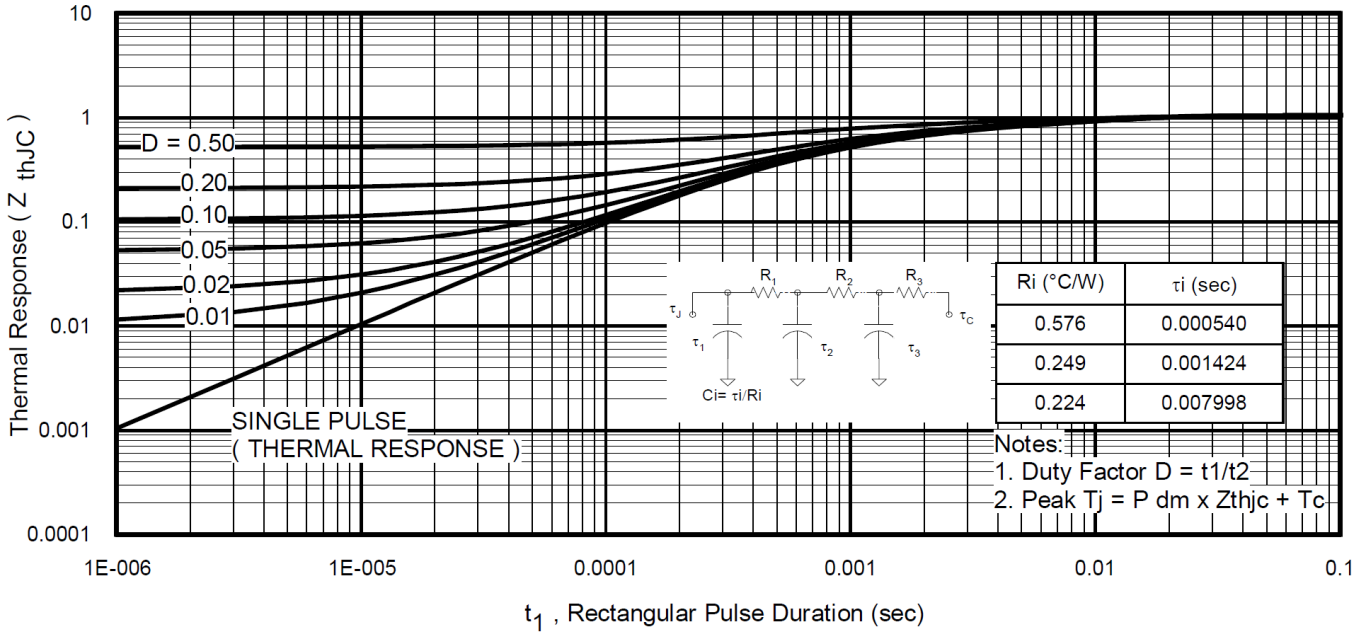


Fig 10. Normalized On-Resistance vs. Temperature



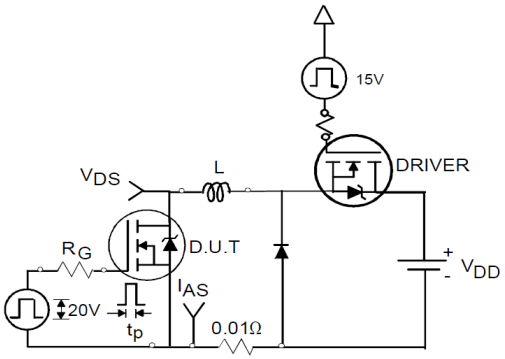


Fig 12a. Unclamped Inductive Test Circuit

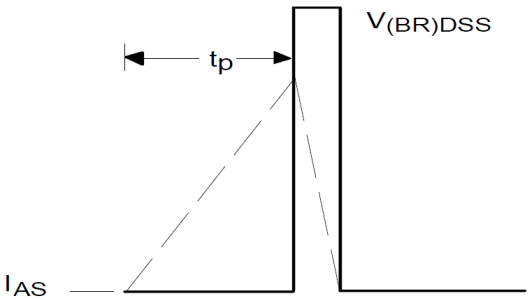


Fig 12b. Unclamped Inductive Waveforms

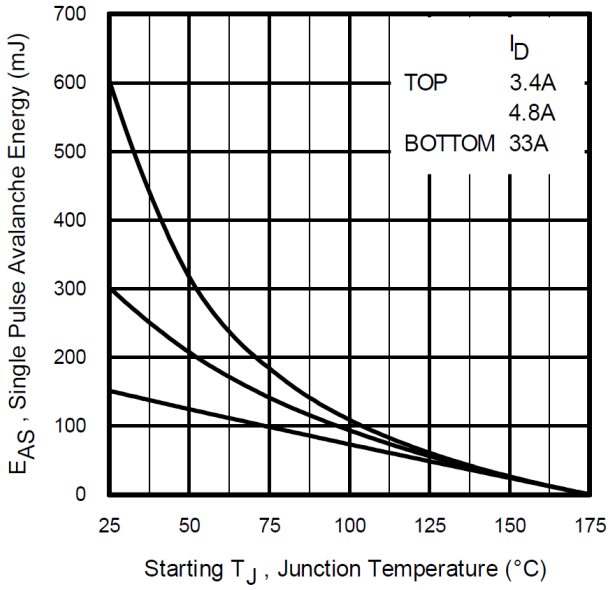


Fig 12c. Maximum Avalanche Energy vs. Drain Current

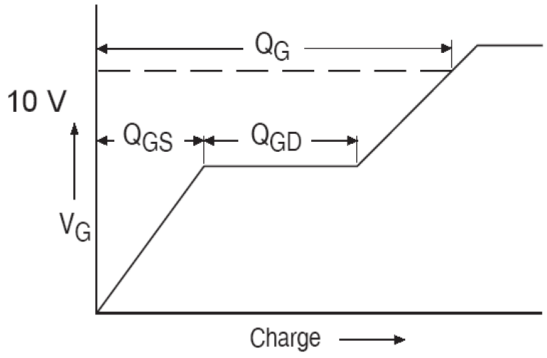


Fig 13a. Gate Charge Waveform

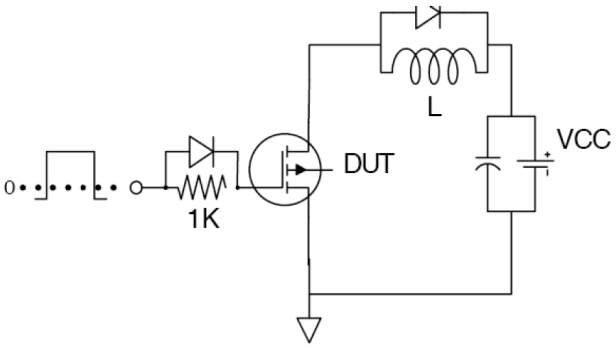


Fig 13b. Gate Charge Test Circuit

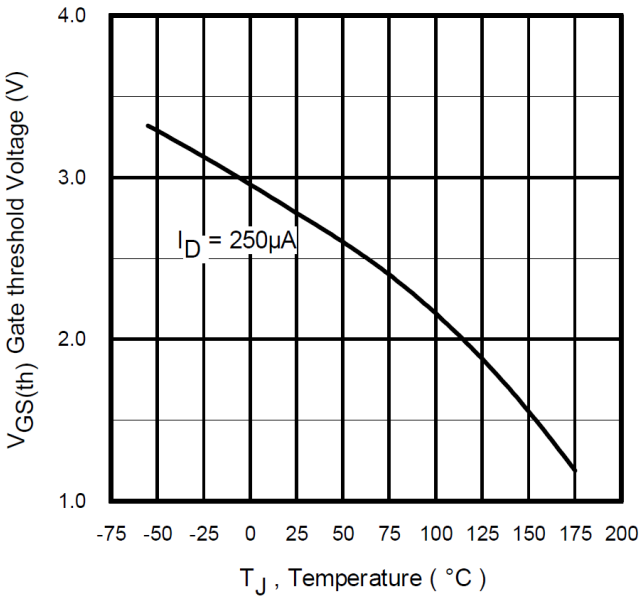


Fig 14. Threshold Voltage vs. Temperature

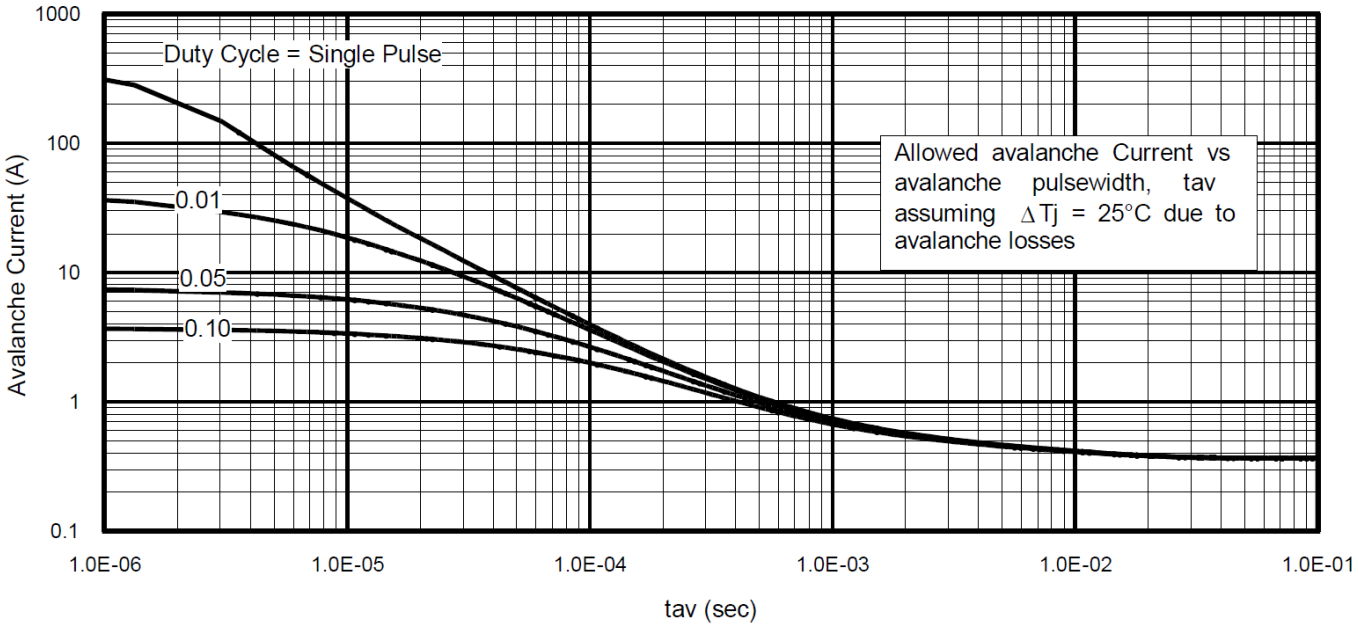


Fig 15. Typical Avalanche Current vs. Pulse width

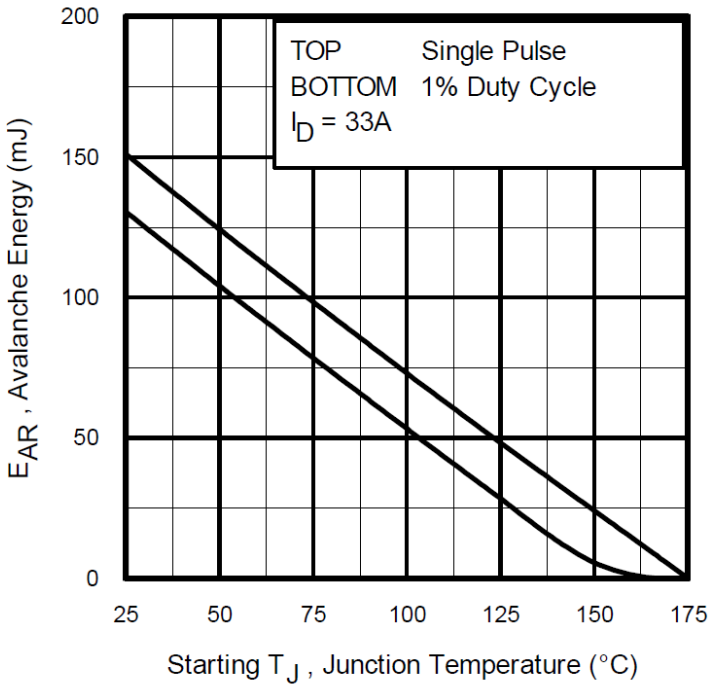


Fig 16. Maximum Avalanche Energy vs. Temperature

关于重复的雪崩曲线的注释，图 15、16：（有关更多信息，请参阅www.infineon.com 上的 AN-1005）

1. 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。
2. 只要不超过 T_{jmax}，就可以在雪崩中安全运行。
3. 如下公式基于图 12a、12b 所示的电路和波形。
4. $P_{D\,(ave)}$ = 每个雪崩脉冲的平均功率耗散。
5. BV = 额定击穿电压（1.3 倍系数，考虑雪崩期间的电压增加）。
6. I_{av} = 可允许的雪崩电流。
7. ΔT = 可允许的结温上升，不得超过 T_{jmax}（图 15、16 中假设为 25°C）。

t_{av} = 雪崩的平均时间。
D = 雪崩占空比 = $t_{av} \cdot f$
$Z_{thJC}(D, t_{av})$ = 瞬态热阻抗，见图 11)

PD (ave) = 1/2 (1.3·BV·I_{av}) = ΔT/ ZthJC
I_{av} = 2ΔT/ [1.3·BV·Zth]
$E_{AS\,(AR)} = P_{D\,(ave)} \cdot t_{av}$

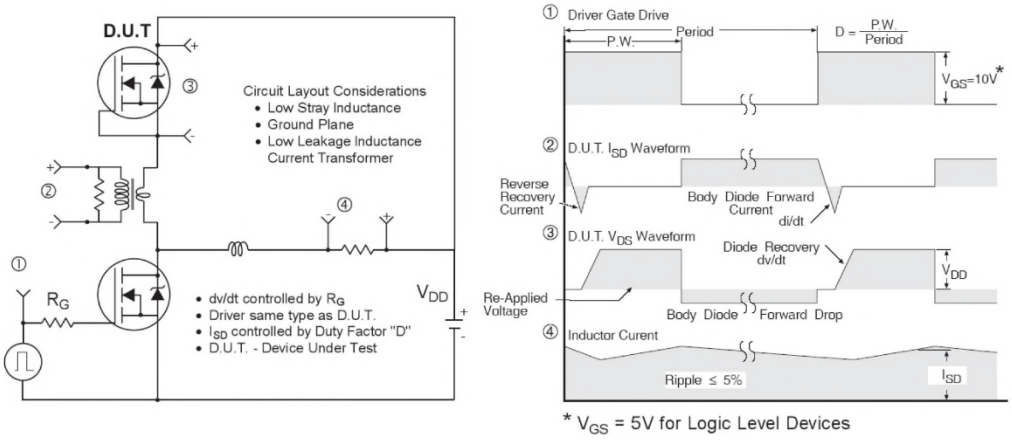


Fig 17. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

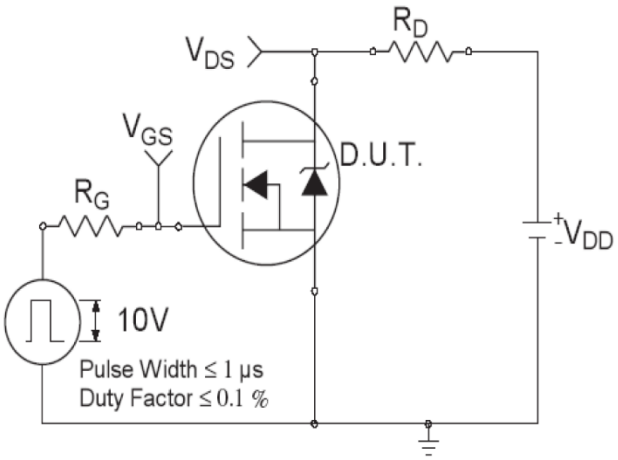


Fig 18a. Switching Time Test Circuit

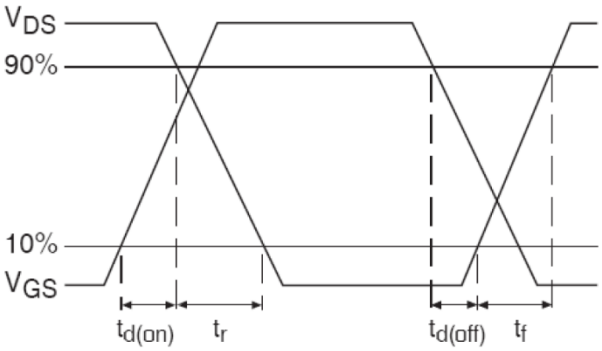
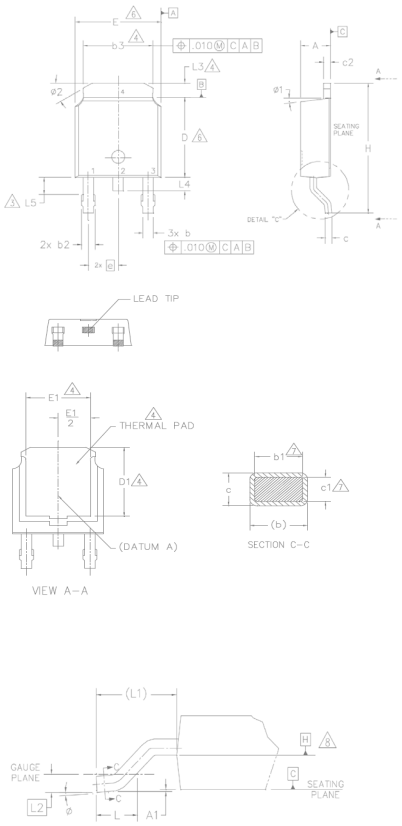


Fig 18b. Switching Time Waveforms

D-Pak (TO-252AA) 封装外形（尺寸以毫米（英寸）为单位）



NOTES:
1.– DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994
2.– DIMENSION ARE SHOWN IN INCHES [MILLIMETERS].
3.– LEAD DIMENSION UNCONTROLLED IN L5.
4.– DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.
5.– SECTION C–C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.
6.– DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .006 [0.15] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
7.– DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.
8.– DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
9.– OUTLINE CONFORMS TO JEDEC OUTLINE TO–252AA.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	.086	.094	
A1	–	0.13	–	.005	
b	0.64	0.89	.025	.035	
b1	0.64	0.79	.025	.031	7
b2	0.76	1.14	.030	.045	
b3	4.95	5.46	.195	.215	4
c	0.46	0.61	.018	.024	
c1	0.41	0.56	.016	.022	7
c2	0.46	0.89	.018	.035	
D	5.97	6.22	.235	.245	6
D1	5.21	–	.205	–	4
E	6.35	6.73	.250	.265	6
E1	4.32	–	.170	–	4
e	2.29 BSC		.090 BSC		
H	9.40	10.41	.370	.410	
L	1.40	1.78	.055	.070	
L1	2.74 BSC		.108 REF.		
L2	0.51 BSC		.020 BSC		
L3	0.89	1.27	.035	.050	4
L4	–	1.02	–	.040	
L5	1.14	1.52	.045	.060	3
ø	0°	10°	0°	10°	
ø1	0°	15°	0°	15°	
ø2	25°	35°	25°	35°	

LEAD ASSIGNMENTS

HEXFET

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

IGBT & CoPAK

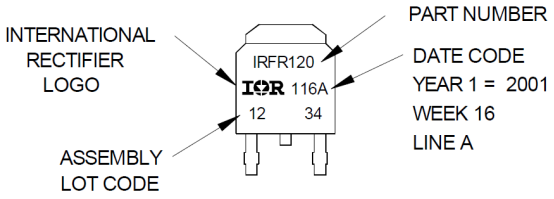
1.– GATE
2.– COLLECTOR
3.– EMITTER
4.– COLLECTOR

D-Pak (TO-252AA) 零件标识信息

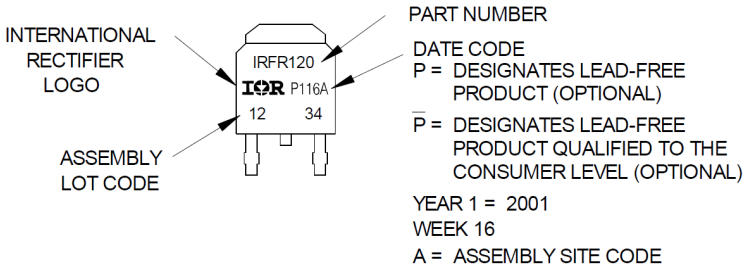
EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 2001
IN THE ASSEMBLY LINE "A"

Note: "P" in assembly line position
indicates "Lead-Free"

"P" in assembly line position indicates
"Lead-Free" qualification to the consumer-level

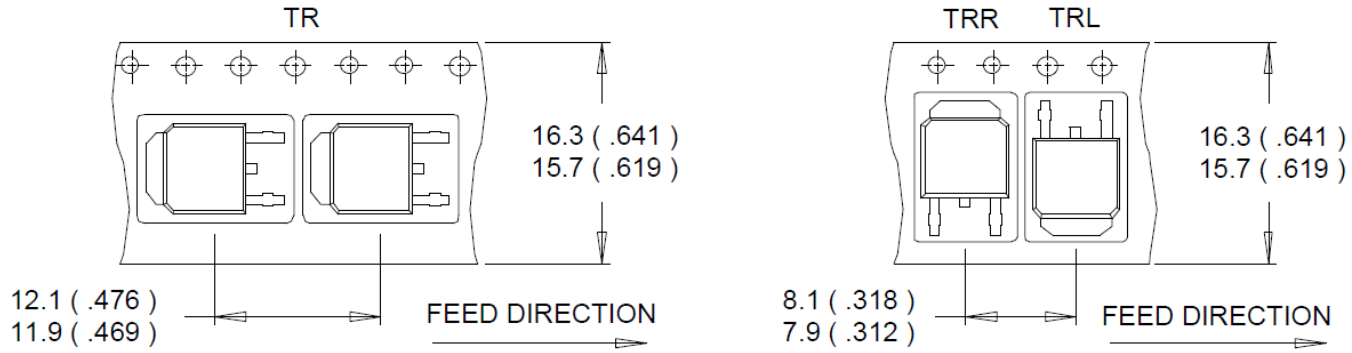


OR

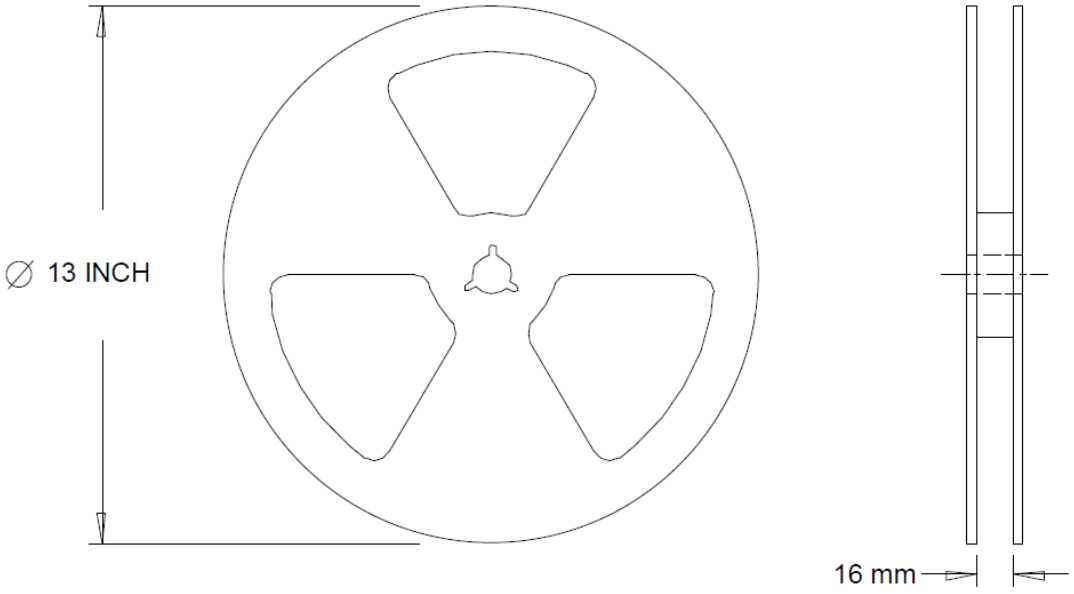


注：
1. 如需获取最新图纸，请访问英飞凌网站：http://www.infineon.com/package/

D-Pak (TO-252AA) 卷带信息（尺寸以毫米（英寸）为单位）



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. OUTLINE CONFORMS TO EIA-481.

注：有关最新图纸，请参阅英飞凌网站 https://www.infineon.cn/ 及其链接。

资质信息

Qualification Level	Industrial (per JEDEC JESD47F) †	
Moisture Sensitivity Level RoHS	D-Pak	MSL1 (per JEDEC J-STD-020D) †
Compliant	Yes	

† 产品发布时 JEDEC 标准的适用版本。

修订记录

Date	Rev.	Comments
05/31/2016	2.1	• Changed datasheet with corporate template. • Added disclaimer on last page.
11/27/2024	2.2	• Removed I-Pack “(IRFU3710ZPbF) and IRFU3710Z-701PbF”-All pages • Updated disclaimer on last page.

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修订记录

IRFR3710ZPBF

Revision 2024 - 12 - 12 , Rev. 1 . 0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2024-12-12	Removed I-Pack “(IRFU3710ZPbF) and IRFU3710Z-701PbF”-All pages

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