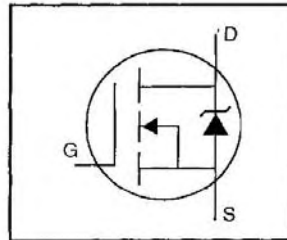


IRFR420PbF IRFU420PbF

HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Surface Mount (IRFR420)
- Straight Lead (IRFU420)
- Available in Tape & Reel
- Fast Switching
- Ease of Paralleling
- Lead-Free



$$V_{DSS} = 500V$$

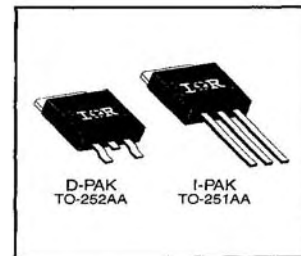
$$R_{DS(on)} = 3.0\Omega$$

$$I_D = 2.4A$$

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 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
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{ V}$	2.4	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{ V}$	1.5	
I_{DM}	Pulsed Drain Current ①	8.0	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation	42	W
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation (PCB Mount)**	2.5	
	Linear Derating Factor	0.33	W/°C
	Linear Derating Factor (PCB Mount)**	0.020	
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	400	mJ
I_{AR}	Avalanche Current ①	2.4	A
E_{AR}	Repetitive Avalanche Energy ①	4.2	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.5	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	°C
	Soldering Temperature, for 10 seconds	260 (1.6mm from case)	

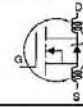
Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	3.0	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)**	—	—	50	
$R_{\theta JA}$	Junction-to-Ambient	—	—	110	


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

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

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	—	—	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.59	—	V/°C	Reference to 25°C , $I_D=1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	3.0	Ω	$V_{GS}=10V, I_D=1.4A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
g_{fs}	Forward Transconductance	1.5	—	—	S	$V_{DS}=50V, I_D=1.4A$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS}=500V, V_{GS}=0V$
		—	—	250		$V_{DS}=400V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS}=20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS}=-20V$
Q_g	Total Gate Charge	—	—	19	nC	$I_D=2.1A$
Q_{gs}	Gate-to-Source Charge	—	—	3.3		$V_{DS}=400V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	13		$V_{GS}=10V$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	8.0	—	ns	$V_{DD}=250V$
t_r	Rise Time	—	8.6	—		$I_D=2.1A$
$t_{d(off)}$	Turn-Off Delay Time	—	33	—		$R_G=18\Omega$
t_f	Fall Time	—	16	—		$R_D=120\Omega$ See Figure 10 ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6 mm (0.25in.) from package 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	—	92	—		$V_{DS}=25V$
C_{rss}	Reverse Transfer Capacitance	—	37	—		$f=1.0\text{MHz}$ See Figure 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	2.4	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	8.0		
V_{SD}	Diode Forward Voltage	—	—	1.6	V	$T_J=25^\circ\text{C}, I_S=2.4A, V_{GS}=0V$ ④
t_{rr}	Reverse Recovery Time	—	260	520	ns	$T_J=25^\circ\text{C}, I_F=2.1A$
Q_{rr}	Reverse Recovery Charge	—	0.70	1.4	μC	$di/dt=100A/\mu s$ 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 Figure 11)
- ② $V_{DD}=50V$, starting $T_J=25^\circ\text{C}$, $L=124\text{mH}$, $R_G=25\Omega$, $I_{AS}=2.4A$ (See Figure 12)
- ③ $I_{SD}\leq 2.4A$, $di/dt\leq 50A/\mu s$, $V_{DD}\leq V_{(BR)DSS}$, $T_J\leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

