

International IOR Rectifier IRFK4H350,IRFK4J350

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.

$$V_{DS} = 400V$$

$$R_{DS(on)} = 75m\Omega$$

$$I_D = 50A$$

Absolute Maximum Rating

| | Parameter | Max. | Units |
|-------------------------|---|------------|-------|
| $I_D @ T_C=25^\circ C$ | Continuous Drain Current | 50 | A |
| $I_D @ T_C=100^\circ C$ | Continuous Drain Current | 32 | A |
| I_{DM} | Pulse Drain Current | 200 | A ① |
| $P_D @ T_C=25^\circ C$ | Maximum Power Dissipation | 500 | 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 | °C |
| T_{STG} | Storage Temperature Range | -40 to 150 | °C |

Thermal and Mechanical Specifications

| | Parameter | Min. | Typ. | Max. | Units |
|------------|--|------|------|------|-------|
| R_{thJC} | Junction-to-Case | - | - | 0.25 | 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.

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

| Parameter | Parameter | Min. | Typ. | Max. | Units | Test Conditions | |
|--------------|--|-----------|------|------|------------|--|--|
| B_{VDSS} | Drain-to-Source Breakdown voltage | 400 | - | - | V | $V_{GS}=0V, I_D=1.0mA$ | |
| $R_{DS(on)}$ | Static Drain-to-Source On-State Resistance | - | 63 | 75 | m Ω | $V_{GS}=10V, I_D=16A$ | |
| $I_{D(on)}$ | On-State Drain Current | 50 | - | - | 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 | $V_{DS}=V_{GS}, I_D=1.0mA$ | |
| g_{fs} | Forward Transconductance ④ | 32 | 50 | - | S | $V_{DS} > 50V, I_D=32A$ | |
| I_{DSS} | Zero Gate Voltage Drain Current | - | - | 1.0 | mA | $V_{DS}=V_{DSmax}, V_{GS}=0V$ | |
| | | - | - | 4.0 | mA | $V_{GS}=10V, T_C=125^\circ\text{C}, V_{DS}=V_{DSmax} \times 0.8$ | |
| I_{GSS} | Gate-to-Source Leakage Forward | - | - | 400 | nA | $V_{GS}=20V$ | |
| I_{GSS} | Gate-to-Source Leakage Reverse | - | - | -400 | nA | $V_{GS}=-20V$ | |
| Q_g | Total Gate Charge | - | 400 | 550 | nC | $I_D=50A, V_{GS}=10V, V_{DS}=V_{DSmax} \times 0.8$ | |
| Q_{gs} | Gate-to-Source Charge | - | 60 | 80 | nC | | |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | - | 175 | 250 | nC | | |
| $t_{d(on)}$ | Turn-on Delay Time | IRFK4H350 | - | 50 | - | ns | $V_{DD}=180V, I_D=32A, V_{GS}=10V, R_{SOURCE}=3.3\Omega$ |
| | | IRFK4J350 | - | 60 | - | ns | |
| t_r | Rise Time | IRFK4H350 | - | 55 | - | ns | |
| | | IRFK4J350 | - | 70 | - | ns | |
| $t_{d(off)}$ | Turn-off Delay Time | IRFK4H350 | - | 230 | - | ns | |
| | | IRFK4J350 | - | 300 | - | ns | |
| t_f | Fall Time | IRFK4H350 | - | 50 | - | ns | |
| | | IRFK4J350 | - | 70 | - | ns | |
| L_{DS} | Drain-to-Source Inductance | - | 18 | - | nH | | |
| C_{iss} | Input Capacitance | - | 17.5 | - | nF | $V_{GS}=0V, V_{DS}=25V, f=1.0MHz$ | |
| C_{oss} | Output Capacitance | - | 11.2 | - | nF | | |
| C_{rss} | Reverse Transfer Capacitance | - | 8.0 | - | nF | | |
| | Linear Derating Factor | - | - | 4 | W/K | | |

Source-Drain Diode Ratings and Characteristics

| Parameter | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|-----------|--|------|------|------|---------------|--|
| I_S | Continuous Source Current (Body Diode) | - | - | 50 | A | |
| I_{SM} | Pulsed Source Current (Body Diode) | - | - | 190 | A | |
| V_{SD} | Diode Forward Voltage | - | - | 1.6 | V | $V_{GS}=0V, I_S=50A, T_C=25^\circ\text{C}$ |
| t_{rr} | Reverse Recovery Time | 180 | 400 | 880 | ns | $di/dt=400A/\mu s, T_J=150^\circ\text{C}$ |
| Q_{rr} | Reverse Recovered Charge | 8.0 | 20.0 | 52.0 | μC | $I_S=50A$ |

Notes:

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



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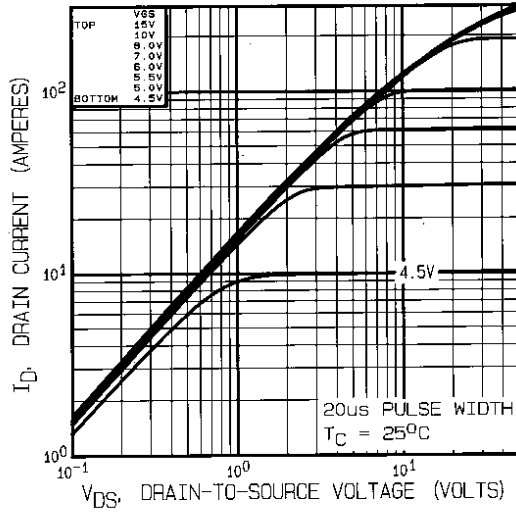


Fig 1. Typical Output Characteristics,
 $T_C = 25^\circ\text{C}$

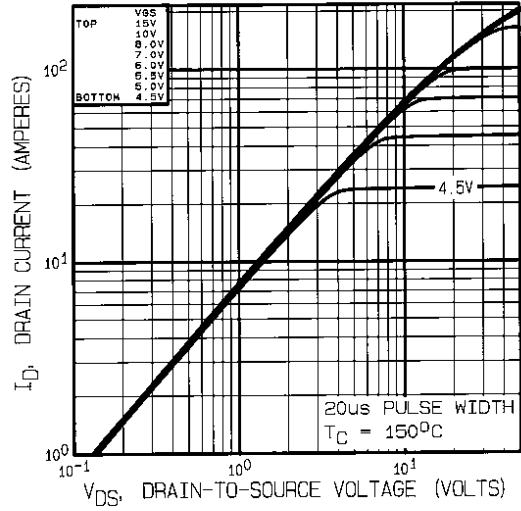


Fig 2. Typical Output Characteristics,
 $T_C = 150^\circ\text{C}$

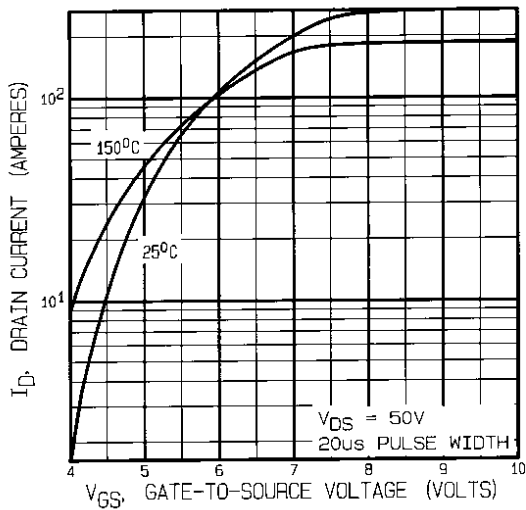


Fig 3. Typical Transfer Characteristics

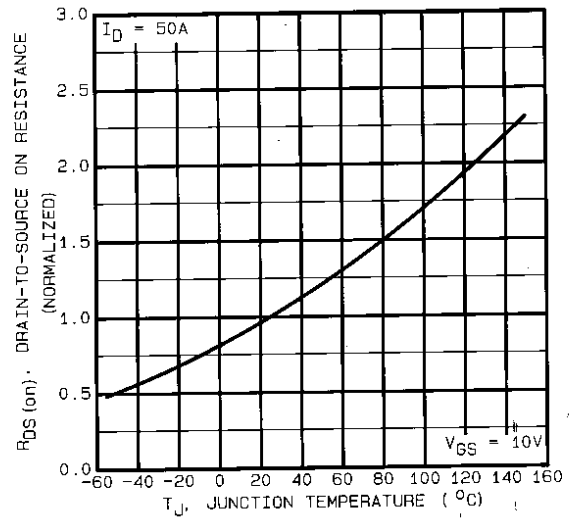


Fig 4. Normalized On-Resistance Vs.
Temperature

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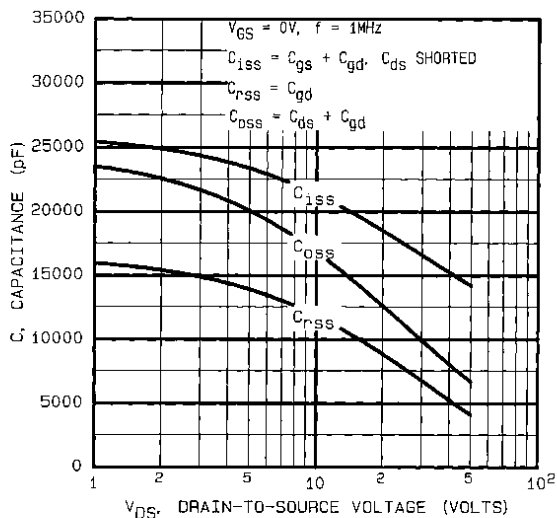


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

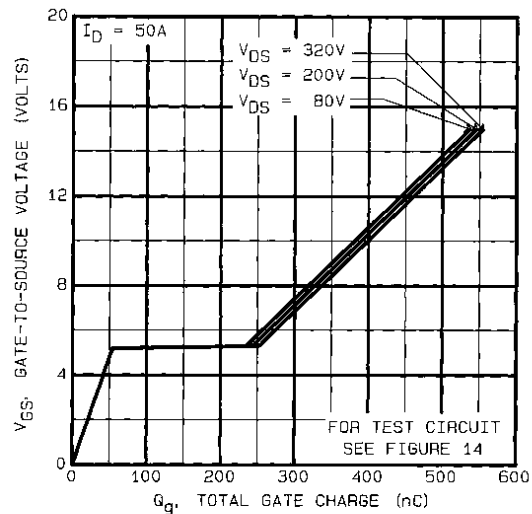


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

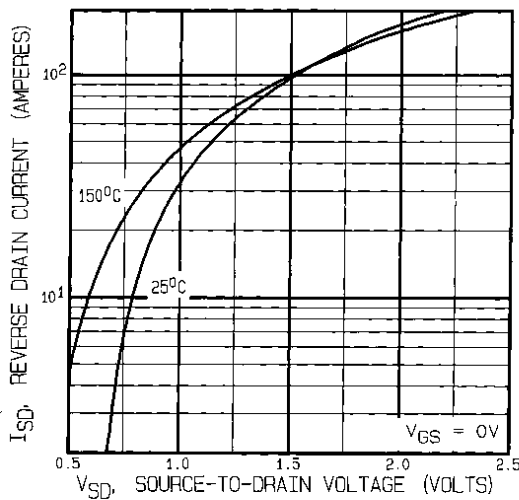


Fig 7. Typical Source-Drain Diode Forward Voltage

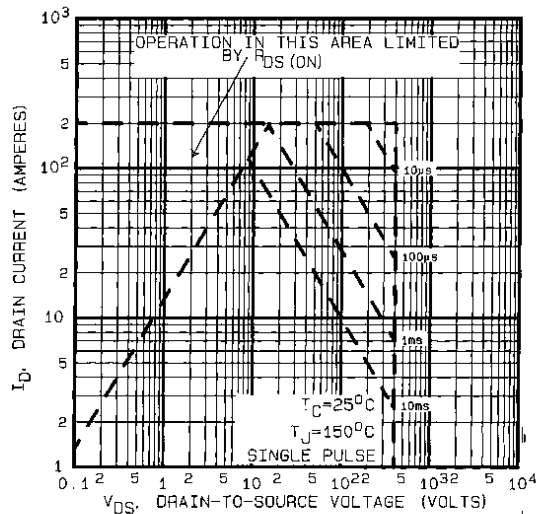


Fig 8. Maximum Safe Operating Area



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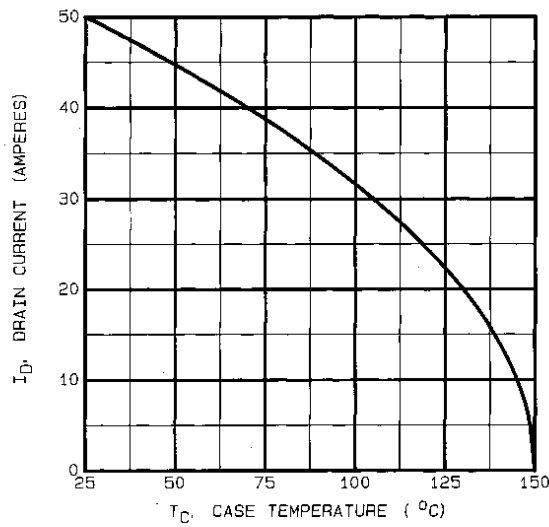


Fig 9. Maximum Drain Current Vs. Case Temperature

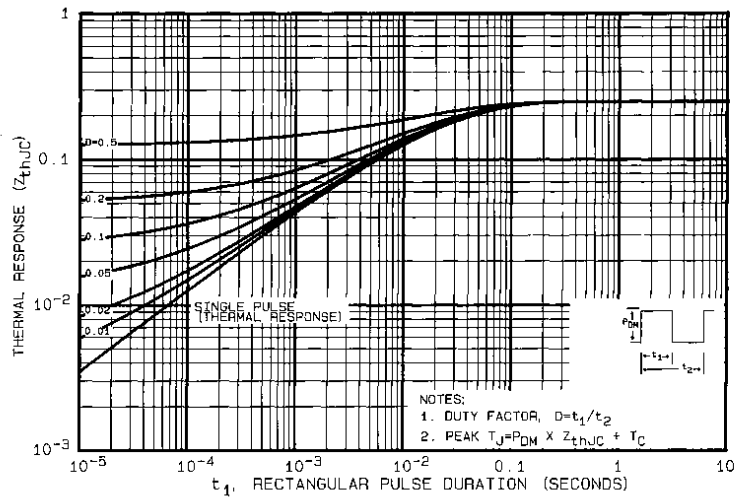


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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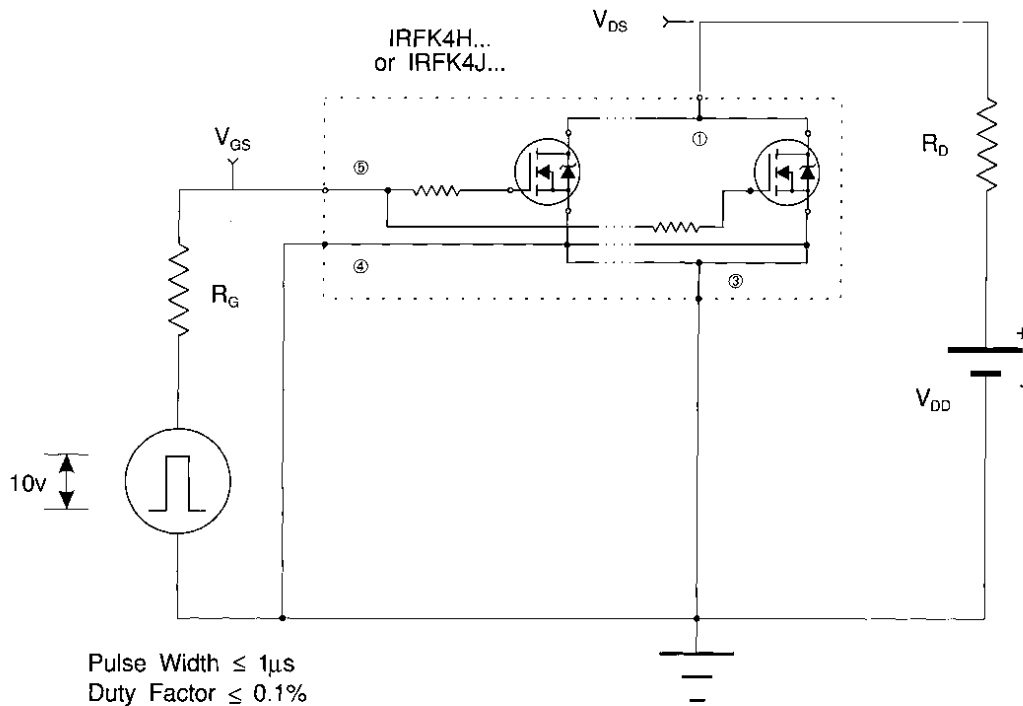


Fig 11a. Switching Time Test Circuit

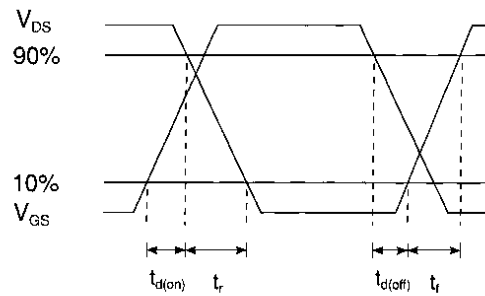
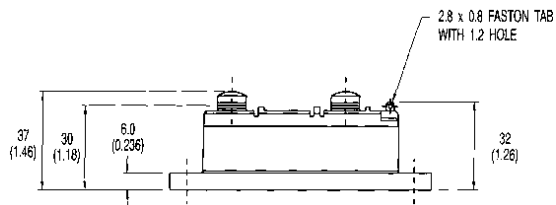
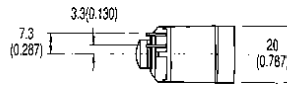
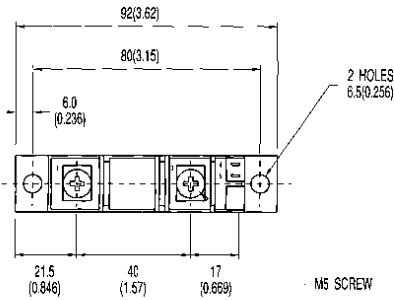
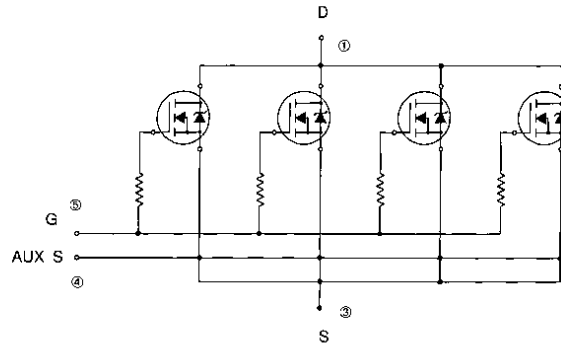


Fig 11b. Switching Time Waveforms



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Circuit Configuration and Outline



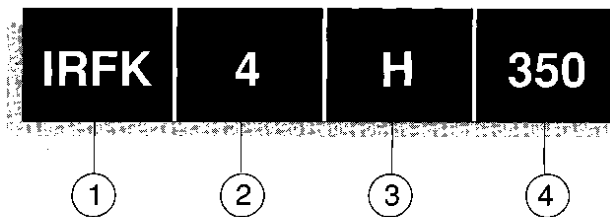
NOTE:
DEVICE IS SUPPLIED WITH
AUXILIARY LEADS 200(7.87) LONG

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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