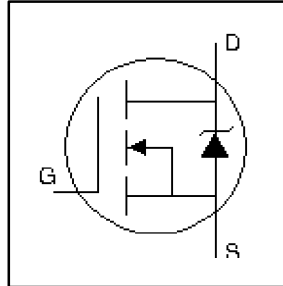


HEXFET® Power MOSFET

- 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

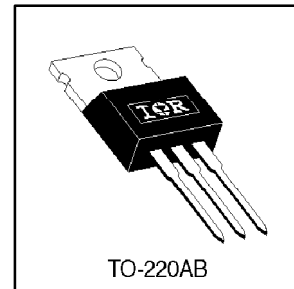


| |
|----------------------------|
| $V_{DSS} = 100V$ |
| $R_{DS(on)} = 0.040\Omega$ |
| $I_D = 40A$ |

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 | 300 (1.6mm from case) | |
| | Mounting torque, 6-32 or M3 screw. | 10 lbf•in (1.1N•m) | |

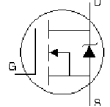
Thermal Resistance

| | Parameter | Min. | Typ. | Max. | Units |
|-----------------|-------------------------------------|------|------|------|---------------|
| $R_{\theta JC}$ | Junction-to-Case | — | — | 0.90 | $^{\circ}C/W$ |
| $R_{\theta CS}$ | Case-to-Sink, Flat, Greased Surface | — | 0.50 | — | |
| $R_{\theta JA}$ | Junction-to-Ambient | — | — | 62 | |

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/°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 |

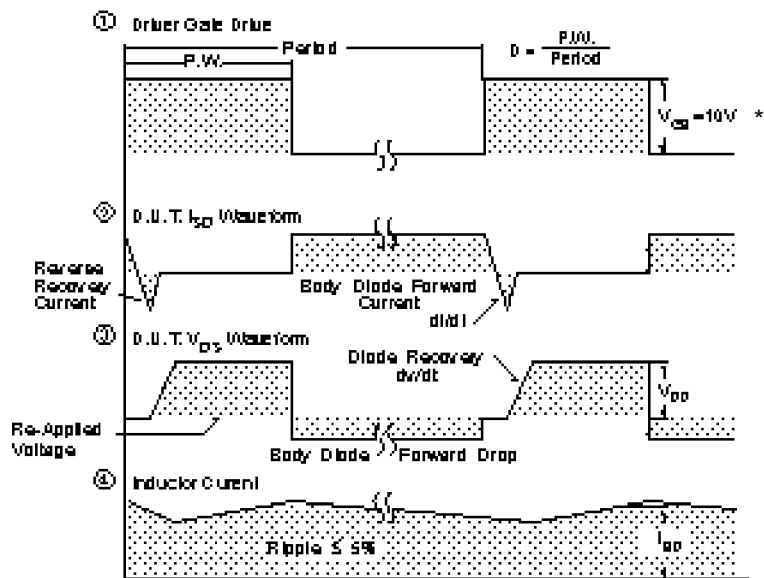
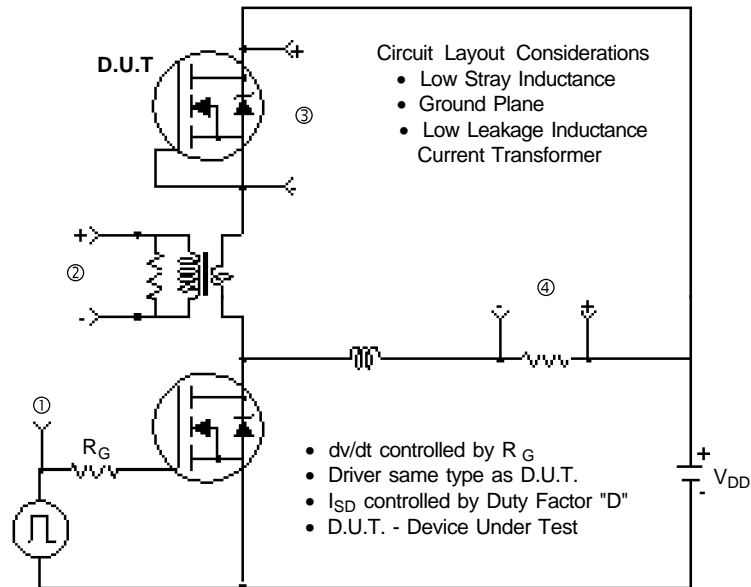
Source-Drain Ratings and Characteristics

| | 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 | $di/dt = 100A/\mu s$ 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 $V_{DD} = 25V$, starting $T_J = 25^\circ\text{C}$, $L = 540\mu H$, $R_G = 25\Omega$, $I_{AS} = 24A$. (See Figure 12)
- ③ $I_{SD} \leq 24A$, $di/dt \leq 170A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

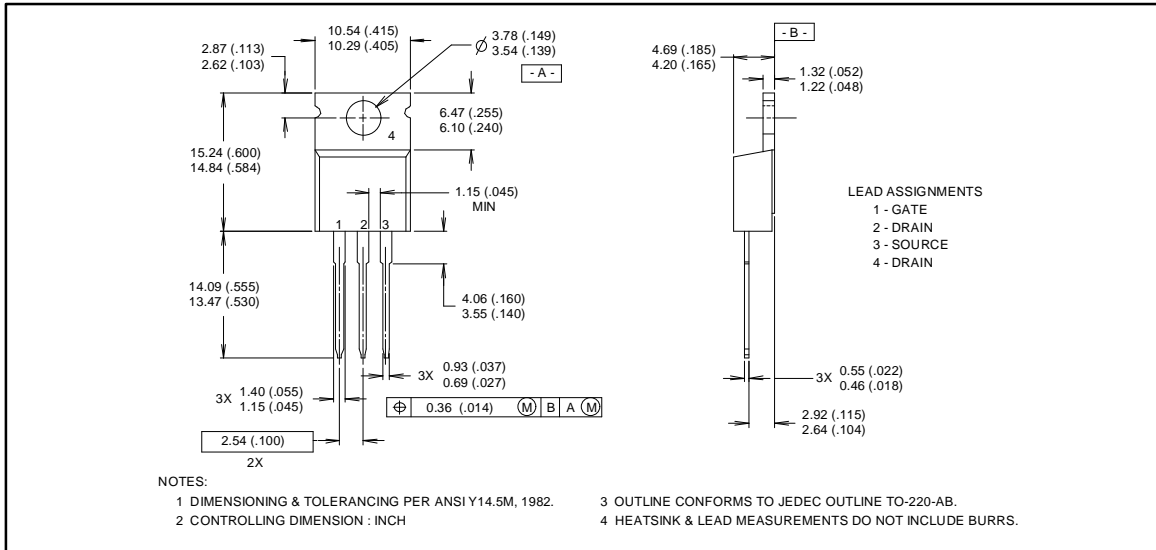
IRFL2310



Package Outline

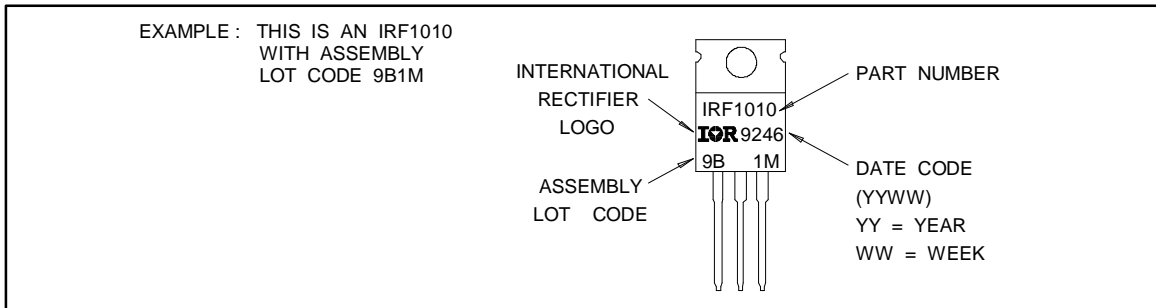
TO-220AB Outline

Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220AB



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EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: (44) 0883 713215
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.