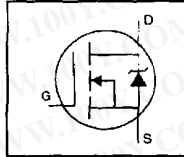


International Rectifier

IRF740LC

HEXFET® Power MOSFET

- Ultra Low Gate Charge
- Reduced Gate Drive Requirement;
- Enhanced 30V V_{GS} Rating
- Reduced C_{iss}, C_{oss}, C_{rss}
- Extremely High Frequency Operation
- Repetitive Avalanche Rated



$$V_{DSS} = 400V$$

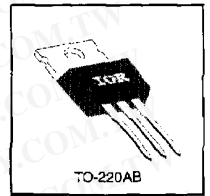
$$R_{DS(on)} = 0.55\Omega$$

$$I_D = 10A$$

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 characteristic of HEXFETs offer the designer a new standard in power transistors for switching applications.



Absolute Maximum Ratings

Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} = 10\text{V}$	10
I_{DM}	Continuous Drain Current, $V_{GS} = 10\text{V}$	6.3
I_{DM}	Pulsed Drain Current $\text{\textcircled{1}}$	32
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	125
	Linear Derating Factor	1.0
V_{GS}	Gate-to-Source Voltage	± 33
E_{AS}	Single Pulse Avalanche Energy $\text{\textcircled{2}}$	520
I_{AR}	Avalanche Current $\text{\textcircled{3}}$	10
E_{AR}	Repetitive Avalanche Energy $\text{\textcircled{3}}$	13
dv/dt	Peak Diode Recovery dv/dt $\text{\textcircled{3}}$	4.0
T_J	Operating Junction and Storage Temperature Range	-55 to +150
T_{STG}	Soldering Temperature, for 10 seconds	300 (1.6mm from case)
	Mounting Torque, 6-32 or M3 screw	10 lbf.in (1.1 N.m)

Thermal Resistance

Parameter	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	1.0	—
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.50	—	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient	—	—	62	—

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

Parameter	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{DS(BR)SS}$	Drain-to-Source Breakdown Voltage	400	—	—	V	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$
$\Delta V_{DS(BR)SS}/\Delta T$	Breakdown Voltage Temp. Coefficient	—	0.76	—	$^\circ\text{C}^{-1}$	Reference to 25°C , $I_D=1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.55	Ω	$V_{GS}=10\text{V}$, $I_D=6.0\text{A}$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$
g_{fs}	Forward Transconductance	3.0	—	—	S	$V_{DS}=50\text{V}$, $I_D=6.0\text{A}$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS}=400\text{V}$, $V_{GS}=0\text{V}$
		—	—	250	μA	$V_{DS}=320\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS}=20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS}=-20\text{V}$
Q_g	Total Gate Charge	—	—	39	nC	$I_D=10\text{A}$
Q_{GS}	Gate-to-Source Charge	—	—	10	nC	$V_{DS}=320\text{V}$
Q_{GD}	Gate-to-Drain ("Miller") Charge	—	—	19	nC	$V_{GS}=10\text{V}$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	11	—	ns	$V_{DS}=200\text{V}$
t_r	Rise Time	—	31	—	ns	$I_D=10\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	25	—	ns	$R_G=9.1\Omega$
t_f	Fall Time	—	20	—	ns	$R_D=20\Omega$ See Figure 10 ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—	nH	
C_{iss}	Input Capacitance	—	1100	—	pF	$V_{GS}=0\text{V}$
C_{oss}	Output Capacitance	—	190	—	pF	$V_{DS}=25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	18	—	pF	$f=1\text{MHz}$ See Figure 5

Source-Drain Ratings and Characteristics

Parameter	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	10	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	32	A	
V_{SD}	Diode Forward Voltage	—	—	2.0	V	$T_J=25^\circ\text{C}$, $I_S=10\text{A}$, $V_{GS}=0\text{V}$ ②
t_{rr}	Reverse Recovery Time	—	380	570	ns	$T_J=25^\circ\text{C}$, $I_F=10\text{A}$
Q_{rr}	Reverse Recovery Charge	—	2.8	4.2	μC	$di/dt=100\text{A}/\mu\text{s}$ 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 Figure 11)
- ② $I_{SDS} \leq 10\text{A}$, $di/dt \leq 120\text{A}/\mu\text{s}$, $V_{DS} \leq V_{DS(BR)SS}$, $T_J \leq 150^\circ\text{C}$
- ③ $V_{DS}=50\text{V}$, starting $T_J=25^\circ\text{C}$, $L=9.1\text{mH}$, $R_G=25\Omega$, $I_{AS}=10\text{A}$ (See Figure 12)
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.



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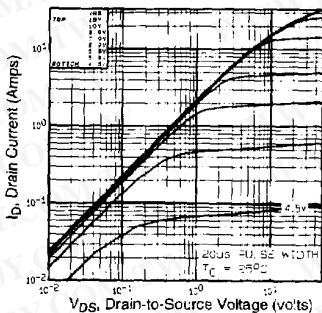


Fig 1. Typical Output Characteristics,
 $T_C=25^\circ\text{C}$

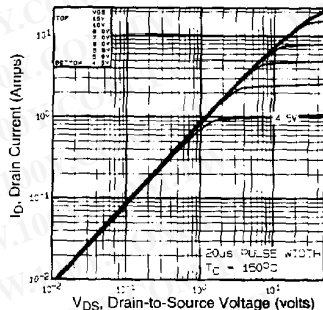


Fig 2. Typical Output Characteristics,
 $T_C=150^\circ\text{C}$

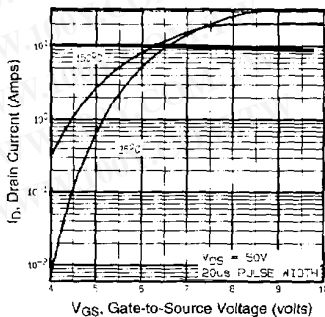


Fig 3. Typical Transfer Characteristics

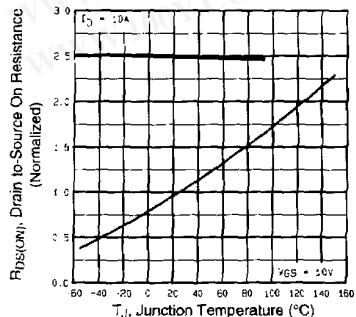


Fig 4. Normalized On-Resistance
Vs. Temperature

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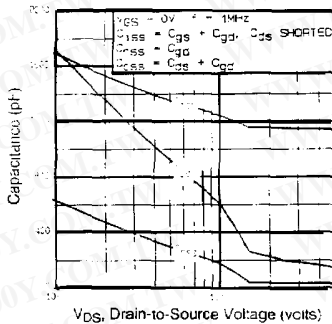


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

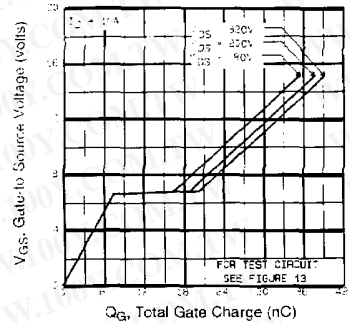


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

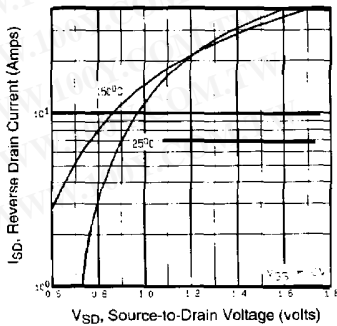


Fig 7. Typical Source-Drain Diode Forward Voltage

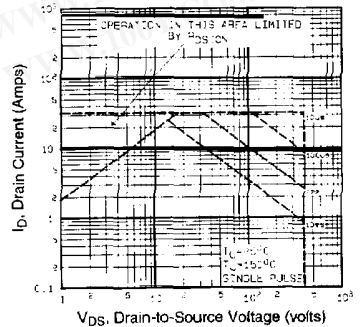


Fig 8. Maximum Safe Operating Area



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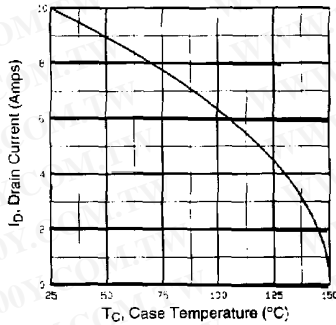


Fig 9. Maximum Drain Current Vs. Case Temperature

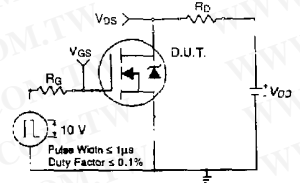


Fig 10a. Switching Time Test Circuit

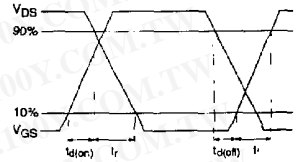


Fig 10b. Switching Time Waveforms

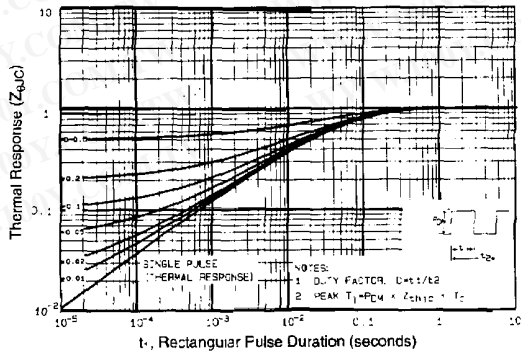


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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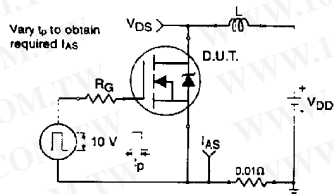


Fig 12a. Unclamped Inductive Test Circuit

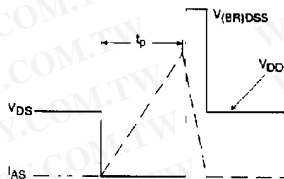


Fig 12b. Unclamped Inductive Waveforms

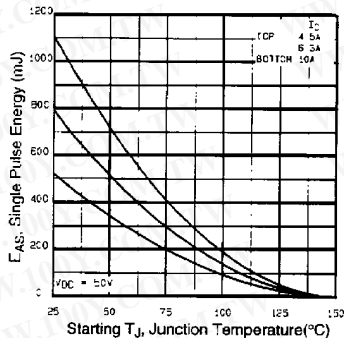


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

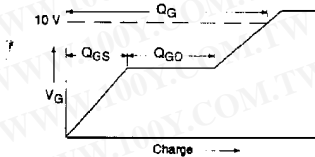


Fig 13a. Basic Gate Charge Waveform

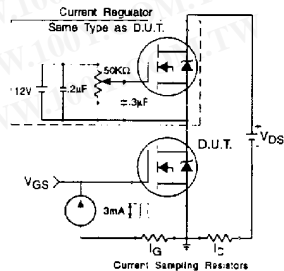


Fig 13b. Gate Charge Test Circuit

Appendix A: Figure 14, Peak Diode Recovery dv/dt Test Circuit

Appendix B: Package Outline Mechanical Drawing

Appendix C: Part Marking Information

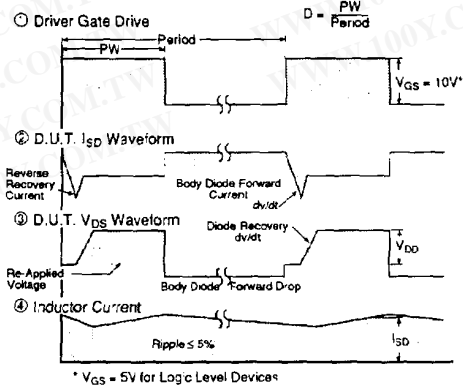
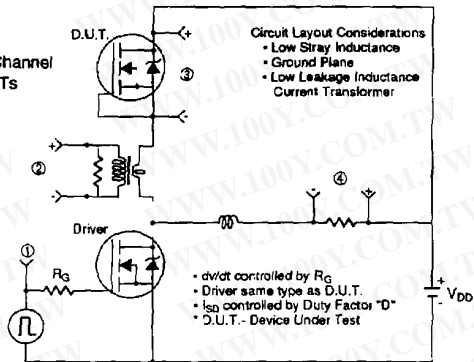


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Appendix A

Peak Diode Recovery dv/dt Test Circuit

Fig 14. For N-Channel HEXFETs



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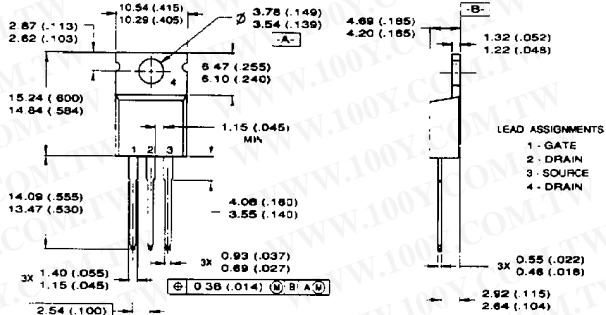
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Package Outline

TO-220AB Outline

Dimensions are shown in millimeters (inches)



LEAD ASSIGNMENTS

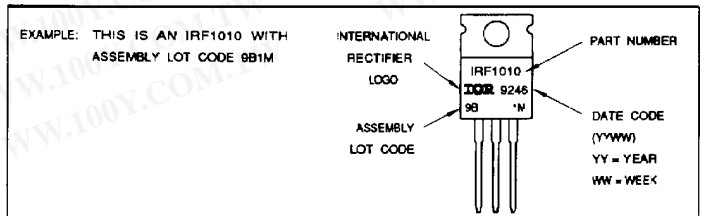
- 1 - GATE
- 2 - DRAIN
- 3 - SOURCE
- 4 - DRAIN

NOTES

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

Part Marking Information

TO-220AB



Printed or Signal recycled offset:
made from 50% recycled waste paper, including
10% de-inked, post-consumer waste.



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WORLD HEADQUARTERS: 233 Manassas St., El Segundo, California 90245 Tel: (310) 322-3331 Fax: 4720423
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