

International  
**IR** Rectifier

PD-95441

**SMPS MOSFET** **IRF6218PbF**  
HEXFET® Power MOSFET

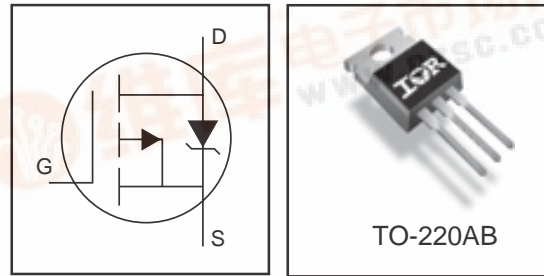
**Applications**

- Reset Switch for Active Clamp Reset DC-DC converters
- Lead-Free

<b>V<sub>DS</sub></b>	<b>R<sub>DS(on)</sub> max</b>	<b>I<sub>D</sub></b>
<b>-150V</b>	<b>150mΩ@V<sub>GS</sub> = -10V</b>	<b>-27A</b>

**Benefits**

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C<sub>OSS</sub> to Simplify Design (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



**Absolute Maximum Ratings**

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	-150	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	-27	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	-19	
I <sub>DM</sub>	Pulsed Drain Current ①	-110	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation	250	W
	Linear Derating Factor	1.6	
dv/dt	Peak Diode Recovery dv/dt ②	8.2	V/ns
T <sub>J</sub>	Operating Junction and Storage Temperature Range	-55 to + 175	°C
T <sub>STG</sub>			
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

**Thermal Resistance**

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case ③	—	0.61	°C/W
R <sub>θCS</sub>	Case-to-Sink, Flat, Greased Surface ⑤	0.50	—	
R <sub>θJA</sub>	Junction-to-Ambient ④	—	62	

Notes ① through ④ are on page 7

www.irf.com

1

06/28/04



# IRF6218PbF

International  
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-150	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.17	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	120	150	m $\Omega$	$V_{GS} = -10V, I_D = -16A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	-3.0	—	-5.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-25	$\mu A$	$V_{DS} = -120V, V_{GS} = 0V$
		—	—	-250		$V_{DS} = -120V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$

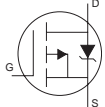
## Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	11	—	—	S	$V_{DS} = -50V, I_D = -16A$
$Q_g$	Total Gate Charge	—	71	110	nC	$I_D = -16A$
$Q_{gs}$	Gate-to-Source Charge	—	21	—		$V_{DS} = -120V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	32	—		$V_{GS} = -10V$ ④
$t_{d(on)}$	Turn-On Delay Time	—	21	—	ns	$V_{DD} = -75V$
$t_r$	Rise Time	—	70	—		$I_D = -16A$
$t_{d(off)}$	Turn-Off Delay Time	—	35	—		$R_G = 3.9\Omega$
$t_f$	Fall Time	—	30	—		$V_{GS} = -10V$ ④
$C_{iss}$	Input Capacitance	—	2210	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	370	—		$V_{DS} = -25V$
$C_{rss}$	Reverse Transfer Capacitance	—	89	—		$f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	2220	—		$V_{GS} = 0V, V_{DS} = -1.0V, f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	170	—		$V_{GS} = 0V, V_{DS} = -120V, f = 1.0\text{MHz}$
$C_{oss\ eff.}$	Effective Output Capacitance	—	340	—		$V_{GS} = 0V, V_{DS} = 0V\ \text{to}\ -120V$

## Avalanche Characteristics

	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	210	mJ
$I_{AR}$	Avalanche Current ①	—	-16	A

## Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-27	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-110		
$V_{SD}$	Diode Forward Voltage	—	—	-1.6	V	$T_J = 25^\circ\text{C}, I_S = -16A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	150	—	ns	$T_J = 25^\circ\text{C}, I_F = -16A, V_{DD} = -25V$
$Q_{rr}$	Reverse Recovery Charge	—	860	—	nC	$di/dt = -100A/\mu s$ ④

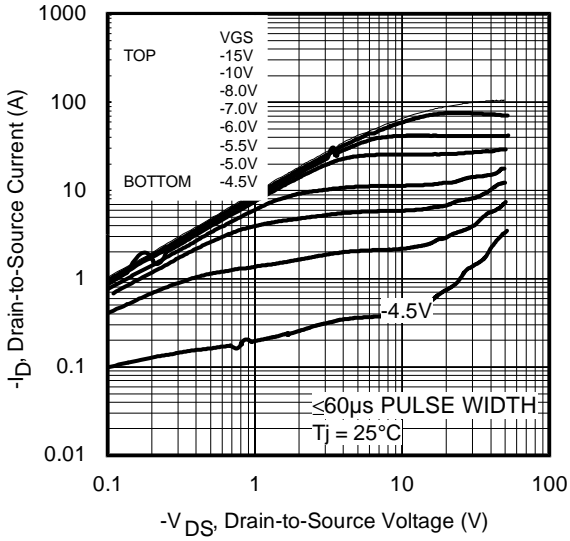


Fig 1. Typical Output Characteristics

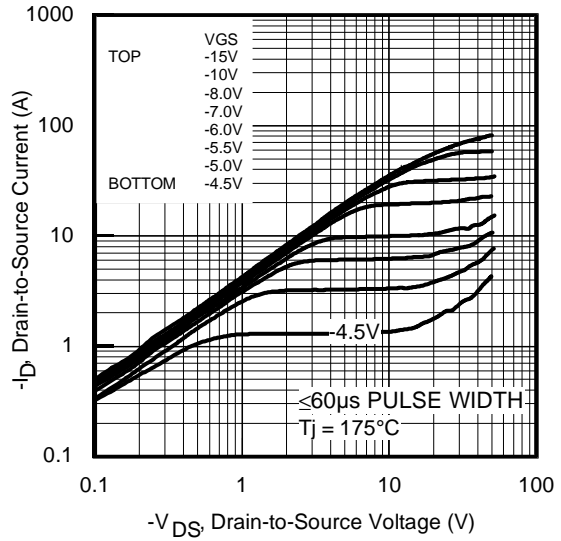


Fig 2. Typical Output Characteristics

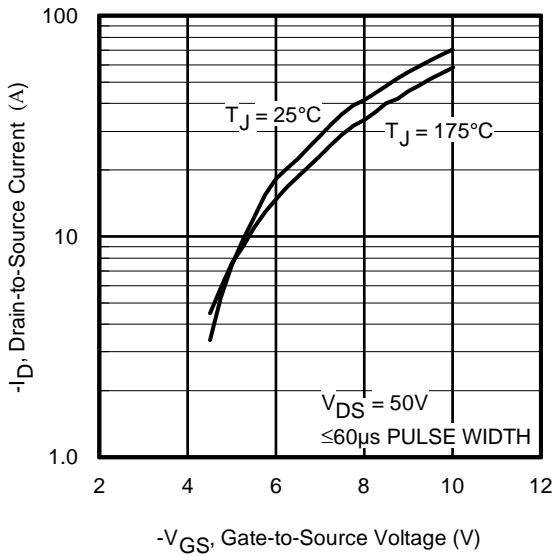


Fig 3. Typical Transfer Characteristics

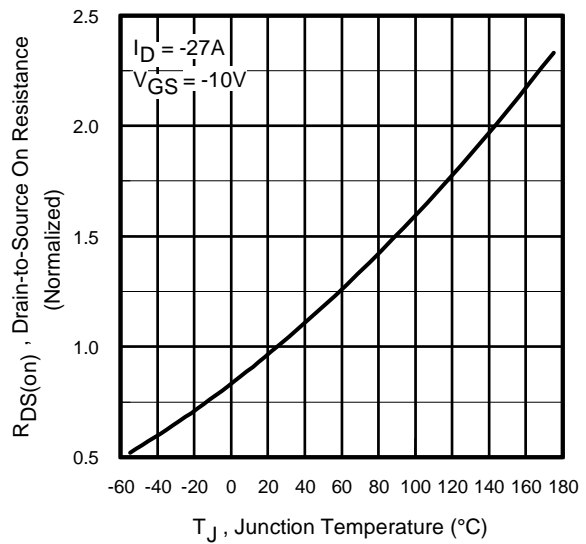
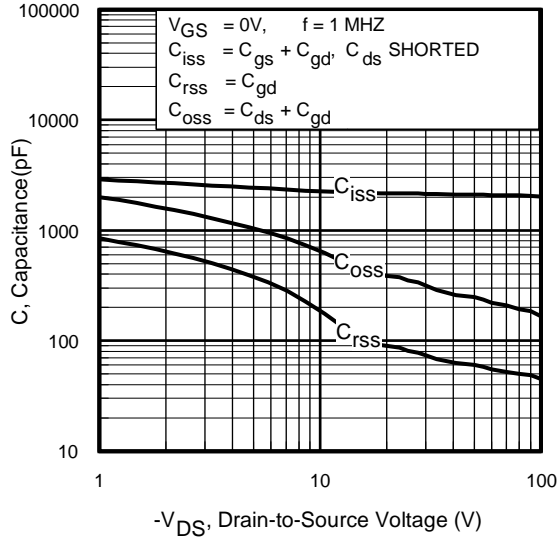


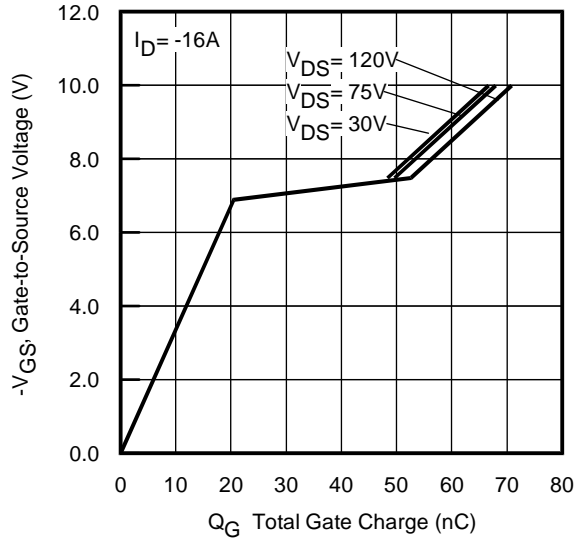
Fig 4. Normalized On-Resistance vs. Temperature

# IRF6218PbF

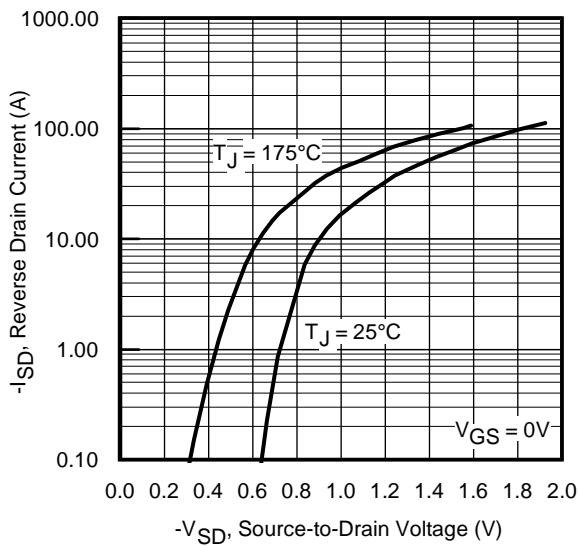
International  
**IR** Rectifier



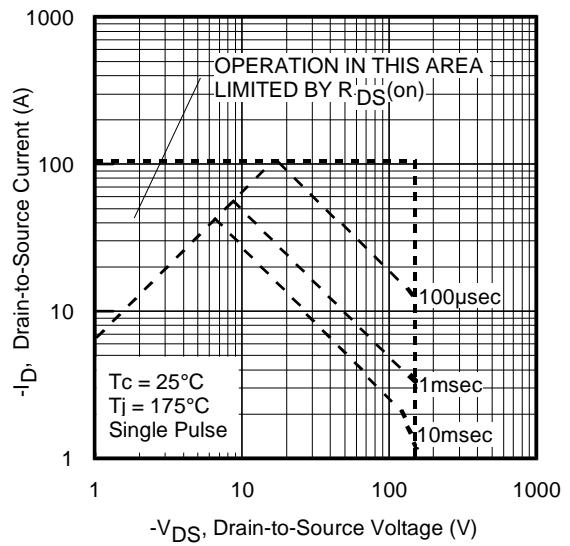
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



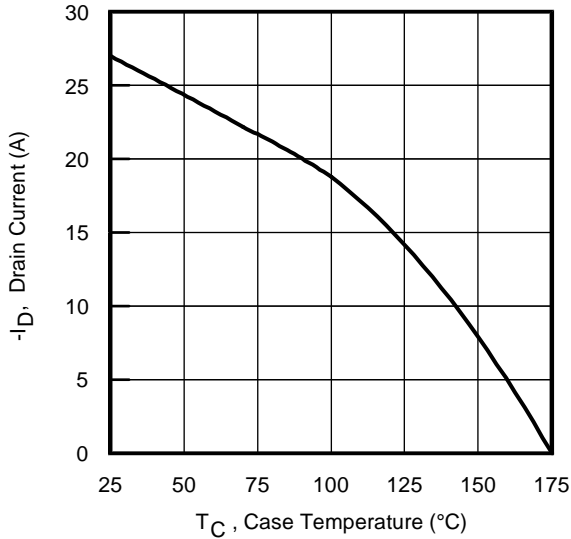
**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage



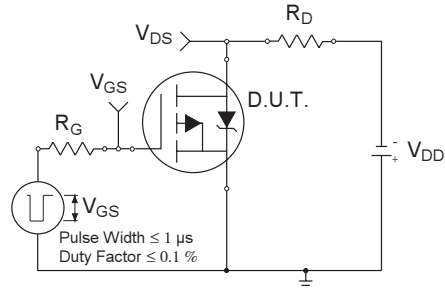
**Fig 7.** Typical Source-Drain Diode Forward Voltage



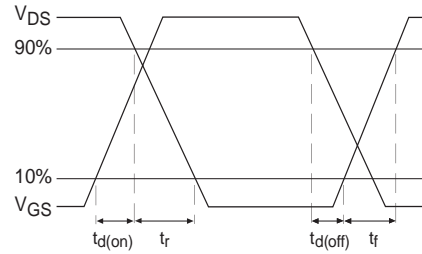
**Fig 8.** Maximum Safe Operating Area



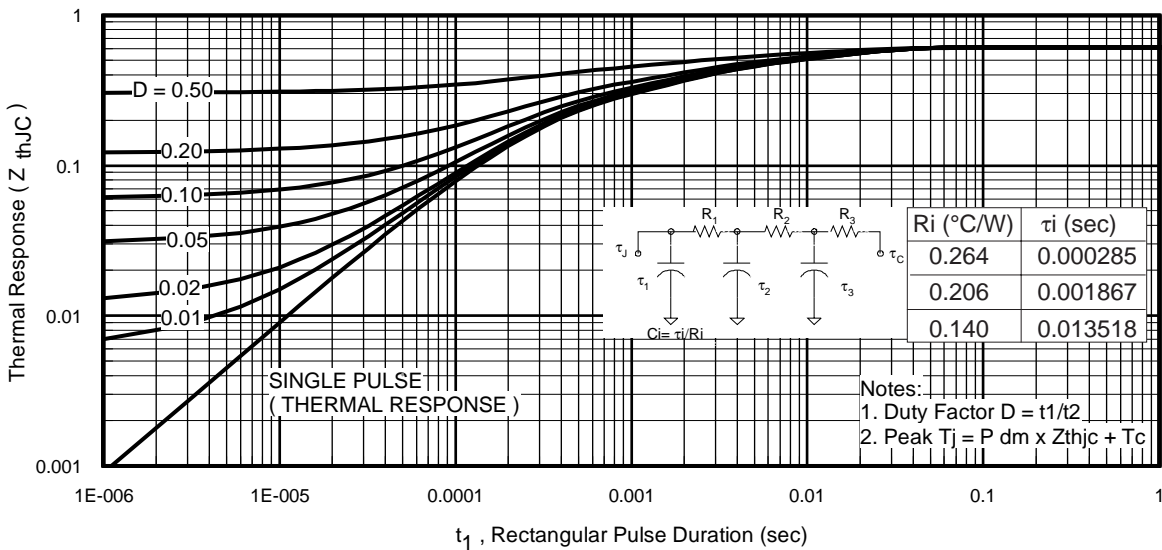
**Fig 9.** Maximum Drain Current vs. Ambient Temperature



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



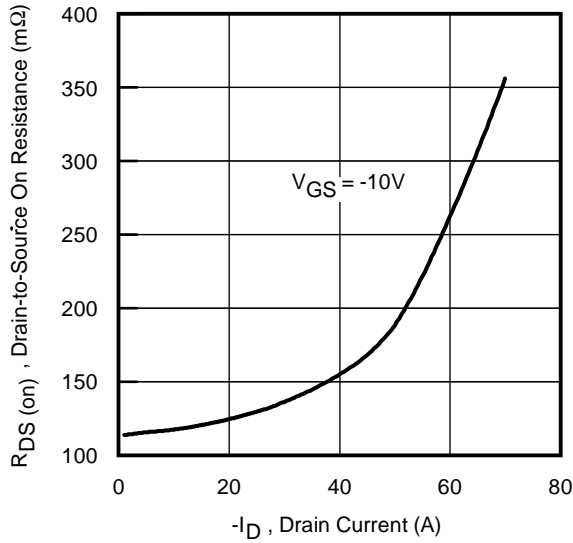
**Fig 10b.** Switching Time Waveforms



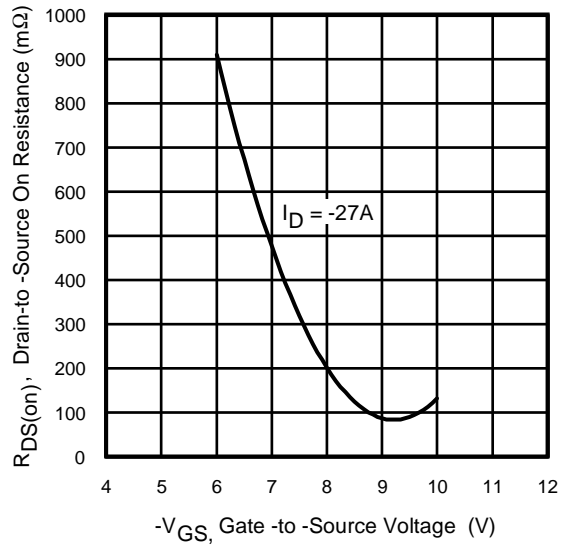
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

# IRF6218PbF

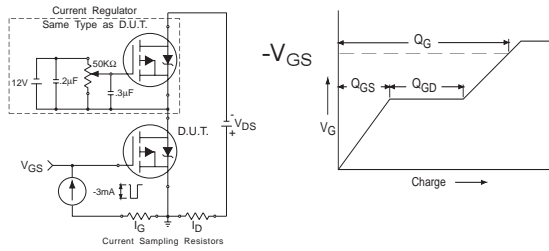
International  
**IR** Rectifier



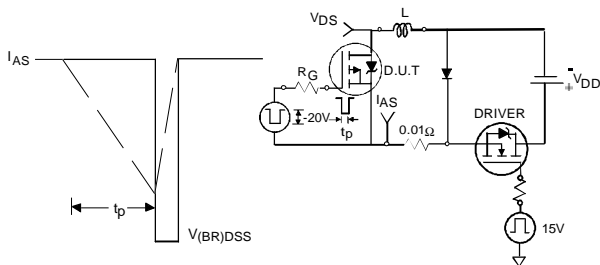
**Fig 12.** On-Resistance vs. Drain Current



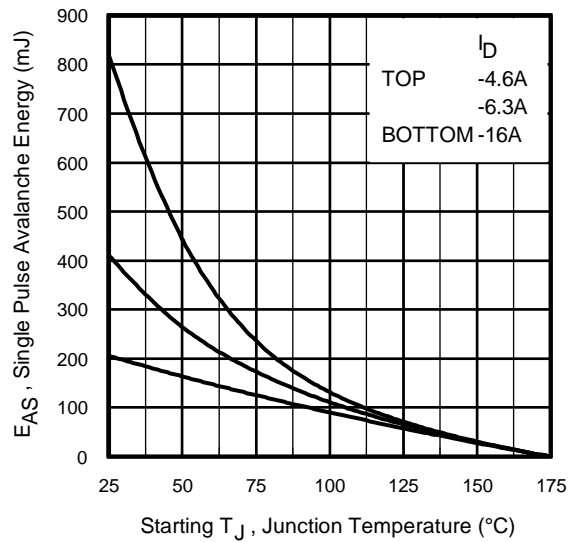
**Fig 13.** On-Resistance vs. Gate Voltage



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



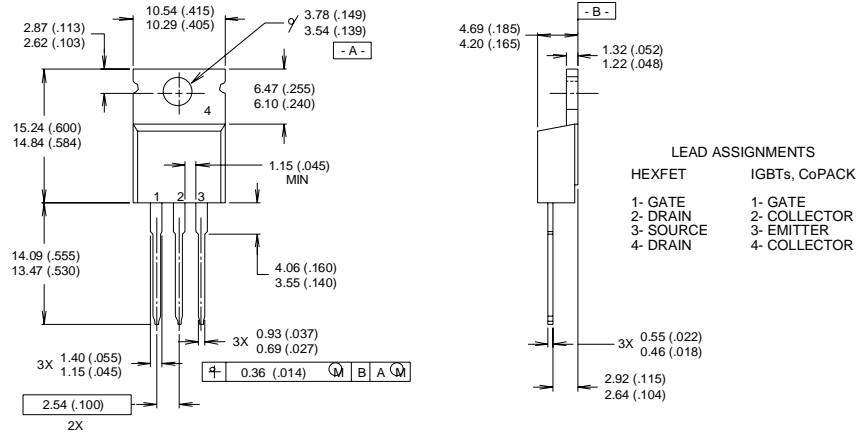
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



**Fig 15c.** Maximum Avalanche Energy vs. Drain Current

## TO-220AB Package Outline

Dimensions are shown in millimeters (inches)

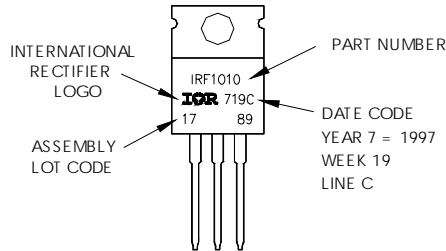


- NOTES:
- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
  - 2 CONTROLLING DIMENSION : INCH
  - 3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
  - 4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

## TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010  
LOT CODE 1789  
ASSEMBLED ON VW 19, 1997  
IN THE ASSEMBLY LINE "C"

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



**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 1.6\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = -17\text{A}$ .
- ③  $I_{SD} \leq -17\text{A}$ ,  $di/dt \leq -520\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$ .
- ④ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ⑤  $R_\theta$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

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.