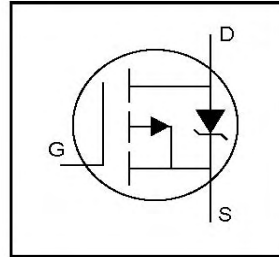


IRFR5505PbF

IRFU5505PbF

- Ultra Low On-Resistance
- P-Channel
- Surface Mount (IRFR5505)
- Straight Lead (IRFU5505)
- Advanced Process Technology
- Fast Switching
- Fully Avalanche Rated
- Lead-Free

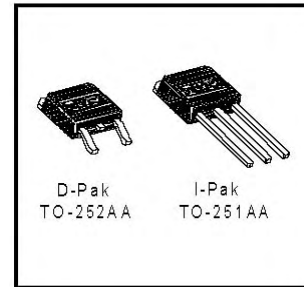


| |
|---------------------------|
| $V_{DSS} = -55V$ |
| $R_{DS(on)} = 0.11\Omega$ |
| $I_D = -18A$ |

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The D-Pak is designed for surface mounting using vapor phase, infrared, or wave soldering techniques. The straight lead version (IRFU series) is for through-hole mounting applications. Power dissipation levels up to 1.5 watts are possible in typical surface mount applications.



Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---------------------------|---|------------------------|-------|
| $I_D @ T_C = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V$ | -18 | A |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V$ | -11 | |
| I_{DM} | Pulsed Drain Current ① | -64 | |
| $P_D @ T_C = 25^\circ C$ | Power Dissipation | 57 | W |
| | Linear Derating Factor | 0.45 | W/°C |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulse Avalanche Energy② | 150 | mJ |
| I_{AR} | Avalanche Current① | -9.6 | A |
| E_{AR} | Repetitive Avalanche Energy① | 5.7 | 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) | |

Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|-----------------|-----------------------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-Case | --- | 2.2 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient (PCB mount)** | --- | 50 | |
| $R_{\theta JA}$ | Junction-to-Ambient | --- | 110 | |

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 | -55 | --- | --- | V | $V_{GS} = 0V, I_D = -250\mu A$ |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | --- | -0.049 | --- | V/°C | Reference to 25°C , $I_D = -1mA$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | --- | --- | 0.11 | Ω | $V_{GS} = -10V, I_D = -9.6A$ ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | -2.0 | --- | -4.0 | V | $V_{DS} = V_{GS}, I_D = -250\mu A$ |
| g_{fs} | Forward Transconductance | 4.2 | --- | --- | S | $V_{DS} = -25V, I_D = -9.6A$ |
| I_{DSS} | Drain-to-Source Leakage Current | --- | --- | -25 | μA | $V_{DS} = -55V, V_{GS} = 0V$ $V_{DS} = -44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | --- | --- | -100 | nA | $V_{GS} = 20V$ |
| | Gate-to-Source Reverse Leakage | --- | --- | 100 | nA | $V_{GS} = -20V$ |
| Q_g | Total Gate Charge | --- | --- | 32 | nC | $I_D = -9.6A$ |
| Q_{gs} | Gate-to-Source Charge | --- | --- | 7.1 | nC | $V_{DS} = -44V$ |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | --- | --- | 15 | nC | $V_{GS} = -10V$, See Fig. 6 and 13 ④ |
| $t_{d(on)}$ | Turn-On Delay Time | --- | 12 | --- | ns | $V_{DD} = -28V$ $I_D = -9.6A$ $R_G = 2.6\Omega$ $R_D = 2.8\Omega$, See Fig. 10 ④ |
| t_r | Rise Time | --- | 28 | --- | | |
| $t_{d(off)}$ | Turn-Off Delay Time | --- | 20 | --- | | |
| t_f | Fall Time | --- | 16 | --- | | |
| L_D | Internal Drain Inductance | --- | 4.5 | --- | nH | Between lead, 6mm (0.25in.) from package and center of die contact ⑤ |
| L_S | Internal Source Inductance | --- | 7.5 | --- | | |
| C_{ISS} | Input Capacitance | --- | 650 | --- | pF | $V_{GS} = 0V$ $V_{DS} = -25V$ $f = 1.0MHz$, See Fig. 5 |
| C_{OSS} | Output Capacitance | --- | 270 | --- | | |
| C_{RSS} | Reverse Transfer Capacitance | --- | 120 | --- | | |

Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|--|---|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) | --- | --- | -18 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| I_{SM} | Pulsed Source Current (Body Diode) ① | --- | --- | -64 | | |
| V_{SD} | Diode Forward Voltage | --- | --- | -1.6 | V | $T_J = 25^\circ\text{C}, I_S = -9.6A, V_{GS} = 0V$ ④ |
| t_{rr} | Reverse Recovery Time | --- | 51 | 77 | ns | $T_J = 25^\circ\text{C}, I_F = -9.6A$ |
| Q_{rr} | Reverse Recovery Charge | --- | 110 | 160 | nC | $di/dt = 100A/\mu s$ ④ |
| 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 Starting $T_J = 25^\circ\text{C}$, $L = 3.2mH$
 $R_G = 25\Omega, I_{AS} = -9.6A$. (See Figure 12)

③ $I_{SD} \leq -9.6A, di/dt \leq 290A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$

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

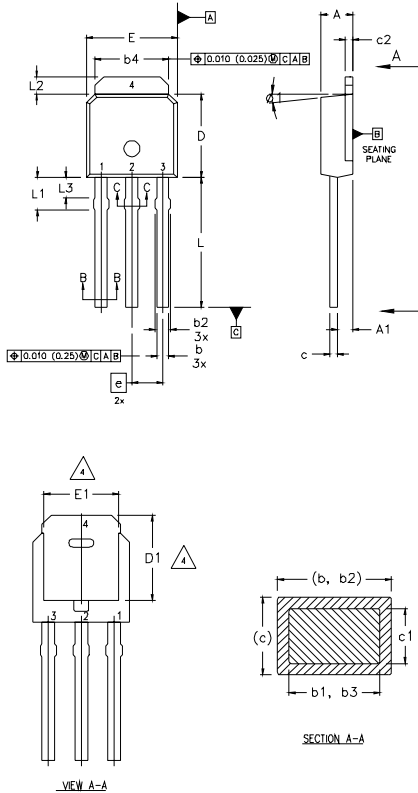
⑤ This is applied for I-PAK, L_S of D-PAK is measured between lead and center of die contact

** When mounted on 1" square PCB (FR-4 or G-10 Material) .

For recommended footprint and soldering techniques refer to application note #AN-994

I-Pak (TO-251AA) Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

- 1 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
- 2 DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
- 3 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 4 THERMAL PAD CONTOUR OPTION WITHIN DIMENSION b4, L2, E1 & D1.
- 5 LEAD DIMENSION UNCONTROLLED IN L3.
- 6 DIMENSION b1, b3 APPLY TO BASE METAL ONLY.
- 7 OUTLINE CONFORMS TO JEDEC OUTLINE TO-251AA.
- 8 CONTROLLING DIMENSION : INCHES.

LEAD ASSIGNMENTS

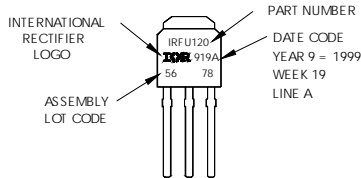
HEXFEEET

- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

| SYMBOL | DIMENSIONS | | | | NOTES |
|--------|-------------|------|-----------|-------|-------|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 2.18 | 2.39 | 0.086 | .094 | |
| A1 | 0.89 | 1.14 | 0.035 | 0.045 | |
| b | 0.64 | 0.89 | 0.025 | 0.035 | |
| b1 | 0.64 | 0.79 | 0.025 | 0.031 | 4 |
| b2 | 0.76 | 1.14 | 0.030 | 0.045 | |
| b3 | 0.76 | 1.04 | 0.030 | 0.041 | |
| b4 | 5.00 | 5.46 | 0.195 | 0.215 | 4 |
| c | 0.46 | 0.61 | 0.018 | 0.024 | |
| c1 | 0.41 | 0.56 | 0.016 | 0.022 | |
| c2 | .046 | 0.86 | 0.018 | 0.035 | |
| D | 5.97 | 6.22 | 0.235 | 0.245 | 3, 4 |
| D1 | 5.21 | - | 0.205 | - | 4 |
| E | 6.35 | 6.73 | 0.250 | 0.265 | 3, 4 |
| E1 | 4.32 | - | 0.170 | - | 4 |
| e | 2.29 | | 0.090 BSC | | |
| L | 8.89 | 9.60 | 0.350 | 0.380 | |
| L1 | 1.91 | 2.29 | 0.075 | 0.090 | |
| L2 | 0.89 | 1.27 | 0.035 | 0.050 | 4 |
| L3 | 1.14 | 1.52 | 0.045 | 0.060 | 5 |
| e1 | 0 | 15 | 0 | 15 | |

I-Pak (TO-251AA) Part Marking Information

EXAMPLE: THIS IS AN IRFU120
 WITH ASSEMBLY
 LOT CODE 5678
 ASSEMBLED ON VW 19, 1999
 IN THE ASSEMBLY LINE "A"
Note: "P" in assembly line
 position indicates "Lead-Free"



OR

