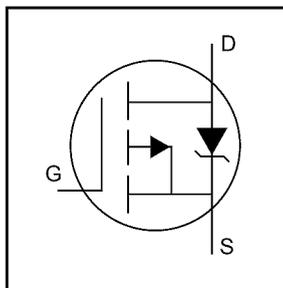


- P-Channel
- Surface Mount (IRFR9214)
- Straight Lead (IRFU9214)
- Advanced Process Technology
- Fast Switching
- Fully Avalanche Rated



$$V_{DS} = -250V$$

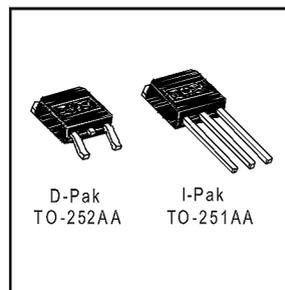
$$R_{DS(on)} = 3.0\Omega$$

$$I_D = -2.7A$$

## Description

Third Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve 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

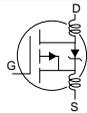
	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-2.7	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-1.7	
$I_{DM}$	Pulsed Drain Current ①	-11	
$P_D @ T_C = 25^\circ C$	Power Dissipation	50	W
	Linear Derating Factor	0.40	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy ②	100	mJ
$I_{AR}$	Avalanche Current ①	-2.7	A
$E_{AR}$	Repetitive Avalanche Energy ①	5.0	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		

## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	2.5	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)**	—	50	
$R_{\theta JA}$	Junction-to-Ambient	—	110	

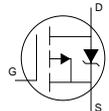
## Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-250	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.25	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	3.0	$\Omega$	$V_{GS} = -10V, I_D = -1.7A$ 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	0.9	—	—	S	$V_{DS} = -50V, I_D = -1.7A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-100	$\mu A$	$V_{DS} = -250V, V_{GS} = 0V$
		—	—	-500		$V_{DS} = -200V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$Q_g$	Total Gate Charge	—	—	14	nC	$I_D = -1.7A$
$Q_{gs}$	Gate-to-Source Charge	—	—	3.1		$V_{DS} = -200V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	6.8		$V_{GS} = -10V$ , See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	11	—	ns	$V_{DD} = -125V$
$t_r$	Rise Time	—	14	—		$I_D = -1.7A$
$t_{d(off)}$	Turn-Off Delay Time	—	20	—		$R_G = 21\Omega$
$t_f$	Fall Time	—	17	—		$R_D = 70\Omega$ See Fig. 10 ④
$L_D$	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	—	220	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	75	—		$V_{DS} = -25V$
$C_{rss}$	Reverse Transfer Capacitance	—	11	—		$f = 1.0\text{MHz}$ , See Fig. 5



## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-2.7	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-11		
$V_{SD}$	Diode Forward Voltage	—	—	-5.8	V	$T_J = 25^\circ\text{C}, I_S = -2.7A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	150	220	ns	$T_J = 25^\circ\text{C}, I_F = -1.7A$
$Q_{rr}$	Reverse Recovery Charge	—	870	1300	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  $T_J = 25^\circ\text{C}$ ,  $L = 27\text{mH}$   
 $R_G = 25\Omega, I_{AS} = -2.7A$ . (See Figure 12)

③  $I_{SD} \leq -2.7A, di/dt \leq 600A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$

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

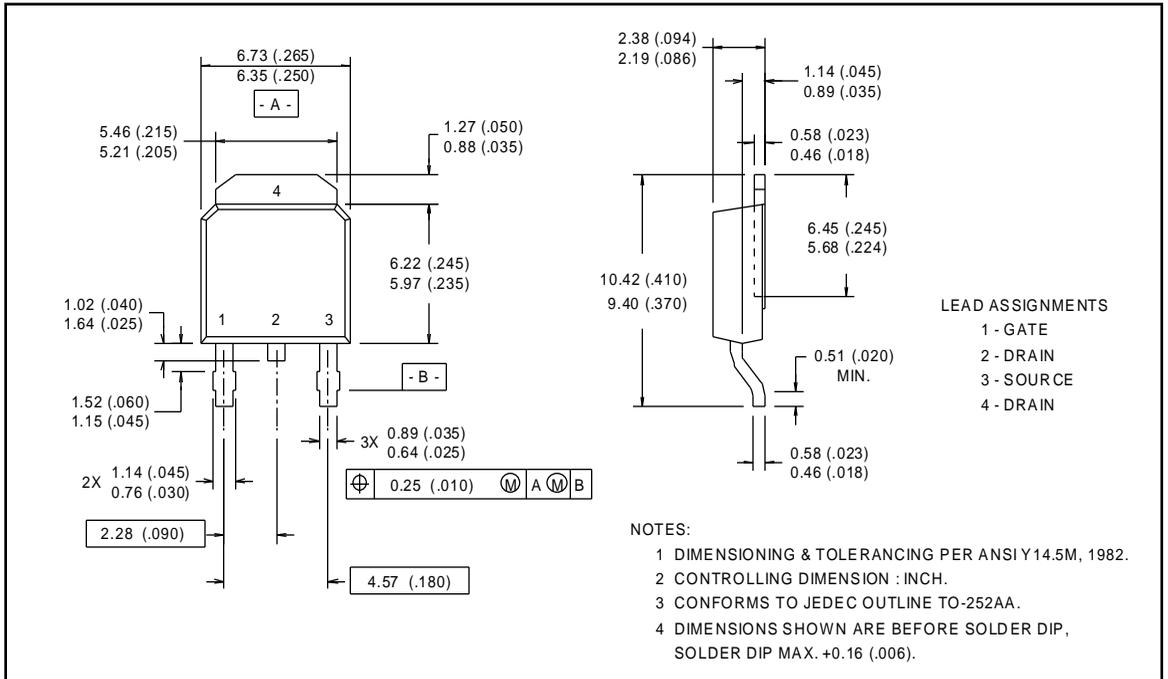
⑤ This is applied for I-PAK,  $L_S$  of D-PAK is measured between lead and center of die contact

\*\* When mounted on 1" square PCB (FR-4 or G-10 Material ) .  
For recommended footprint and soldering techniques refer to application note #AN-994

## Package Outline

### TO-252AA Outline

Dimensions are shown in millimeters (inches)



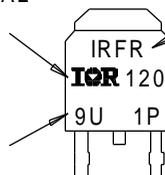
## Part Marking Information

### TO-252AA (D-Pak)

EXAMPLE : THIS IS AN IRFR120  
WITH ASSEMBLY  
LOT CODE 9U1P

INTERNATIONAL  
RECTIFIER  
LOGO

ASSEMBLY  
LOT CODE

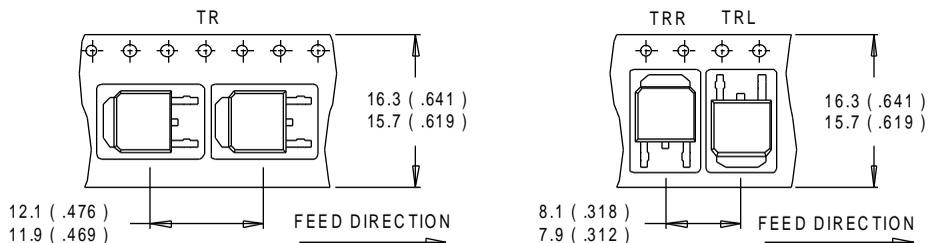


FIRST PORTION  
OF PART NUMBER

SECOND PORTION  
OF PART NUMBER

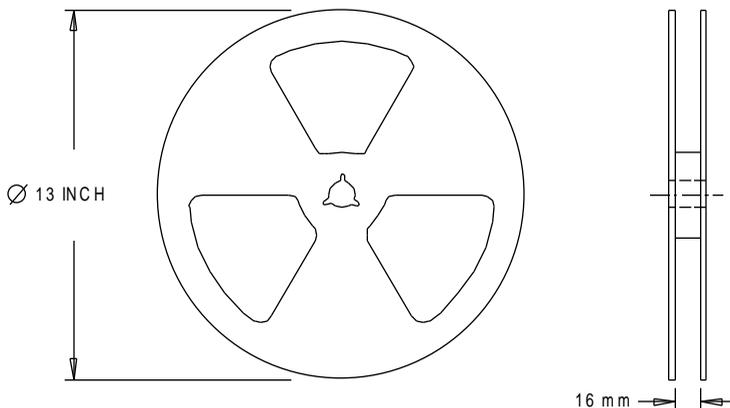
## Tape & Reel Information

TO-252AA



NOTES :

1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS ( INCHES ).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :

1. OUTLINE CONFORMS TO EIA-481.