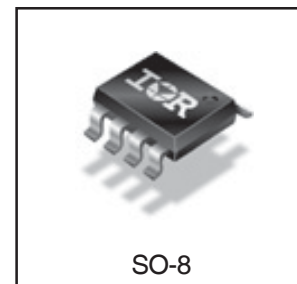
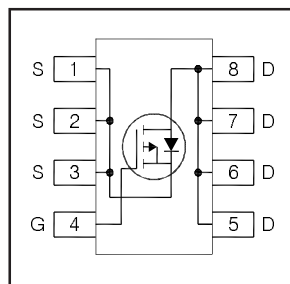


IRF9321PbF

HEXFET® Power MOSFET

V_{DS}	-30	V
R_{DS(on)} max (@ V _{GS} = -10V)	7.2	mΩ
R_{DS(on)} max (@ V _{GS} = -4.5V)	11.2	mΩ
Q_g (typical)	34	nC
I_D (@ T _A = 25°C)	-15	A



Applications

- Charge and Discharge Switch for Notebook PC Battery Application

Features and Benefits

Features

Industry-Standard SO-8 Package
RoHS Compliant Containing no Lead, no Bromide and no Halogen

results in
⇒

Resulting Benefits

Multi-Vendor Compatibility
Environmentally Friendlier

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRF9321PbF	SO8	Tube/Bulk	95	
IRF9321TRPbF	SO8	Tape and Reel	4000	

Absolute Maximum Ratings

	Parameter	Max.	Units
V _{DS}	Drain-to-Source Voltage	-30	V
V _{GS}	Gate-to-Source Voltage	±20	
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ -10V	-15	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ -10V	-12	
I _{DM}	Pulsed Drain Current ①	-120	
P _D @ T _A = 25°C	Power Dissipation ④	2.5	W
P _D @ T _A = 70°C	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T _J	Operating Junction and	-55 to + 150	°C
T _{STG}	Storage Temperature Range		

Notes ① through ⑥ are on page 2

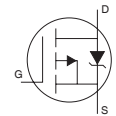
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-30	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.021	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	5.9	7.2	m Ω	$V_{GS} = -10V, I_D = -15A$ ③
		—	9.3	11.2		$V_{GS} = -4.5V, I_D = -12A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	-1.3	-1.8	-2.4	V	$V_{DS} = V_{GS}, I_D = -50\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-5.9	—	mV/ $^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current	—	—	-1.0	μA	$V_{DS} = -24V, V_{GS} = 0V$
		—	—	-150		$V_{DS} = -24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$
g_{fs}	Forward Transconductance	30	—	—	S	$V_{DS} = -10V, I_D = -12A$
Q_g	Total Gate Charge ⑥	—	34	—	nC	$V_{DS} = -15V, V_{GS} = -4.5V, I_D = -12A$
Q_g	Total Gate Charge ⑥	—	65	98	nC	$V_{GS} = -10V$
Q_{gs}	Gate-to-Source Charge ⑥	—	10	—		$V_{DS} = -15V$
Q_{gd}	Gate-to-Drain Charge ⑥	—	16	—		$I_D = -12A$
R_G	Gate Resistance ⑥	—	18	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	21	—	ns	$V_{DD} = -30V, V_{GS} = -4.5V$ ③
t_r	Rise Time	—	79	—		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	185	—		$R_G = 6.8\Omega$
t_f	Fall Time	—	145	—		See Figs. 19a & 19b
C_{iss}	Input Capacitance	—	2590	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	590	—		$V_{DS} = -25V$
C_{rss}	Reverse Transfer Capacitance	—	360	—		$f = 1.0\text{MHz}$

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	310	mJ
I_{AR}	Avalanche Current ①	—	-12	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-120		
V_{SD}	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -2.5A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	38	57	ns	$T_J = 25^\circ\text{C}, I_F = -2.5A, V_{DD} = -24V$
Q_{rr}	Reverse Recovery Charge	—	24	36	nC	$di/dt = 100/\mu s$ ③

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient ④	—	50	

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 4.3\text{mH}$, $R_G = 25\Omega$, $I_{AS} = -12A$.
- ③ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board.
- ⑤ R_θ is measured at T_J of approximately 90°C .
- ⑥ For DESIGN AID ONLY, not subject to production testing.

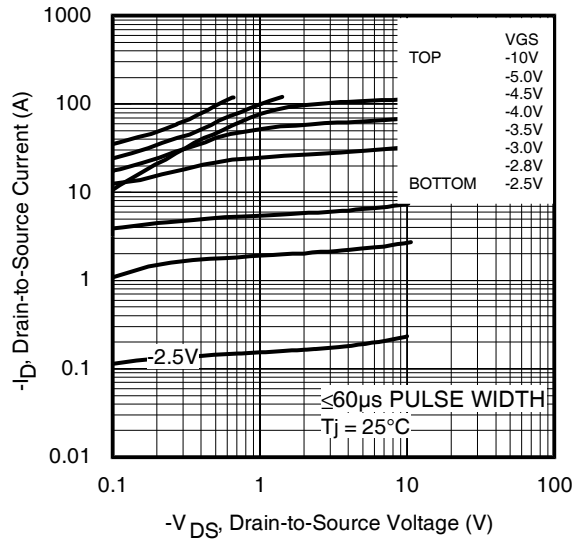


Fig 1. Typical Output Characteristics

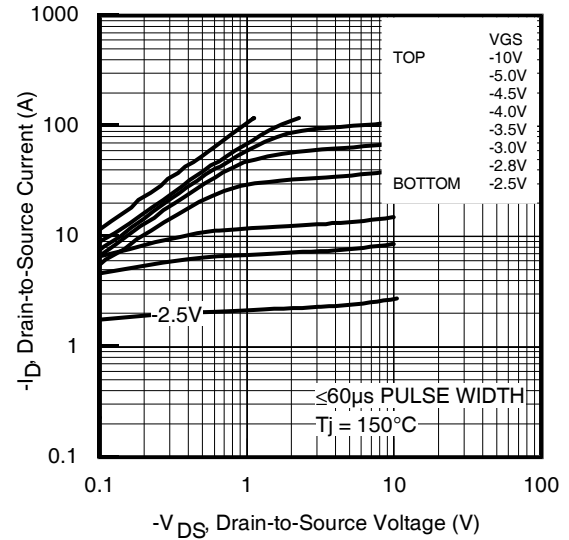


Fig 2. Typical Output Characteristics

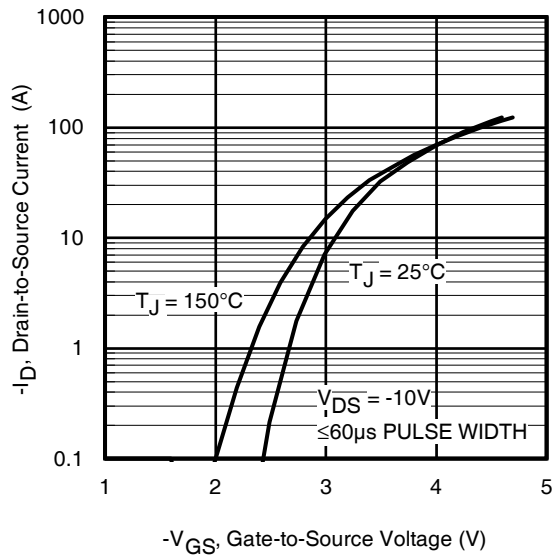


Fig 3. Typical Transfer Characteristics

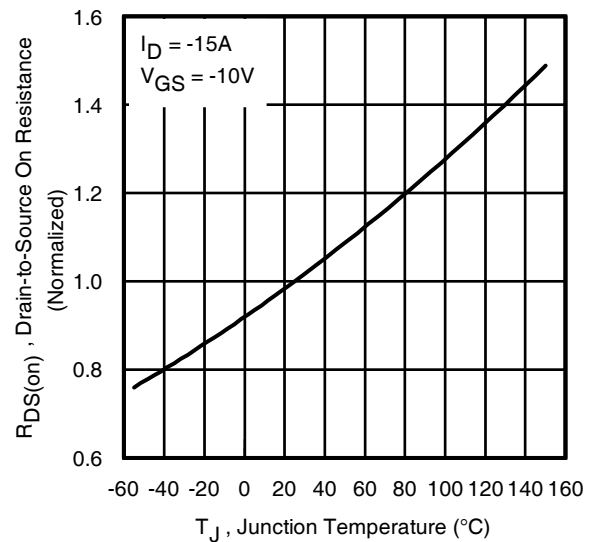


Fig 4. Normalized On-Resistance vs. Temperature

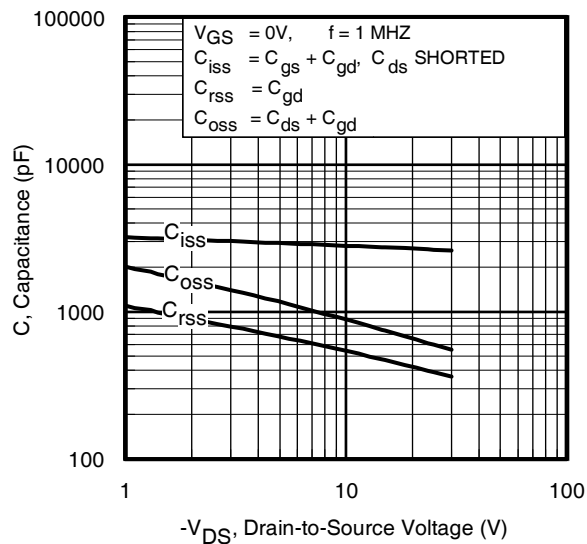


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage
www.irf.com

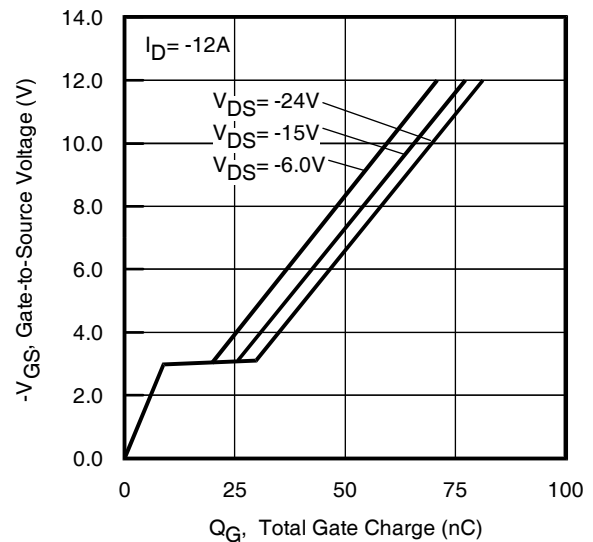


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

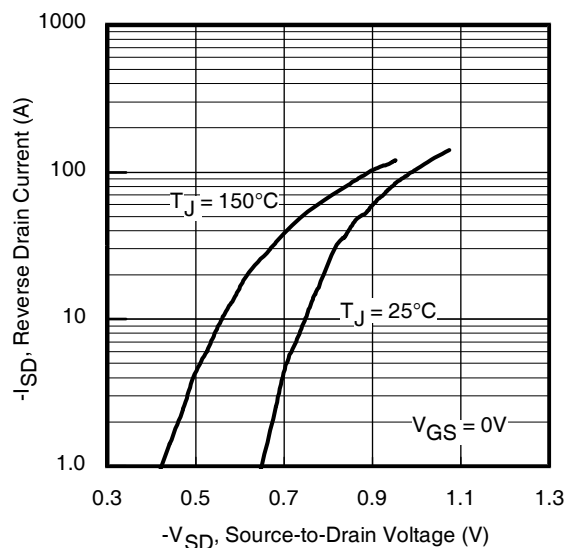


Fig 7. Typical Source-Drain Diode Forward Voltage

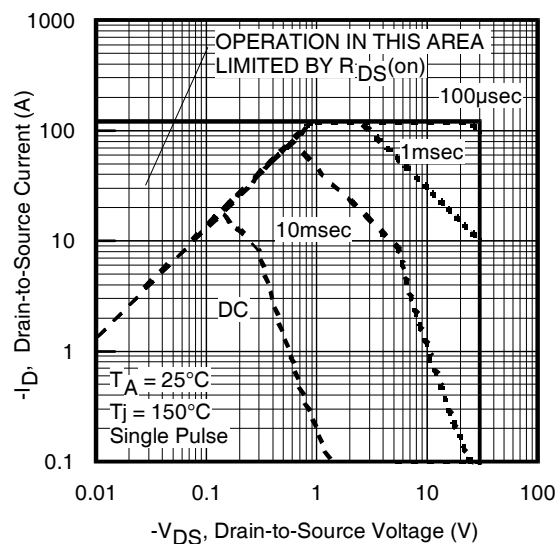


Fig 8. Maximum Safe Operating Area

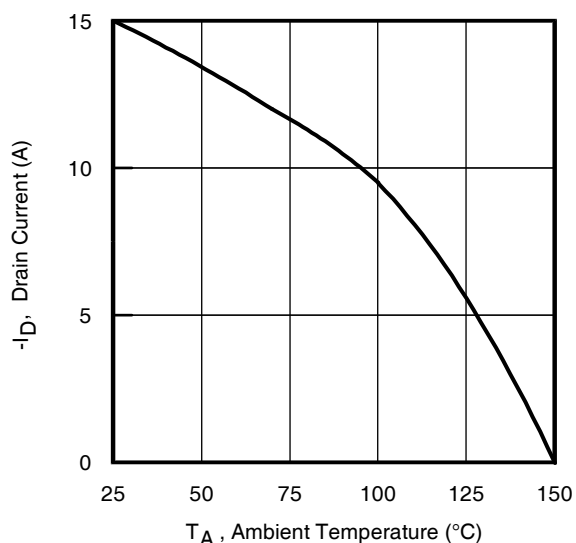


Fig 9. Maximum Drain Current vs. Ambient Temperature

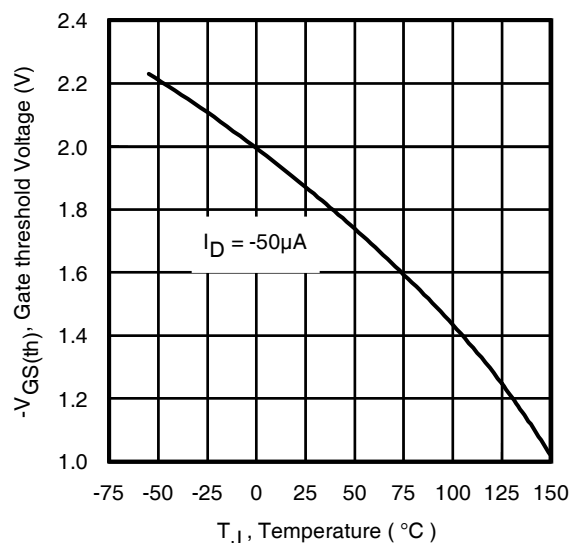


Fig 10. Threshold Voltage vs. Temperature

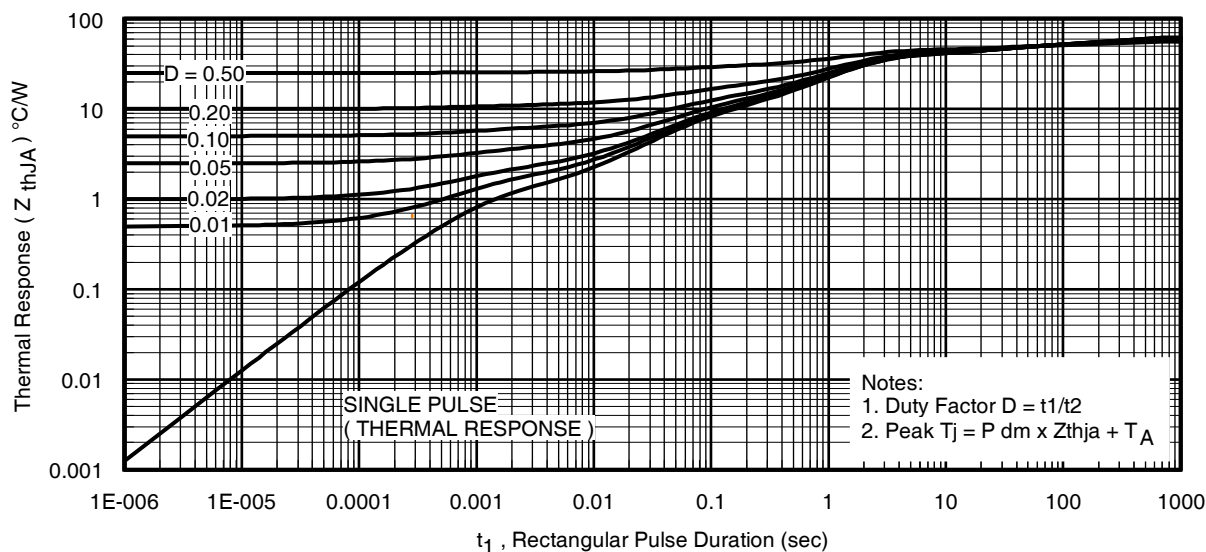


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

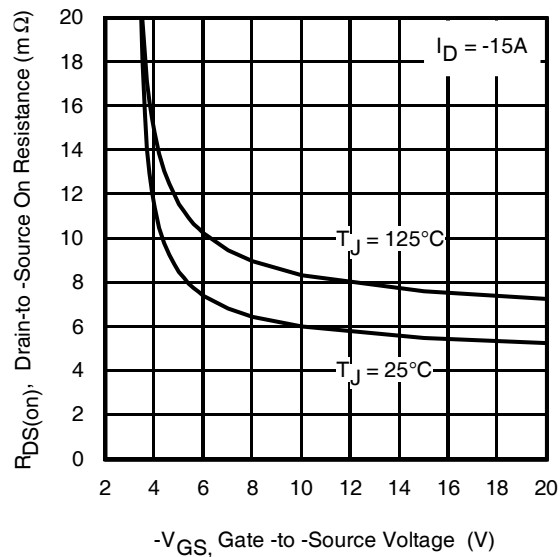


Fig 12. On-Resistance vs. Gate Voltage

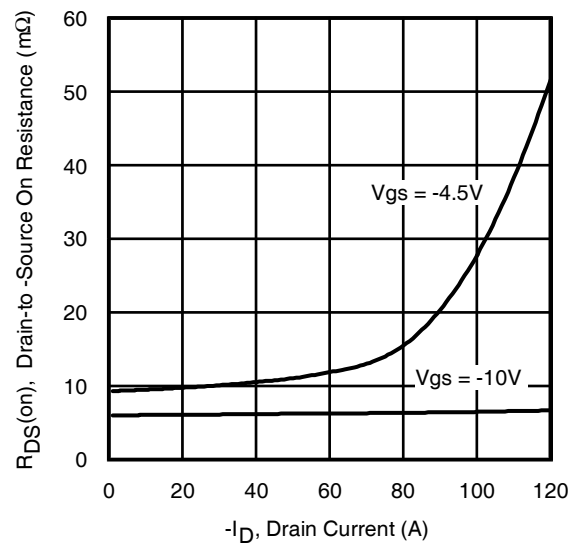


Fig 13. Typical On-Resistance vs. Drain Current

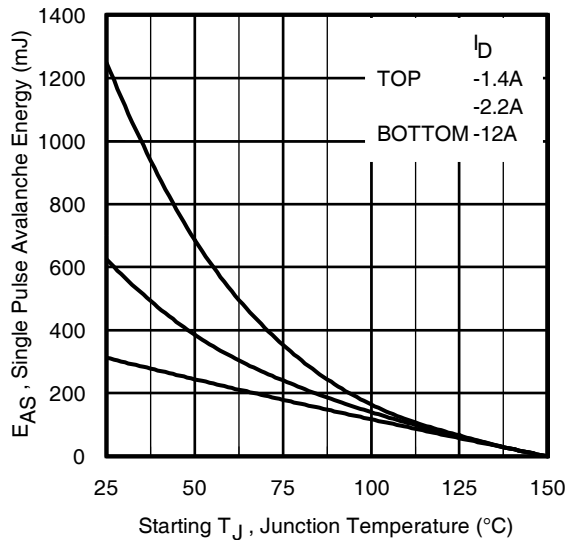


Fig 14. Maximum Avalanche Energy vs. Drain Current

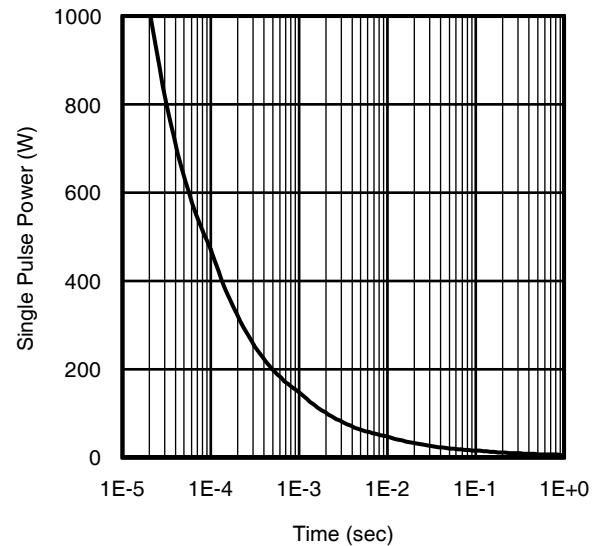
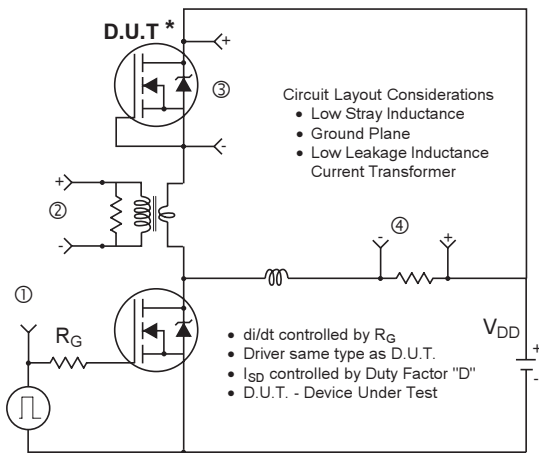
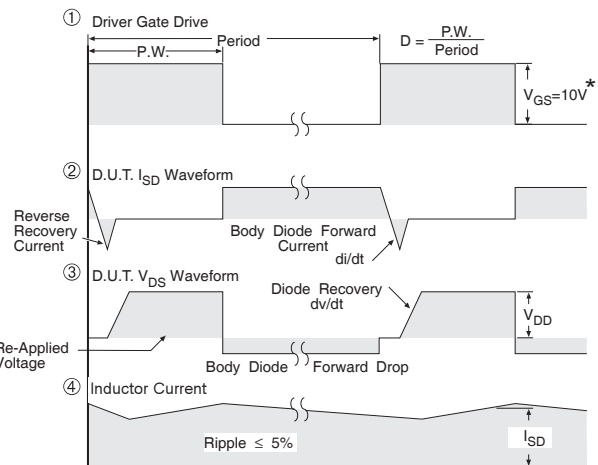


Fig 15. Typical Power vs. Time



* Reverse Polarity of D.U.T. for P-Channel



* $V_{GS} = 5V$ for Logic Level Devices

Fig 16. Diode Reverse Recovery Test Circuit for P-Channel HEXFET® Power MOSFETs

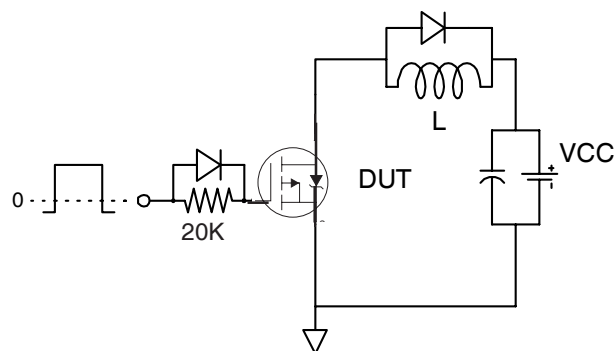


Fig 17a. Gate Charge Test Circuit

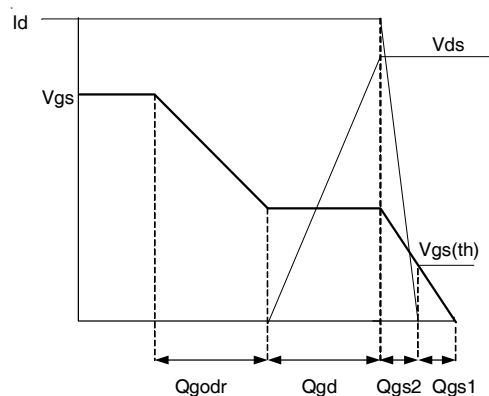


Fig 17b. Gate Charge Waveform

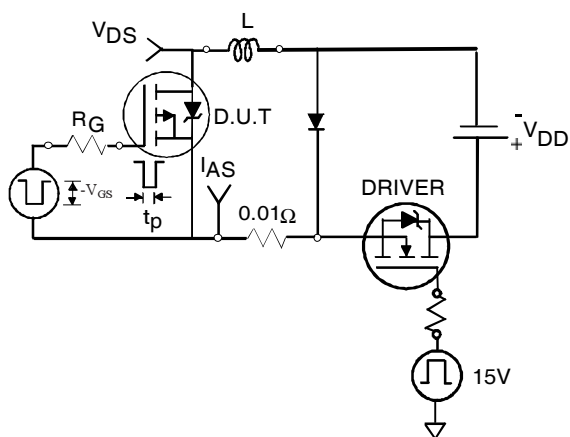


Fig 18a. Unclamped Inductive Test Circuit

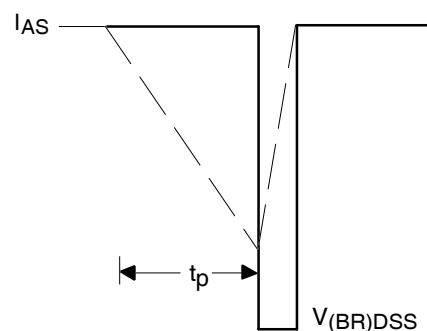


Fig 18b. Unclamped Inductive Waveforms

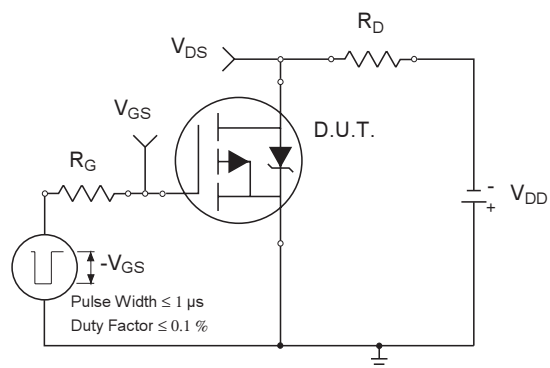


Fig 19a. Switching Time Test Circuit

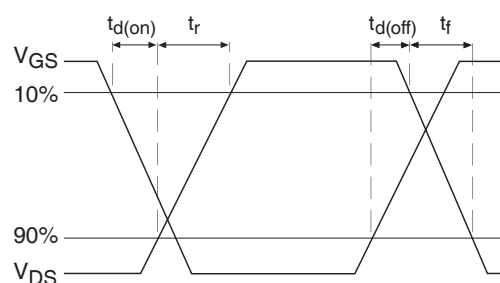
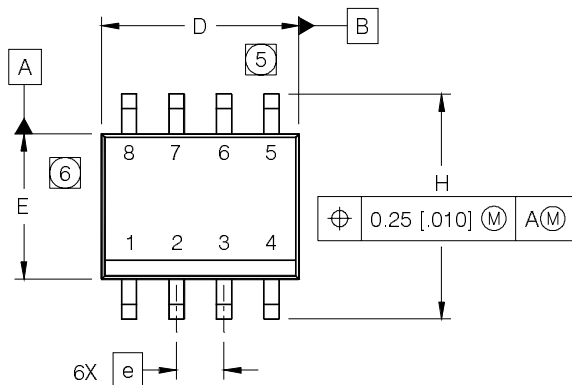


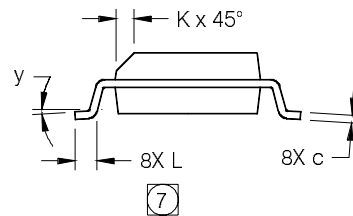
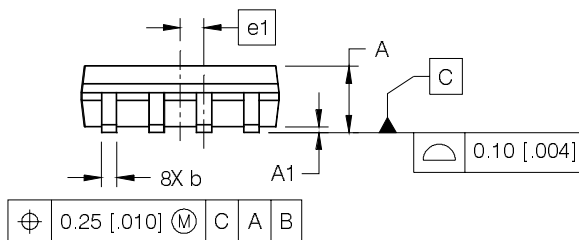
Fig 19b. Switching Time Waveforms

SO-8 Package Outline (Mosfet & Fetky)

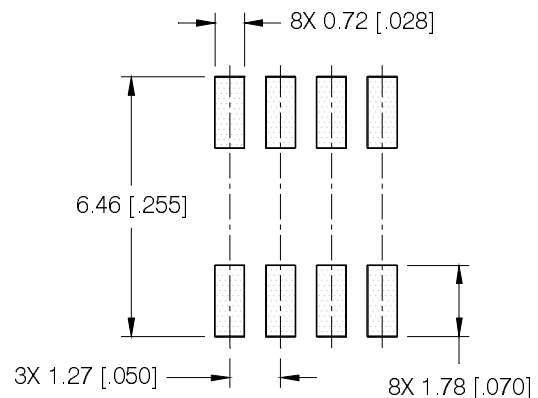
Dimensions are shown in millimeters (inches)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



FOOTPRINT

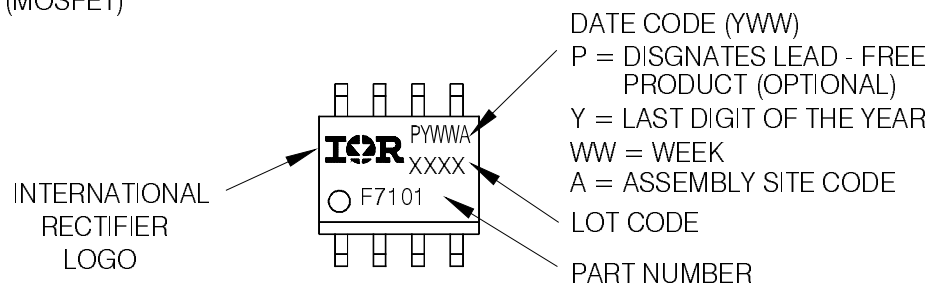


NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

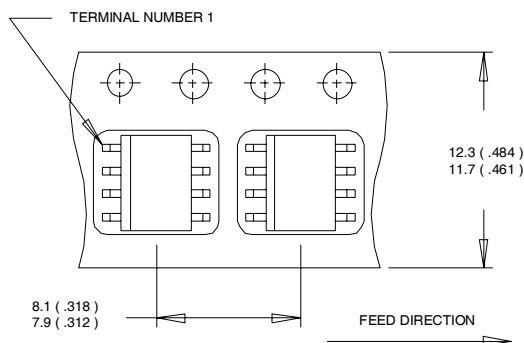


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

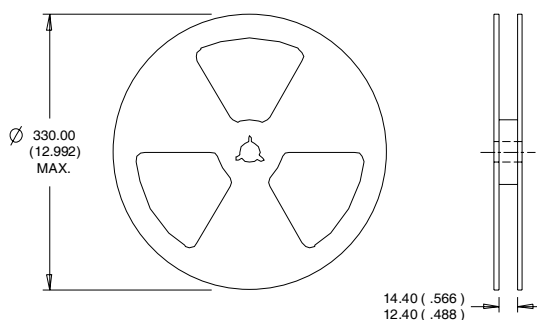
IRF9321PbF

SO-8 Tape and Reel (Dimensions are shown in millimeters (inches))

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IR Rectifier



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



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Qualification Information[†]

Qualification level	Consumer ^{††}	
	(per JEDEC JESD47F ^{†††} guidelines)	
Moisture Sensitivity Level	SO-8	MSL1 (per JEDEC J-STD-020D ^{†††})
RoHS Compliant	Yes	

† Qualification standards can be found at International Rectifier's web site
<http://www.irf.com/product-info/reliability>

†† Higher qualification ratings may be available should the user have such requirements.
Please contact your International Rectifier sales representative for further information:
<http://www.irf.com/whoto-call/salesrep/>

††† Applicable version of JEDEC standard at the time of product release.

Data and specifications subject to change without notice.

International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.05/2010



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

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