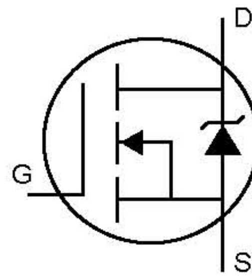
IRF3205
HEXFET ® Power MOSFET

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



V_{DSS}=55V

$R_{DS(on)}$=8.0mΩ

I_D=110A⑤

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 packages 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°C	Continuous Drain Current, V_{GS} @ 10V	110⑤	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V	80	
I_{DM}	Pulsed Drain Current ①	390	
P_D @ Tc=25°C	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
I_{AR}	Avalanche Current ①	62	A
E_{AR}	Repetitive Avalanche Energy ①	20	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting torque, 6-32 or M3 srew	10 lbf•in (1.1 N•m)	

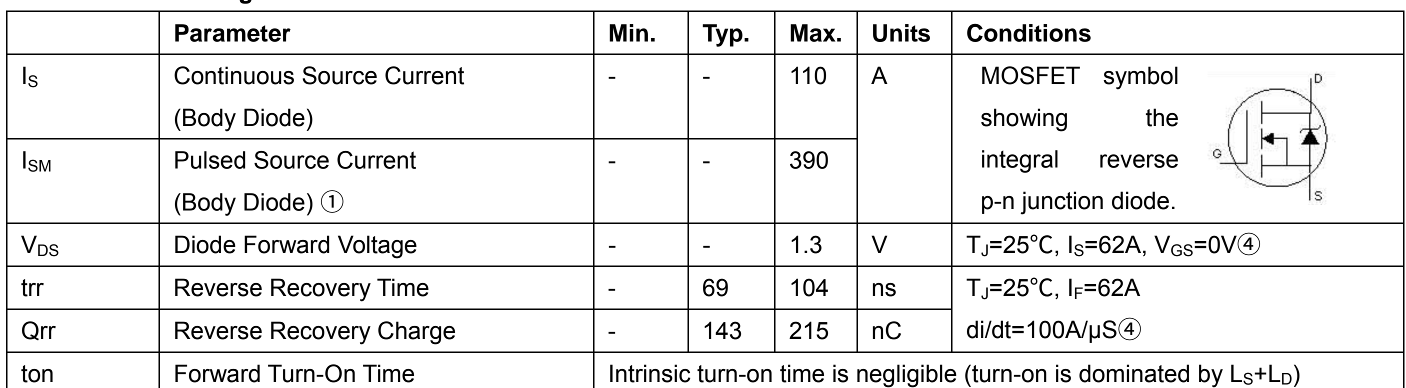
Thermal Resistance

	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	

Electrical Characteristics @ TJ=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
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	-	0.057	-	V/°C	Reference to 25°C, I_D=1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	-	-	8.0	mΩ	V_{GS}=10V, I_D=62A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	V_{DS}=V_{GS}, I_D=250μA
gfs	Forward Transconductance	44	-	-	S	V_{DS}=25V, I_D=62A ④
I_{DSS}	Drain-to-Source Leakage Current	-	-	25	μA	V_{DS}=55V, V_{GS}=0V
		-	-	250		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		V_{GS}=-20V
Qg	Total Gate Charge	-	-	146	nC	I_D=62A
Qgs	Gate-to-Source Charge	-	-	35		V_{DS}=44V
Qgd	Gate-to-Drain ("Miller") Charge	-	-	54		V_{GS}=10V, See Fig.6 and 13
td(on)	Turn-On Delay Time	-	14	-	ns	V_{DD}=28V
tr	Rise Time	-	-101	-		I_D=62A
td(off)	Turn-On Delay Time		50	-		R_G=4.5 Ω
tf	Fall Time	-	65	-		V_{GS}=10V, See Fig.10④
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	-		
Ciss	Input Capacitance	-	3247	-	pF	V_{GS}=0V
Coss	Output Capacitance	-	781	-		V_{DS}=25V
Crss	Reverse Transfer Capacitance	-	211	-		f=1.0MHz, See Fig.5
E_{AS}	Single Pulse Avalanche Energy ②	-	1050⑥	264⑦	mJ	I_{AS}=62A, L=138μH

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_{DS}	Diode Forward Voltage	-	-	1.3	V	T_J=25°C, I_S=62A, V_{GS}=0V④
trr	Reverse Recovery Time	-	69	104	ns	T_J=25°C, I_F=62A
Qrr	Reverse Recovery Charge	-	143	215	nC	di/dt=100A/μS④
ton	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

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

②Starting T_J=25°C, L=138μH, R_G=25Ω, I_{AS}=62A. (See fig. 12)

③I_{SD}≤62A, di/dt≤207A/μs, V_{DD} ≤$V_{(BR)DSS}$, T_J≤175°C

④ Pulse width ≤400μs; duty cycle ≤2%.

⑤ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

⑥This is a typical value at device destruction and represents operation outside rated limits.

⑦This is a calculated value limited to T_J=175°C.

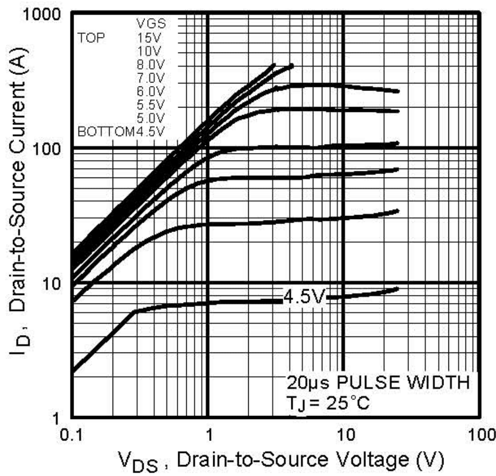


Fig 1. Typical Output Characteristics

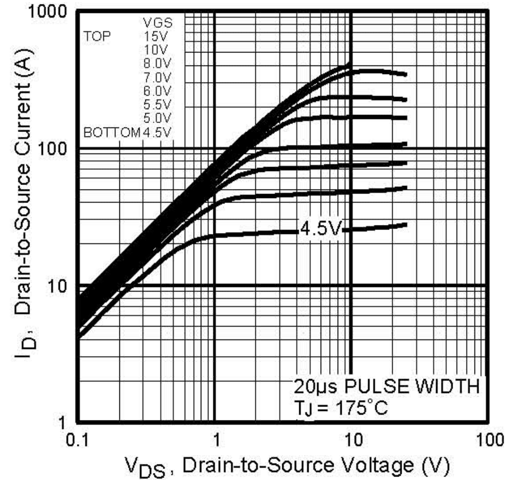


Fig2. Typical Output Characteristics

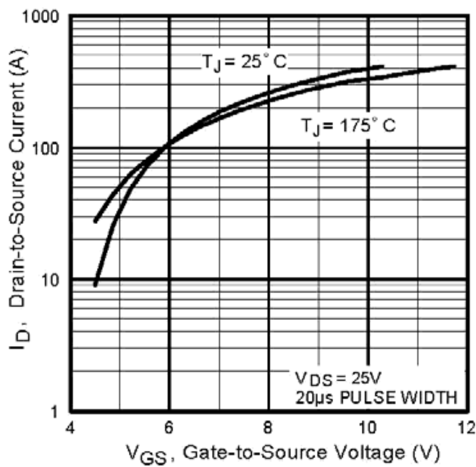


Fig 3. Typical Transfer Characteristics

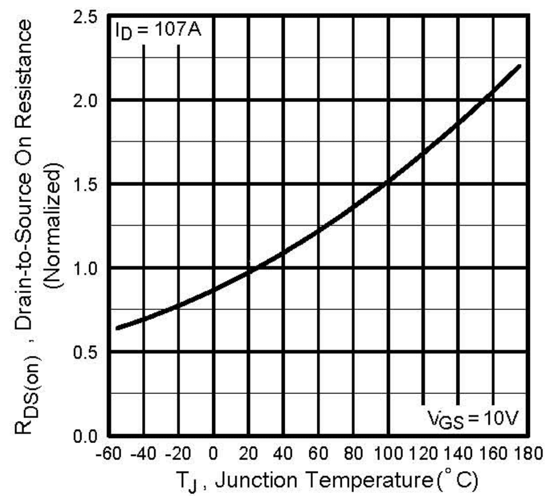


Fig 4. Normalized On-Resistance

Vs. Temperature

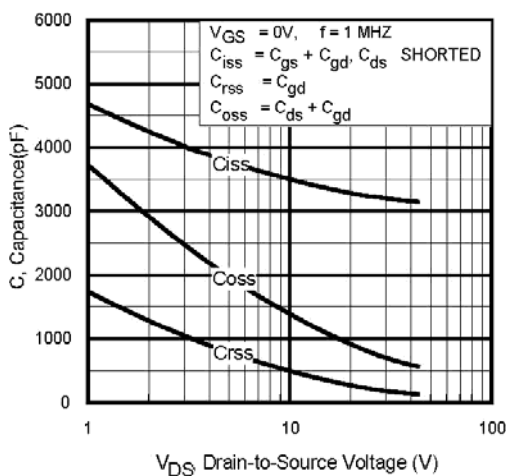


Fig 5. Typical Capacitance Vs.

Drain-to-Source Voltage

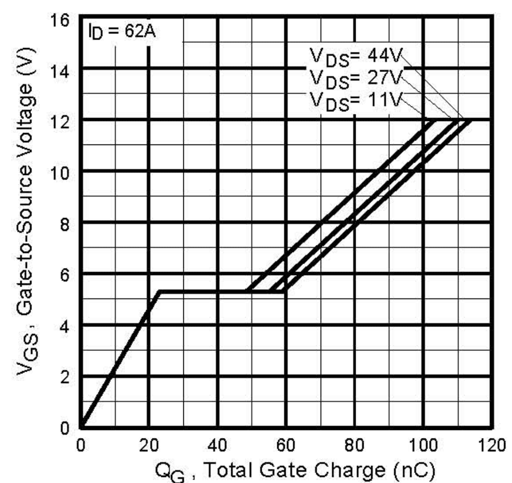


Fig 6. Typical Gate Charge Vs.

Gate-to-Source Voltage

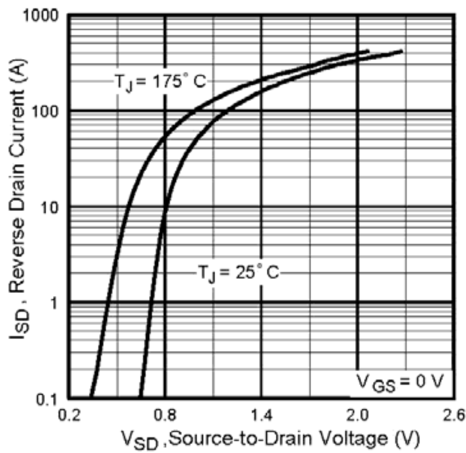


Fig 7. Typical Source-Drain Diode Forward Voltage

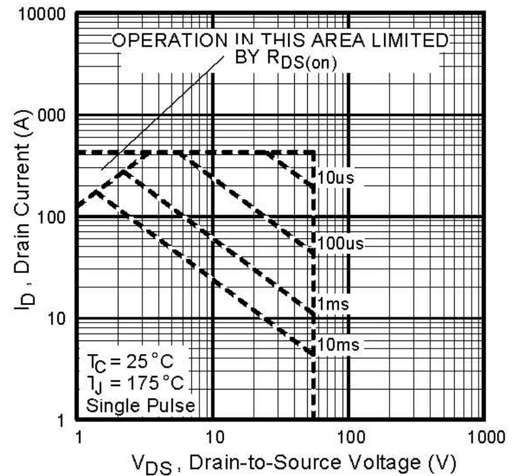


Fig 8. Maximum Safe Operating Area

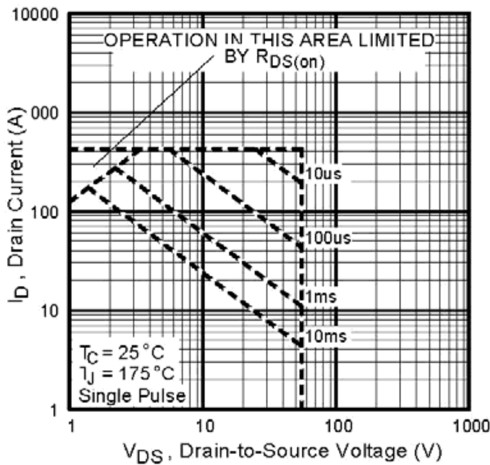


Fig 9. Maximum Drain Current Vs. Case Temperature

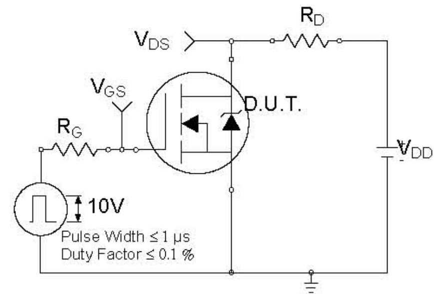


Fig 10a. Switching Time Test Circuit

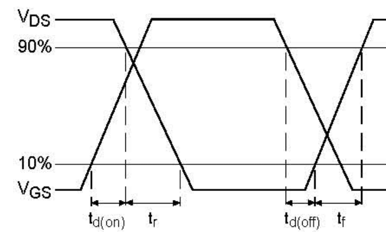


Fig 10b. Switching Time Waveforms

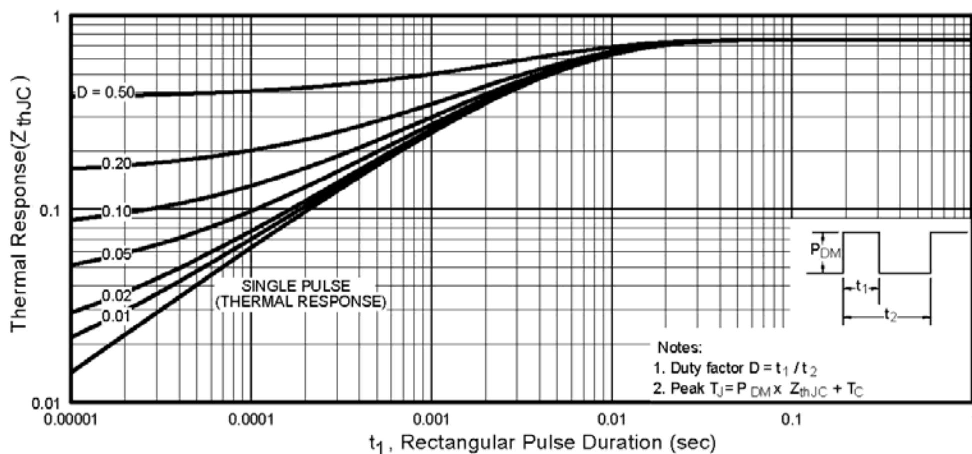


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

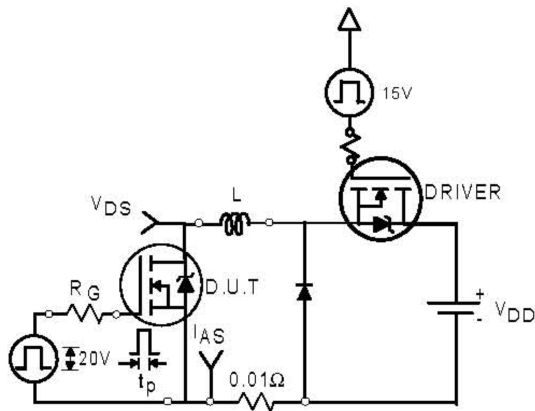


Fig 12a. Unclamped Inductive Test Circuit

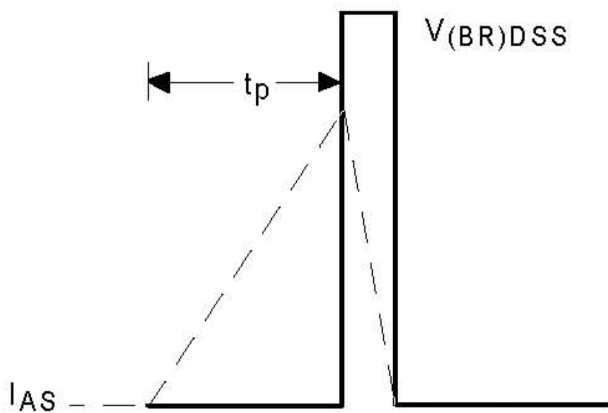


Fig 12b. Unclamped Inductive Waveforms

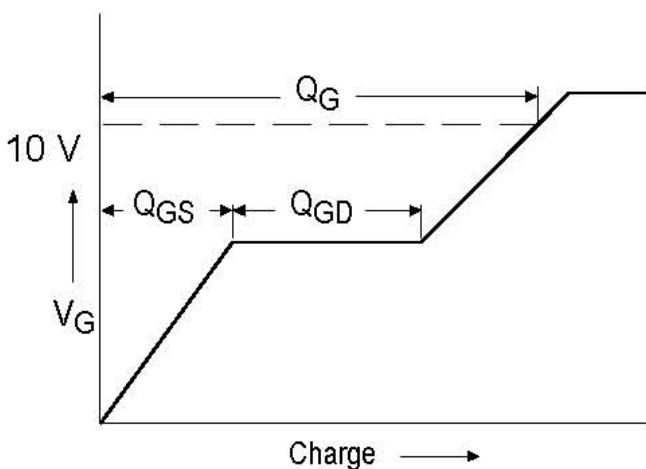


Fig 13a. Basic Gate Charge Waveform

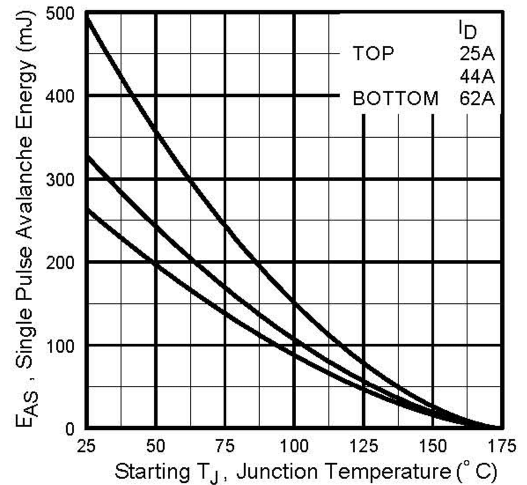


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

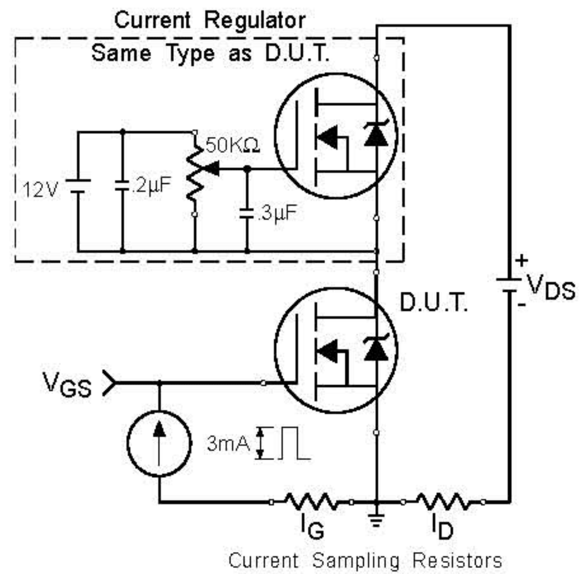
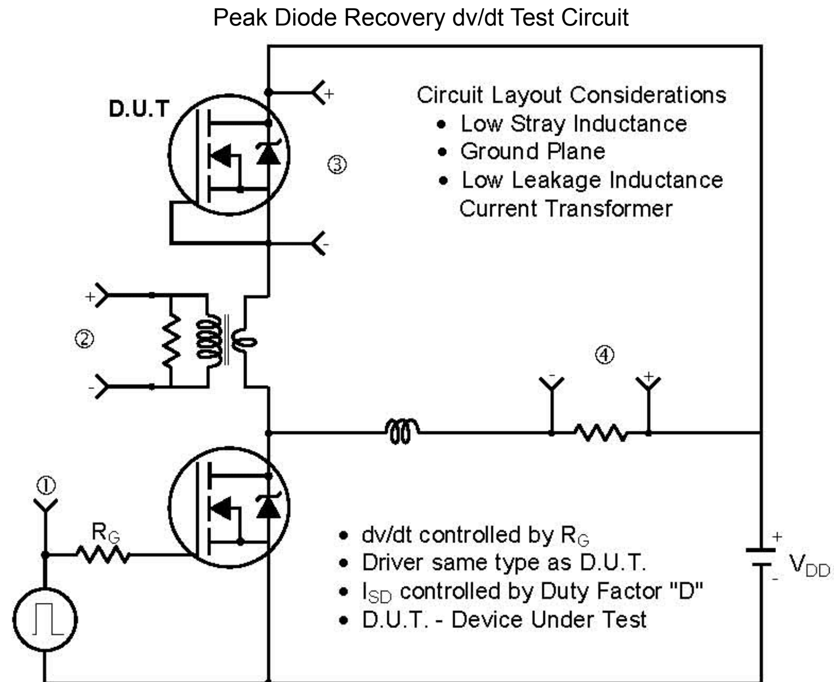
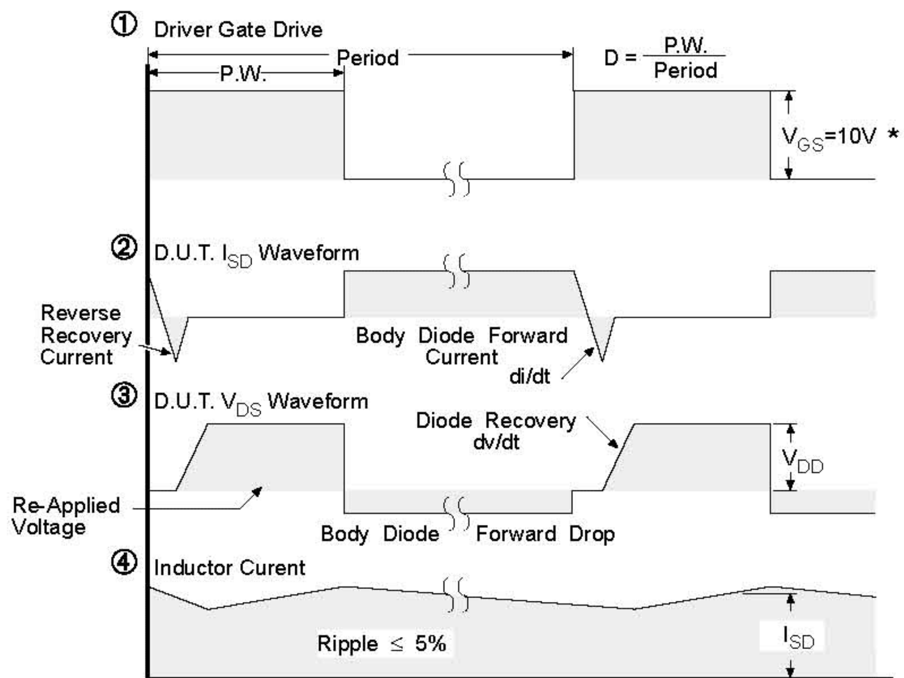


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit





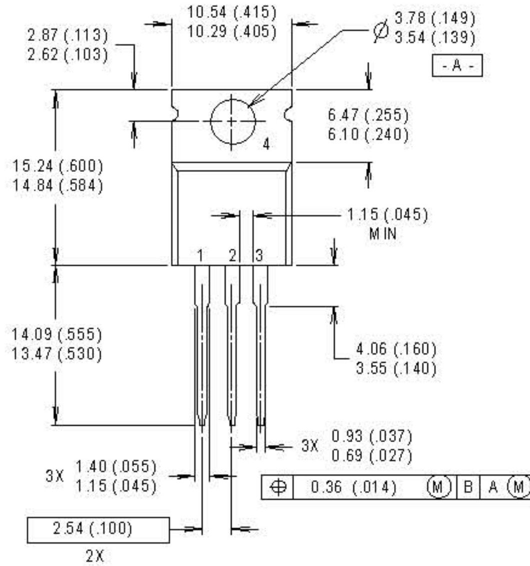
* V_{GS} = 5V for Logic Level Devices

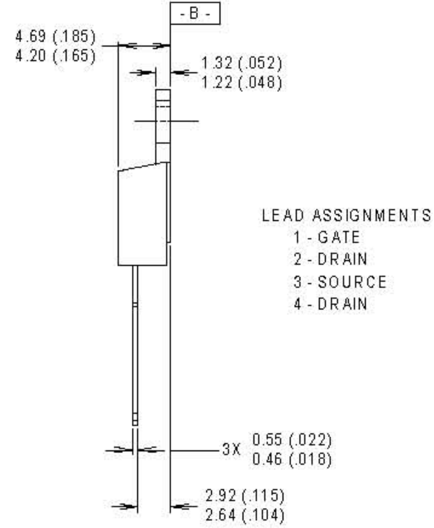
Fig 14. For N-Channel HEXFETs

Package Outline

TO-220AB 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.