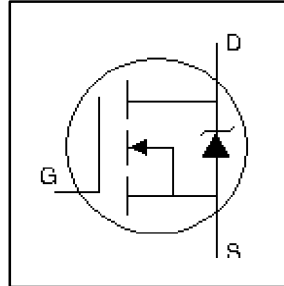


### HEXFET® Power MOSFET

- Isolated Package
- High Voltage Isolation = 2.5KVRMS⑤
- Sink to Lead Creepage Dist. 4.8mm
- Logic-Level Gate Drive
- $R_{DS(on)}$  Specified at  $V_{GS} = 4V$  &  $5V$
- Fast Switching
- Ease of paralleling



$$V_{DSS} = 200V$$

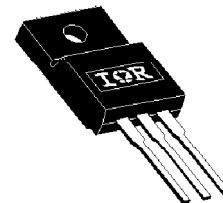
$$R_{DS(on)} = 0.80\Omega$$

$$I_D = 4.0A$$

### Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 Fullpak eliminates the need for additional insulating hardware in commercial-industrial applications. The moulding compound used provides a high isolation capability and a low thermal resistance between the tab and external heatsink. This isolation is equivalent to using a 100 micron mica barrier with standard TO-220 product. The Fullpak is mounted to a heatsink using a single clip or by a single screw fixing.



TO-220 FULLPAK

### Absolute Maximum Ratings

|                             | Parameter                                 | Max.                  | Units |
|-----------------------------|-------------------------------------------|-----------------------|-------|
| $I_D$ @ $T_C = 25^\circ C$  | Continuous Drain Current, $V_{GS}$ @ 5.0V | 4.0                   | A     |
| $I_D$ @ $T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 5.0V | 2.6                   |       |
| $I_{DM}$                    | Pulsed Drain Current ①                    | 16                    |       |
| $P_D$ @ $T_C = 25^\circ C$  | Power Dissipation                         | 30                    | W     |
|                             | Linear Derating Factor                    | 0.24                  | W/°C  |
| $V_{GS}$                    | Gate-to-Source Voltage                    | ±10                   | V     |
| $E_{AS}$                    | Single Pulse Avalanche Energy ②           | 62                    | mJ    |
| $I_{AR}$                    | Avalanche Current ③                       | 4.0                   | A     |
| $E_{AR}$                    | Repetitive Avalanche Energy ③             | 3.0                   | mJ    |
| $dv/dt$                     | Peak Diode Recovery $dv/dt$ ③             | 5.0                   | 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    | —    | —    | 4.1  | °C/W  |
| $R_{\theta JA}$ | Junction-to-Ambient | —    | —    | 65   |       |

# IRLI620G



## 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    | 200  | —    | —    | V                   | $V_{GS} = 0V, I_D = 250\mu A$                                               |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.27 | —    | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}, I_D = 1mA$                                  |
| $R_{DS(ON)}$                    | Static Drain-to-Source On-Resistance | —    | —    | 0.80 | $\Omega$            | $V_{GS} = 5.0V, I_D = 2.4A$ ④                                               |
|                                 |                                      | —    | —    | 1.0  |                     | $V_{GS} = 4.0V, I_D = 2.0A$ 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             | 1.2  | —    | —    | S                   | $V_{DS} = 50V, I_D = 3.1A$                                                  |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —    | 25   | $\mu A$             | $V_{DS} = 200V, V_{GS} = 0V$                                                |
|                                 |                                      | —    | —    | 250  |                     | $V_{DS} = 160V, V_{GS} = 0V, T_J = 125^\circ\text{C}$                       |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —    | 100  | nA                  | $V_{GS} = 10V$                                                              |
|                                 | Gate-to-Source Reverse Leakage       | —    | —    | -100 |                     | $V_{GS} = -10V$                                                             |
| $Q_g$                           | Total Gate Charge                    | —    | —    | 16   | nC                  | $I_D = 5.2A$                                                                |
| $Q_{gs}$                        | Gate-to-Source Charge                | —    | —    | 2.7  |                     | $V_{DS} = 160V$                                                             |
| $Q_{gd}$                        | Gate-to-Drain ("Miller") Charge      | —    | —    | 9.6  |                     | $V_{GS} = 10V$ , See Fig. 6 and 13 ④                                        |
| $t_{d(on)}$                     | Turn-On Delay Time                   | —    | 4.2  | —    | ns                  | $V_{DD} = 100V$                                                             |
| $t_r$                           | Rise Time                            | —    | 31   | —    |                     | $I_D = 5.2A$                                                                |
| $t_{d(off)}$                    | Turn-Off Delay Time                  | —    | 18   | —    |                     | $R_G = 9.0\Omega$                                                           |
| $t_f$                           | Fall Time                            | —    | 17   | —    |                     | $R_D = 20\Omega$ , See Fig. 10 ④                                            |
| $L_D$                           | Internal Drain Inductance            | —    | 4.5  | —    | nH                  | Between lead,<br>6mm (0.25in.)<br>from package<br>and center of die contact |
| $L_S$                           | Internal Source Inductance           | —    | 7.5  | —    |                     |                                                                             |
| $C_{iss}$                       | Input Capacitance                    | —    | 360  | —    | pF                  | $V_{GS} = 0V$                                                               |
| $C_{oss}$                       | Output Capacitance                   | —    | 91   | —    |                     | $V_{DS} = 25V$                                                              |
| $C_{rss}$                       | Reverse Transfer Capacitance         | —    | 27   | —    |                     | $f = 1.0MHz$ , See Fig. 5                                                   |



## Source-Drain Ratings and Characteristics

|          | Parameter                              | Min.                                                                        | Typ. | Max. | Units   | Conditions                                                     |
|----------|----------------------------------------|-----------------------------------------------------------------------------|------|------|---------|----------------------------------------------------------------|
| $I_S$    | Continuous Source Current (Body Diode) | —                                                                           | —    | 4.0  | A       | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —                                                                           | —    | 16   |         |                                                                |
| $V_{SD}$ | Diode Forward Voltage                  | —                                                                           | —    | 1.8  | V       | $T_J = 25^\circ\text{C}, I_S = 4.0A, V_{GS} = 0V$ ②            |
| $t_{rr}$ | Reverse Recovery Time                  | —                                                                           | 180  | 270  | ns      | $T_J = 25^\circ\text{C}, I_F = 5.2A$                           |
| $Q_{rr}$ | Reverse Recovery Charge                | —                                                                           | 1.1  | 1.7  | $\mu C$ | $di/dt = 100A/\mu s$ ③                                         |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |         |                                                                |

### Notes:

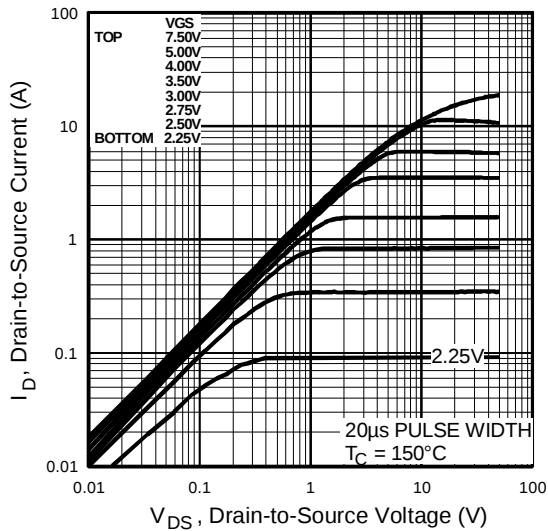
① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )

③  $I_{SD} \leq 5.2A, di/dt \leq 95A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$

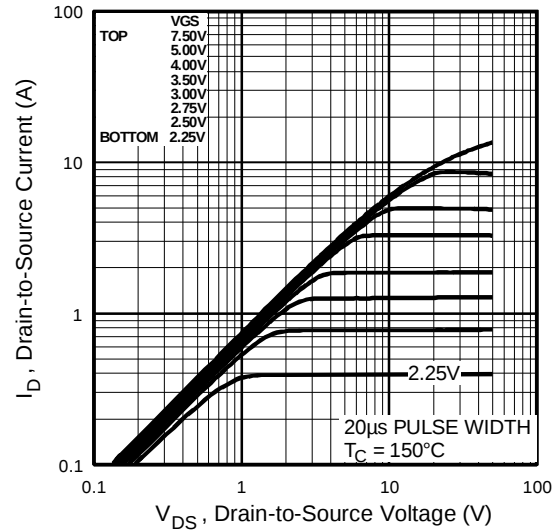
⑤  $t = 60s, f = 60Hz$

②  $V_{DD} = 25V$ , starting  $T_J = 25^\circ\text{C}, L = 5.8mH$   
 $R_G = 25\Omega, I_{AS} = 4.0A$ . (See Figure 12)

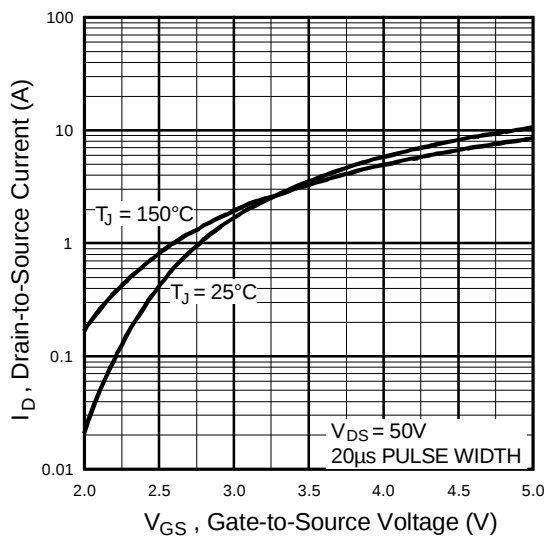
④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .



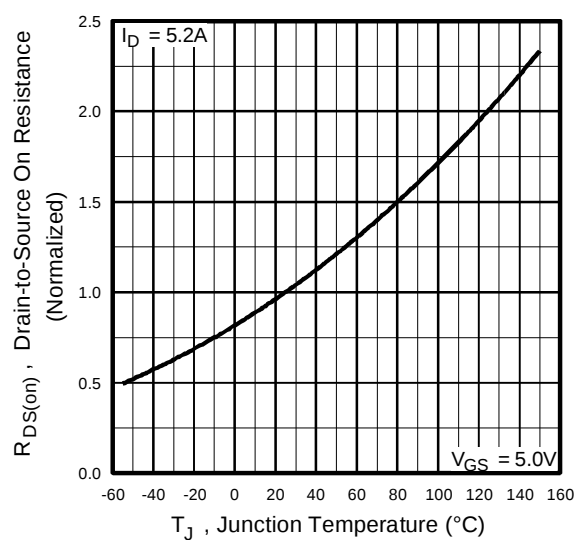
**Fig 1.** Typical Output Characteristics,  
 $T_C = 25^\circ\text{C}$



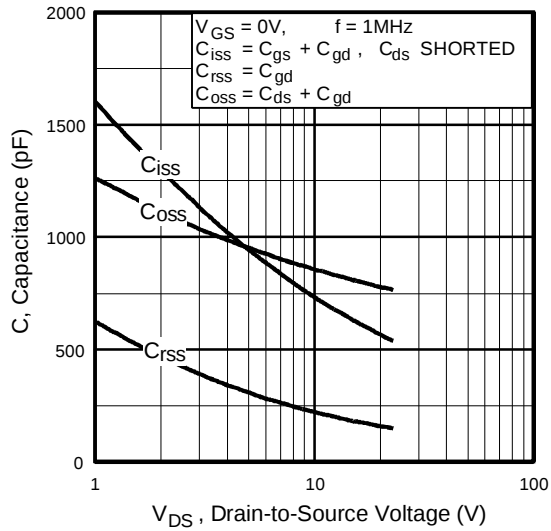
**Fig 2.** Typical Output Characteristics,  
 $T_C = 150^\circ\text{C}$



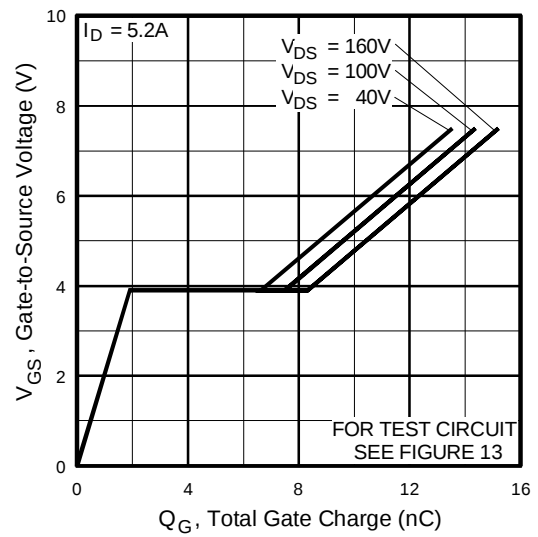
**Fig 3.** Typical Transfer Characteristics



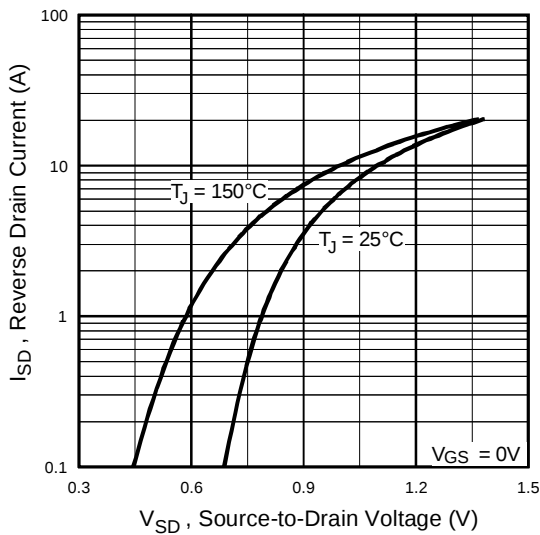
**Fig 4.** Normalized On-Resistance  
Vs. Temperature



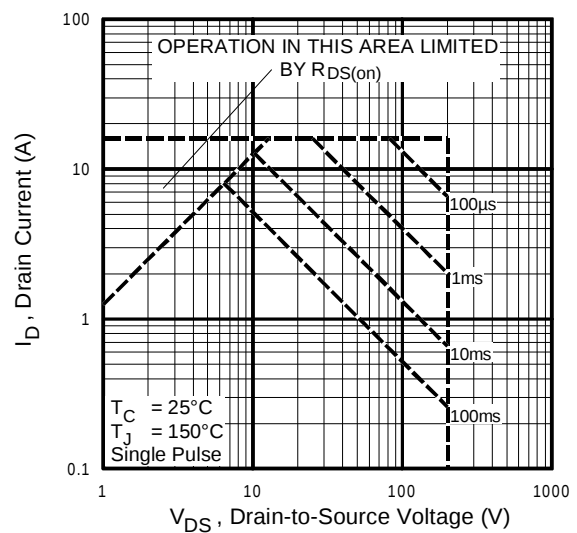
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



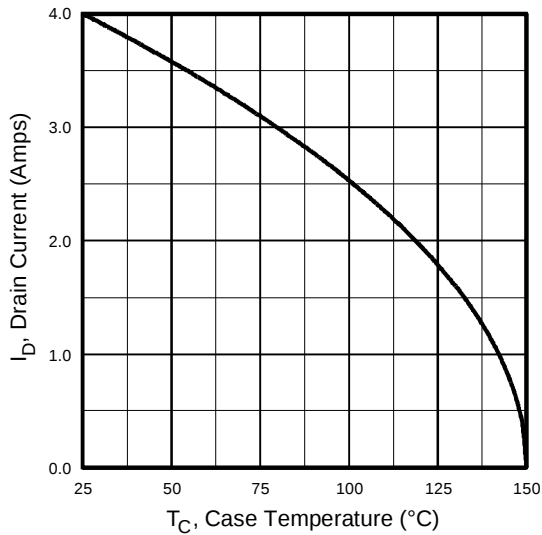
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



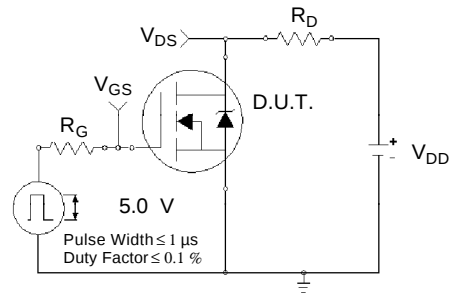
**Fig 7.** Typical Source-Drain Diode Forward Voltage



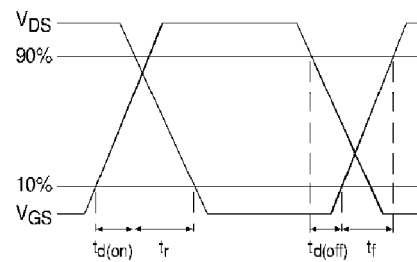
**Fig 8.** Maximum Safe Operating Area



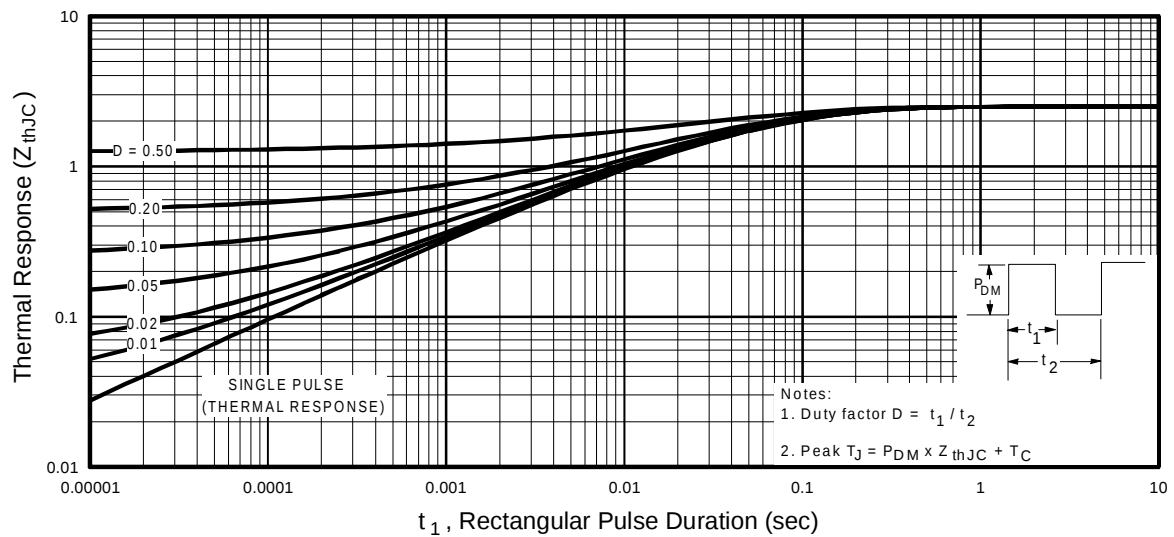
**Fig 9.** Maximum Drain Current Vs. Case Temperature



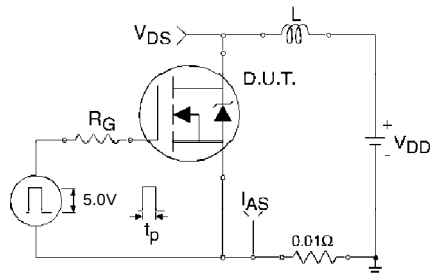
**Fig 10a.** Switching Time Test Circuit



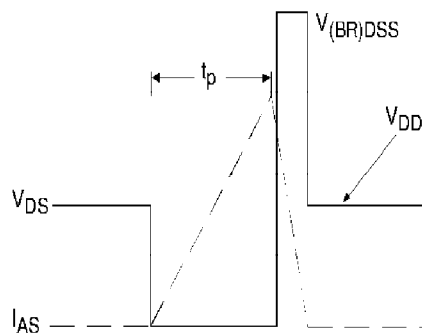
**Fig 10b.** Switching Time Waveforms



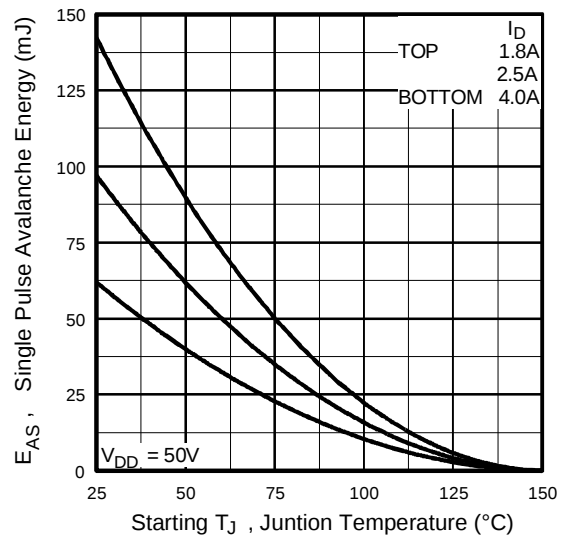
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case



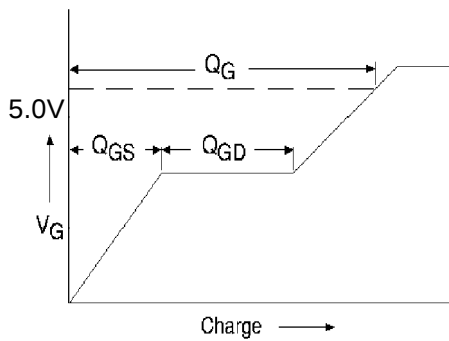
**Fig 12a.** Unclamped Inductive Test Circuit



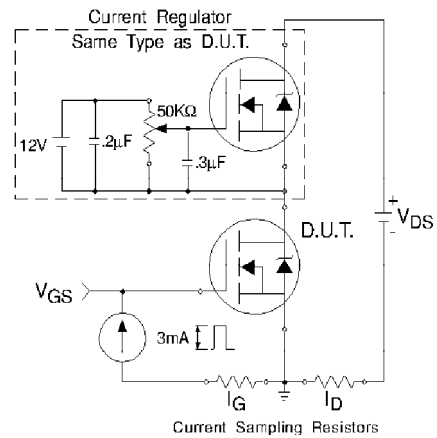
**Fig 12b.** Unclamped Inductive Waveforms



**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current

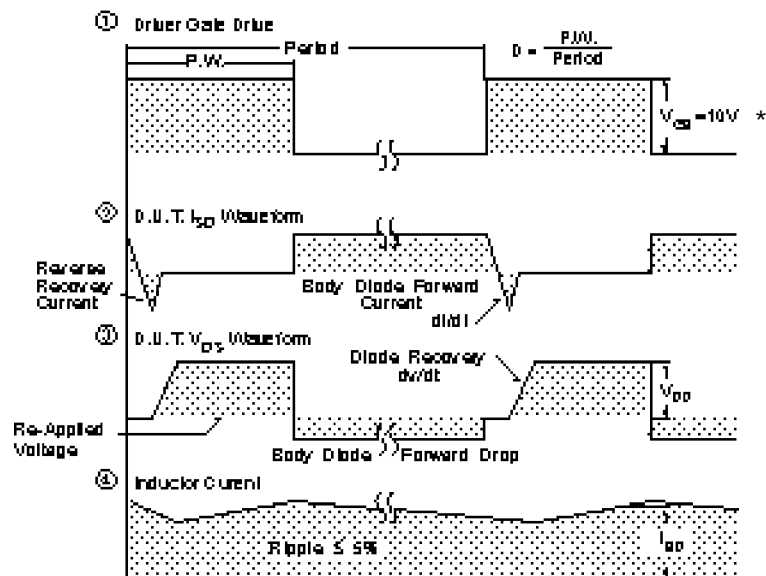
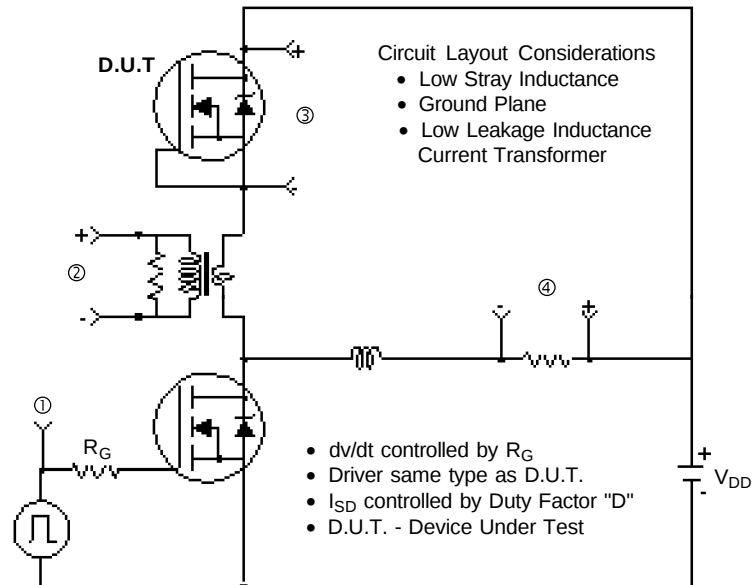


**Fig 13a.** Basic Gate Charge Waveform



**Fig 13b.** Gate Charge Test Circuit

## Peak Diode Recovery dv/dt Test Circuit



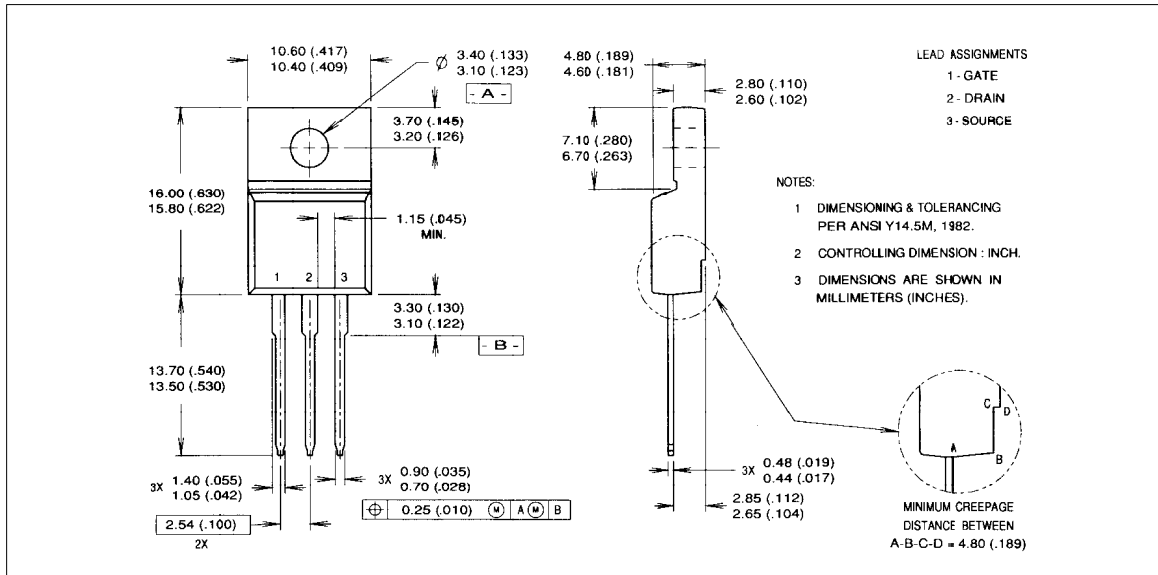
\*  $V_{GS} = 5V$  for Logic Level Devices

**Fig 14. For N-Channel HEXFETS**

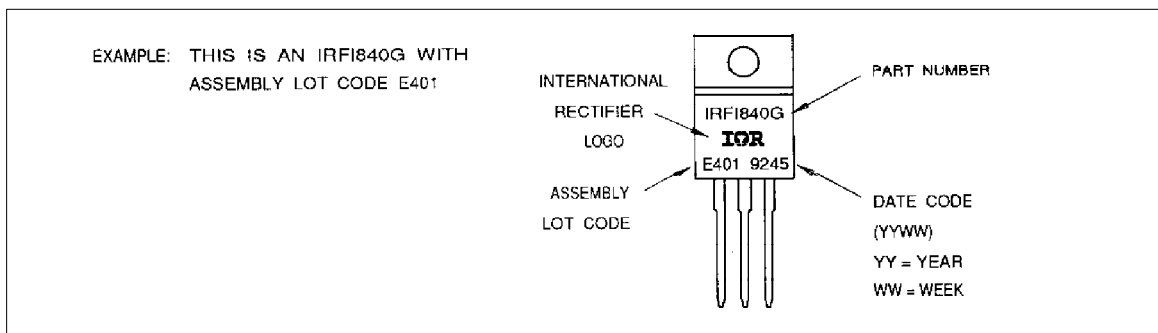
# IRLI620G



## Package Outline TO-220 Full-Pak



## Part Marking Information TO-220 Full-Pak



**International Rectifier**

**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331  
**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.*