

International **IR** Rectifier

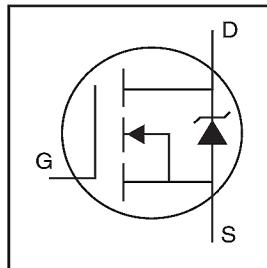
PD - 94149A

IRF3205S

IRF3205L

HEXFET® Power MOSFET

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



$V_{DSS} = 55V$
$R_{DS(on)} = 8.0m\Omega$
$I_D = 110A^{\circ}$

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 D²Pak 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 D²Pak 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 (IRF3205L) is available for low-profile applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	110 ^⑤	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	80	
I_{DM}	Pulsed Drain Current ^①	390	
$P_D @ T_C = 25^\circ C$	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/ $^\circ C$
V_{GS}	Gate-to-Source Voltage	± 20	V
I_{AR}	Avalanche Current ^①	62	A
E_{AR}	Repetitive Avalanche Energy ^①	20	mJ
dv/dt	Peak Diode Recovery dv/dt ^③	5.0	V/ns
T_J	Operating Junction and	$-55 \text{ to } +175$	$^\circ C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 screw	10 lbf \cdot in (1.1N \cdot m)	



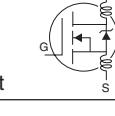
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.75	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient (PCB mounted, steady-state)*	—	40	

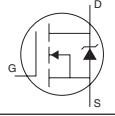
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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(\text{BR})\text{DSS}}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{\text{GS}} = 0\text{V}$, $I_D = 250\mu\text{A}$
$\Delta V_{(\text{BR})\text{DSS}/\Delta T_J}$	Breakdown Voltage Temp. Coefficient	—	0.057	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{\text{DS}(\text{on})}$	Static Drain-to-Source On-Resistance	—	—	8.0	$\text{m}\Omega$	$V_{\text{GS}} = 10\text{V}$, $I_D = 62\text{A}$ ④
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 250\mu\text{A}$
g_{fs}	Forward Transconductance	44	—	—	S	$V_{\text{DS}} = 25\text{V}$, $I_D = 62\text{A}$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{\text{DS}} = 55\text{V}$, $V_{\text{GS}} = 0\text{V}$
		—	—	250		$V_{\text{DS}} = 44\text{V}$, $V_{\text{GS}} = 0\text{V}$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{\text{GS}} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{\text{GS}} = -20\text{V}$
Q_g	Total Gate Charge	—	—	146	nC	$I_D = 62\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	35		$V_{\text{DS}} = 44\text{V}$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	54		$V_{\text{GS}} = 10\text{V}$, See Fig. 6 and 13
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	—	14	—		
t_r	Rise Time	—	101	—	ns	$V_{\text{DD}} = 28\text{V}$
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time	—	50	—		$I_D = 62\text{A}$
t_f	Fall Time	—	65	—		$R_G = 4.5\Omega$
L_D	Internal Drain Inductance	—	4.5	—	nH	$V_{\text{GS}} = 10\text{V}$, See Fig. 10 ④
L_S	Internal Source Inductance	—	7.5	—		Between lead, 6mm (0.25in.) from package and center of die contact
C_{iss}	Input Capacitance	—	3247	—	pF	
C_{oss}	Output Capacitance	—	781	—		$V_{\text{GS}} = 0\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	211	—		$V_{\text{DS}} = 25\text{V}$
E_{AS}	Single Pulse Avalanche Energy ②	—	1050 ⑥	264 ⑦	mJ	$f = 1.0\text{MHz}$, See Fig. 5
						$I_{\text{AS}} = 62\text{A}$, $L = 138\mu\text{H}$

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	390		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$, $I_S = 62\text{A}$, $V_{\text{GS}} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	69	104	ns	$T_J = 25^\circ\text{C}$, $I_F = 62\text{A}$
Q_{rr}	Reverse Recovery Charge	—	143	215	nC	$dI/dt = 100\text{A}/\mu\text{s}$ 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 $T_J = 25^\circ\text{C}$, $L = 138\mu\text{H}$
 $R_G = 25\Omega$, $I_{\text{AS}} = 62\text{A}$. (See Figure 12)
- ③ $I_{\text{SD}} \leq 62\text{A}$, $dI/dt \leq 207\text{A}/\mu\text{s}$, $V_{\text{DD}} \leq V_{(\text{BR})\text{DSS}}$
 $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑥ This is a typical value at device destruction and represents operation outside rated limits.
- ⑦ This is a calculated value limited to $T_J = 175^\circ\text{C}$.

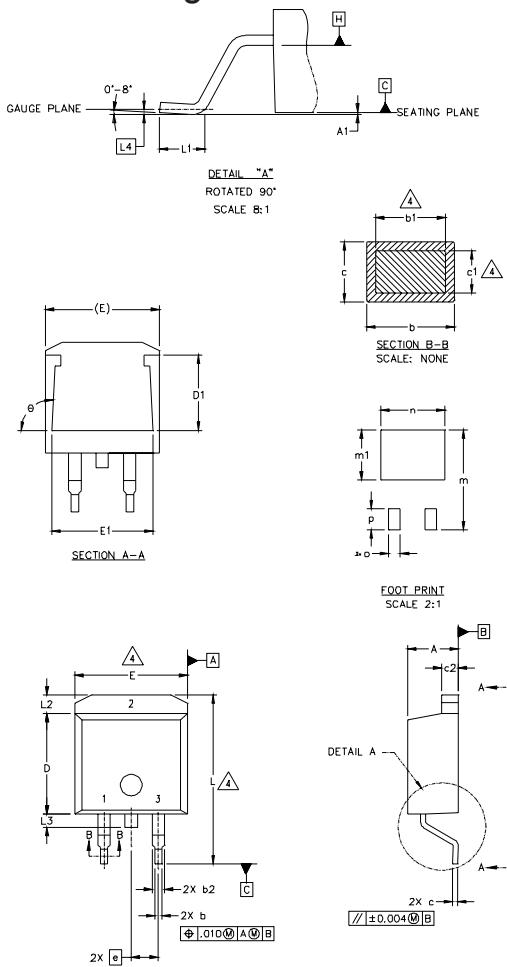
* When mounted on 1" square PCB (FR-4 or G-10 Material).

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

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D²Pak Package Outline



SYMBOL	DIMENSIONS				NOTES	
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	4.06	4.83	.160	.190		
A1		0.127		.005		
b	0.51	0.99	.020	.039		
b1	0.51	0.89	.020	.035	4	
b2	1.14	1.40	.045	.055		
c	0.43	0.63	.017	.025		
c1	0.38	0.74	.015	.029	4	
c2	1.14	1.40	.045	.055		
D	8.51	9.65	.335	.380	3	
D1	5.33		.210			
E	9.65	10.67	.380	.420	3	
E1	6.22		.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

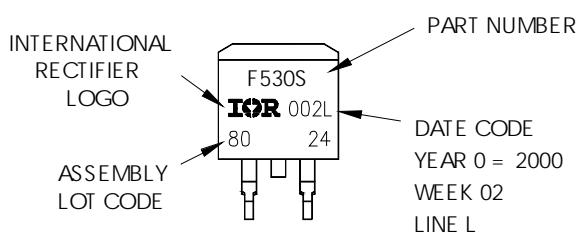
* PART DEPENDENT.

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 [.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.

D²Pak Part Marking Information

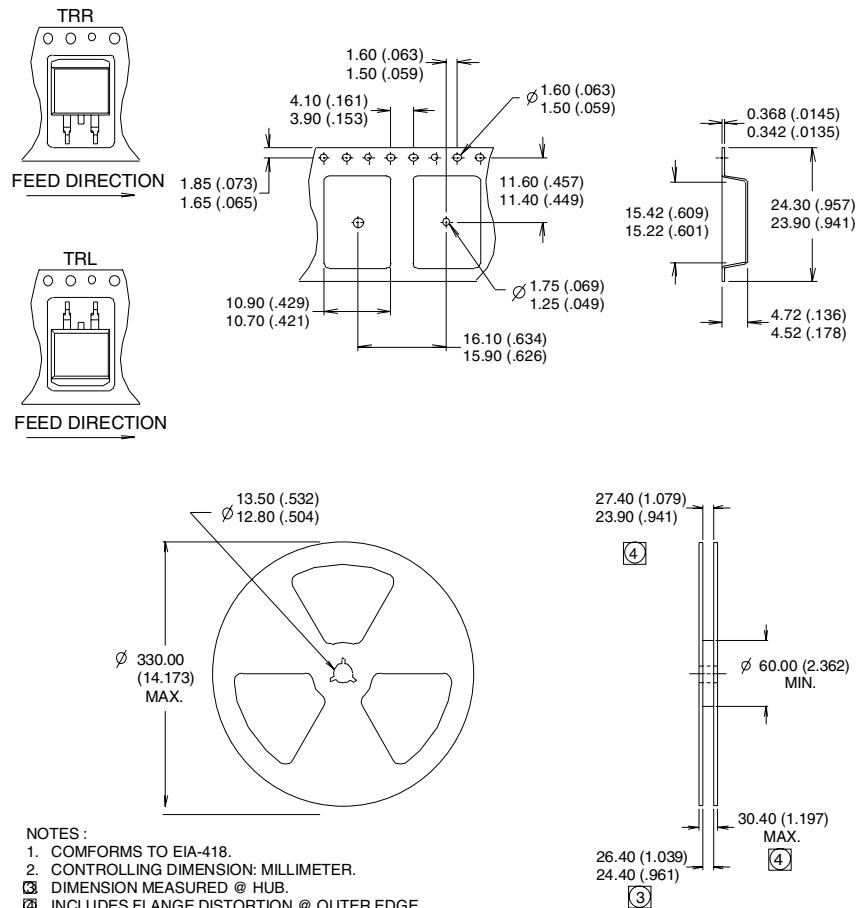
EXAMPLE: THIS IS AN IRF530S WITH
LOT CODE 8024
ASSEMBLED ON WV 02, 2000
IN THE ASSEMBLY LINE "L"



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D²Pak Tape & Reel Information



Data and specifications subject to change without notice.
This product has been designed and qualified for the industrial market.
Qualification Standards can be found on IR's Web site.

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