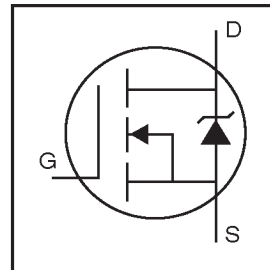


- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free



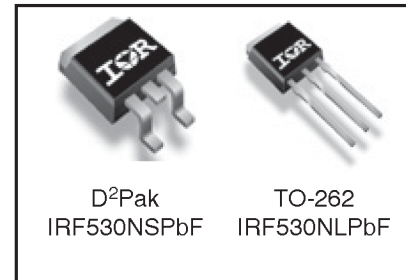
$V_{DSS} = 100V$
$R_{DS(on)} = 90m\Omega$
$I_D = 17A$

### Description

Advanced HEXFET® Power MOSFETs 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<sup>2</sup>Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D<sup>2</sup>Pak is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application.

The through-hole version (IRF530NL) is available for low-profile applications.



D<sup>2</sup>Pak  
IRF530NSPbF

TO-262  
IRF530NLPbF

### Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ⑦	17	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ⑦	12	
$I_{DM}$	Pulsed Drain Current ① ⑦	60	
$P_D @ T_A = 25^\circ C$	Power Dissipation	3.8	W
$P_D @ T_C = 25^\circ C$	Power Dissipation	70	W
	Linear Derating Factor	0.47	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_{AR}$	Avalanche Current ①	9.0	A
$E_{AR}$	Repetitive Avalanche Energy ①	7.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③ ⑦	7.4	V/ns
$T_J$	Operating Junction and	-55 to +175	°C
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		

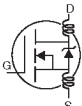
### Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	2.15	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mounted, steady-state)**	—	40	

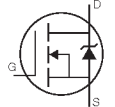
# IRF530NS/LPbF

International  
IR Rectifier

## 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	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.11	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$ ⑦
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	90	m $\Omega$	$V_{GS} = 10V, I_D = 9.0A$ 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	12	—	—	S	$V_{DS} = 50V, I_D = 9.0A$ ④ ⑦
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	25	$\mu A$	$V_{DS} = 100V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$Q_g$	Total Gate Charge	—	—	37	nC	$I_D = 9.0A$
$Q_{gs}$	Gate-to-Source Charge	—	—	7.2		$V_{DS} = 80V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	11	ns	$V_{GS} = 10V$ , See Fig. 6 and 13 ⑦
$t_{d(on)}$	Turn-On Delay Time	—	9.2	—		$V_{DD} = 50V$
$t_r$	Rise Time	—	22	—		$I_D = 9.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	35	—		$R_G = 12\Omega$
$t_f$	Fall Time	—	25	—		$V_{GS} = 10V$ , See Fig. 10 ④ ⑦
$L_D$	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
$L_S$	Internal Source Inductance	—	7.5	—		
$C_{iss}$	Input Capacitance	—	920	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	130	—		$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	19	—		$f = 1.0\text{MHz}$ , See Fig. 5 ⑦
$E_{AS}$	Single Pulse Avalanche Energy ② ⑦	—	340 ⑤	93 ⑥		$I_{AS} = 9.0A, L = 2.3\text{mH}$

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	60		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 9.0A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	93	140	ns	$T_J = 25^\circ\text{C}, I_F = 9.0A$
$Q_{rr}$	Reverse Recovery Charge	—	320	480	nC	$di/dt = 100A/\mu s$ ④ ⑦
$t_{on}$	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  $T_J = 25^\circ\text{C}$ ,  $L = 2.3\text{mH}$   
 $R_G = 25\Omega, I_{AS} = 9.0A, V_{GS} = 10V$  (See Figure 12)
- ③  $I_{SD} \leq 9.0A, di/dt \leq 410A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ\text{C}$
- ④ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .

⑤ This is a typical value at device destruction and represents operation outside rated limits.

⑥ This is a calculated value limited to  $T_J = 175^\circ\text{C}$ .

⑦ Uses IRF530N data and test conditions.

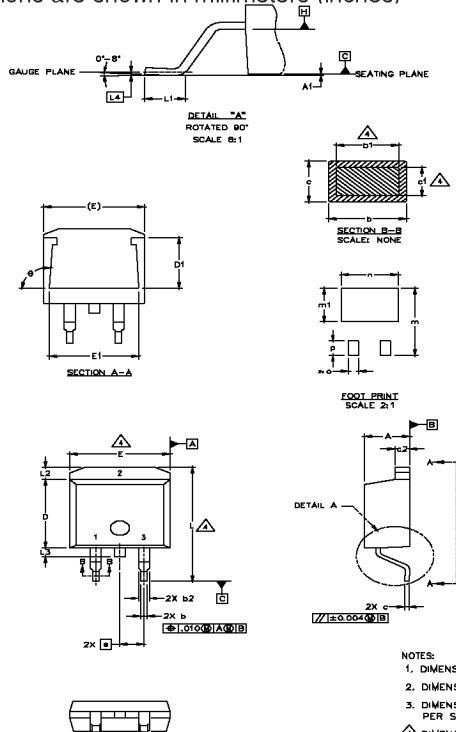
\*\*When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994

# IRF530NS/LPbF

International  
**IR** Rectifier

## D<sup>2</sup>Pak Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	4
A1		0.127		.005	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	
b2	1.14	1.40	.045	.055	4
c	0.43	0.63	.017	.025	
c1	0.38	0.74	.015	.029	
c2	1.14	1.40	.045	.055	3
D	8.51	9.85	.335	.380	
D1	5.33		.210		3
E	9.85	10.67	.380	.420	
E1	8.22		.245		
e	2.54 BSC		.100 BSC		
L	14.61	15.88	.575	.625	
L1	1.78	2.79	.070	.110	
L2		1.65		.065	
L3	1.27	1.78	.050	.070	
L4	0.25 BSC		.010 BSC		
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
θ	90°	93°	90°	93°	

### LEAD ASSIGNMENTS

HEXFET	IGBTs, CoPACK	DIODES
1- GATE	1- GATE	1- ANODE *
2- DRAIN	2- COLLECTOR	2- CATHODE
3- SOURCE	3- EMITTER	3- ANODE

\* PART DEPENDENT.

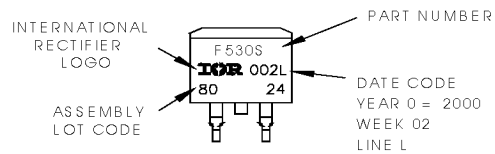
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
5. CONTROLLING DIMENSION: INCH.

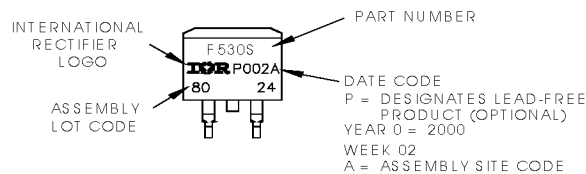
## D<sup>2</sup>Pak Part Marking Information (Lead-Free)

EXAMPLE: THIS IS AN IRF530S WITH  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000  
IN THE ASSEMBLY LINE "L"

Note: "P" in assembly line  
position indicates "Lead-Free"



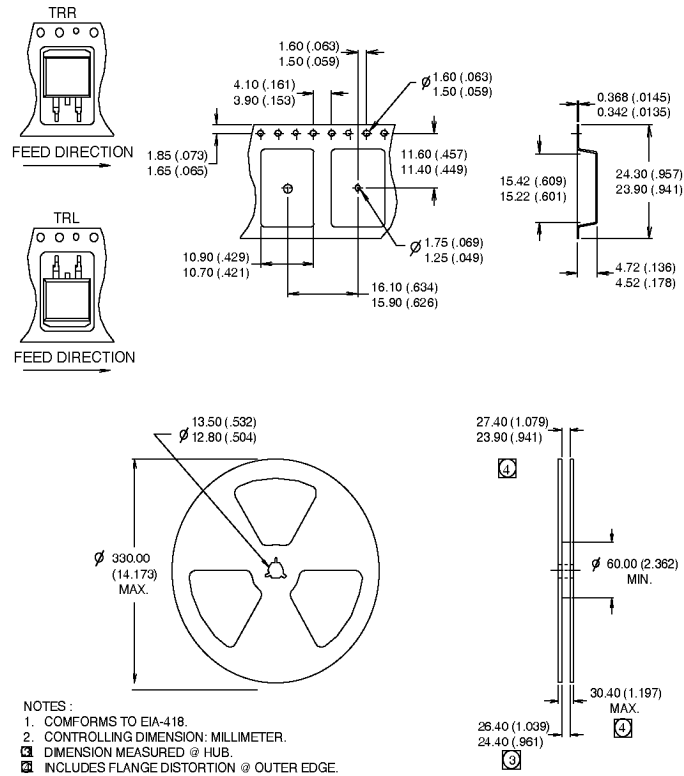
**OR**



# IRF530NS/LPbF

## D<sup>2</sup>Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



Data and specifications subject to change without notice.