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[International Rectifier \(Infineon Technologies Americas Corp.\)
IRFZ44VPBF](#)

For any questions, you can email us directly:

sales@integrated-circuit.com

International Rectifier

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Optimized for SMPS Applications
- Lead-Free

Description

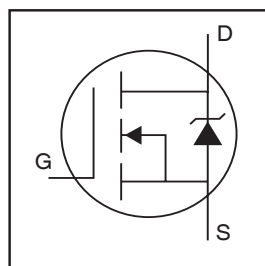
Advanced HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer 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.

PD - 94826A

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HEXFET® Power MOSFET



$$V_{DS} = 60V$$

$$R_{DS(on)} = 16.5m\Omega$$

$$I_D = 55A$$



TO-220AB

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V	55	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V	39	
I_{DM}	Pulsed Drain Current ①	220	
P_D @ $T_C = 25^\circ C$	Power Dissipation	115	W
	Linear Derating Factor	0.77	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	115	mJ
I_{AR}	Avalanche Current①	55	A
E_{AR}	Repetitive Avalanche Energy①	11	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	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

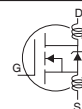
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.3	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.062	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	16.5	m Ω	$V_{GS} = 10V, I_D = 31A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Transconductance	24	—	—	S	$V_{DS} = 25V, I_D = 31A$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 60V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 48V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	67	nC	$I_D = 51A$
Q_{gs}	Gate-to-Source Charge	—	—	18		$V_{DS} = 48V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	25		$V_{GS} = 10V$, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	13	—	ns	$V_{DD} = 30V$
t_r	Rise Time	—	97	—		$I_D = 51A$
$t_{d(off)}$	Turn-Off Delay Time	—	40	—		$R_G = 9.1\Omega$
t_f	Fall Time	—	57	—		$R_D = 0.6\Omega$, 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	—		
C_{iss}	Input Capacitance	—	1812	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	393	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	103	—		$f = 1.0\text{MHz}$, See Fig. 5



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	55	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode)①	—	—	220		
V_{SD}	Diode Forward Voltage	—	—	2.5	V	$T_J = 25^\circ\text{C}, I_S = 51A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	70	105	ns	$T_J = 25^\circ\text{C}, I_F = 51A$
Q_{rr}	Reverse Recovery Charge	—	146	219	nC	$di/dt = 100A/\mu s$ 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 $T_J = 25^\circ\text{C}$, $L = 89\mu H$
 $R_G = 25\Omega$, $I_{AS} = 51A$. (See Figure 12)

③ $I_{SD} \leq 51A$, $di/dt \leq 227A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$

④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

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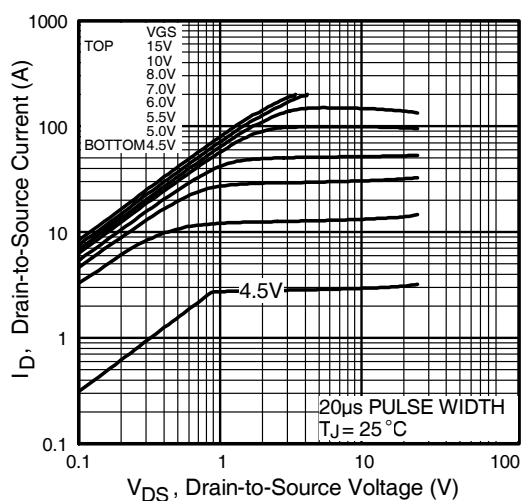


Fig 1. Typical Output Characteristics

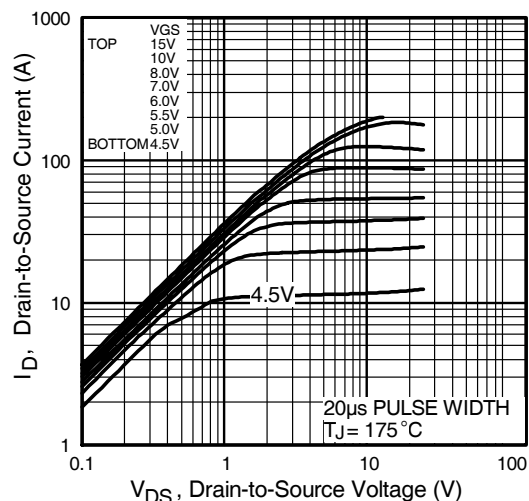


Fig 2. Typical Output Characteristics

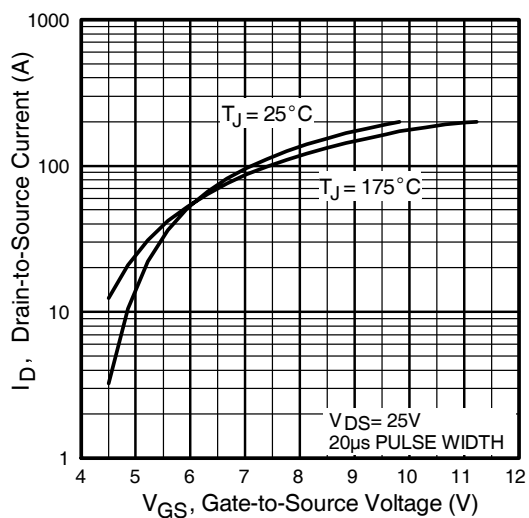


Fig 3. Typical Transfer Characteristics

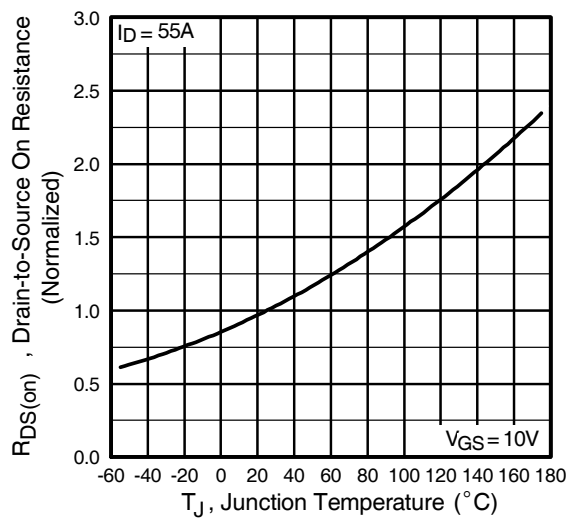


Fig 4. Normalized On-Resistance Vs. Temperature

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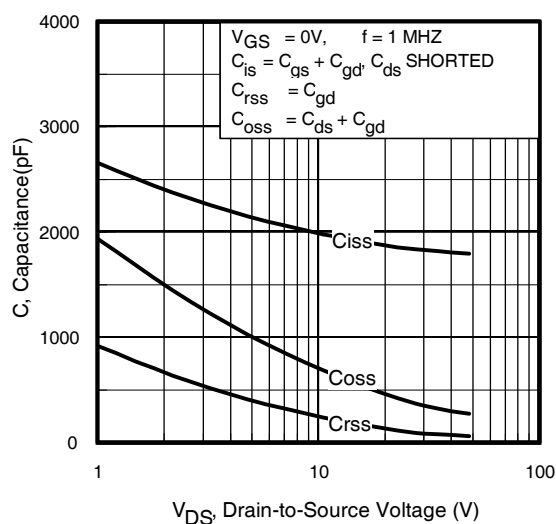


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

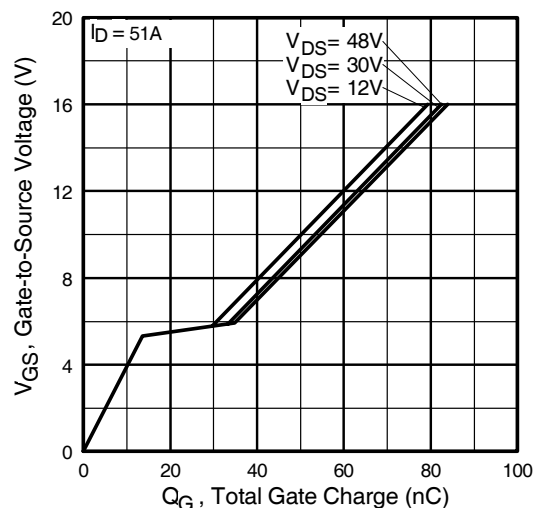


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

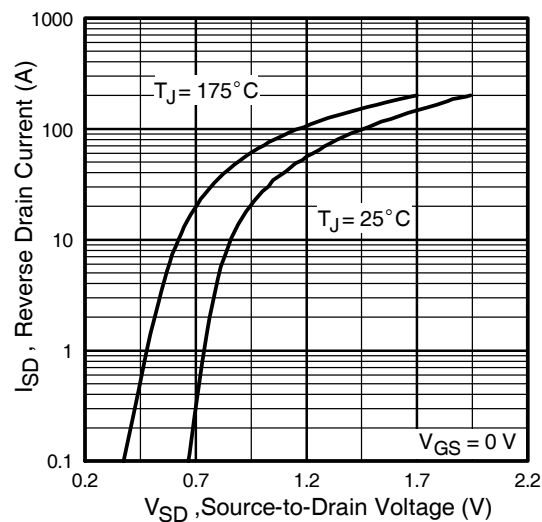


Fig 7. Typical Source-Drain Diode Forward Voltage

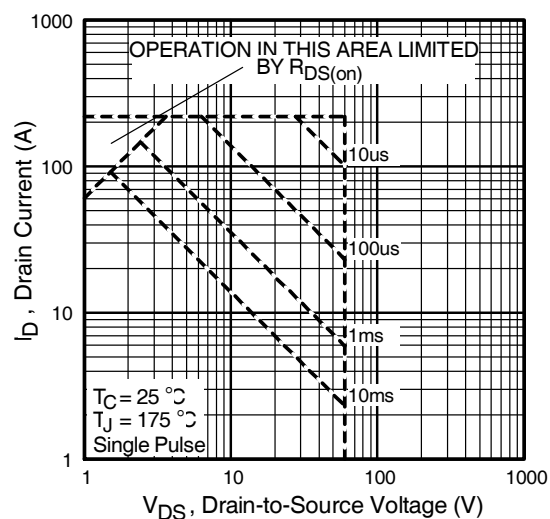


Fig 8. Maximum Safe Operating Area

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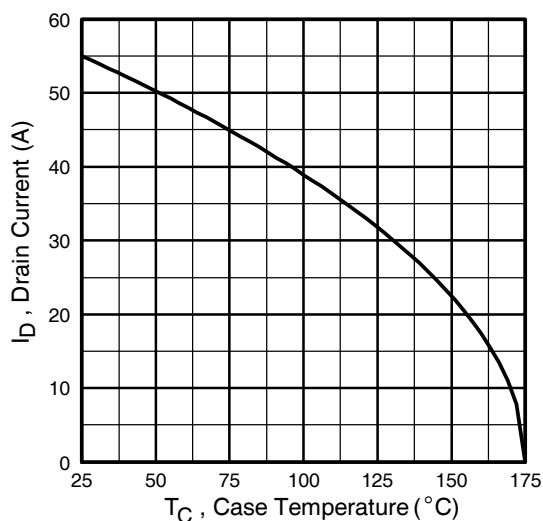


Fig 9. Maximum Drain Current Vs. Case Temperature

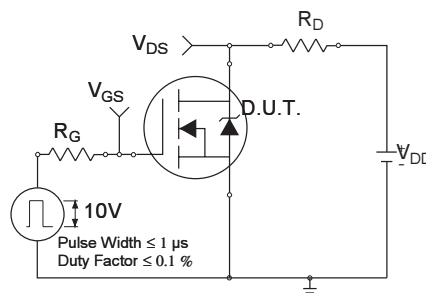


Fig 10a. Switching Time Test Circuit

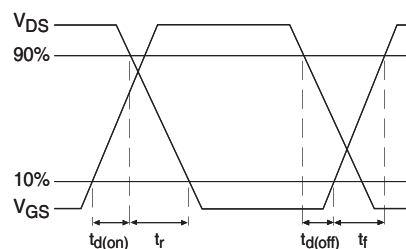


Fig 10b. Switching Time Waveforms

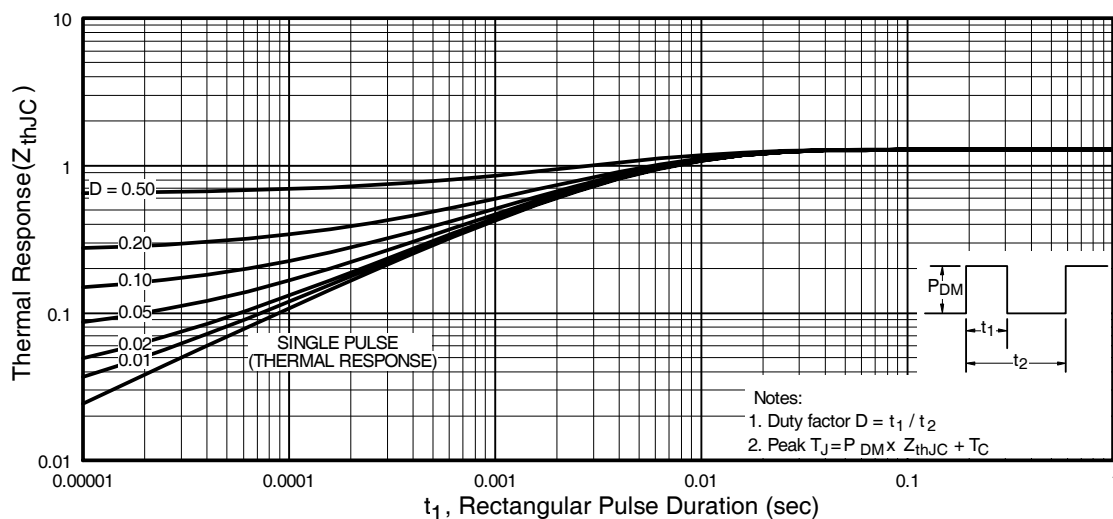


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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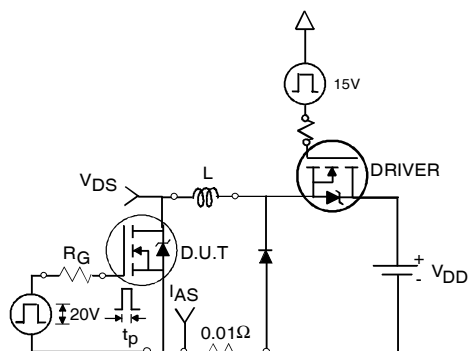


Fig 12a. Unclamped Inductive Test Circuit

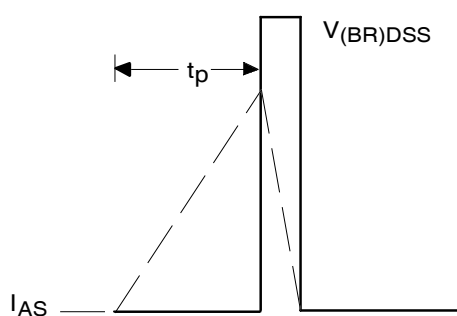


Fig 12b. Unclamped Inductive Waveforms

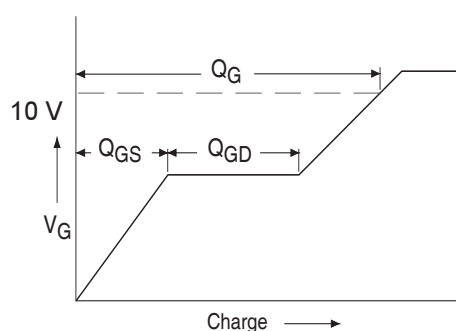


Fig 13a. Basic Gate Charge Waveform

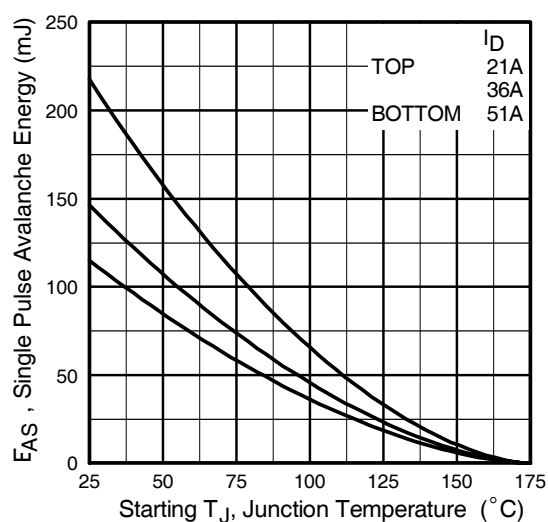


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

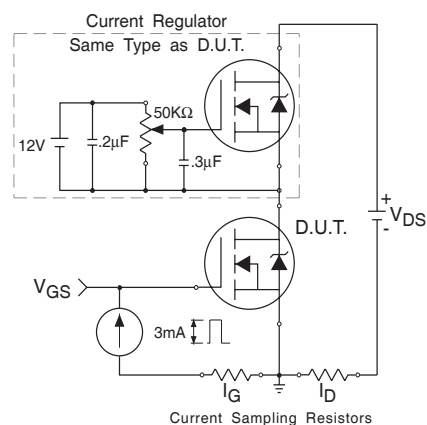
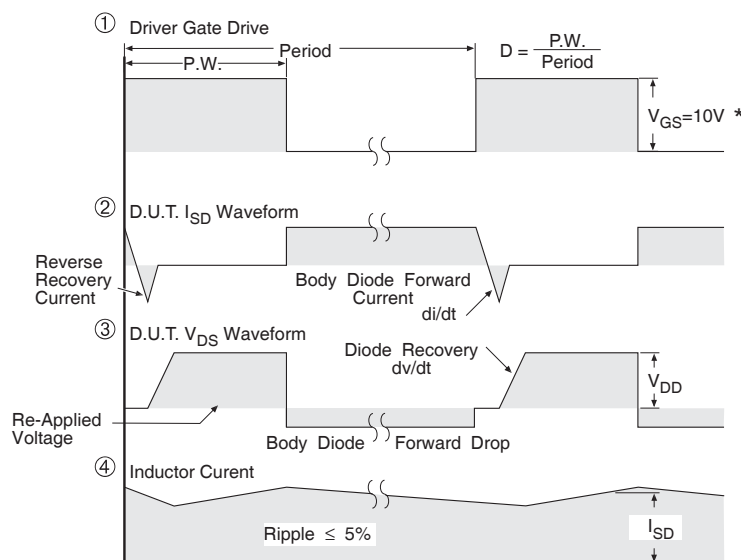
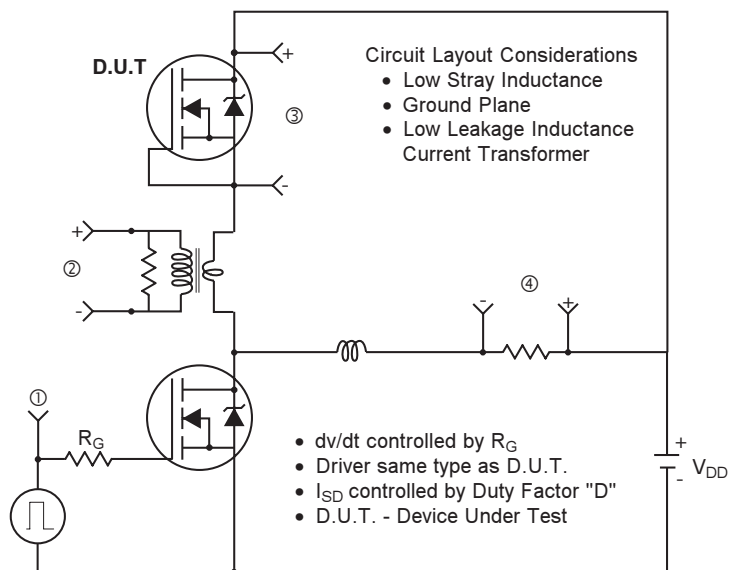


Fig 13b. Gate Charge Test Circuit

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Peak Diode Recovery dv/dt Test Circuit



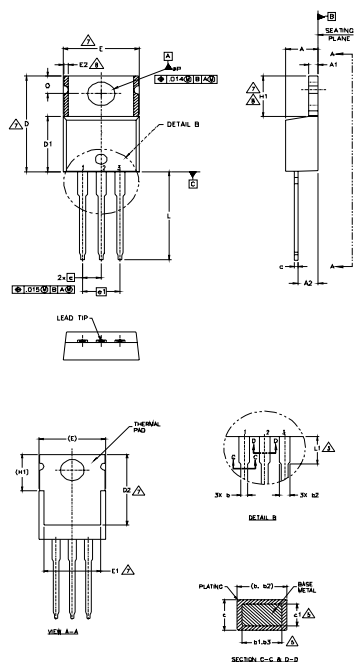
* $V_{GS} = 5V$ for Logic Level Devices

Fig 14. For N-Channel HEXFETS

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TO-220AB Package Outline (Dimensions are shown in millimeters (inches))



- NOTES:
1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
 2. DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
 3. LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
 4. DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
 5. DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
 6. CONTROLLING DIMENSION : INCHES.
 7. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E, H1, D2 & E1
 8. DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
 9. OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max) AND D2 (min) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

DIMENSIONS						NOTES
SYMBOL	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	3.56	4.83	.140	.190	5	
A1	0.51	1.40	.020	.055		
A2	2.03	2.92	.080	.115		
b	0.38	1.01	.015	.040		
b1	0.38	0.97	.015	.038	5	
b2	1.14	1.78	.045	.070		
b3	1.14	1.73	.045	.068		
c	0.36	0.61	.014	.024		
c1	0.36	0.56	.014	.022	5	
D	14.22	16.51	.560	.650	4	
D1	8.38	9.02	.330	.355	7	
D2	11.68	12.88	.460	.507		
E	9.65	10.67	.380	.420	4,7	
E1	6.86	8.89	.270	.350	7	
E2	—	0.76	—	.030	8	
e	2.54 BSC		.100 BSC		7,8	
e1	5.08 BSC		.200 BSC			
H1	5.84	6.86	.230	.270		
L	12.70	14.73	.500	.580	3	
L1	—	6.35	—	.250		
ØP	3.54	4.08	.139	.161		
Q	2.54	3.42	.100	.135		

LEAD ASSIGNMENTS

HEXFEET
1. - GATE
2. - DRAIN
3. - SOURCE

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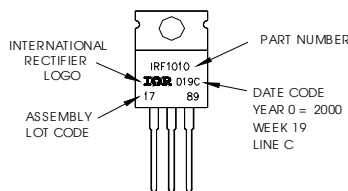
1. - GATE
2. - COLLECTOR
3. - EMITTER

DIODES
1. - ANODE/OPEN
2. - CATHODE
3. - ANODE

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 2000
IN THE ASSEMBLY LINE "C"

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



Notes:

1. For an Automotive Qualified version of this part please see <http://www.irf.com/product-info/auto/>
2. For the most current drawing please refer to IR website at <http://www.irf.com/package/>

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.

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IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

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