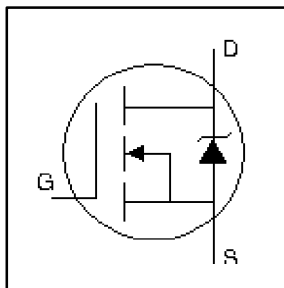


HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Logic-Level Gate Drive
- $R_{DS(on)}$ Specified at $V_{GS} = 4.5V$ & $10V$
- $175^{\circ}C$ Operating Temperature



$$V_{DSS} = 100V$$

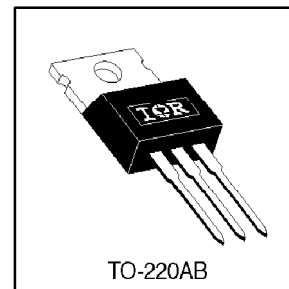
$$R_{DS(on)} = 0.040\Omega$$

$$I_D = 40A$$

Description

Fourth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible 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 device for use in a wide variety of application.

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} @ 5.0V	40	A
I_D @ $T_C = 100^{\circ}C$	Continuous Drain Current, V_{GS} @ 5.0V	29	
I_{DM}	Pulsed Drain Current ①	160	
P_D @ $T_C = 25^{\circ}C$	Power Dissipation	170	W
	Linear Derating Factor	1.1	W/ $^{\circ}C$
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	500	mJ
I_{AR}	Avalanche Current ①	24	A
E_{AR}	Repetitive Avalanche Energy ①	17	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.5	V/ns
T_J	Operating Junction and	-55 to + 175	$^{\circ}C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	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	—	—	0.90	$^{\circ}C/W$
$R_{\theta CS}$	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	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.11	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	—	—	0.040	Ω	$V_{GS} = 10V, I_D = 24A$ ④
		—	—	0.050		$V_{GS} = 4.5V, I_D = 20A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Transconductance	18	—	—	S	$V_{DS} = 50V, I_D = 24A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 100V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
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	—	—	160	nC	$I_D = 24A$
Q_{gs}	Gate-to-Source Charge	—	—	13		$V_{DS} = 80V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	45		$V_{GS} = 10V$, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	6.6	—	ns	$V_{DD} = 50V$
t_r	Rise Time	—	38	—		$I_D = 24A$
$t_{d(off)}$	Turn-Off Delay Time	—	140	—		$R_G = 5.0\Omega$
t_f	Fall Time	—	84	—		$R_D = 2.0\Omega$, 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	—	3200	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	610	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	140	—		$f = 1.0\text{MHz}$, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	40	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	160		
V_{SD}	Diode Forward Voltage	—	—	1.6	V	$T_J = 25^\circ\text{C}, I_S = 24A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	180	270	ns	$T_J = 25^\circ\text{C}, I_F = 24A$
Q_{rr}	Reverse Recovery Charge	—	0.98	1.5	μC	$di/dt = 100A/\mu\text{s}$ ③
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)

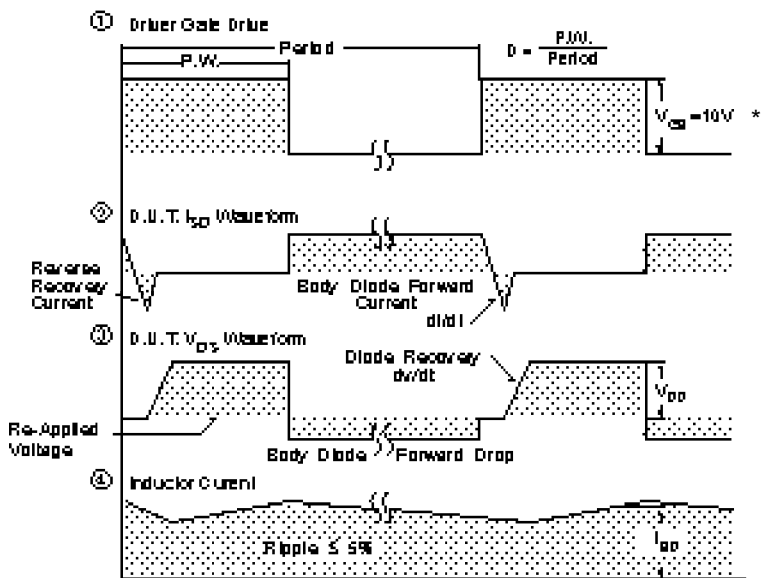
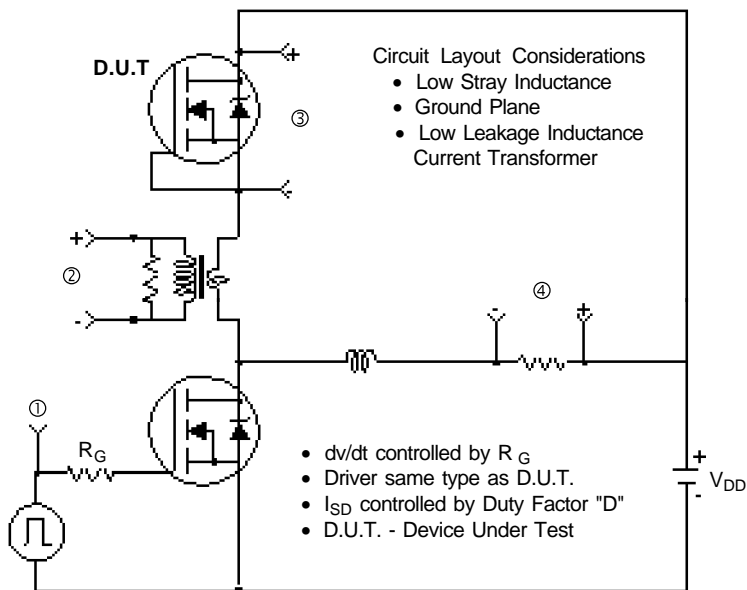
② $I_{SD} \leq 24A, di/dt \leq 170A/\mu\text{s}, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ\text{C}$

③ $V_{DD} = 25V$, starting $T_J = 25^\circ\text{C}, L = 540\mu\text{H}$
 $R_G = 25\Omega, I_{AS} = 24A$. (See Figure 12)

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



Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

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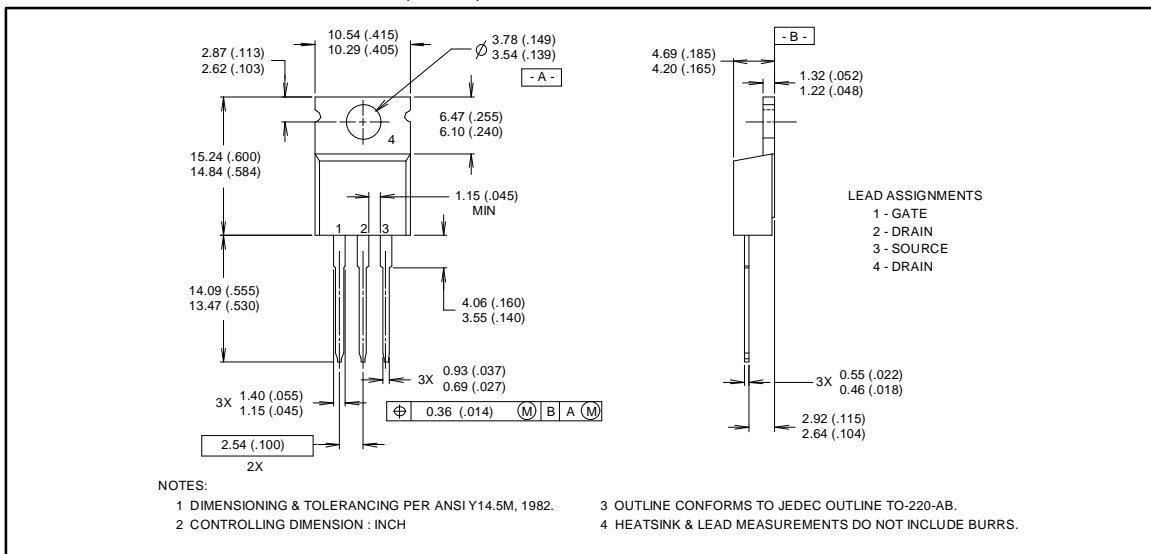
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Package Outline

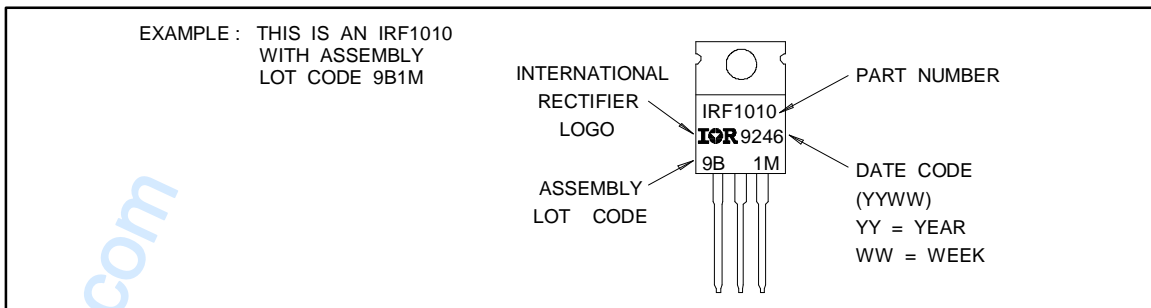
TO-220AB Outline

Dimensions are shown in millimeters (inches)



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, 0316 Tel: 65 221 8371

Data and specifications subject to change without notice.

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