

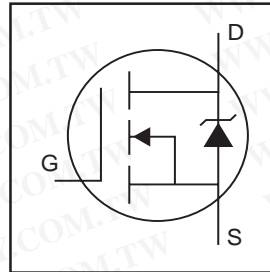
International **IR** Rectifier

PD- 91832

IRFB9N30A

HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paraleling
- Simple Drive Requirements

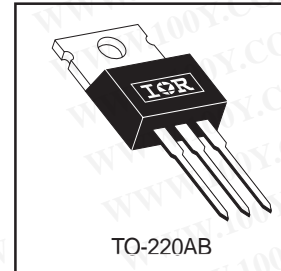


$V_{DS} = 300V$
$R_{DS(on)} = 0.45\Omega$
$I_D = 9.3A$

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

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, $V_{GS} @ 10V$	9.3	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	5.9	
I_{DM}	Pulsed Drain Current ①	37	
$P_D @ T_C = 25^\circ C$	Power Dissipation	96	W
	Linear Derating Factor	0.77	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy②	160	mJ
I_{AR}	Avalanche Current①	9.3	A
E_{AR}	Repetitive Avalanche Energy①	9.6	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.6	V/ns
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 srew	10 lbf•in (1.1N•m)	

Thermal Resistance

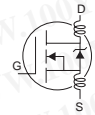
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.3	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	300	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS/ΔT_J}	Breakdown Voltage Temp. Coefficient	—	0.38	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.45	Ω	V _{GS} = 10V, I _D = 5.6A ④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	6.6	—	—	S	V _{DS} = 50V, I _D = 5.6A
I _{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	V _{DS} = 300V, V _{GS} = 0V
		—	—	250		V _{DS} = 240V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 30V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -30V
Q _g	Total Gate Charge	—	—	33	nC	I _D = 9.3A
Q _{gs}	Gate-to-Source Charge	—	—	6.9		V _{DS} = 240V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	—	12		V _{GS} = 10V, See Fig. 6 and 13 ④
t _{d(on)}	Turn-On Delay Time	—	10	—		V _{DD} = 150V
t _r	Rise Time	—	25	—	ns	I _D = 9.3A
t _{d(off)}	Turn-Off Delay Time	—	35	—		R _G = 12Ω
t _f	Fall Time	—	29	—		R _D = 16Ω, See Fig. 10 ④
L _D	Internal Drain Inductance	—	4.5	—		nH
L _S	Internal Source Inductance	—	7.5	—		
C _{iss}	Input Capacitance	—	920	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	160	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	8.7	—		f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance	—	1200	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance	—	52	—		V _{GS} = 0V, V _{DS} = 240V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance ⑤	—	102	—		V _{GS} = 0V, V _{DS} = 0V to 240V



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	9.3	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	37		
V _{SD}	Diode Forward Voltage	—	—	1.5	V	T _J = 25°C, I _S = 9.3A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	280	420	ns	T _J = 25°C, I _F = 9.3A
Q _{rr}	Reverse Recovery Charge	—	1.5	2.3	μC	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 = 3.7mH
R_G = 25Ω, I_{AS} = 9.3A. (See Figure 12)
- ③ I_{SD} ≤ 9.3A, di/dt ≤ 270A/μs, V_{DD} ≤ V_{(BR)DSS},
T_J ≤ 150°C
- ④ Pulse width ≤ 300μs; 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_{DS}

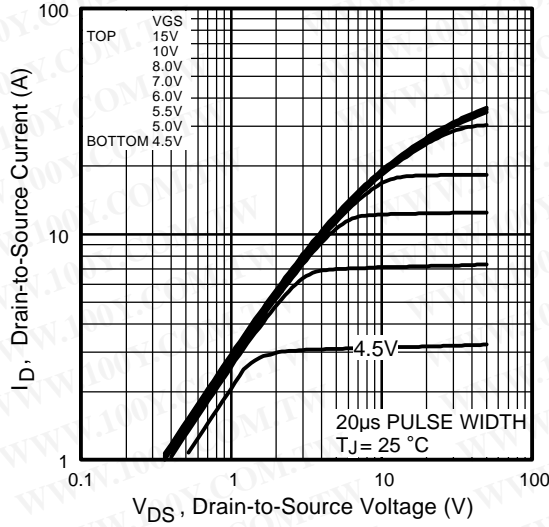


Fig 1. Typical Output Characteristics

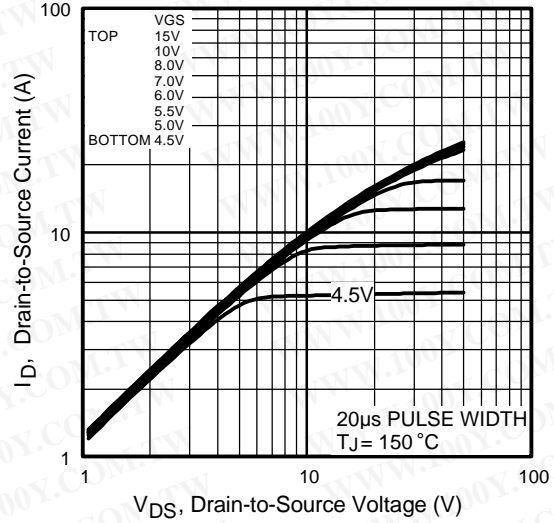


Fig 2. Typical Output Characteristics

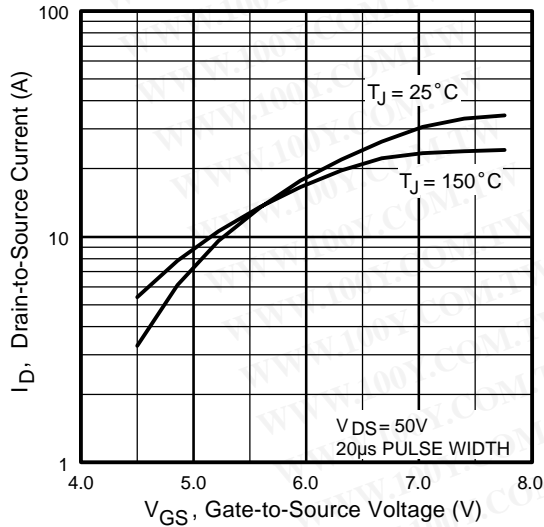


Fig 3. Typical Transfer Characteristics

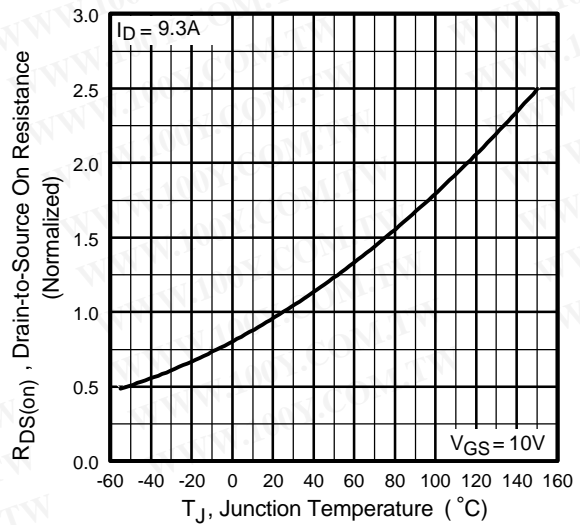


Fig 4. Normalized On-Resistance Vs. Temperature

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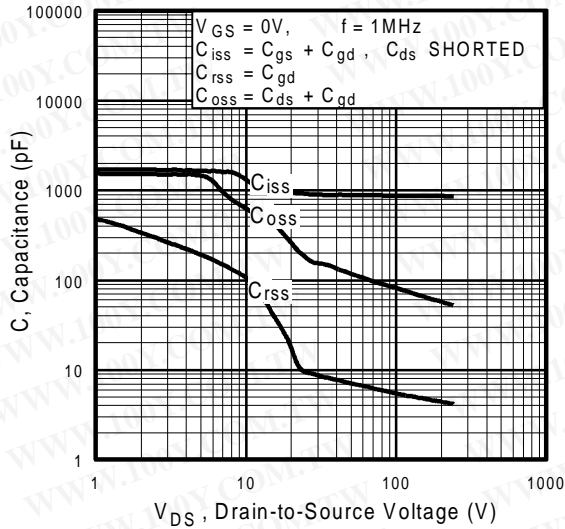


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

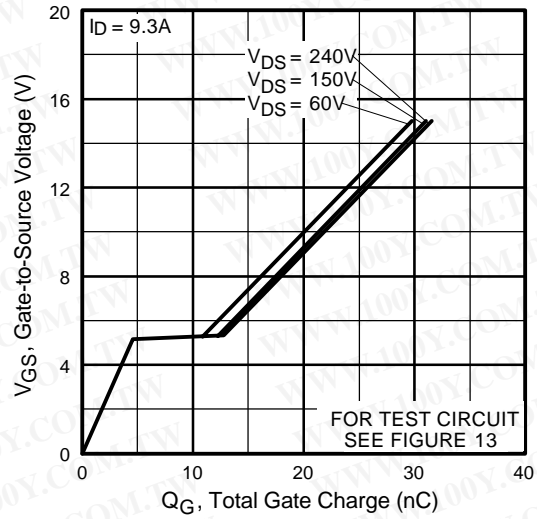


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

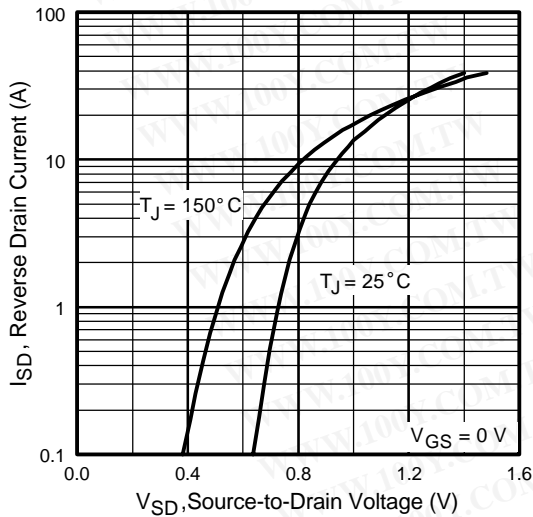


Fig 7. Typical Source-Drain Diode Forward Voltage

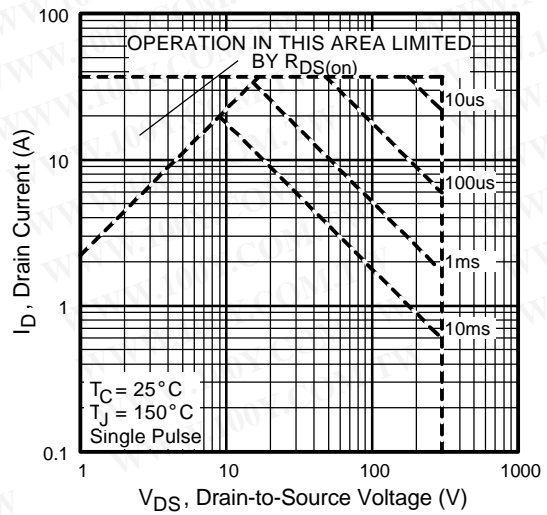


Fig 8. Maximum Safe Operating Area

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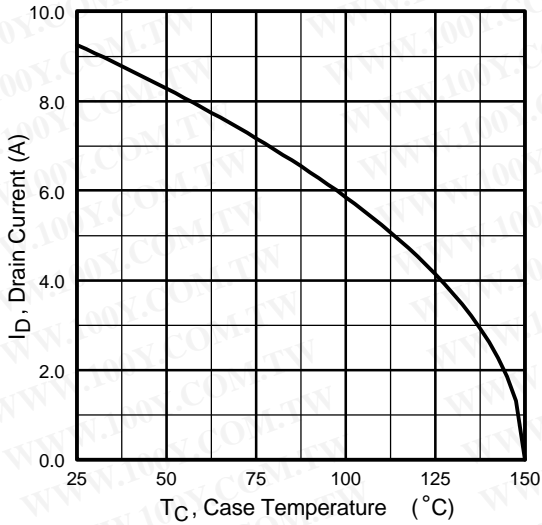


Fig 9. Maximum Drain Current Vs. Case Temperature

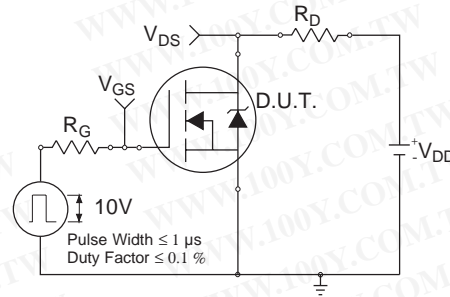


Fig 10a. Switching Time Test Circuit

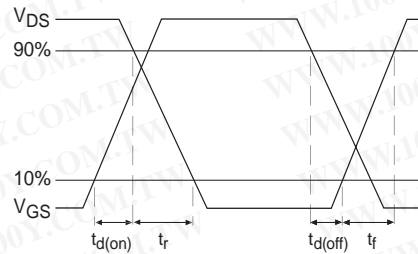


Fig 10b. Switching Time Waveforms

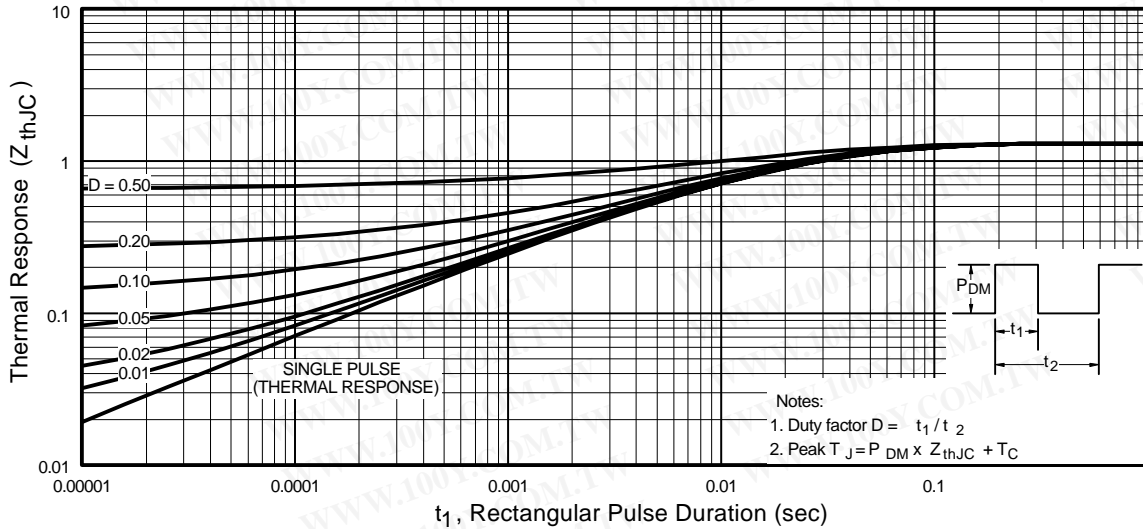


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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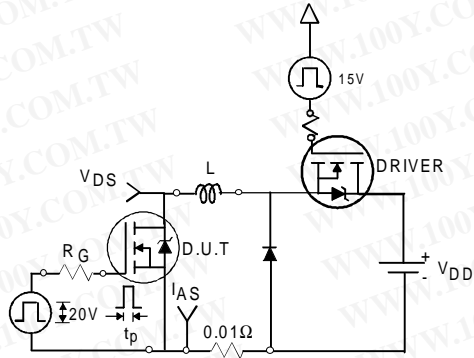


Fig 12a. Unclamped Inductive Test Circuit

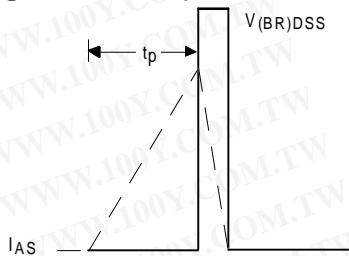


Fig 12b. Unclamped Inductive Waveforms

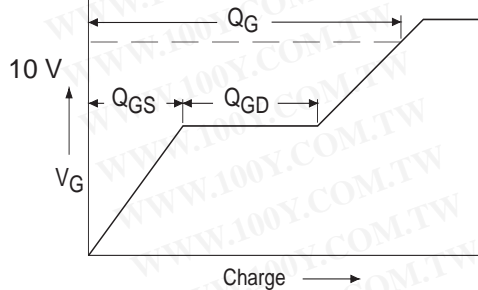


Fig 13a. Basic Gate Charge Waveform

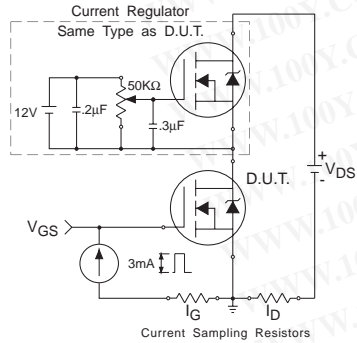


Fig 13b. Gate Charge Test Circuit

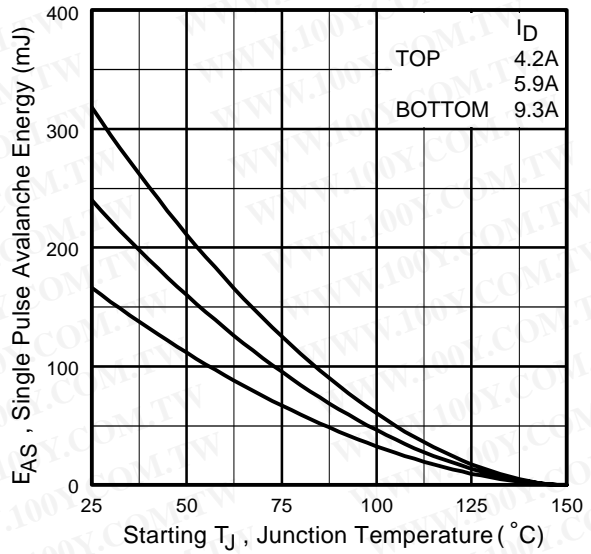


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

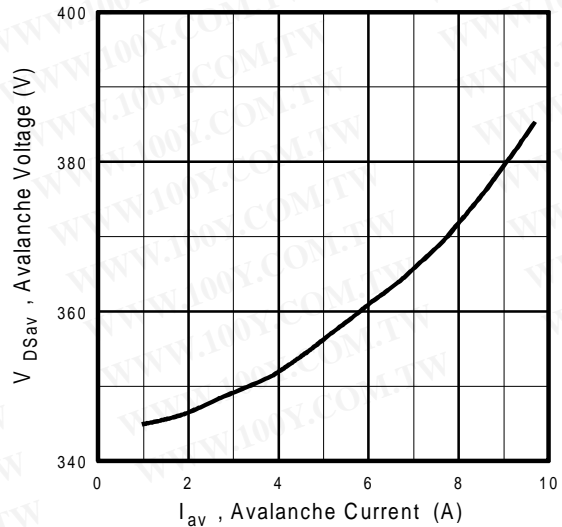
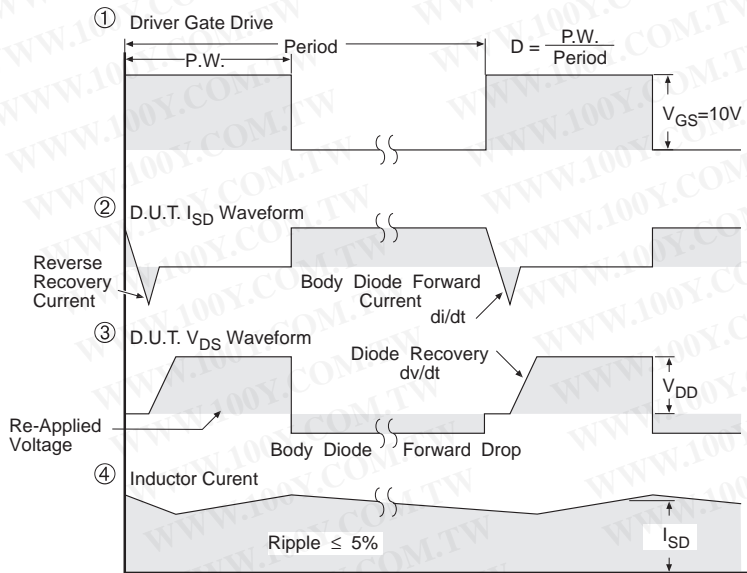
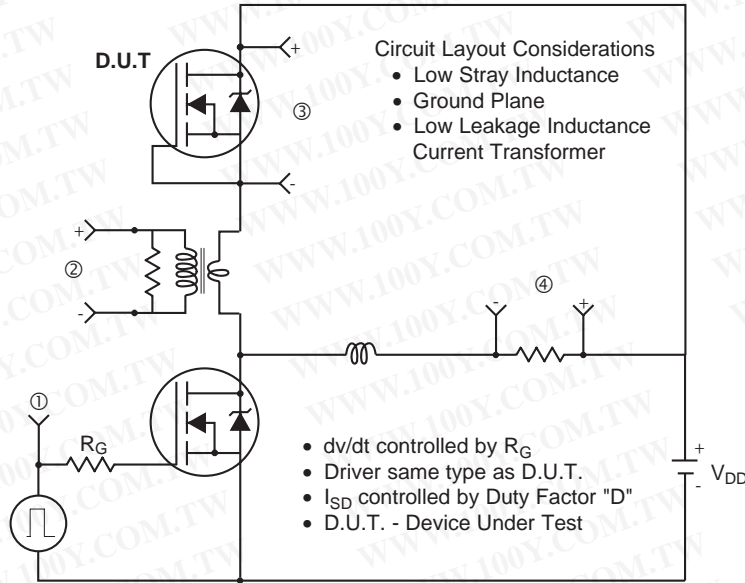


Fig 12d. Typical Drain-to-Source Voltage Vs. Avalanche Current

Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

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 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

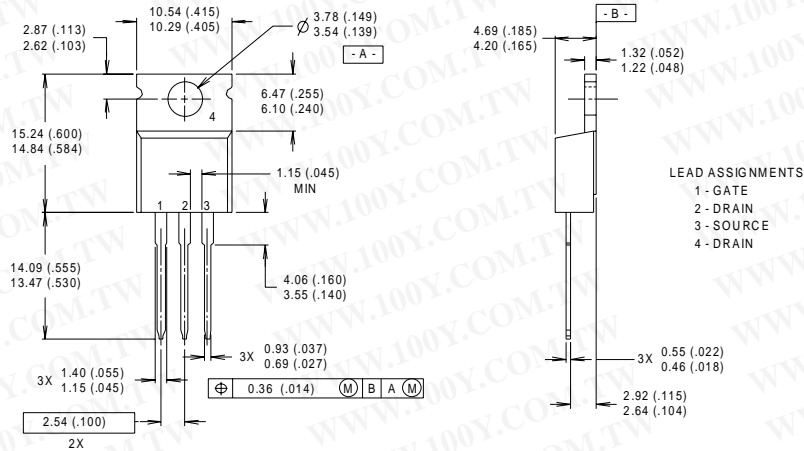
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Package Outline

TO-220AB Outline

Dimensions are shown in millimeters (inches)



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

Part Marking Information

TO-220AB

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

