

**International**  
**IOR Rectifier**
**IRFK6H450, IRFK6J450**
**Isolated Base Power HEX-pak™ Assembly - Parallel Chip Configuration**

- High Current Capability.
- UL recognised E78996.
- Electrically Isolated Base Plate.
- Easy Assembly into Equipment.

**Description**

The HEX-pak™ utilises the well-proven HEXFET™ die, combining low on-state resistance with high transconductance. These superior technology die are assembled by state of the art techniques into the TO-240 package, featuring 2.5kV rms isolation and solid M5 screw connections. The small footprint means the package is highly suited to power applications where space is a premium. Available in two versions, IRFK.H... for fast switching and IRFK.J... for oscillation sensitive applications.

$$V_{DS} = 500V$$

$$R_{DS(on)} = 67m\Omega$$

$$I_D = 66A$$

**Absolute Maximum Rating**

|                           | Parameter                                 | Max.       | Units      |
|---------------------------|---|------------|------------|
| $I_D$ @ $T_C=25^\circ C$  | Continuous Drain Current                  | 66         | A          |
| $I_D$ @ $T_C=100^\circ C$ | Continuous Drain Current                  | 42         | A          |
| $I_{DM}$                  | Pulse Drain Current                       | 264        | A ①        |
| $P_D$ @ $T_C=25^\circ C$  | Maximum Power Dissipation                 | 625        | W          |
| $V_{GS}$                  | Gate-to-Source Voltage                    | 20         | V          |
| $V_{INS}$                 | R.M.S. Isolation Voltage, circuit to base | 2.5        | kV         |
| $T_J$                     | Operating Junction Temperature Range      | -40 to 150 | $^\circ C$ |
| $T_{STG}$                 | Storage Temperature Range                 | -40 to 150 | $^\circ C$ |

**Thermal and Mechanical Specifications**

|            | Parameter                              | Min. | Typ. | Max. | Units |
|------------|--|------|------|------|-------|
| $R_{thJC}$ | Junction-to-Case                       | -    | -    | 0.20 | K/W ② |
| $R_{thCS}$ | Case-to-Sink, smooth & greased surface | -    | 0.1  | -    | K/W   |
| $T$        | Mounting Torque +10%                   |      |      |      | ③     |
|            | HEXpak to Heatsink                     | -    | 5    | -    | Nm    |
|            | Busbar to HEXpak                       | -    | 3    | -    | Nm    |
| wt         | Approximate Weight                     | -    | 140  | -    | g     |
|            |  | -    | 5    | -    | oz    |

**Notes:**

- ① - Repetitive Rating: Pulse width limited by maximum junction temperature see figure 8.
- ② - Per Module.
- ③ - A mounting compound is recommended and the torque should be rechecked after a period of three hours to allow for the spread of the compound.

# IRFK6H450, IRFK6J450



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

|              | Parameter                                  | Min.      | Typ. | Max. | Units      | Test Conditions   |
|--------------|--|-----------|------|------|------------|---|
| $B_{VDS}$    | Drain-to-Source Breakdown voltage          | 500       | -    | -    | V          | $V_{GS}=0V, I_D=1.0mA$  |
| $R_{DS(on)}$ | Static Drain-to-Source On-State Resistance | -         | 50   | 67   | m $\Omega$ | $V_{GS}=10V, I_D=42A$   |
| $I_{D(on)}$  | On-State Drain Current                     | 66        | -    | -    | A          | $V_{DS} > I_{D(on)} \times R_{DS(on)}^{max}, V_{GS}=10V$              |
| $V_{GS(th)}$ | Gate Threshold Voltage                     | 2.0       | -    | 4.0  | V          | $V_{DS}=V_{GS}, I_D=1.5mA$  |
| $g_{fs}$     | Forward Transconductance ④                 | 48        | 72   | -    | S          | $V_{DS} > 50V, I_D=42A$   |
| $I_{DSS}$    | Zero Gate Voltage Drain Current            | -         | -    | 1.5  | mA         | $V_{DS}=V_{DS}^{max}, V_{GS}=0V$                                      |
|              |  | -         | -    | 6.0  | mA         | $V_{GS}=10V, T_C=125^{\circ}\text{C}, V_{DS}=V_{DS}^{max} \times 0.8$ |
| $I_{GSS}$    | Gate-to-Source Leakage Forward             | -         | -    | 600  | nA         | $V_{GS}=20V$  |
| $I_{GSS}$    | Gate-to-Source Leakage Reverse             | -         | -    | -600 | nA         | $V_{GS}=-20V$   |
| $Q_g$        | Total Gate Charge                          | -         | 800  | 880  | nC         | $I_D=66A, V_{GS}=10V,$  |
| $Q_{gs}$     | Gate-to-Source Charge                      | -         | 70   | 105  | nC         | $V_{DS}=V_{DS}^{max} \times 0.8$                                      |
| $Q_{gd}$     | Gate-to-Drain ("Miller") Charge            | -         | 260  | 400  | nC         |   |
| $t_{d(on)}$  | Turn-on Delay Time                         | IRFK6H450 | -    | 55   | ns         | $V_{DD}=210V, I_D=42A,$   |
|              |  | IRFK6J450 | -    | 65   | ns         |   |
| $t_r$        | Rise Time                                  | IRFK6H450 | -    | 55   | ns         | $V_{GS}=10V,$   |
|              |  | IRFK6J450 | -    | 70   | ns         |   |
| $t_{d(off)}$ | Turn-off Delay Time                        | IRFK6H450 | -    | 330  | ns         | $R_{SOURCE}=3.3\Omega$  |
|              |  | IRFK6J450 | -    | 440  | ns         |   |
| $t_f$        | Fall Time                                  | IRFK6H450 | -    | 70   | ns         |   |
|              |  | IRFK6J450 | -    | 110  | ns         |   |
| $L_{DS}$     | Drain-to-Source Inductance                 | -         | 18   | -    | nH         |   |
| $C_{iss}$    | Input Capacitance                          | -         | 8.0  | -    | nF         | $V_{GS}=0V, V_{DS}=25V,$  |
| $C_{oss}$    | Output Capacitance                         | -         | 2.0  | -    | nF         | $f=1.0MHz$  |
| $C_{rss}$    | Reverse Transfer Capacitance               | -         | 0.8  | -    | nF         |   |
|              | Linear Derating Factor                     | -         | -    | 5    | W/K        |   |

## Source-Drain Diode Ratings and Characteristics

|          | Parameter                              | Min. | Typ. | Max. | Units         | Test Conditions                              |
|----------|--|------|------|------|---------------|--|
| $I_S$    | Continuous Source Current (Body Diode) | -    | -    | 66   | A             |  |
| $I_{SM}$ | Pulsed Source Current (Body Diode)     | -    | -    | 230  | A             |  |
| $V_{SD}$ | Diode Forward Voltage                  | -    | -    | 1.4  | V             | $V_{GS}=0V, I_S=66A, T_C=25^{\circ}\text{C}$ |
| $t_{rr}$ | Reverse Recovery Time                  | 280  | 580  | 1200 | ns            | $di/dt=400A/\mu s, T_J=150^{\circ}\text{C}$  |
| $Q_{rr}$ | Reverse Recovered Charge               | 19.0 | 42.0 | 90.0 | $\mu\text{C}$ | $I_S=66A$                                    |

### Notes:

④ - Pulse Width  $\leq 300\mu s$ ; Duty cycle  $\leq 2\%$ .

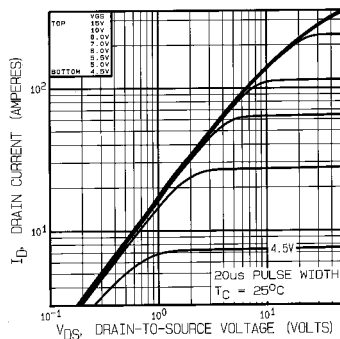


Fig 1. Typical Output Characteristics,  
 $T_C = 25^\circ\text{C}$

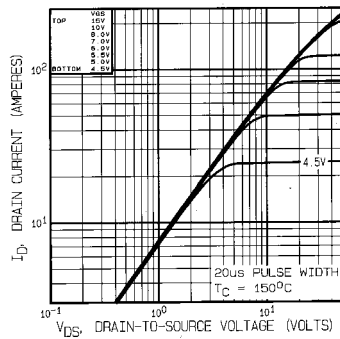


Fig 2. Typical Output Characteristics,  
 $T_C = 150^\circ\text{C}$

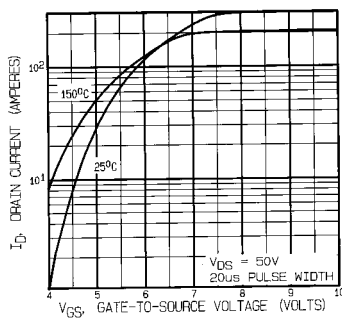


Fig 3. Typical Transfer Characteristics

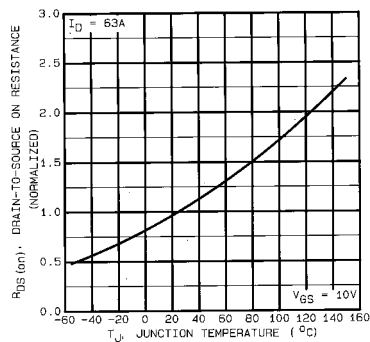


Fig 4. Normalized On-Resistance Vs.  
Temperature

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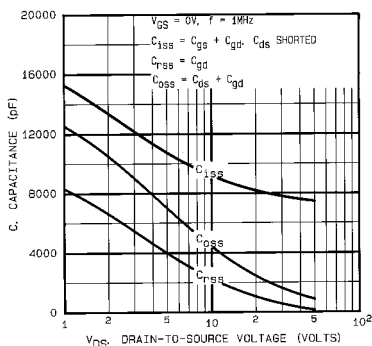


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

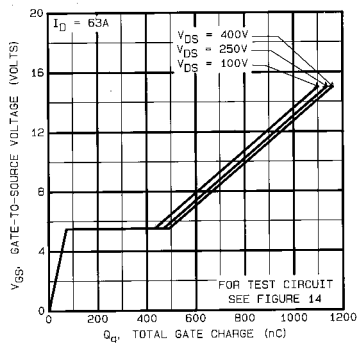


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

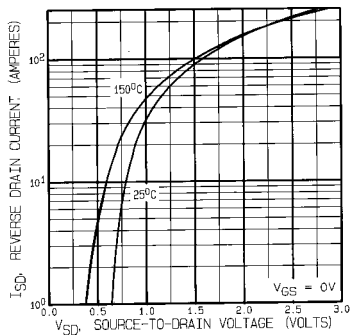


Fig 7. Typical Source-Drain Diode Forward Voltage

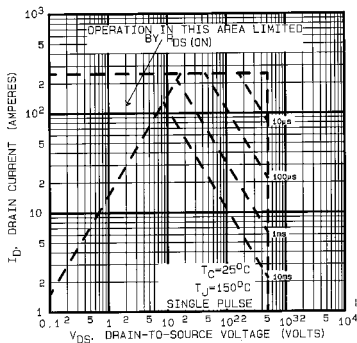


Fig 8. Maximum Safe Operating Area



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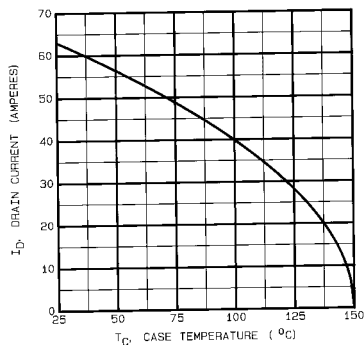


Fig 9. Maximum Drain Current Vs. Case Temperature

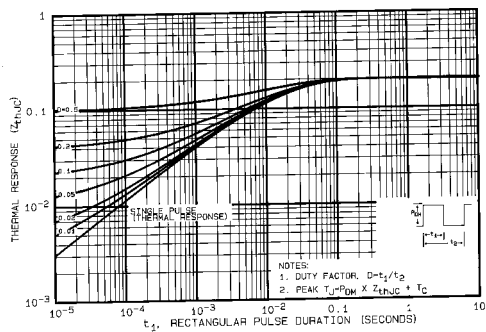


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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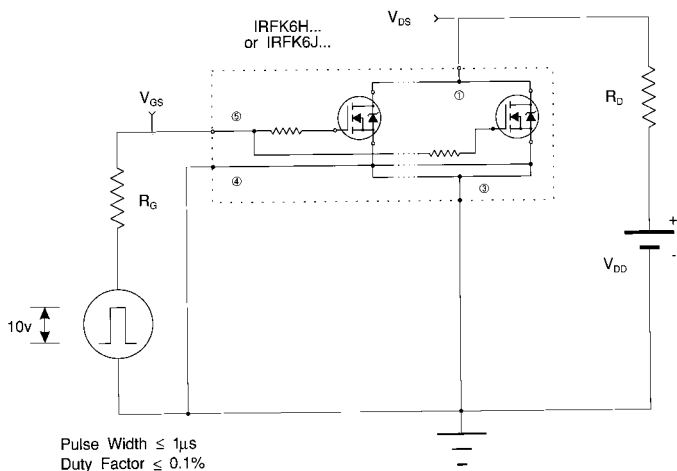


Fig 11a. Switching Time Test Circuit

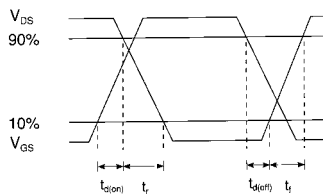
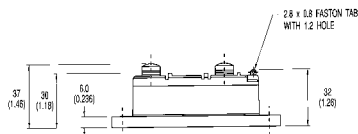
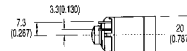
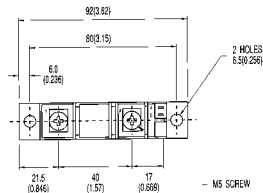
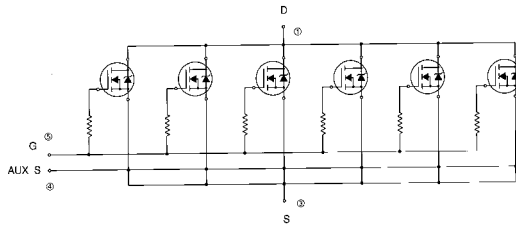


Fig 11b. Switching Time Waveforms



## IRFK6H450, IRFK6J450

### Circuit Configuration and Outline



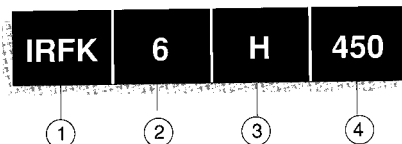
NOTE:  
DEVICE IS SUPPLIED WITH  
AUXILIARY LEADS 200(7.87) LONG

All dimensions in millimetres (inches)

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## Part Numbering



1. - HEX-pak Module.
2. - Number of HEXFETs in parallel.
3. - H - Fast switching.  
- J - Oscillation resistant for sensitive applications.
4. - Voltage code:-  
054 - 60V  
150 - 100V  
250 - 200V  
350 - 400V  
450 - 500V  
C50 - 600V

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MJW/192