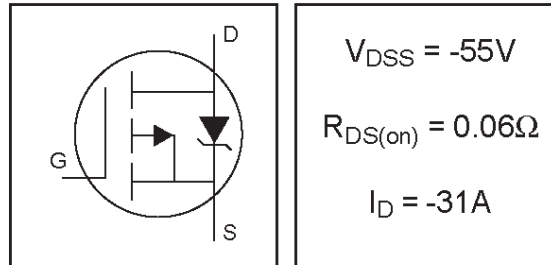


# IRF5305S/LPbF

- Lead-Free
- Advanced Process Technology
- Surface Mount (IRF5305S)
- Low-profile through-hole (IRF5305L)
- 175°C Operating Temperature
- Fast Switching
- P-Channel
- Fully Avalanche Rated

## HEXFET® Power MOSFET

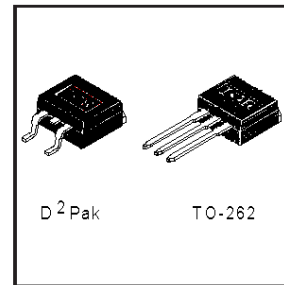


### Description

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<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 (IRF5305L) is available for low-profile applications.



### Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -10\text{V}^{\text{⑤}}$	-31	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -10\text{V}^{\text{⑤}}$	-22	
$I_{DM}$	Pulsed Drain Current ①⑤	-110	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	3.8	W
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation	110	W
	Linear Derating Factor	0.71	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy②⑤	280	mJ
$I_{AR}$	Avalanche Current①	-16	A
$E_{AR}$	Repetitive Avalanche Energy①	11	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑤	-5.8	V/ns
$T_J$	Operating Junction and	-55 to + 175	°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	---	1.4	°C/W
$R_{\theta JA}$	Junction-to-Ambient ( PCB Mounted, steady-state)**	---	40	

## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	-55	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient	—	-0.034	—	V/°C	Reference to 25°C, I <sub>D</sub> = -1mA <sup>⑤</sup>
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	0.06	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -16A <sup>④</sup>
V <sub>GS(th)</sub>	Gate Threshold Voltage	-2.0	—	-4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
g <sub>fs</sub>	Forward Transconductance	8.0	—	—	S	V <sub>DS</sub> = -25V, I <sub>D</sub> = -16A <sup>⑤</sup>
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	-25	μA	V <sub>DS</sub> = -55V, V <sub>GS</sub> = 0V
		—	—	-250		V <sub>DS</sub> = -44V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
Q <sub>g</sub>	Total Gate Charge	—	—	63	nC	I <sub>D</sub> = -16A
Q <sub>gs</sub>	Gate-to-Source Charge	—	—	13		V <sub>DS</sub> = -44V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	—	29		V <sub>GS</sub> = -10V, See Fig. 6 and 13 <sup>④⑤</sup>
t <sub>d(on)</sub>	Turn-On Delay Time	—	14	—	ns	V <sub>DD</sub> = -28V
t <sub>r</sub>	Rise Time	—	66	—		I <sub>D</sub> = -16A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	39	—		R <sub>G</sub> = 6.8Ω
t <sub>f</sub>	Fall Time	—	63	—		R <sub>D</sub> = 1.6Ω, See Fig. 10 <sup>④⑤</sup>
L <sub>S</sub>	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
C <sub>iss</sub>	Input Capacitance	—	1200	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	520	—		V <sub>DS</sub> = -25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	250	—		f = 1.0MHz, See Fig. 5 <sup>⑤</sup>

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	-31	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) <sup>①</sup>	—	—	-110		
V <sub>SD</sub>	Diode Forward Voltage	—	—	-1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = -16A, V <sub>GS</sub> = 0V <sup>④</sup>
t <sub>rr</sub>	Reverse Recovery Time	—	71	110	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = -16A
Q <sub>rr</sub>	Reverse Recovery Charge	—	170	250	nC	di/dt = -100A/μs <sup>④⑤</sup>
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> )				

### Notes:

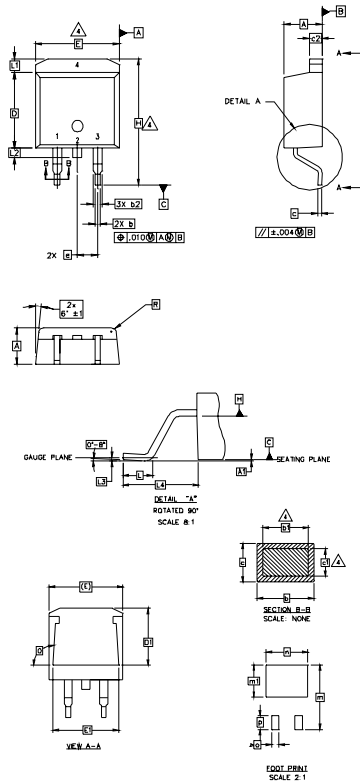
- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② V<sub>DD</sub> = -25V, Starting T<sub>J</sub> = 25°C, L = 2.1mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = -16A. (See Figure 12)
- ③ I<sub>SD</sub> ≤ -16A, di/dt ≤ -280A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>,  
T<sub>J</sub> ≤ 175°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Uses IRF5305 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.

# IRF5305S/LPbF

International  
**IR** Rectifier

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



- 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 [.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.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.78	.045	.070	
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	4
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86		.270		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1		1.65		.065	
L2	1.27	1.78	.050	.070	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
R	0.51	0.71	.020	.028	
θ	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**

- HCXFET**
- 1.- GATE
  - 2, 4.- DRAIN
  - 3.- SOURCE

**IGBTs, CoPACK**

- 1.- GATE
- 2, 4.- COLLECTOR
- 3.- EMITTER

**DIODES**

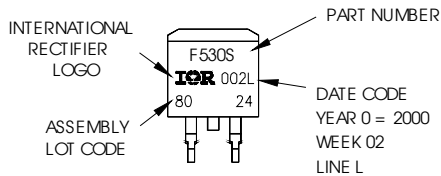
- 1.- ANODE \*
- 2, 4.- CATHODE
- 3.- ANODE

\* PART DEPENDENT.

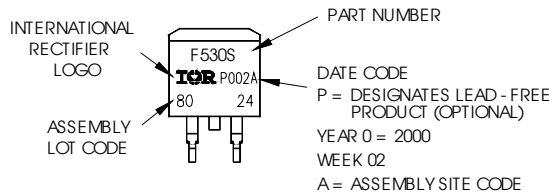
## D<sup>2</sup>Pak Part Marking Information

EXAMPLE: THIS IS AN IRF530S WITH  
LOT CODE 8024  
ASSEMBLED ON WW02, 2000  
IN THE ASSEMBLY LINE "L"

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



OR

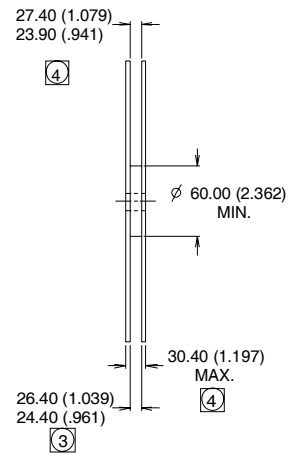
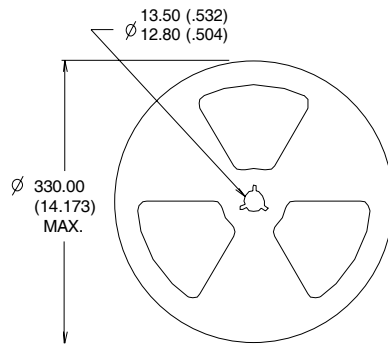
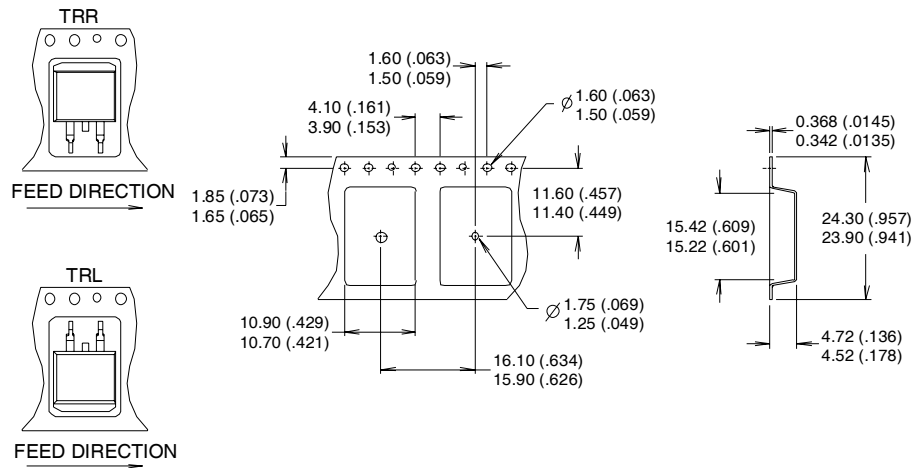


# IRF5305S/LPbF

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

Dimensions are shown in millimeters (inches)



- NOTES :
1. CONFORMS TO EIA-418.
  2. CONTROLLING DIMENSION: MILLIMETER.
  - ③ DIMENSION MEASURED @ HUB.
  - ④ INCLUDES FLANGE DISTORTION @ OUTER EDGE.

Data and specifications subject to change without notice.

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