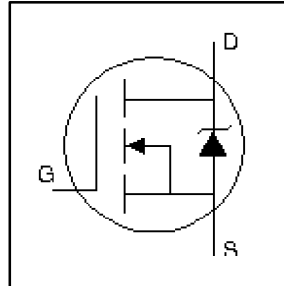


- Advanced Process Technology
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated

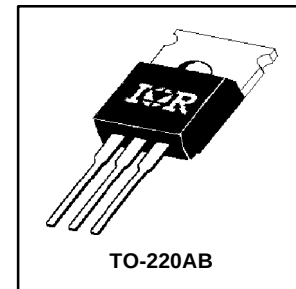


$V_{DS} = 55V$
$R_{DS(on)} = 0.012\Omega$
$I_D = 72A$

Description

Fifth Generation HEXFETs 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 for which HEXFET Power MOSFETs are well known, 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, $V_{GS} @ 10V$	72	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	51	
I_{DM}	Pulsed Drain Current ①	290	
$P_D @ T_C = 25^\circ C$	Power Dissipation	130	W
	Linear Derating Factor	0.83	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	360	mJ
I_{AR}	Avalanche Current ③	43	A
E_{AR}	Repetitive Avalanche Energy ①	13	mJ
dv/dt	Peak Diode Recovery dv/dt ③	7.2	V/ns
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	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.2	°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	55	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.06	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.012	Ω	V _{GS} = 10V, I _D = 43A ④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	30	—	—	S	V _{DS} = 25V, I _D = 43A
I _{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	V _{DS} = 55V, V _{GS} = 0V
		—	—	250	μA	V _{DS} = 44V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100	nA	V _{GS} = -20V
Q _g	Total Gate Charge	—	—	130	nC	I _D = 43A
Q _{gs}	Gate-to-Source Charge	—	—	23	nC	V _{DS} = 44V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	—	53	nC	V _{GS} = 10V, See Fig. 6 and 13 ④
t _{d(on)}	Turn-On Delay Time	—	11	—	ns	V _{DD} = 28V
t _r	Rise Time	—	66	—	ns	I _D = 43A
t _{d(off)}	Turn-Off Delay Time	—	40	—	ns	R _G = 3.6Ω
t _f	Fall Time	—	46	—	ns	R _D = 0.62Ω, 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	—	nH	
C _{ISS}	Input Capacitance	—	2900	—	pF	V _{GS} = 0V
C _{OSS}	Output Capacitance	—	880	—	pF	V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	330	—	pF	f = 1.0MHz, See Fig. 5



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	72	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	290	A	
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 43A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	81	120	ns	T _J = 25°C, I _F = 43A
Q _{rr}	Reverse Recovery Charge	—	240	370	nC	di/dt = 100A/μs ④

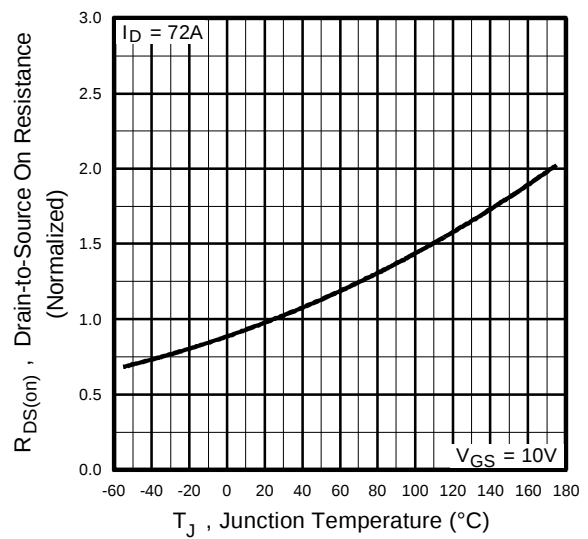
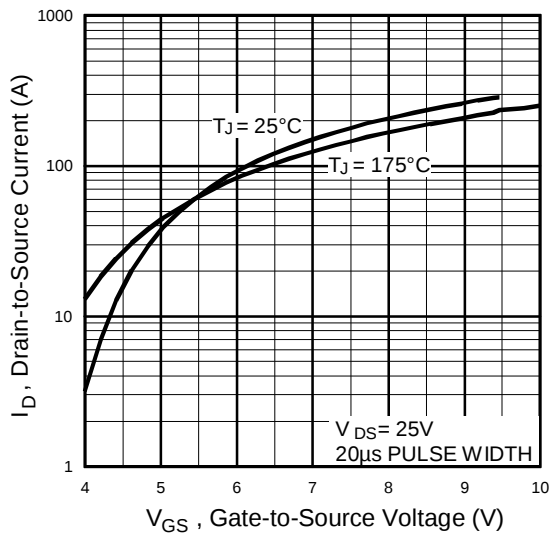
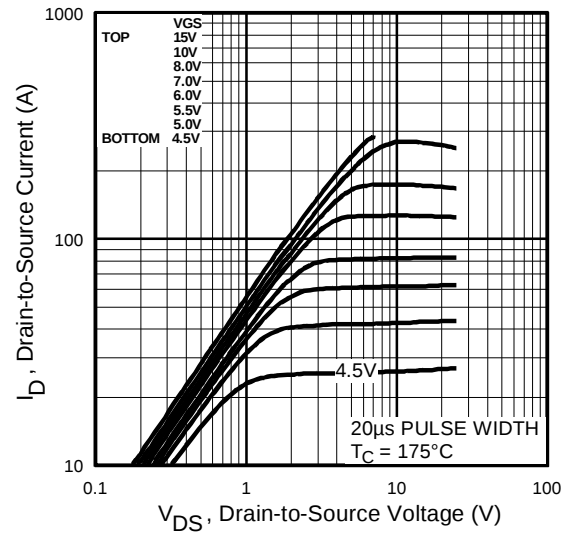
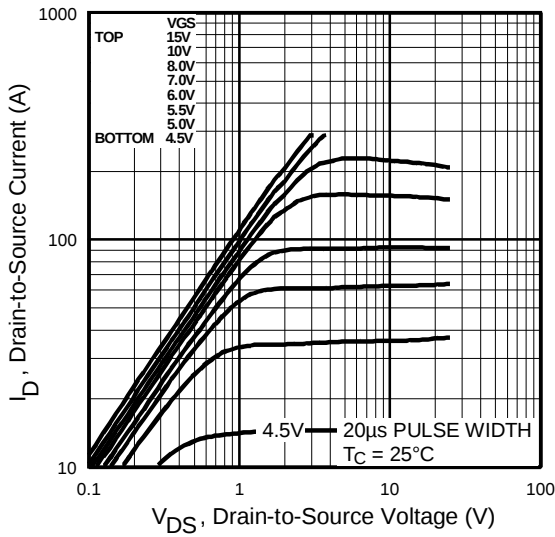
Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② V_{DD} = 25V, starting T_J = 25°C, L = 390μH
R_G = 25Ω, I_{AS} = 43A. (See Figure 12)

③ I_{SD} ≤ 43A, di/dt ≤ 260A/μs, V_{DD} ≤ V_{(BR)DSS},
T_J ≤ 175°C

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.



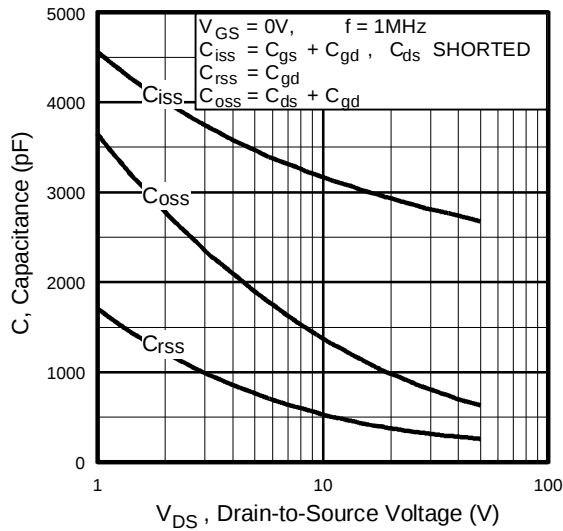


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

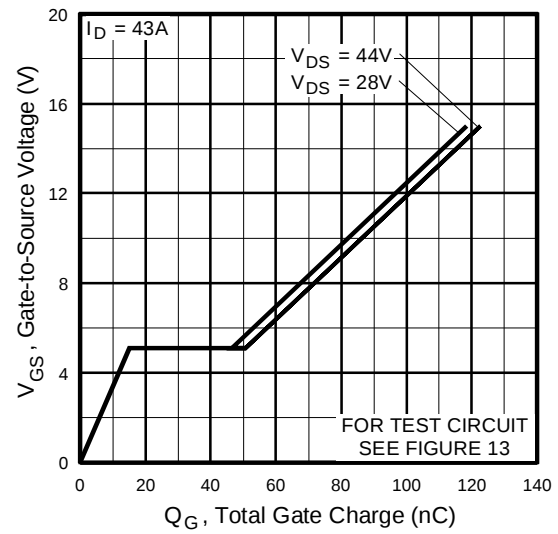


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

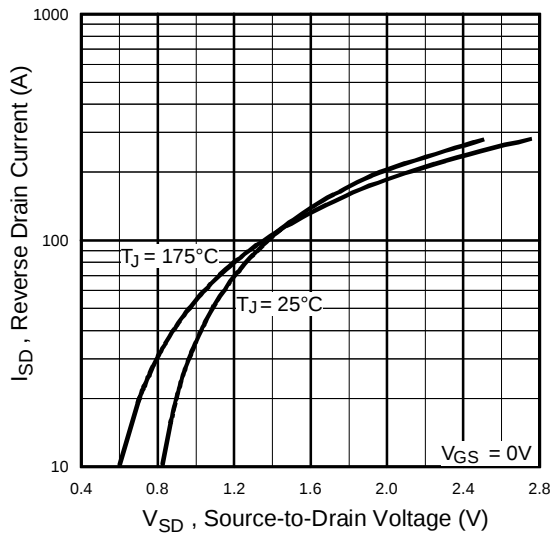


Fig 7. Typical Source-Drain Diode Forward Voltage

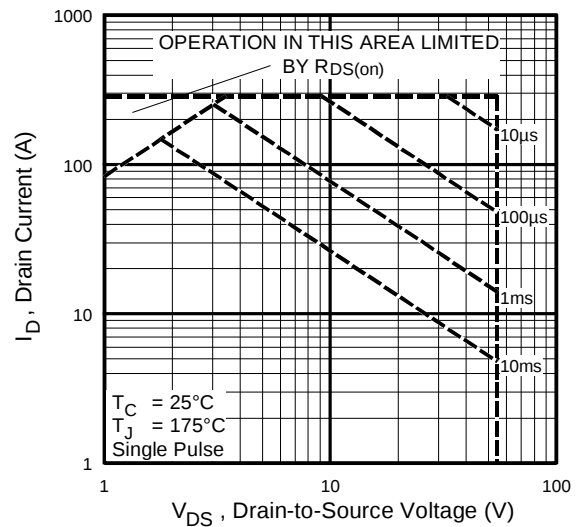


Fig 8. Maximum Safe Operating Area

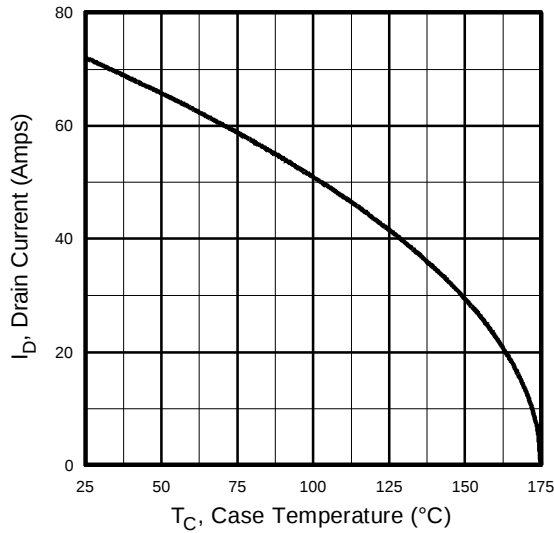


Fig 9. Maximum Drain Current Vs. Case Temperature

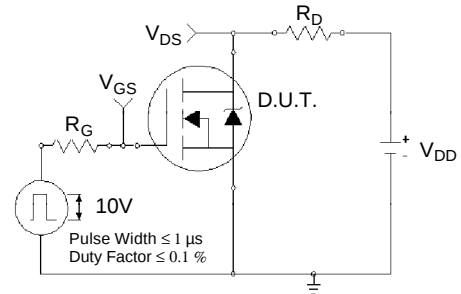


Fig 10a. Switching Time Test Circuit

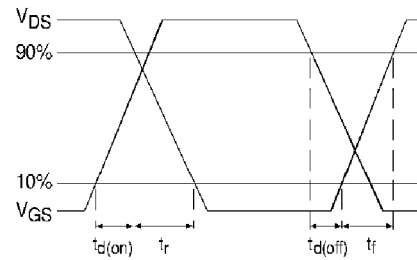


Fig 10b. Switching Time Waveforms

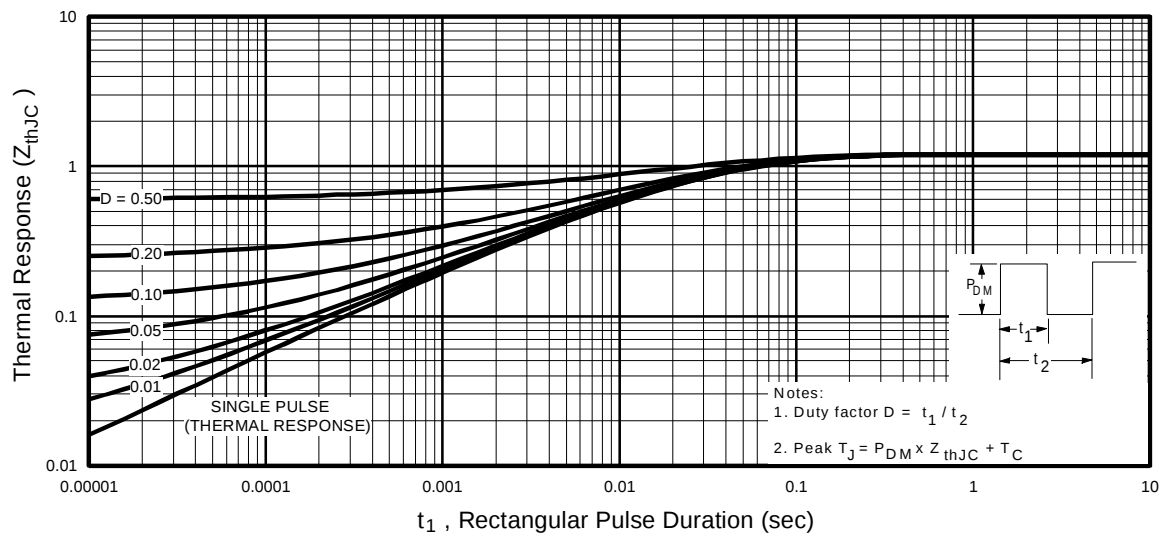


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

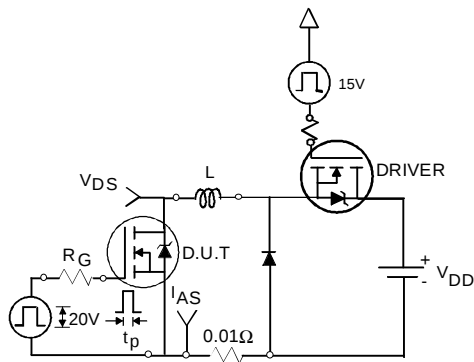


Fig 12a. Unclamped Inductive Test Circuit

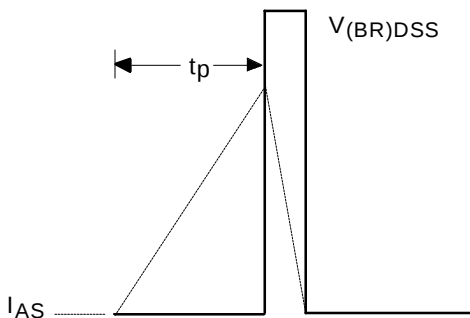


Fig 12b. Unclamped Inductive Waveforms

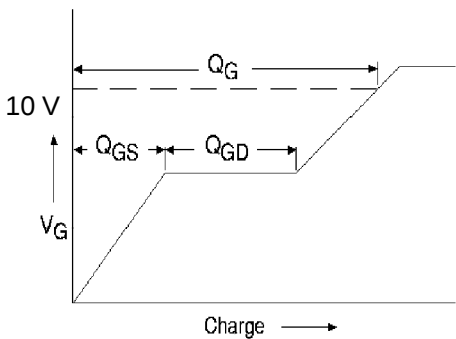


Fig 13a. Basic Gate Charge Waveform

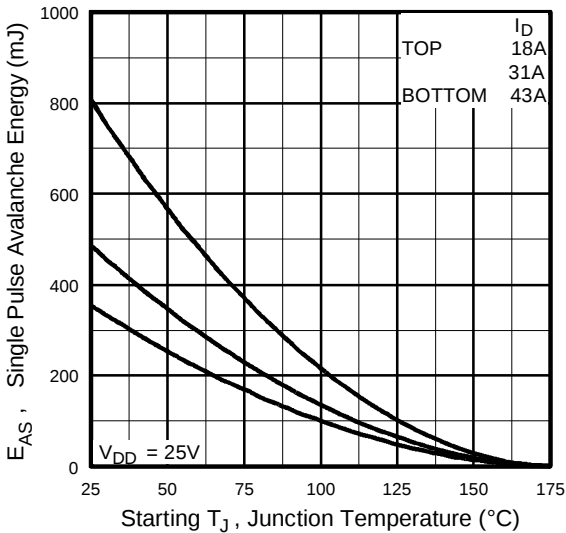


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

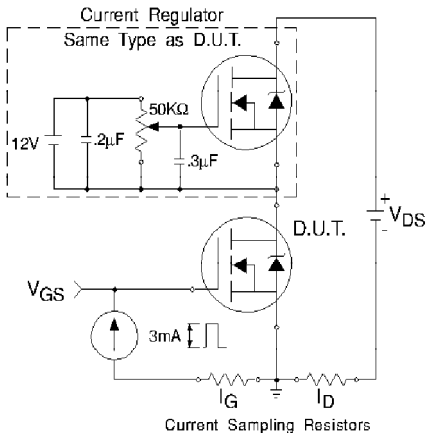
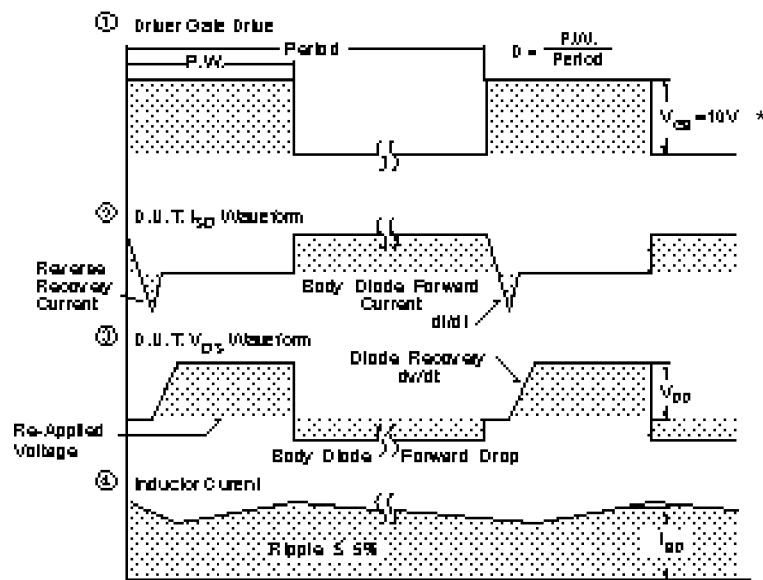
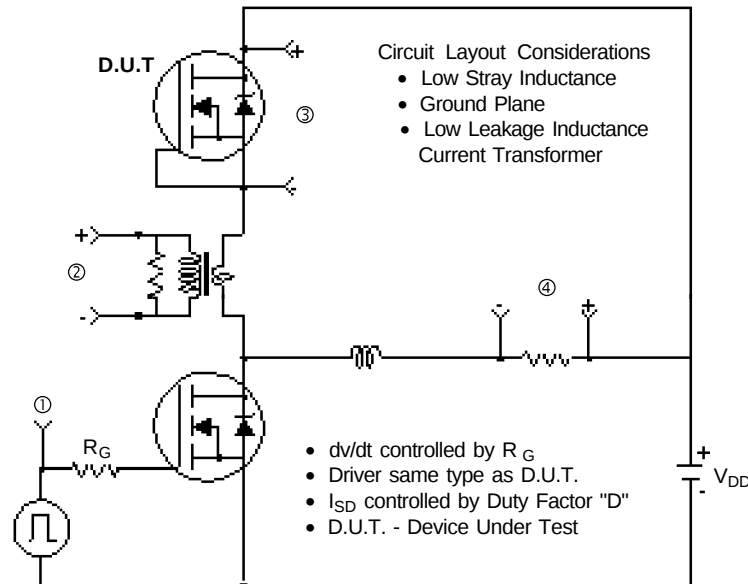


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

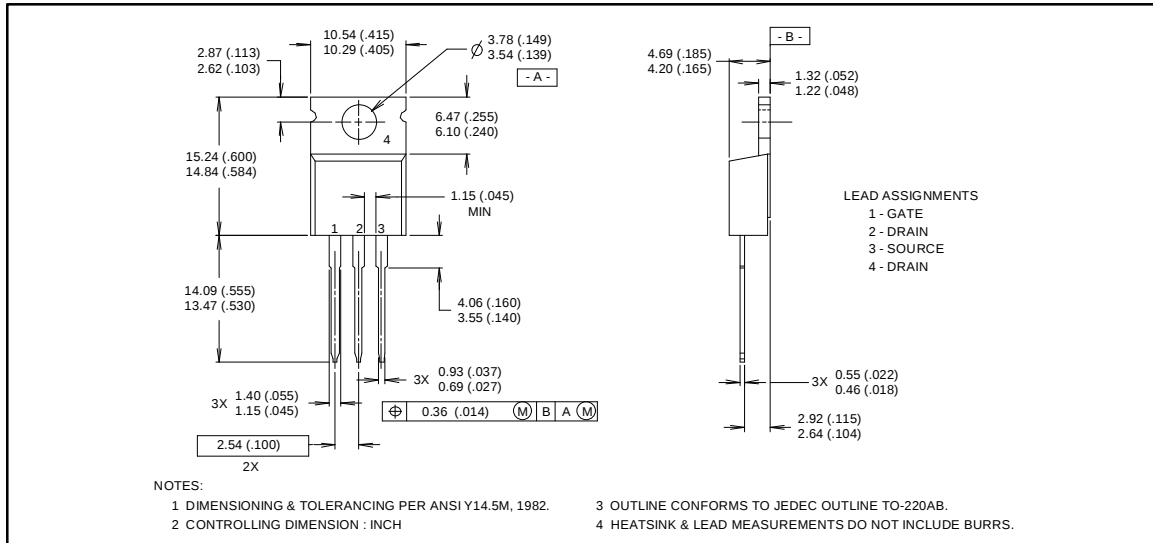
IRF1010N



Package Outline

TO-220AB Outline

Dimensions are shown in millimeters (inches)



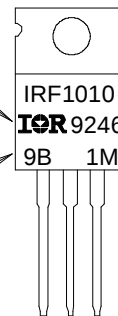
Part Marking Information

TO-220AB

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

INTERNATIONAL
RECTIFIER
LOGO

ASSEMBLY
LOT CODE



PART NUMBER

DATE CODE
(YYWW)
YY = YEAR
WW = WEEK

**International
Rectifier**

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IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111

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