

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[International Rectifier \(Infineon Technologies Americas Corp.\)
IRF3007PBF](#)

For any questions, you can email us directly:

sales@integrated-circuit.com

IRF3007PbF

Typical Applications

- Industrial Motor Drive

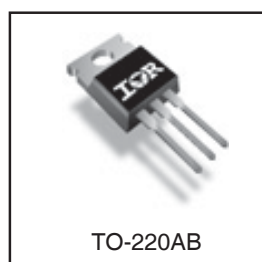
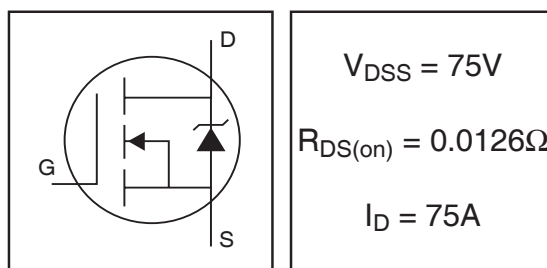
Features

- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to T_{jmax}
- Lead-Free

Description

This design of HEXFET® Power MOSFETs utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this HEXFET power MOSFET are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These combine to make this design an extremely efficient and reliable device for use in a wide variety of applications.

HEXFET® Power MOSFET



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Silicon limited)	80	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (See Fig.9)	56	
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Package limited)	75	
I_{DM}	Pulsed Drain Current ①	320	
$P_D @ T_C = 25^\circ C$	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	280	mJ
$E_{AS} (6 \text{ sigma})$	Single Pulse Avalanche Energy Tested Value ②	946	
I_{AR}	Avalanche Current ①	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy ③		mJ
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	1.1 (10)	N•m (lb•in)

Thermal Resistance

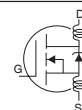
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.74	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

IRF3007PbF

 International


Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	75	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.084	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	10.5	12.6	mΩ	V _{GS} = 10V, I _D = 48A ④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = 10V, I _D = 250μA
g _{fs}	Forward Transconductance	180	—	—	S	V _{DS} = 25V, I _D = 48A
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 75V, V _{GS} = 0V
		—	—	250		V _{DS} = 60V, V _{GS} = 0V, T _J = 150°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	—	89	130	nC	I _D = 48A
Q _{gs}	Gate-to-Source Charge	—	21	32		V _{DS} = 60V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	30	45		V _{GS} = 10V
t _{d(on)}	Turn-On Delay Time	—	12	—		ns
t _r	Rise Time	—	80	—	I _D = 48A	
t _{d(off)}	Turn-Off Delay Time	—	55	—	R _G = 4.6Ω	
t _f	Fall Time	—	49	—	V _{GS} = 10V ④	
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	—	3270	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	520	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	78	—		f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance	—	3500	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance	—	340	—		V _{GS} = 0V, V _{DS} = 60V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance ⑤	—	640	—		V _{GS} = 0V, V _{DS} = 0V to 60V



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	80⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	320		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 48A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	85	130	ns	T _J = 25°C, I _F = 48A, V _{DD} = 38V
Q _{rr}	Reverse Recovery Charge	—	280	420	nC	di/dt = 100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
- ② Starting T_J = 25°C, L = 0.24mH
R_G = 25Ω, I_{AS} = 48A, V_{GS} = 10V (See Figure 12).
- ③ I_{SD} ≤ 48A, di/dt ≤ 330A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 175°C
- ④ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑤ C_{oss eff.} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.
- ⑥ Limited by T_{Jmax}, see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.
- ⑦ This value determined from sample failure population. 100% tested to this value in production.

International
IR Rectifier

IRF3007PbF

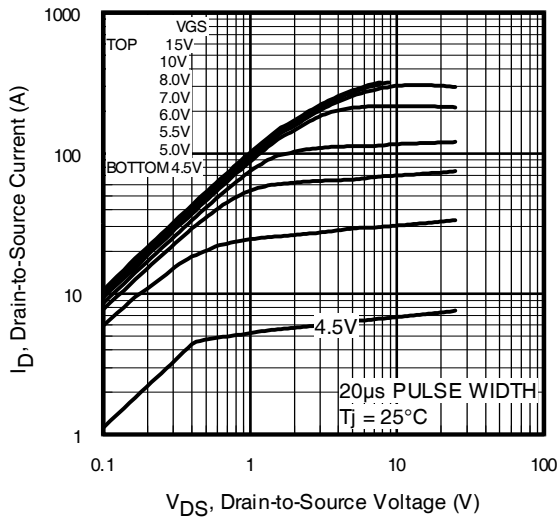


Fig 1. Typical Output Characteristics

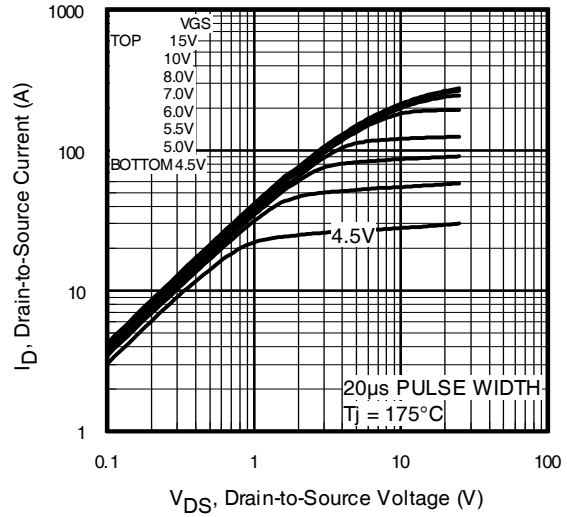


Fig 2. Typical Output Characteristics

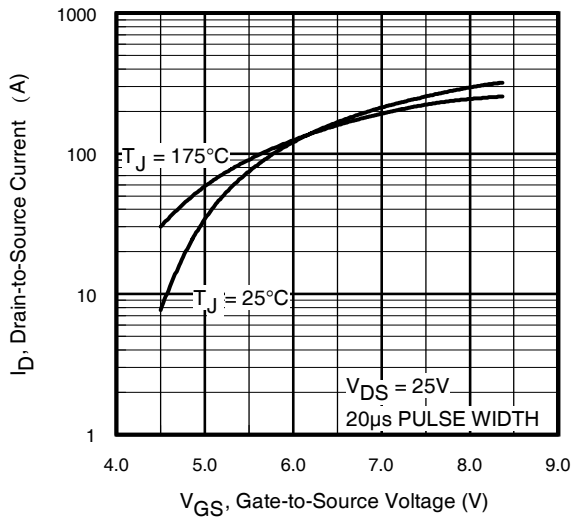


Fig 3. Typical Transfer Characteristics

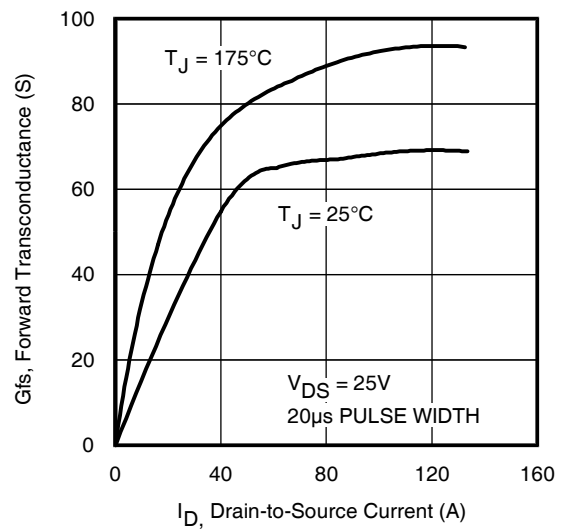


Fig 4. Typical Forward Transconductance Vs. Drain Current

IRF3007PbF

International
IR Rectifier

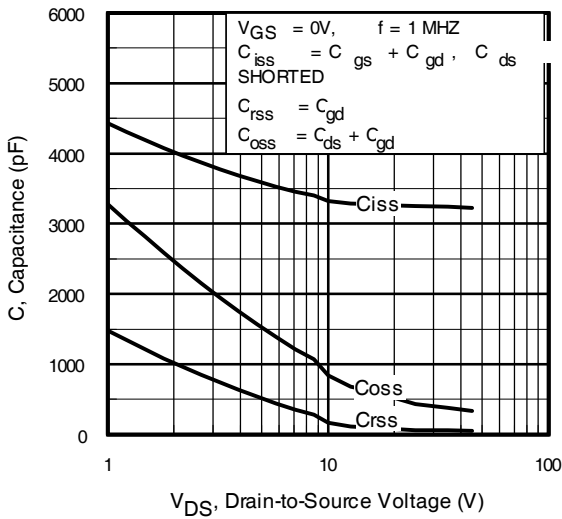


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

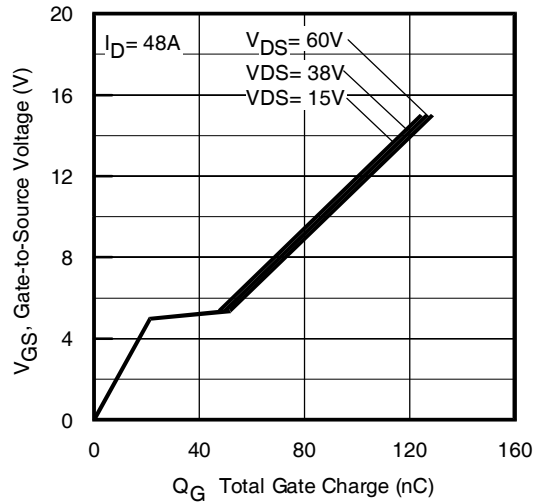


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

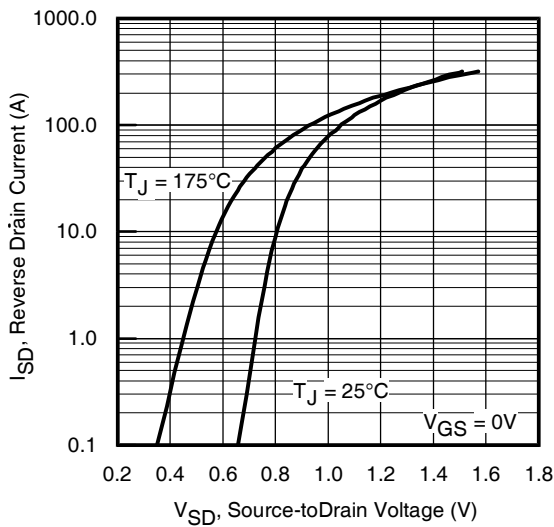


Fig 7. Typical Source-Drain Diode Forward Voltage

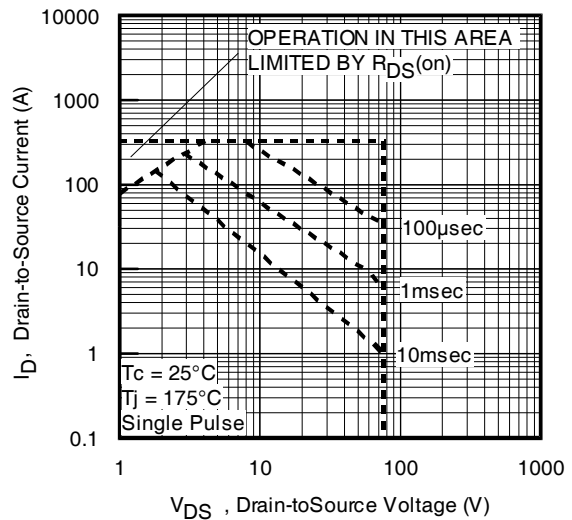


Fig 8. Maximum Safe Operating Area

International
IR Rectifier

IRF3007PbF

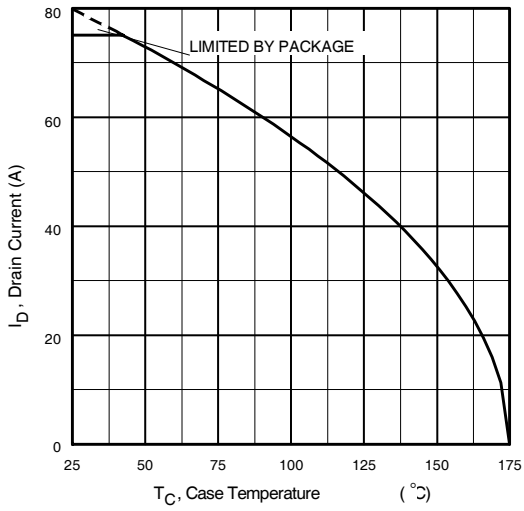


Fig 9. Maximum Drain Current Vs. Case Temperature

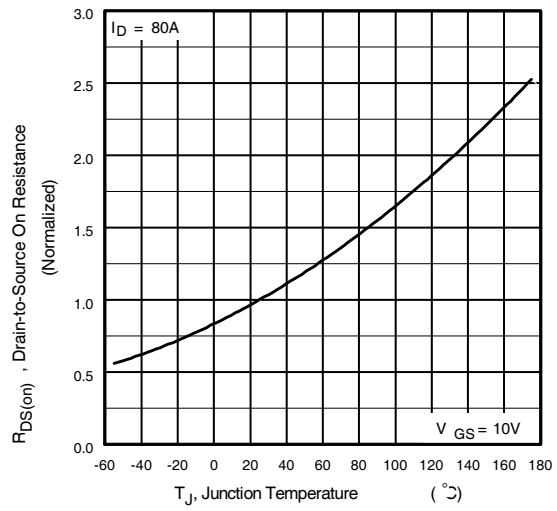


Fig 10. Normalized On-Resistance Vs. Temperature

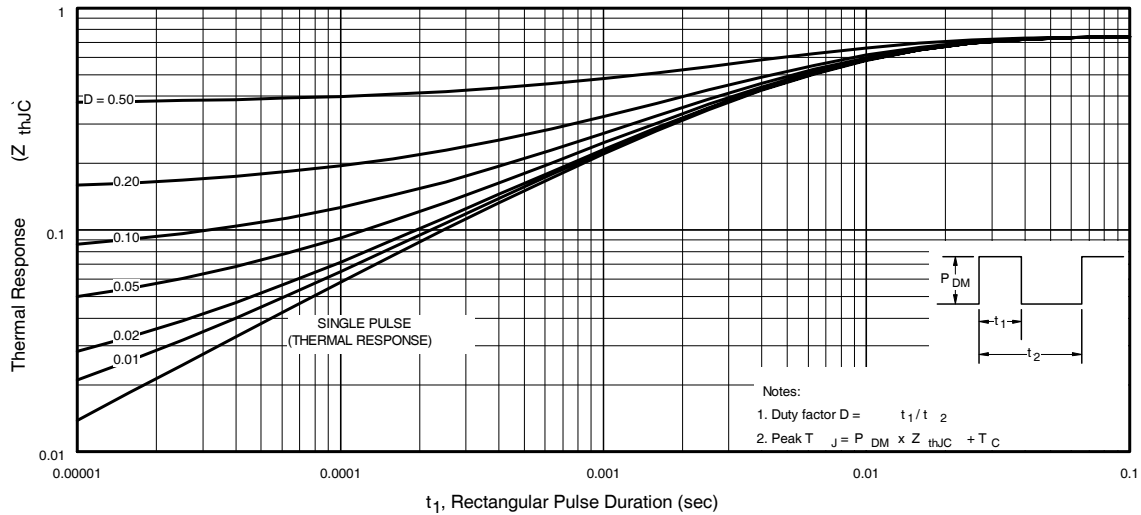


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

IRF3007PbF

International
IR Rectifier

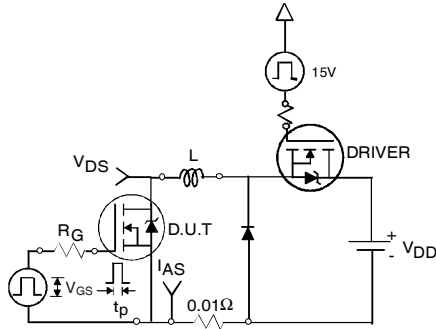


Fig 12a. Unclamped Inductive Test Circuit

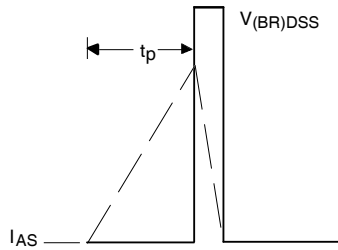


Fig 12b. Unclamped Inductive Waveforms

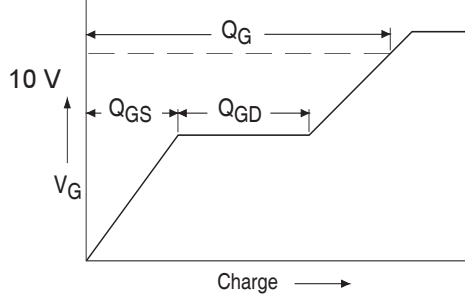


Fig 13a. Basic Gate Charge Waveform

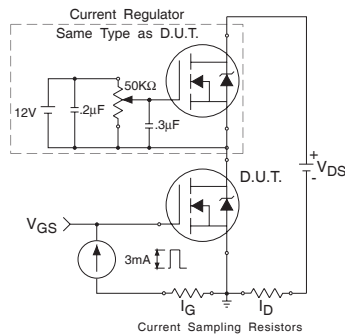


Fig 13b. Gate Charge Test Circuit

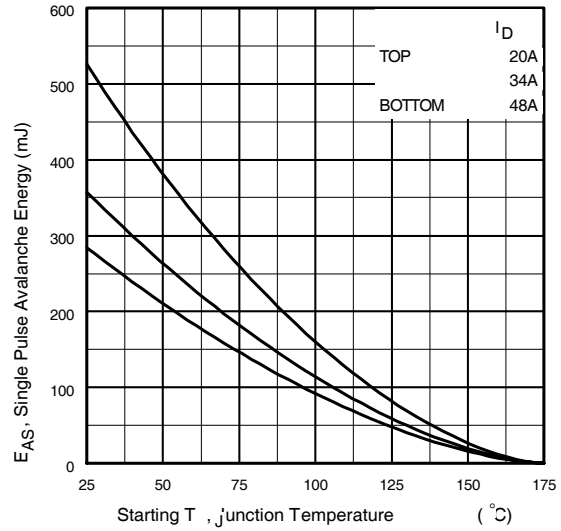


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

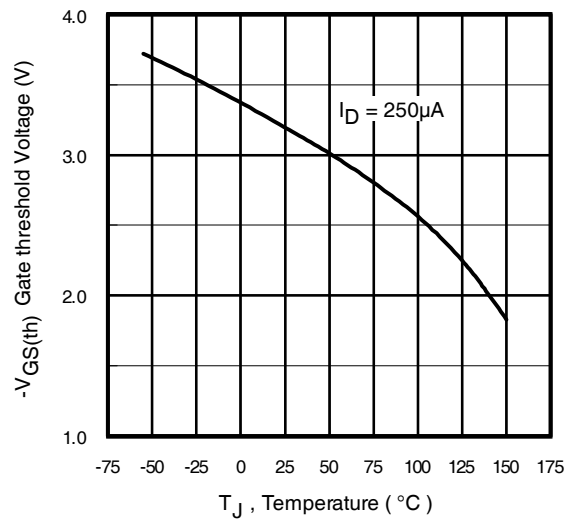


Fig 14. Threshold Voltage Vs. Temperature

www.irf.com

International
IR Rectifier

IRF3007PbF

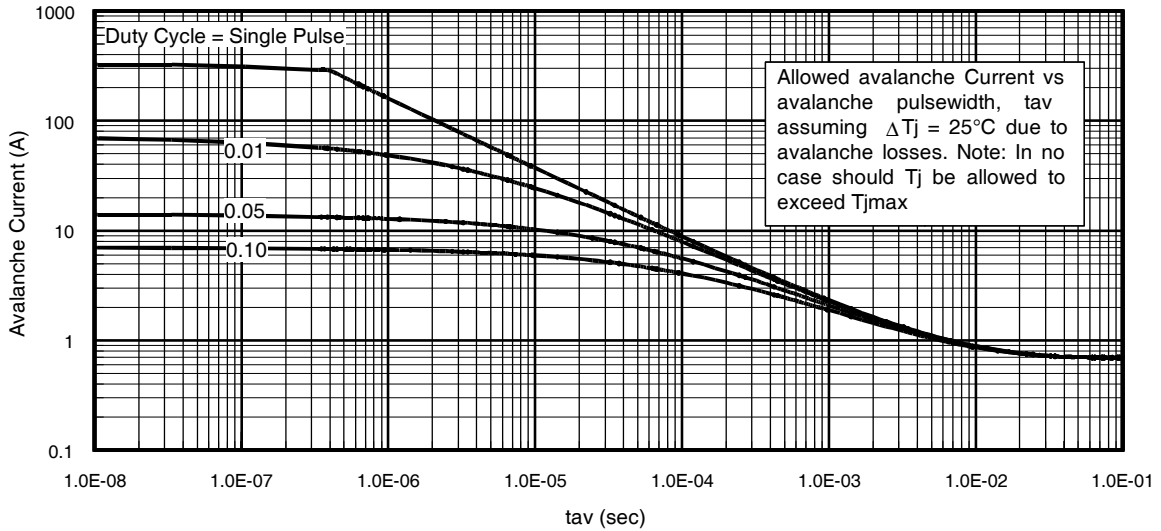


Fig 15. Typical Avalanche Current Vs.Pulsewidth

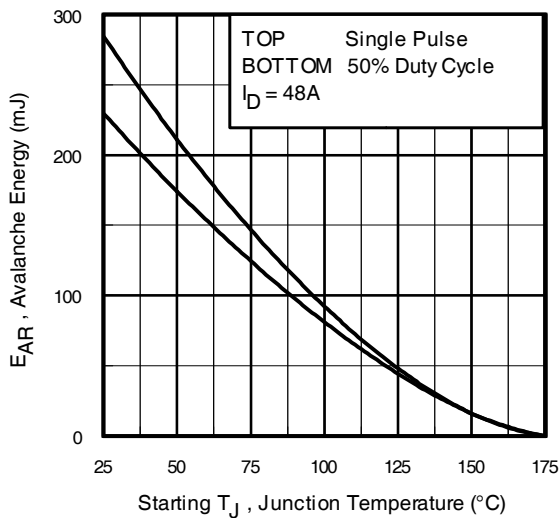


Fig 16. Maximum Avalanche Energy Vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 15, 16:
 (For further info, see AN-1005 at www.irf.com)

1. Avalanche failures assumption: Purely a thermal phenomenon and failure occurs at a temperature far in excess of T_{jmax} . This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as T_{jmax} is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 12a, 12b.
4. $P_{D(ave)}$ = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6. I_{av} = Allowable avalanche current.
7. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 15, 16).
 t_{av} = Average time in avalanche.
 D = Duty cycle in avalanche = $t_{av} \cdot f$
 $Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see figure 11)

$$P_{D(ave)} = 1/2 (1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}$$

$$I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$$

$$E_{AS(AR)} = P_{D(ave)} \cdot t_{av}$$

IRF3007PbF

International
IR Rectifier

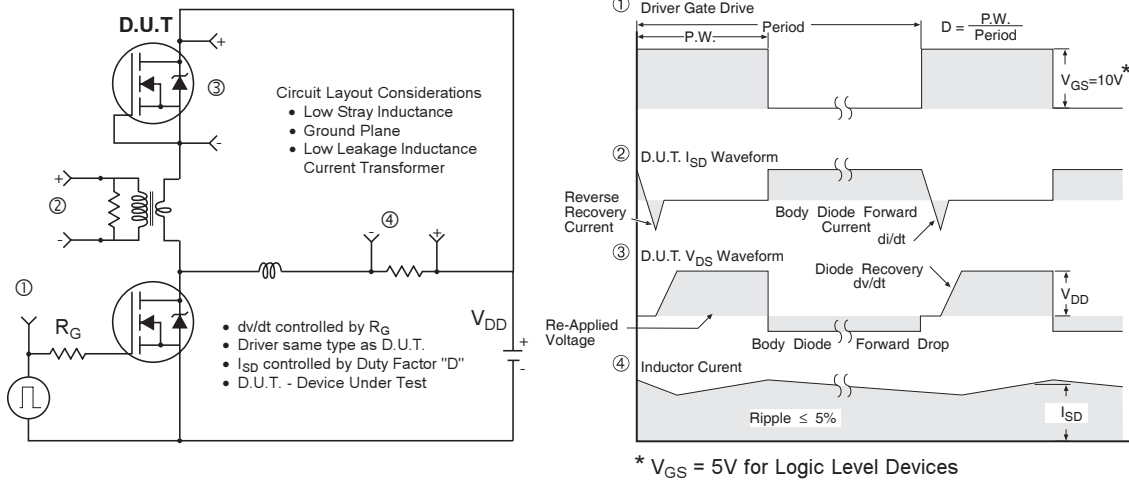


Fig 17. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETS

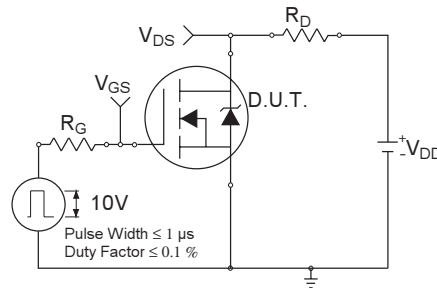


Fig 18a. Switching Time Test Circuit

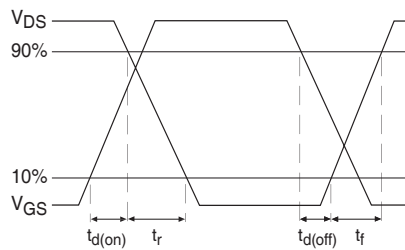


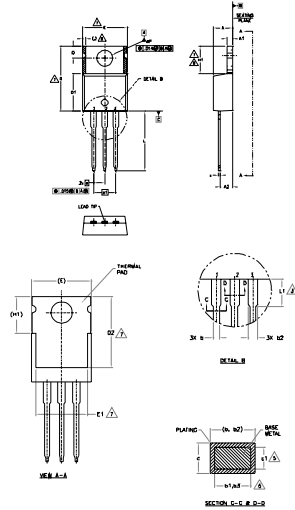
Fig 18b. Switching Time Waveforms

International
IR Rectifier

IRF3007PbF

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



- NOTES:
- 1- DIMENSIONS AND TOLERANCING IS PER ASME Y14.5 M-1994
 - 2- DIMENSIONS ARE SHOWN IN MILLIMETERS
 - 3- LEAD DIMENSIONS AND FINISH UNCONTROLLED IN U.S.
 - 4- DIMENSION 6, IF IT IS TO NOT INCLUDE WELD PLUNGER SHALL NOT EXCEED 0.02 (0.001) FOR ALL THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMITY OF THE PLASTIC BODY
 - 5- DIMENSION 61 IS \pm OF APPLY TO BASE METAL ONLY.
 - 6- CONTROLLING DIMENSION - FINISH
 - 7- INTERNAL PAD CENTER (OPTIONAL) WITHIN DIMENSIONS (E1) D2 & E1
 - 8- DIMENSION 12 IS IN OPTION. FOR WIRE STRAPPING AND SOLDERING PRECAUTIONS ARE ALLOWED
 - 9- DIMENSIONS SHOWN TO ACCURACY UNLESS OTHERWISE SPECIFIED (IN MM) DIMENSIONS ARE SHOWN TO THE ACTUAL PACKAGE OUTLINE

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
B	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.71	.045	.068	5
C	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.52	.330	.375	
D2	11.68	12.88	.460	.507	7
E	9.53	10.67	.380	.420	4,7
E1	8.86	8.89	.350	.350	7
E2		0.76		.030	8
F	2.25	3.05	.088	.120	
f1	0.51	0.51	.020	.020	
H	15.84	6.38	.620	.250	1,8
L	12.70	14.72	.500	.580	
L1	3.06	4.06	.120	.160	3
W	1.54	4.06	.060	.160	
Q	2.54	2.42	.100	.095	

USE DIMENSIONS

1- CASE

2- WIRE

3- FINISH

4- DIMENSION

5- DIMENSION

6- DIMENSION

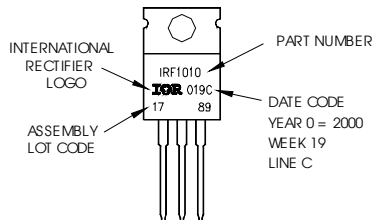
7- DIMENSION

8- DIMENSION

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
 LOT CODE 1789
 ASSEMBLED ON WW 19, 2000
 IN THE ASSEMBLY LINE "C"

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



TO-220AB package is not recommended for Surface Mount Application

Notes:

1. For an Automotive Qualified version of this part please see <http://www.irf.com/product-info/auto/>
2. For the most current drawing please refer to IR website at <http://www.irf.com/package/>

Data and specifications subject to change without notice.
 This product has been designed and qualified for the Industrial market.
 Qualification Standards can be found on IR's Web site.

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.07/2010