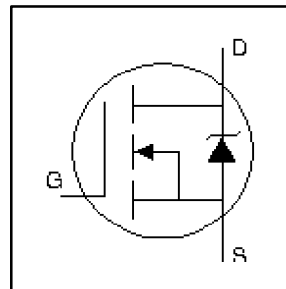


HEXFET® Power MOSFET

- Reduced Gate Drive Requirement
- Enhanced 30V V_{GS} Rating
- Reduced C_{ISS} , C_{OSS} , C_{RSS}
- Extremely High Frequency Operation
- Repetitive Avalanche Rated

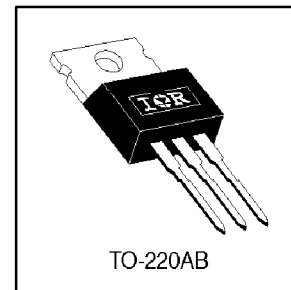


$V_{DSS} = 300V$
$R_{DS(on)} = 0.75\Omega$
$I_D = 6.1A$

Description

This new series of Low Charge HEXFETs achieve significantly lower gate charge over conventional MOSFETs. Utilizing the new LCDMOS technology, the device improvements are achieved without added product cost, allowing for reduced gate drive requirements and total system savings. In addition, reduced switching losses and improved efficiency are achievable in a variety of high frequency applications. Frequencies of a few MHz at high current are possible using the new Low Charge MOSFETs.

These device improvements combined with the proven ruggedness and reliability that are characteristics of HEXFETs offer the designer a new standard in power transistors for switching applications.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	6.1	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	3.9	
I_{DM}	Pulsed Drain Current ①	24	
$P_D @ T_C = 25^\circ C$	Power Dissipation	74	W
	Linear Derating Factor	0.59	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy ②	120	mJ
I_{AR}	Avalanche Current ①	6.1	A
E_{AR}	Repetitive Avalanche Energy ①	7.4	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.4	V/ns
T_J	Operating Junction and	-55 to + 150	°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	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	1.7	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	62	

IRF737LC



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	300	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.391	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.75	Ω	$V_{GS} = 10V, I_D = 3.7A$ 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	2.7	—	—	S	$V_{DS} = 50V, I_D = 3.7A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 300V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 240V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
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	—	—	17	nC	$I_D = 6.1A$
Q_{gs}	Gate-to-Source Charge	—	—	4.8		$V_{DS} = 240V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	7.6		$V_{GS} = 10V$, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	6.6	—	ns	$V_{DD} = 150V$
t_r	Rise Time	—	21	—		$I_D = 6.1A$
$t_{d(off)}$	Turn-Off Delay Time	—	13	—		$R_G = 12\Omega$
t_f	Fall Time	—	12	—		$R_D = 24\Omega$, 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	—	430	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	120	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	9.2	—		$f = 1.0\text{MHz}$, See Fig. 5



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current	—	—	6.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
	(Body Diode)	—	—	6.1		
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	24		
V_{SD}	Diode Forward Voltage	—	—	1.6	V	$T_J = 25^\circ\text{C}, I_S = 6.1A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	320	490	ns	$T_J = 25^\circ\text{C}, I_F = 6.1A$
Q_{rr}	Reverse Recovery Charge	—	1.5	2.2	μC	$di/dt = 100A/\mu\text{s}$ ④

Notes:

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

② $V_{DD} = 25V$, starting $T_J = 25^\circ\text{C}$, $L = 5.7\text{mH}$
 $R_G = 25\Omega, I_{AS} = 6.1A$. (See Figure 12)

③ $I_{SD} \leq 6.1A, di/dt \leq 270A/\mu\text{s}, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$

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



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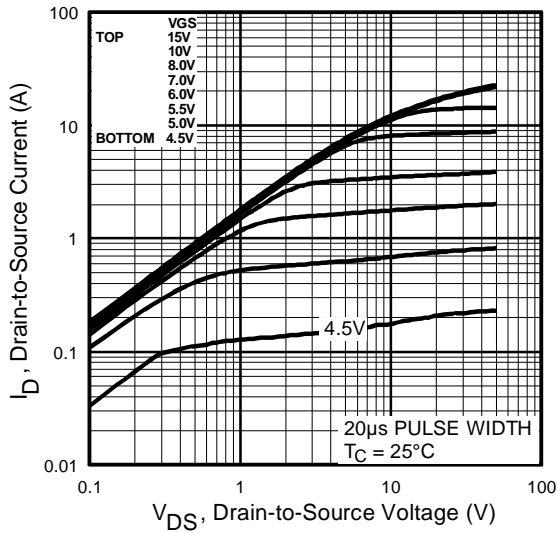


Fig 1. Typical Output Characteristics,
 $T_J = 25^\circ\text{C}$

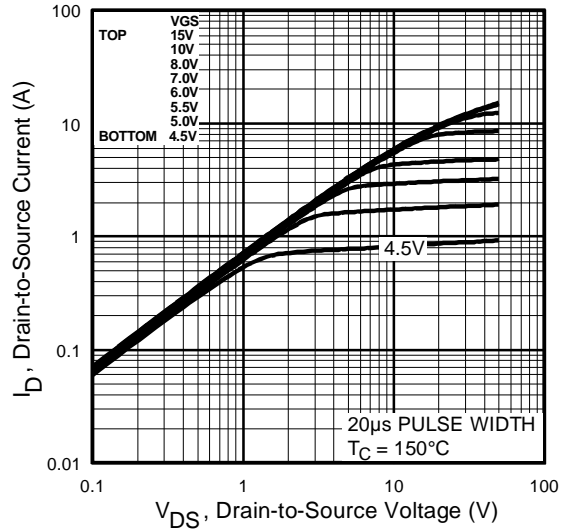


Fig 2. Typical Output Characteristics,
 $T_J = 150^\circ\text{C}$

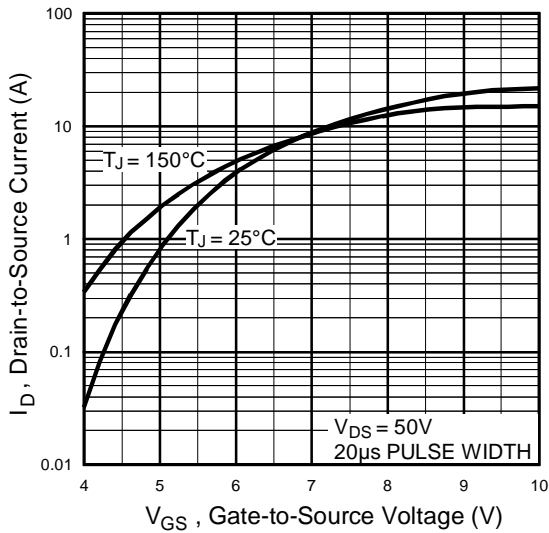


Fig 3. Typical Transfer Characteristics

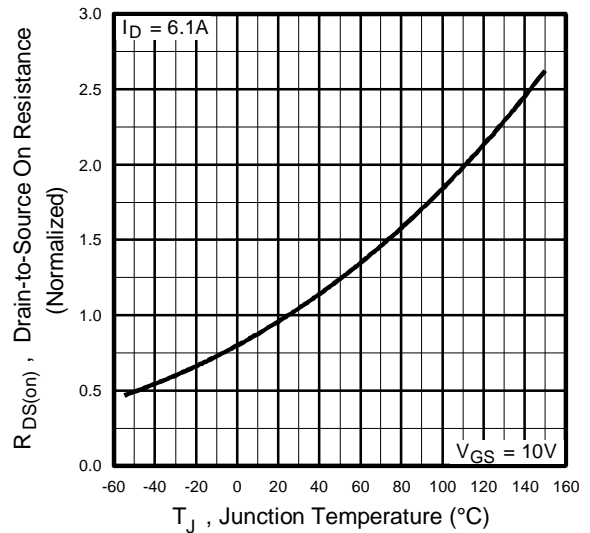


Fig 4. Normalized On-Resistance
Vs. Temperature

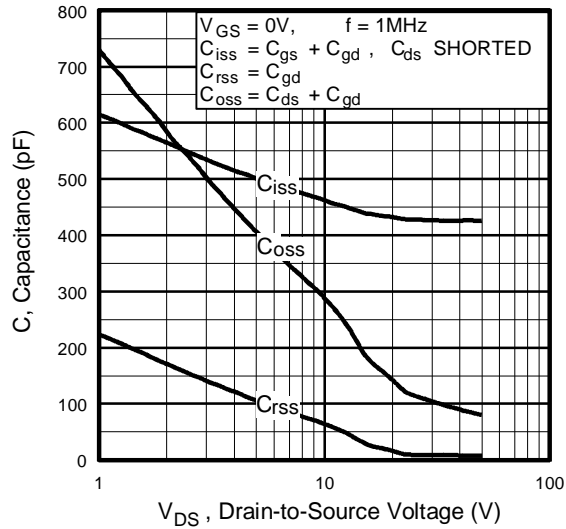


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

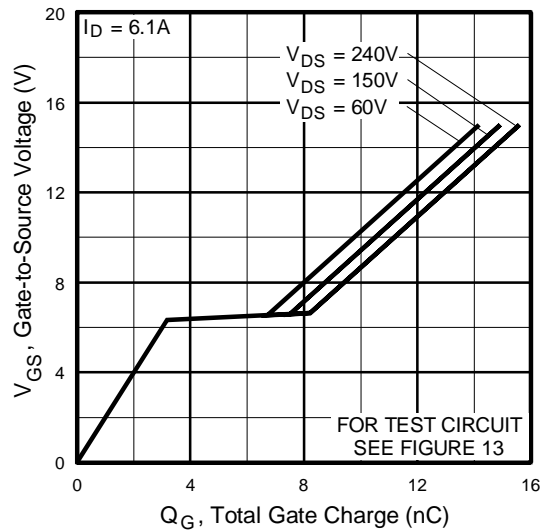


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

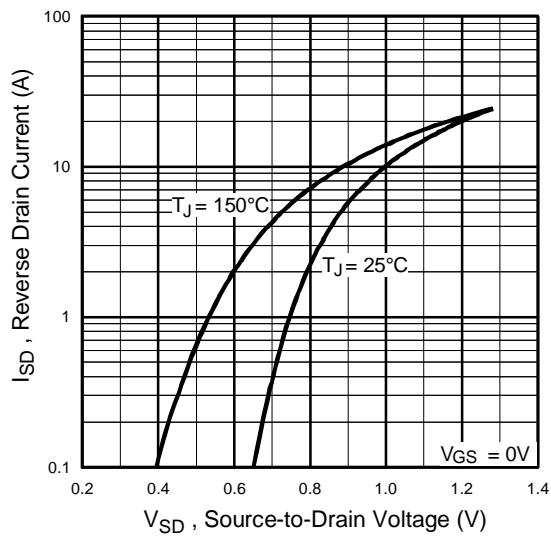


Fig 7. Typical Source-Drain Diode Forward Voltage

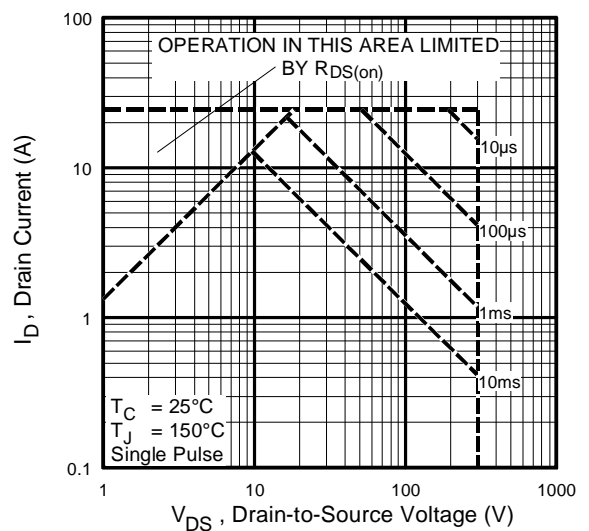


Fig 8. Maximum Safe Operating Area

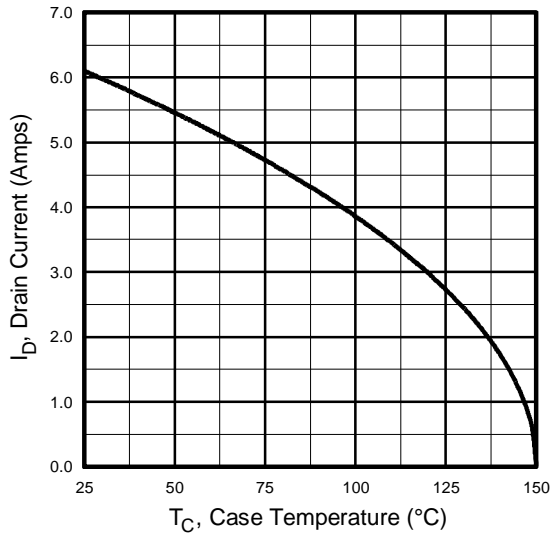


Fig 9. Maximum Drain Current Vs. Case Temperature

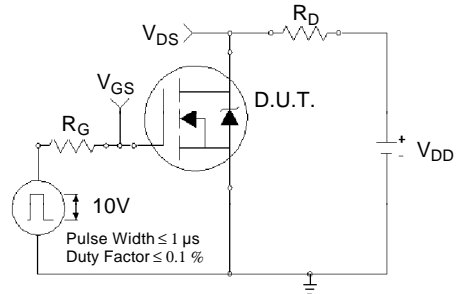


Fig 10a. Switching Time Test Circuit

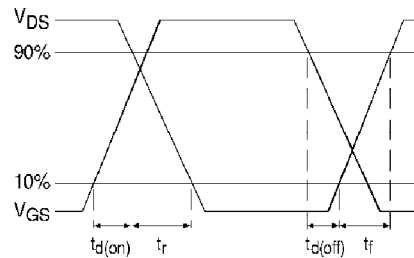


Fig 10b. Switching Time Waveforms

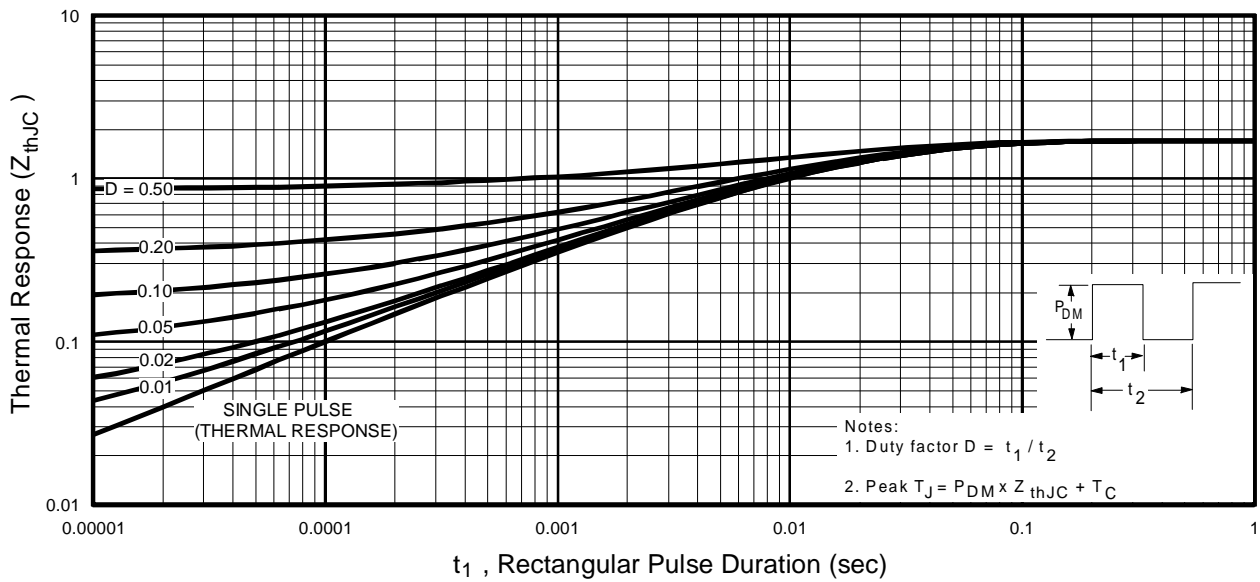


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

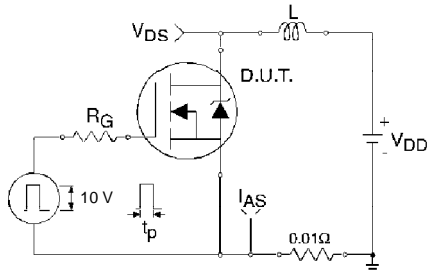


Fig 12a. Unclamped Inductive Test Circuit

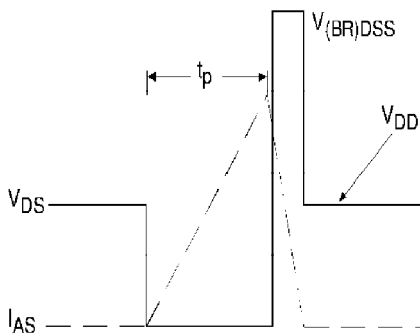


Fig 12b. Unclamped Inductive Waveforms

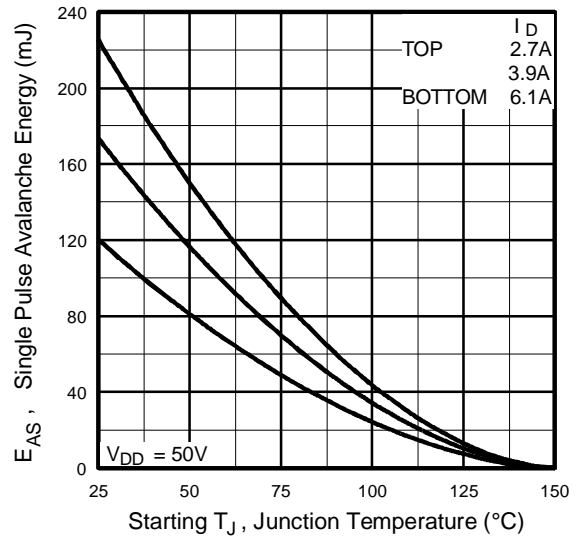


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

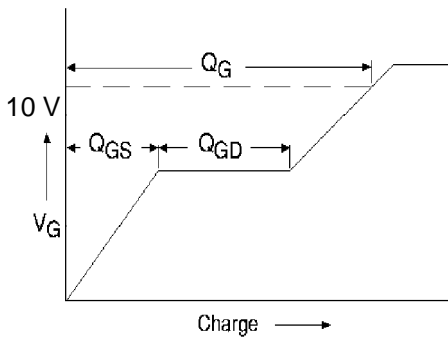


Fig 13a. Basic Gate Charge Waveform

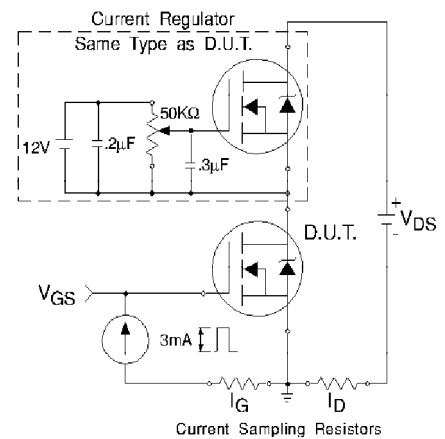
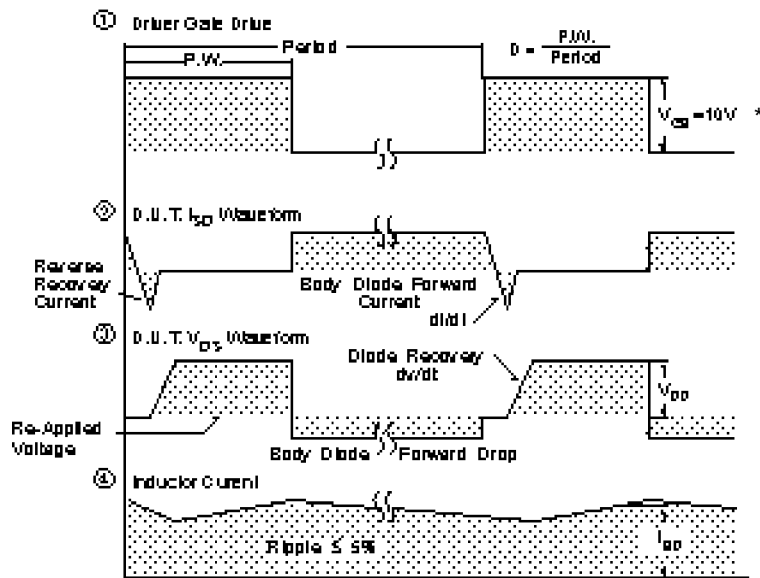
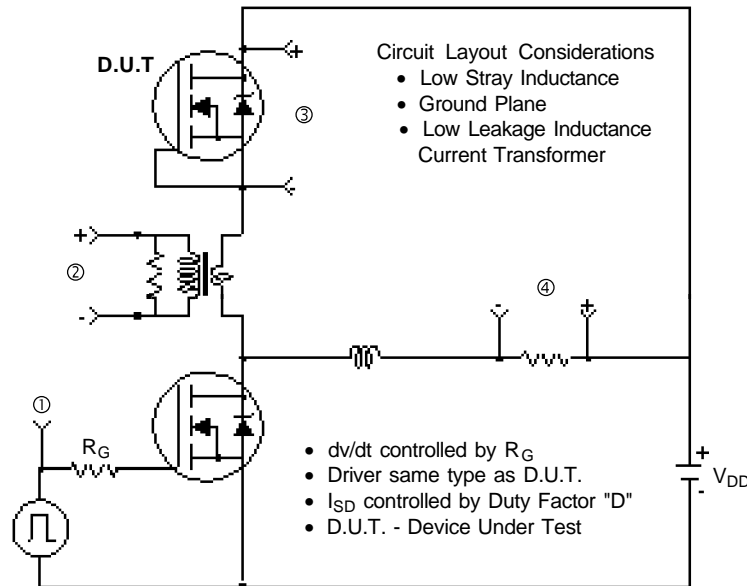


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

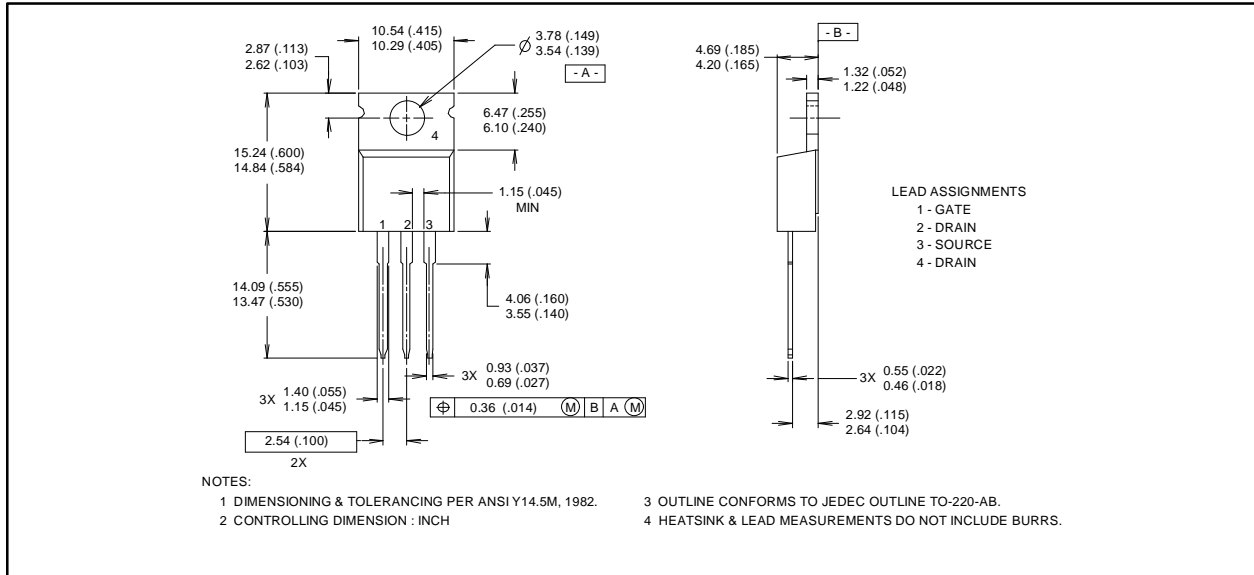
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Package Outline

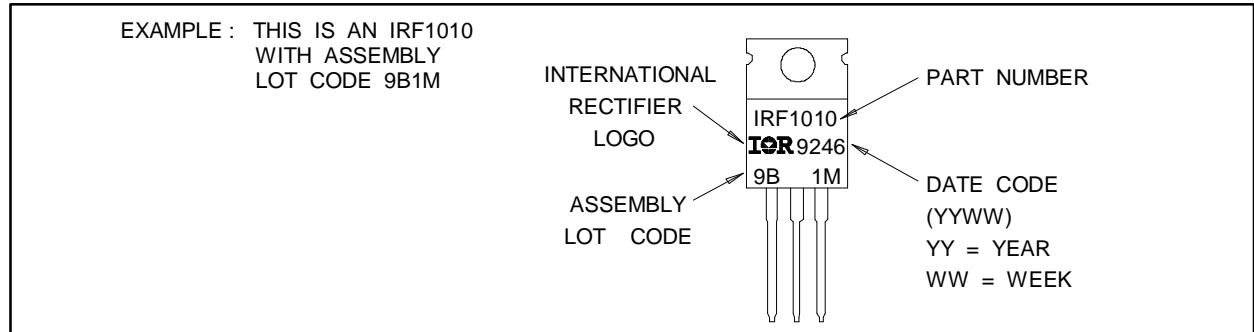
TO-220AB Outline

Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220AB



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IR CANADA: 7321 Victoria Park Ave., Suite 201, Markham, Ontario L3R 3L1, Tel: (905) 475 1897
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg Tel: 6172 37066
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: (39) 1145 10111
IR FAR EAST: K&H Bldg., 2F, 3-30-4 Nishi-Ikeburo 3-Chome, Toshima-Ki, Tokyo 171 Tel: (03)3983 0641
IR SOUTHEAST ASIA: 315 Outram Road, #10-02 Tan Boon Liat Building, Singapore 0316 Tel: 65 221 8371

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