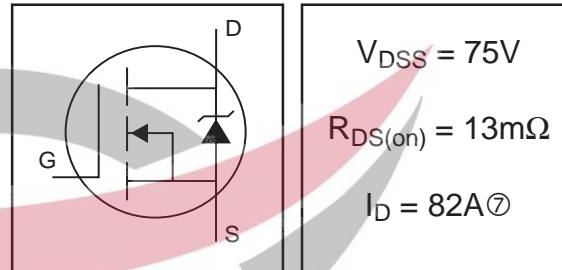


# IRF2807

HEXFET® Power MOSFET

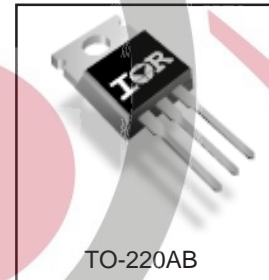
- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic  $dv/dt$  Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated



## 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	
$I_D$ @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	82 <sup>(7)</sup>	A	
$I_D$ @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	58		
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	280		
$P_D$ @ $T_C = 25^\circ\text{C}$	Power Dissipation	230	W	
	Linear Derating Factor	1.5	W/°C	
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V	
$I_{AR}$	Avalanche Current <sup>(1)</sup>	43	A	
$E_{AR}$	Repetitive Avalanche Energy <sup>(1)</sup>	23	mJ	
$dv/dt$	Peak Diode Recovery $dv/dt$ <sup>(3)</sup>	5.9	V/ns	
$T_J$	Operating Junction and Storage Temperature Range	-55 to + 175	°C	
$T_{STG}$		Soldering Temperature, for 10 seconds		300 (1.6mm from case )
		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	—	0.65	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	75	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient	—	0.074	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	13	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 43A <sup>④</sup>
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Transconductance	38	—	—	S	V <sub>DS</sub> = 50V, I <sub>D</sub> = 43A <sup>④</sup>
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	25	μA	V <sub>DS</sub> = 75V, V <sub>GS</sub> = 0V
		—	—	250	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100	nA	V <sub>GS</sub> = -20V
Q <sub>g</sub>	Total Gate Charge	—	—	160	nC	I <sub>D</sub> = 43A
Q <sub>gs</sub>	Gate-to-Source Charge	—	—	29	nC	V <sub>DS</sub> = 60V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	—	55	nC	V <sub>GS</sub> = 10V, See Fig. 6 and 13
t <sub>d(on)</sub>	Turn-On Delay Time	—	13	—	ns	V <sub>DD</sub> = 38V
t <sub>r</sub>	Rise Time	—	64	—		I <sub>D</sub> = 43A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	49	—		R <sub>G</sub> = 2.5Ω
t <sub>f</sub>	Fall Time	—	48	—		V <sub>GS</sub> = 10V, See Fig. 10 <sup>④</sup>
L <sub>D</sub>	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L <sub>S</sub>	Internal Source Inductance	—	7.5	—		
C <sub>iss</sub>	Input Capacitance	—	3820	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	610	—		V <sub>DS</sub> = 25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	130	—		f = 1.0MHz, See Fig. 5
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>②</sup>	—	1280 <sup>③</sup>	340 <sup>⑥</sup>	mJ	I <sub>AS</sub> = 50A, L = 370μH

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	82 <sup>⑦</sup>	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) <sup>①</sup>	—	—	280		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.2	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 43A, V <sub>GS</sub> = 0V <sup>④</sup>
t <sub>rr</sub>	Reverse Recovery Time	—	100	150	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 43A
Q <sub>rr</sub>	Reverse Recovery Charge	—	410	610	nC	di/dt = 100A/μs <sup>④</sup>
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> )				

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Starting T<sub>J</sub> = 25°C, L = 370μH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 43A, V<sub>GS</sub> = 10V (See Figure 12)
- ③ I<sub>SD</sub> ≤ 43A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>,  
T<sub>J</sub> ≤ 175°C
- ④ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑤ This is a typical value at device destruction and represents operation outside rated limits.
- ⑥ This is a calculated value limited to T<sub>J</sub> = 175°C .
- ⑦ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

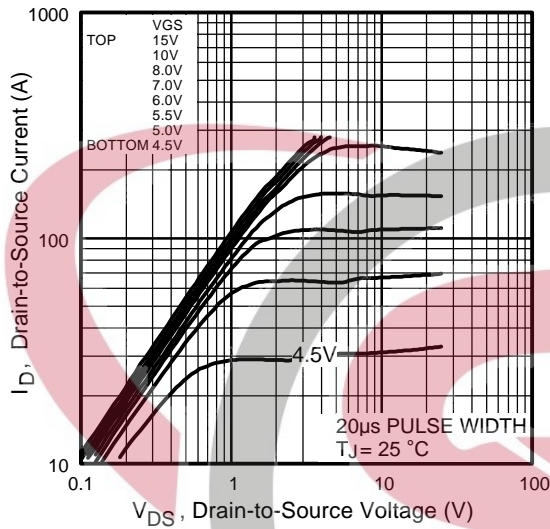


Fig 1. Typical Output Characteristics

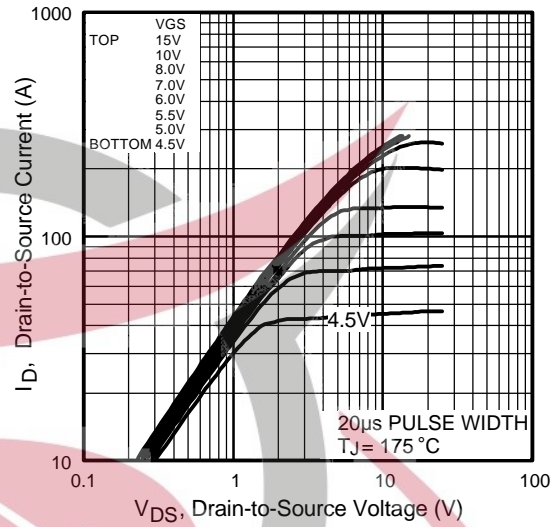


Fig 2. Typical Output Characteristics

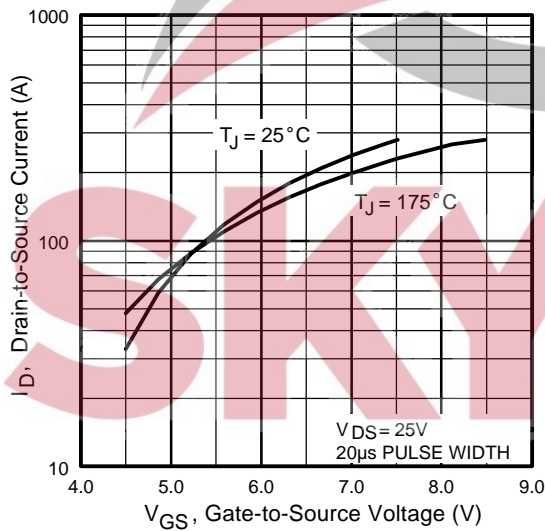


Fig 3. Typical Transfer Characteristics

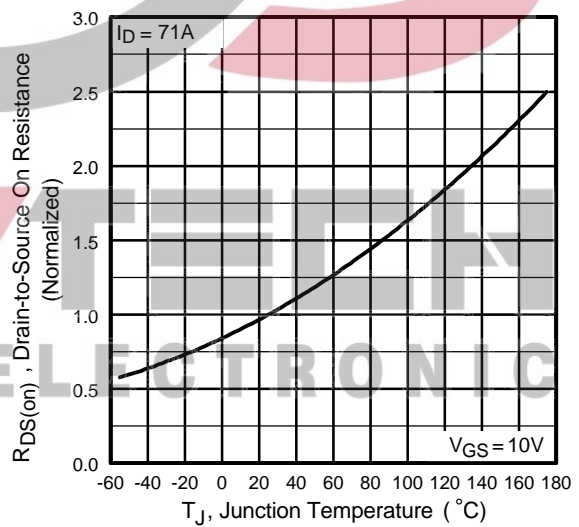
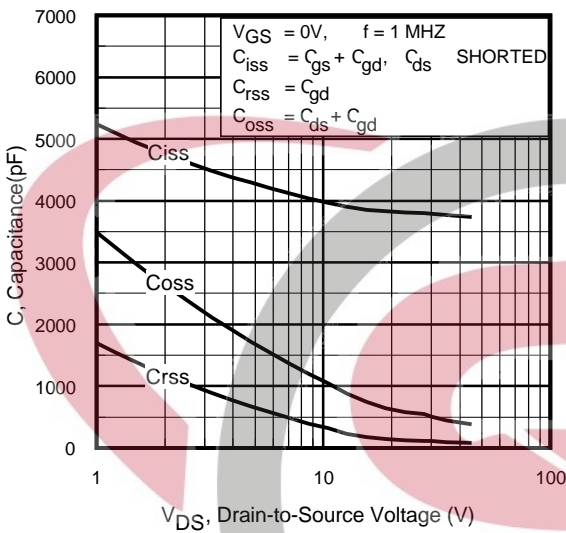
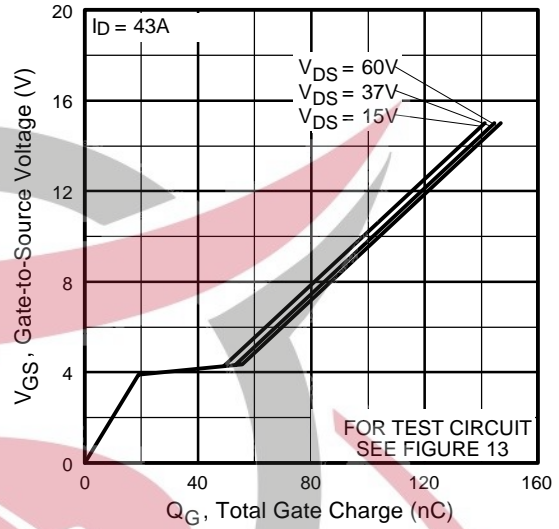


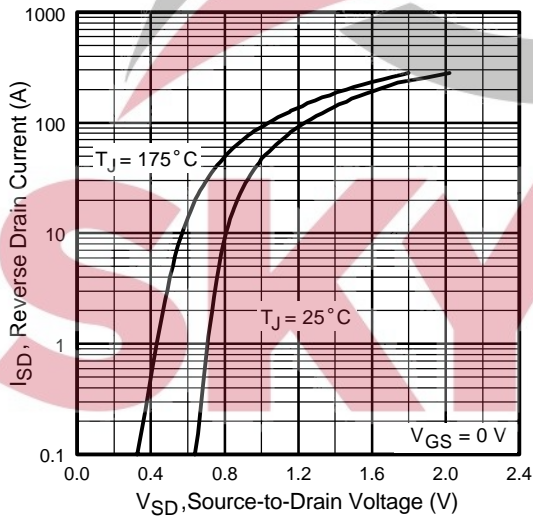
Fig 4. Normalized On-Resistance Vs. Temperature



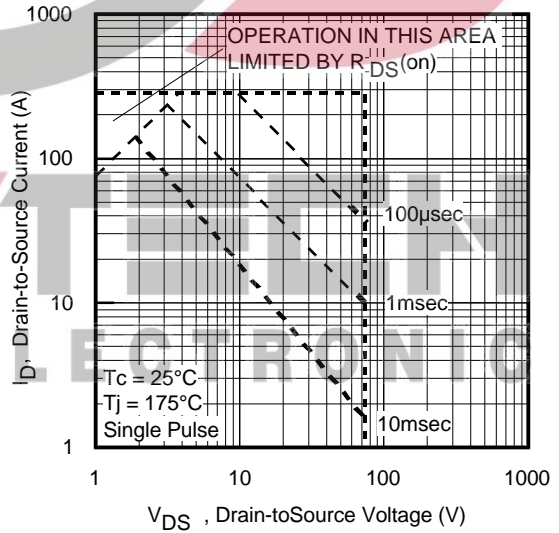
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

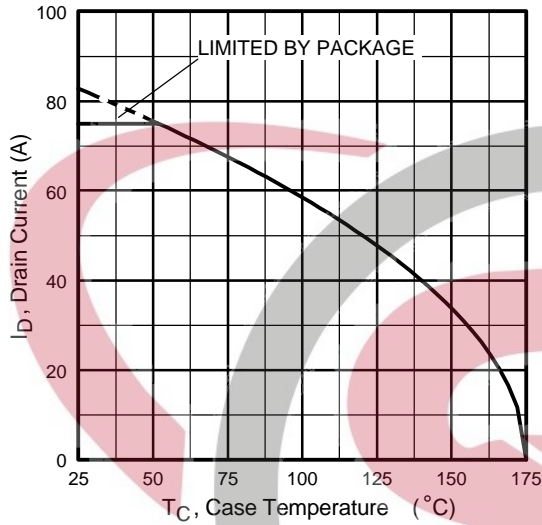


Fig 9. Maximum Drain Current Vs. Case Temperature

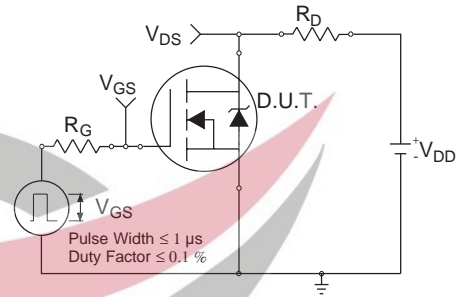


Fig 10a. Switching Time Test Circuit

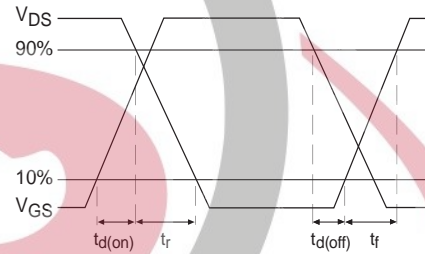


Fig 10b. Switching Time Waveforms

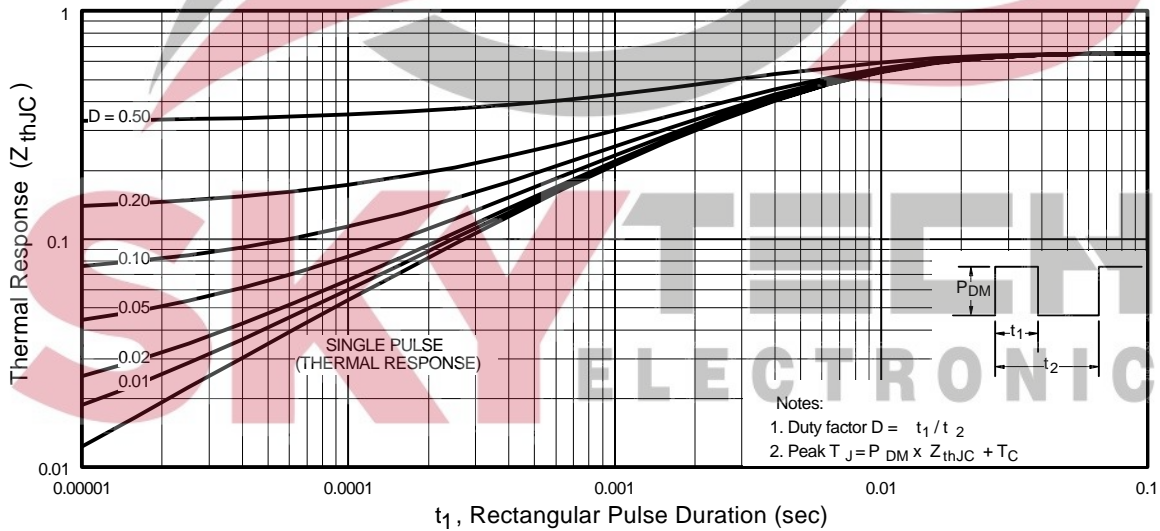
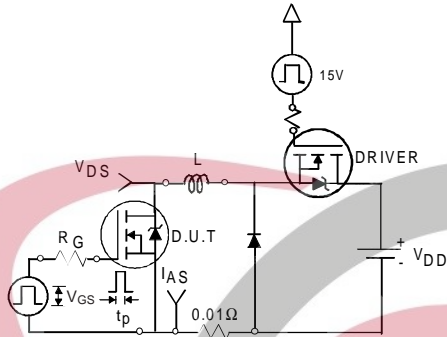
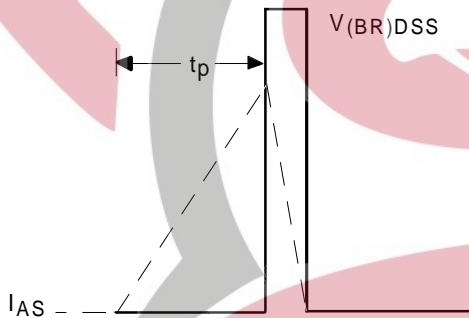


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

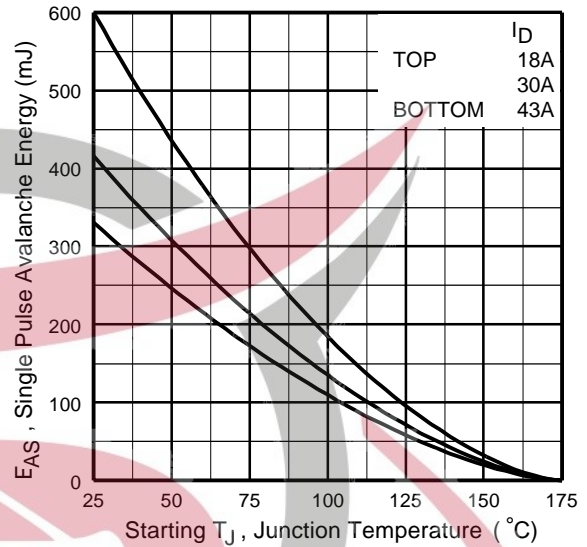




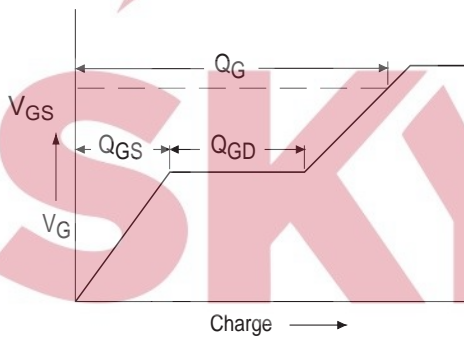
**Fig 12a.** Unclamped Inductive Test Circuit



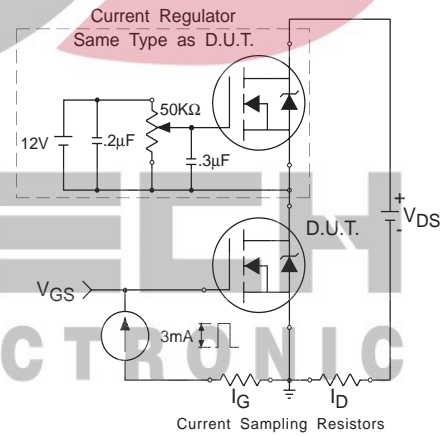
**Fig 12b.** Unclamped Inductive Waveforms



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

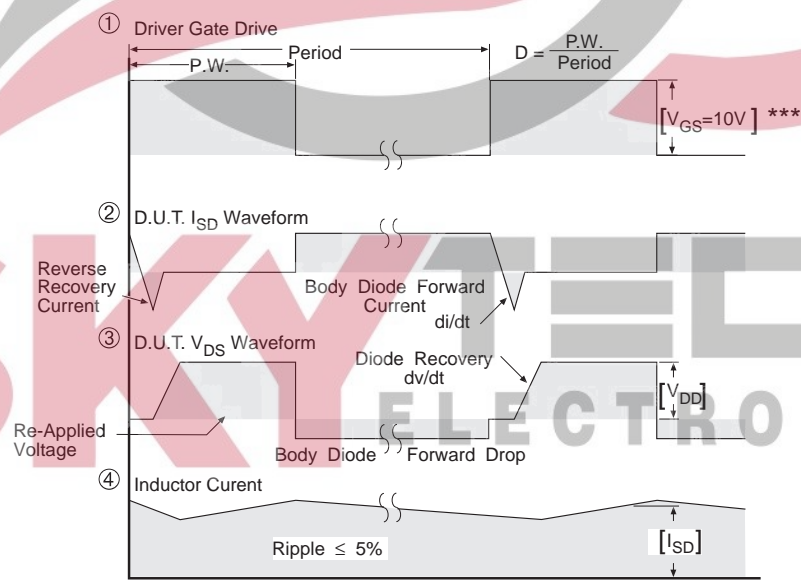
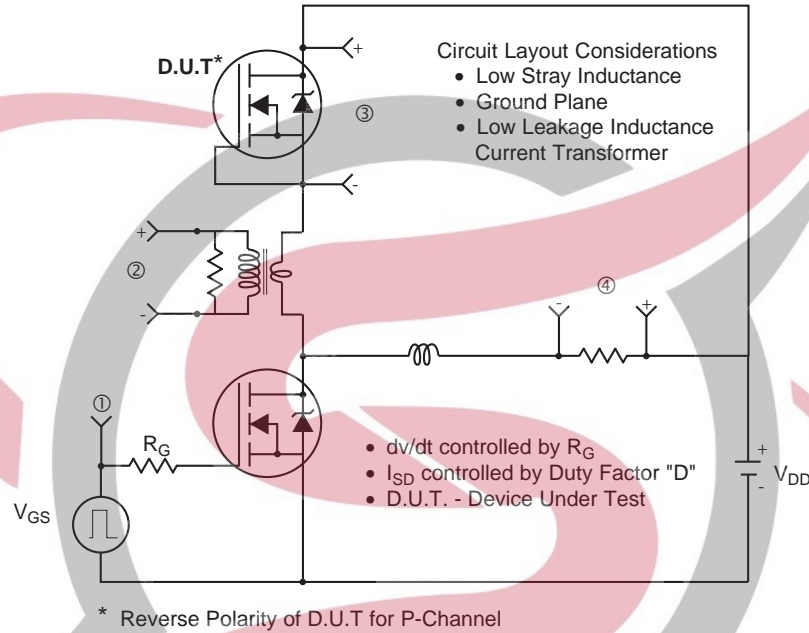


**Fig 13a.** Basic Gate Charge Waveform



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

Peak Diode Recovery dv/dt Test Circuit



\*\*\*  $V_{GS} = 5.0V$  for Logic Level and 3V Drive Devices

Fig 14. For N-channel HEXFET® power MOSFETs

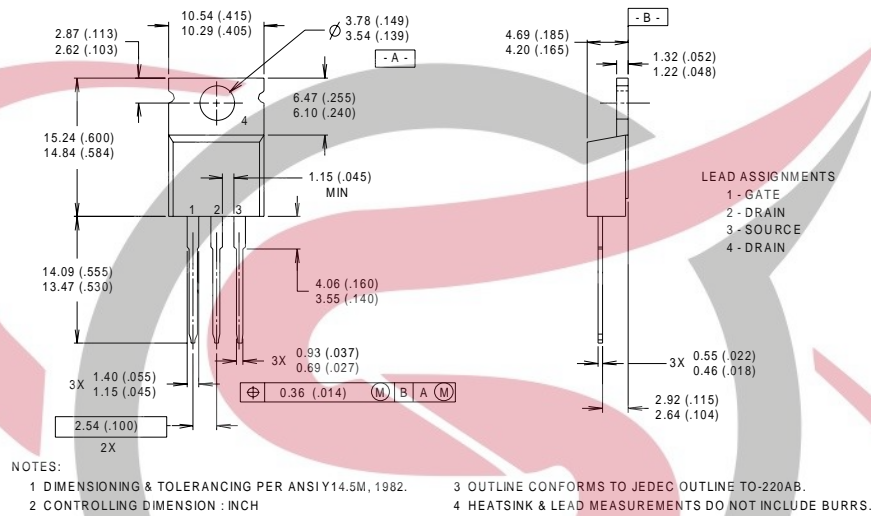
# IRF2807

International  
**IR** Rectifier

## Package Outline

### TO-220AB

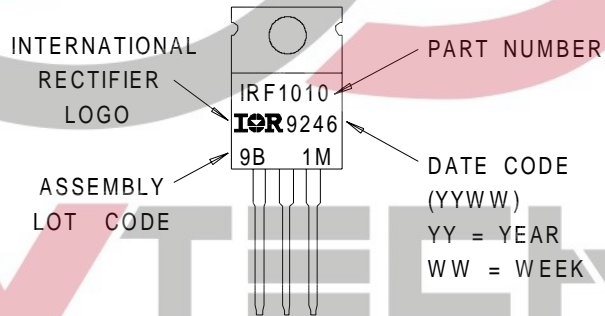
Dimensions are shown in millimeters (inches)



## Part Marking Information

### TO-220AB

EXAMPLE : THIS IS AN IRF1010  
WITH ASSEMBLY  
LOT CODE 9B1M



Data and specifications subject to change without notice.  
This product has been designed and qualified for the Automotive [Q101] market.  
Qualification Standards can be found on IR's Web site.

International  
**IR** Rectifier

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

