International
IOR Rectifier PROVISIONAL

# IRFK6H/J054

**Isolated Base Power HEX-pak™ Assembly - Parallel Chip**

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

$V_{DSS}$ = 60V

$R_{DS(on)}$ = 3.3mΩ

$I_D$ = 350A

## Description

The HEX-pak™ utilizes the well-proven HEXFET™ transistor 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.

HEX-pak

## Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V ① | 350 | A |
| $I_D$ @ $T_C$ = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V ① | 220 | |
| $I_{DM}$ | Pulsed Drain Current ① | 1400 | |
| | Linear Derating Factor | 5.0 | W/°C |
| $P_D$ @ $T_C$ = 25°C | Power Dissipation | 625 | W |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $V_{IN}$ | R.M.S. Isolation Voltage, Circuit to Base (1 Minute) | 2.5 | kV |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | -40 to 150 | °C |

## Thermal Resistance

| | Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | — | — | 0.20 | °C/W |
| $R_{\theta CS}$ | Case-to-Sink, Flat, Greased Surface | — | 0.10 | — | |
| T | Mounting torque ±10%, M6 Screw ② | — | 5.0 | — | Nm |
| | Busbar to HEXPAK with M5 Screw | — | 3.0 | — | |
| wt | Approximate Weight | — | 140 (5.0) | — | g (oz) |

## Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | | 60 | — | — | V | $V_{GS}$ = 0V, ID = 1.0mA |
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance ④ | | — | 2.2 | 3.3 | mΩ | $V_{GS}$ = 10V, $I_D$ = 110A ④ |
| $I_{D(ON)}$ | On State Drain Current | | 150 | — | — | A | $V_{DS} > I_{D(ON)} x R_{DS(ON)}$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 ⑤ | | 186 | 282 | — | S | $V_{DS}$ = 50V, $I_D$ = 225A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | | — | — | 1.5 | mA | $V_{DS}$ = 60V, $V_{GS}$ = 0V |
| | | | — | — | 6.0 | | $V_{DS}$ = 48V, $V_{GS}$ = 0V, $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | | — | — | 600 | nA | $V_{GS}$ = 20V |
| | Gate-to-Source Reverse Leakage | | — | — | -600 | | $V_{GS}$ = -20V |
| $Q_g$ | Total Gate Charge | | — | 780 | 900 | nC | $I_D$ = 225A |
| $Q_{gs}$ | Gate-to-Source Charge | | — | 150 | 220 | | $V_{DS}$ = 48V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | | — | 270 | 400 | | $V_{GS}$ = 10V ④ |
| $t_{d(on)}$ | Turn-On Delay Time | IRFK6H054 | — | 110 | — | ns | $V_{DD}$ = 25V<br>$I_D$ = 225A<br>$V_{GS}$ = 10V<br>$R_S$ = 3.3Ω ④ |
| | | IRFK6J054 | — | 125 | — | | |
| $t_r$ | Rise Time | IRFK6H054 | — | 700 | — | | |
| | | IRFK6J054 | — | 800 | — | | |
| $t_{d(off)}$ | Turn-Off Delay Time | IRFK6H054 | — | 400 | — | | |
| | | IRFK6J054 | — | 530 | — | | |
| $t_f$ | Fall Time | IRFK6H054 | — | 260 | — | | |
| | | IRFK6J054 | — | 300 | — | | |
| $L_{DS}$ | Drain Inductance to Source | | — | 18 | — | nH | |
| $C_{iss}$ | Input Capacitance | | — | 14 | — | nF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | | — | 2.5 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | | — | 0.75 | — | | f = 1.0MHz |

## Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 300 | A | Modified MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 1100 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 2.5 | V | $T_J$ = 25°C, $I_S$ = 225A, $V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | 71 | 150 | 320 | ns | $T_J$ = 25°C, $I_F$ = 225A |
| $Q_{rr}$ | Reverse RecoveryCharge | 4.4 | 10 | 23 | μC | di/dt = 400A/μs ④ |

**Notes:**

① Repetitive rating; pulse width limited by maximum junction temperature.

② 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.

③ Limited by package to 200 amperes maximum continuous current.

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.