

# IRF3205PBF Datasheet

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DiGi Electronics Part Number	IRF3205PBF-DG
Manufacturer	<a href="#">Infineon Technologies</a>
Manufacturer Product Number	IRF3205PBF
Description	MOSFET N-CH 55V 110A TO220AB
Detailed Description	N-Channel 55 V 110A (Tc) 200W (Tc) Through Hole TO-220AB



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## Purchase and inquiry

Manufacturer Product Number:

IRF3205PBF

Series:

HEXFET®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

55 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (Tj)

Supplier Device Package:

TO-220AB

Base Product Number:

IRF3205

Manufacturer:

Infineon Technologies

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

110A (Tc)

Rds On (Max) @ Id, Vgs:

8mOhm @ 62A, 10V

Gate Charge (Qg) (Max) @ Vgs:

146 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

3247 pF @ 25 V

Power Dissipation (Max):

200W (Tc)

Mounting Type:

Through Hole

Package / Case:

TO-220-3

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

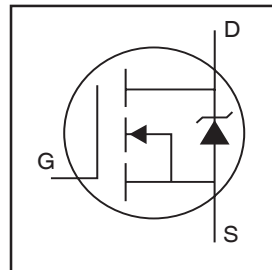
International  
**IR** Rectifier

PD-94791B

# IRF3205PbF

HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free

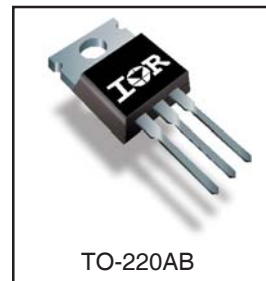


$V_{DSS} = 55V$
$R_{DS(on)} = 8.0m\Omega$
$I_D = 110A^{\textcircled{5}}$

## Description

Advanced HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.



## Absolute Maximum Ratings

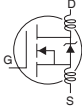
	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	110 $\text{\textcircled{5}}$	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	80	
$I_{DM}$	Pulsed Drain Current $\text{\textcircled{1}}$	390	
$P_D @ T_C = 25^\circ C$	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_{AR}$	Avalanche Current $\text{\textcircled{1}}$	62	A
$E_{AR}$	Repetitive Avalanche Energy $\text{\textcircled{1}}$	20	mJ
dv/dt	Peak Diode Recovery dv/dt $\text{\textcircled{3}}$	5.0	V/ns
$T_J$	Operating Junction and	-55 to + 175	°C
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.75	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

## IRF3205PbF

International  
TOR RectifierElectrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.057	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	8.0	m $\Omega$	$V_{GS} = 10V, I_D = 62A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Transconductance	44	—	—	S	$V_{DS} = 25V, I_D = 62A$ ④
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	25	$\mu A$	$V_{DS} = 55V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$Q_g$	Total Gate Charge	—	—	146	nC	$I_D = 62A$
$Q_{gs}$	Gate-to-Source Charge	—	—	35		$V_{DS} = 44V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	54		$V_{GS} = 10V$ , See Fig. 6 and 13
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 28V$
$t_r$	Rise Time	—	101	—		$I_D = 62A$
$t_{d(off)}$	Turn-Off Delay Time	—	50	—		$R_G = 4.5\Omega$
$t_f$	Fall Time	—	65	—		$V_{GS} = 10V$ , See Fig. 10 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	—	3247	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	781	—		$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	211	—		$f = 1.0\text{MHz}$ , See Fig. 5
$E_{AS}$	Single Pulse Avalanche Energy ②	—	1050 ⑥	264 ⑦		mJ

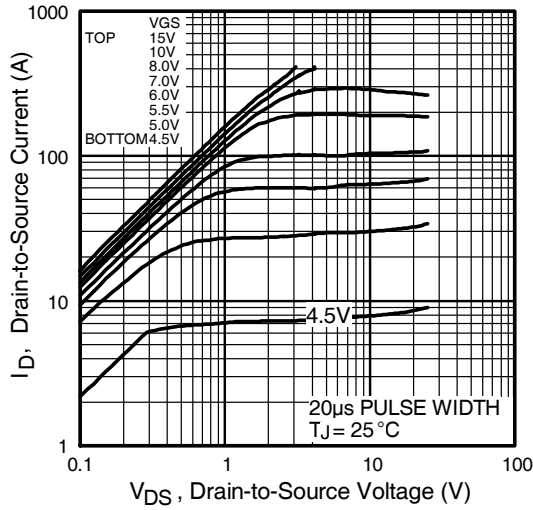
## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	390		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 62A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	69	104	ns	$T_J = 25^\circ\text{C}, I_F = 62A$
$Q_{rr}$	Reverse Recovery Charge	—	143	215	nC	$di/dt = 100A/\mu s$ ④
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ )				

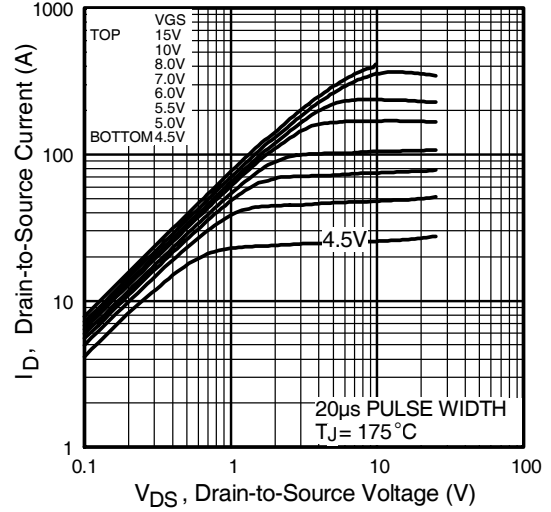
## Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting  $T_J = 25^\circ\text{C}, L = 138\mu H$   
 $R_G = 25\Omega, I_{AS} = 62A$ . (See Figure 12)
- ③  $I_{SD} \leq 62A, di/dt \leq 207A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ\text{C}$
- ④ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑥ This is a typical value at device destruction and represents operation outside rated limits.
- ⑦ This is a calculated value limited to  $T_J = 175^\circ\text{C}$ .

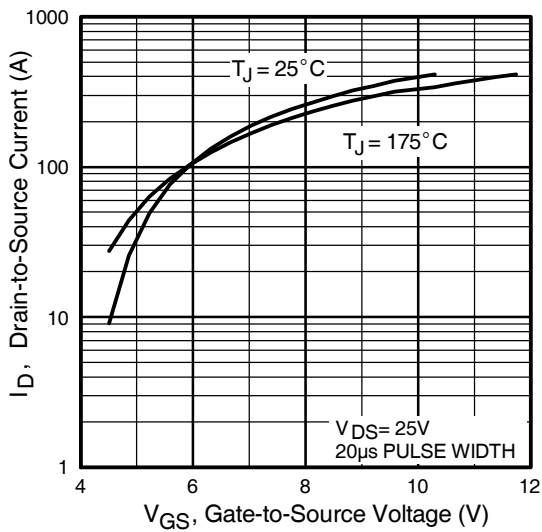
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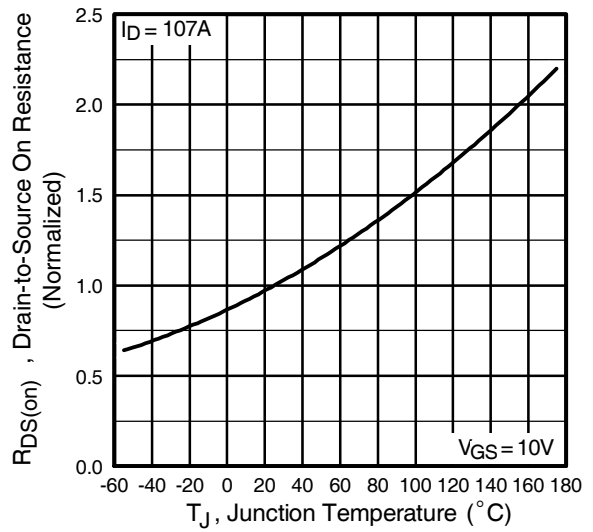
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics

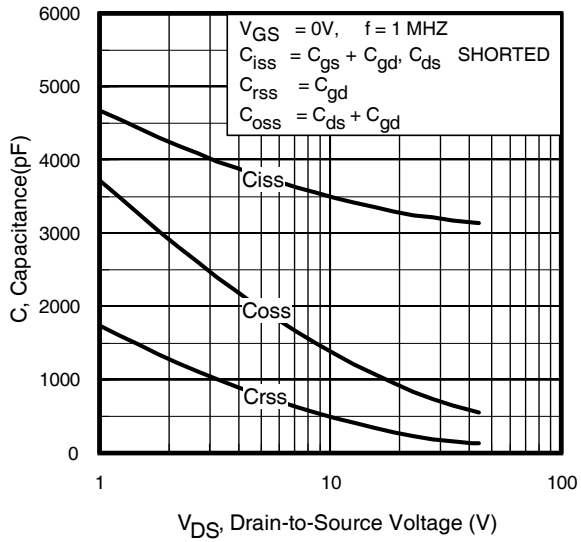


**Fig 3.** Typical Transfer Characteristics

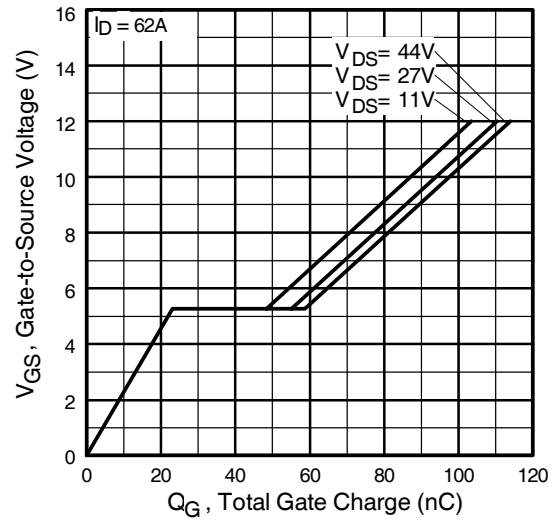


**Fig 4.** Normalized On-Resistance Vs. Temperature

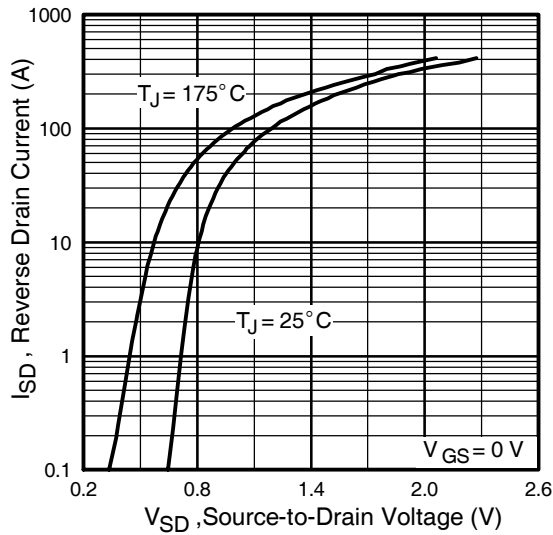
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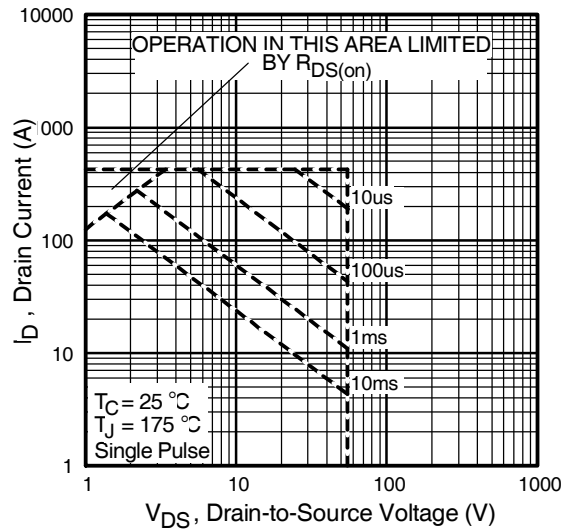
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



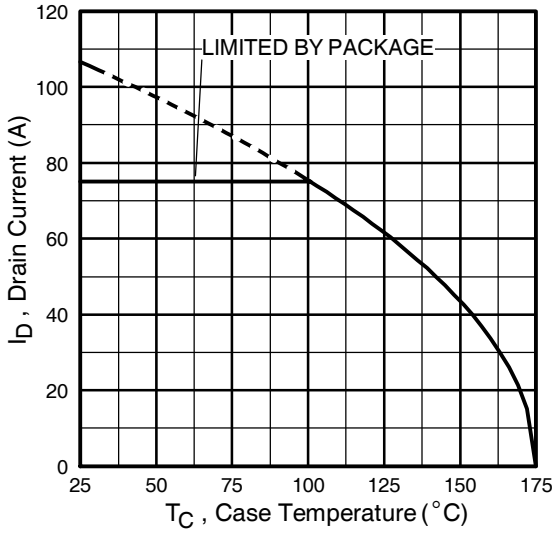
**Fig 7.** Typical Source-Drain Diode Forward Voltage



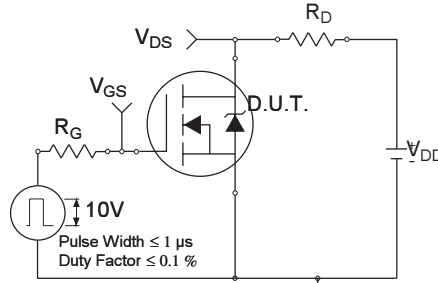
**Fig 8.** Maximum Safe Operating Area

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IOR Rectifier

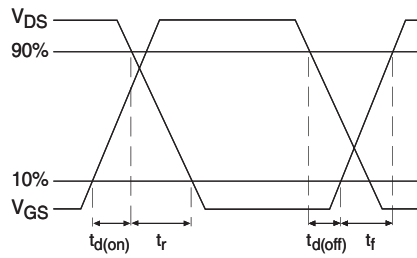
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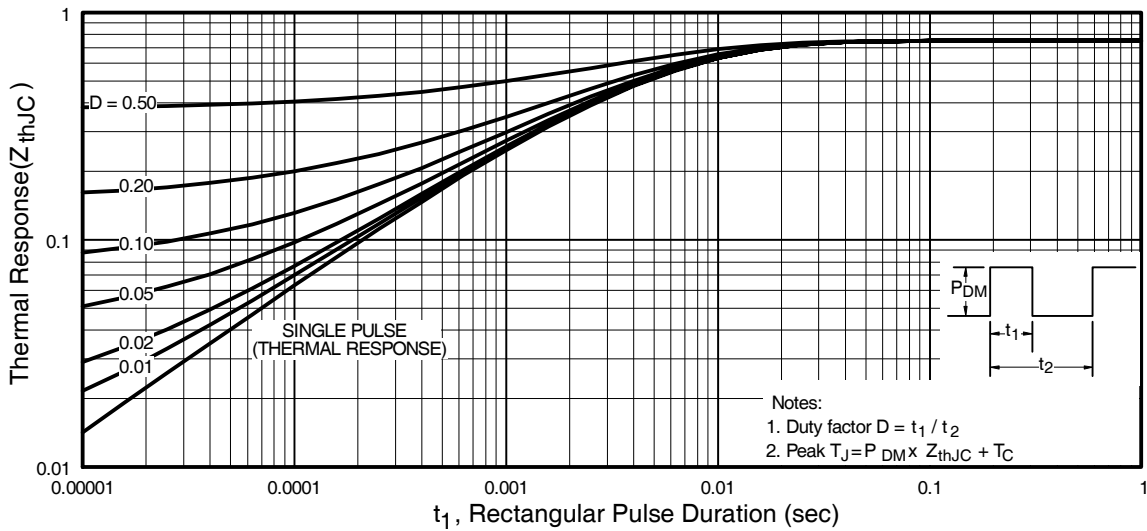
**Fig 9. Maximum Drain Current Vs. Case Temperature**



**Fig 10a. Switching Time Test Circuit**



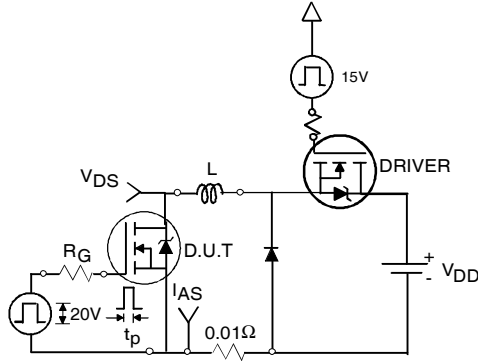
**Fig 10b. Switching Time Waveforms**



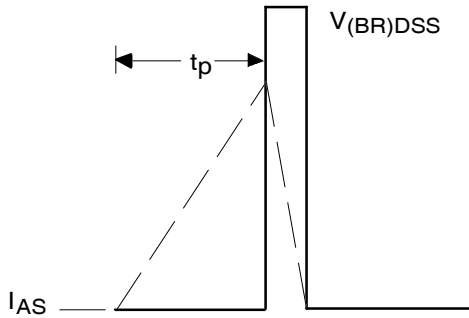
**Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case**

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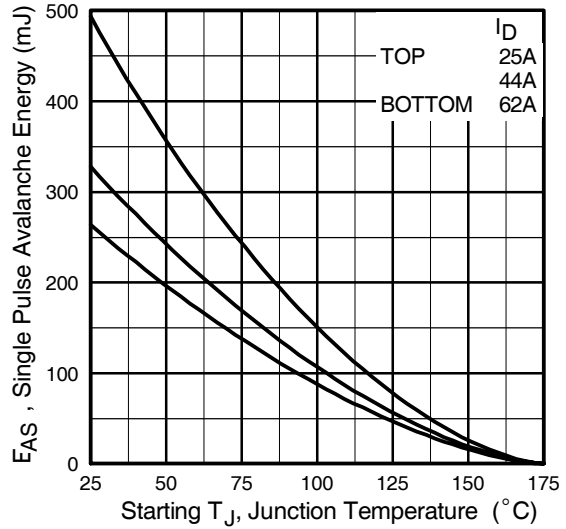
International  
**IR** Rectifier



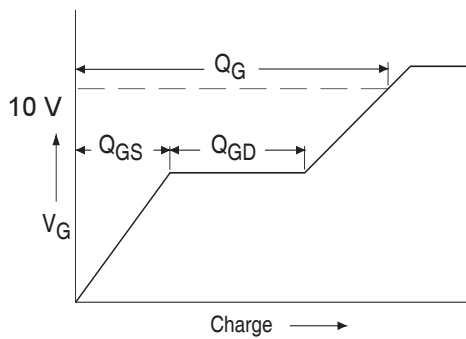
**Fig 12a.** Unclamped Inductive Test Circuit



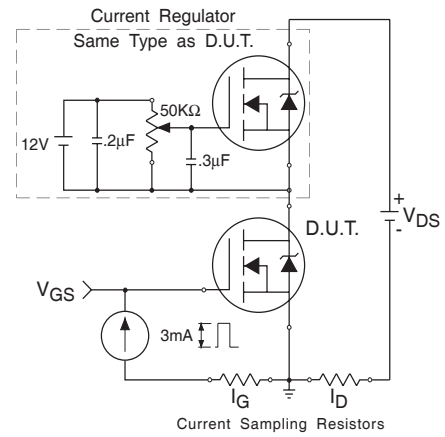
**Fig 12b.** Unclamped Inductive Waveforms



**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current



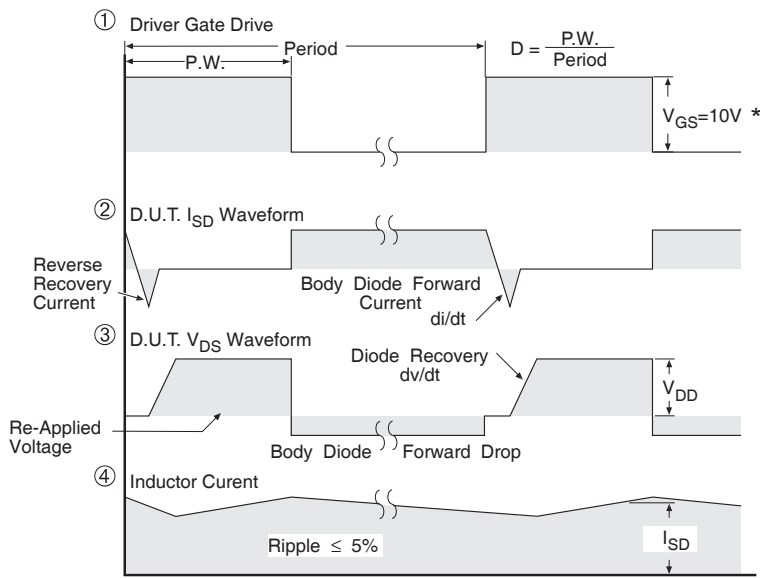
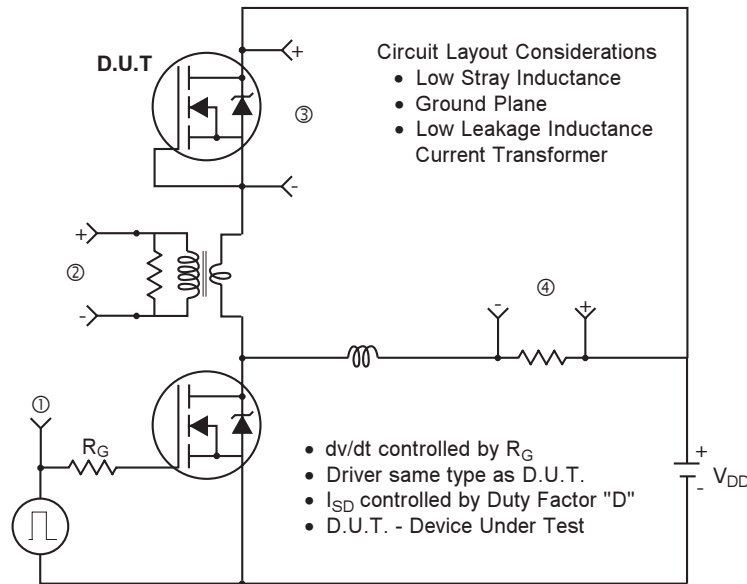
**Fig 13a.** Basic Gate Charge Waveform



**Fig 13b.** Gate Charge Test Circuit



**Peak Diode Recovery dv/dt Test Circuit**



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

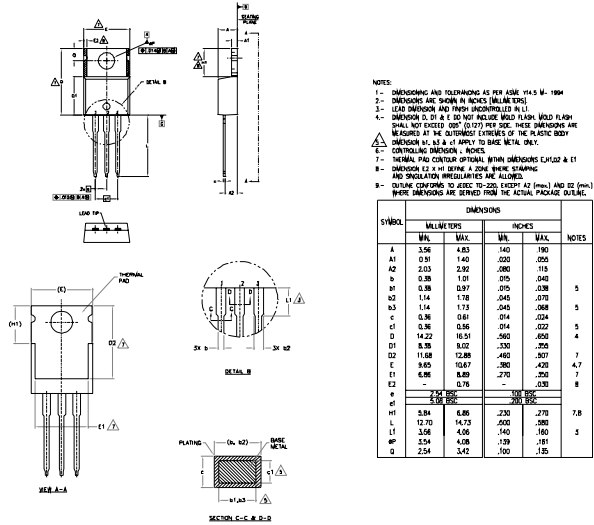
**Fig 14.** For N-Channel HEXFETS

# IRF3205PbF



## TO-220AB Package Outline

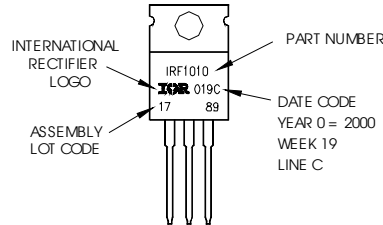
Dimensions are shown in millimeters (inches)



## 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.



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