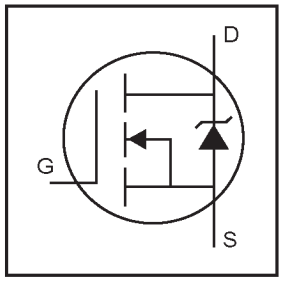
International
IOR Rectifier

PD - 95432

IRF1503SPbF
IRF1503LPbF

HEXFET® Power MOSFET

Typical Applications
- 14V Automotive Electrical Systems
- 14V Electronic Power Steering
- Lead-Free



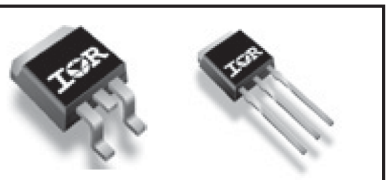
V_{DSS} = 30V

$R_{DS(on)}$ = 3.3mΩ

I_D = 75A

Benefits
- Advanced Process Technology
- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax

Description
Specifically designed for Automotive applications, this Stripe Planar design of HEXFET® Power MOSFETs utilizes the lastest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this HEXFET power MOSFET are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These benefits combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.



D^2Pak IRF1503S | TO-262 IRF1503L

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon limited)	190	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V (See Fig.9)	130	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package limited)	75	
I_{DM}	Pulsed Drain Current ①	960	
P_D @T_C = 25°C	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	510	mJ
E_{AS} (tested)	Single Pulse Avalanche Energy Tested Value⑥	980	
I_{AR}	Avalanche Current①	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy⑤		mJ
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.75	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.028	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	2.6	3.3	mΩ	V_{GS} = 10V, I_D = 140A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = 10V, I_D = 250µA
g_{fs}	Forward Transconductance	75	—	—	S	V_{DS} = 25V, I_D = 140A
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	V_{DS} = 30V, V_{GS} = 0V
		—	—	250		V_{DS} = 24V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V_{GS} = -20V
Q_g	Total Gate Charge	—	130	200	nC	I_D = 140A
Q_{gs}	Gate-to-Source Charge	—	36	54		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	41	62		V_{GS} = 10V④
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	V_{DD} = 15V
t_r	Rise Time	—	130	—		I_D = 140A
$t_{d(off)}$	Turn-Off Delay Time	—	59	—		R_G = 2.5Ω
t_f	Fall Time	—	48	—		V_{GS} = 10V ④
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	13	—		
C_{iss}	Input Capacitance	—	5730	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	2250	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	290	—		f = 1.0MHz, See Fig. 5
C_{oss}	Output Capacitance	—	7580	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	2290	—		V_{GS} = 0V, V_{DS} = 24V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance ⑤	—	3420	—		V_{GS} = 0V, V_{DS} = 0V to 24V

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	190⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	960		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 140A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	71	110	ns	T_J = 25°C, I_F = 140A
Q_{rr}	Reverse RecoveryCharge	—	110	170	nC	di/dt = 100A/µs 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°C, L = 0.049mH R_G = 25Ω, I_{AS} = 140A. (See Figure 12).

③ I_{SD} ≤ 140A, di/dt ≤ 110A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C

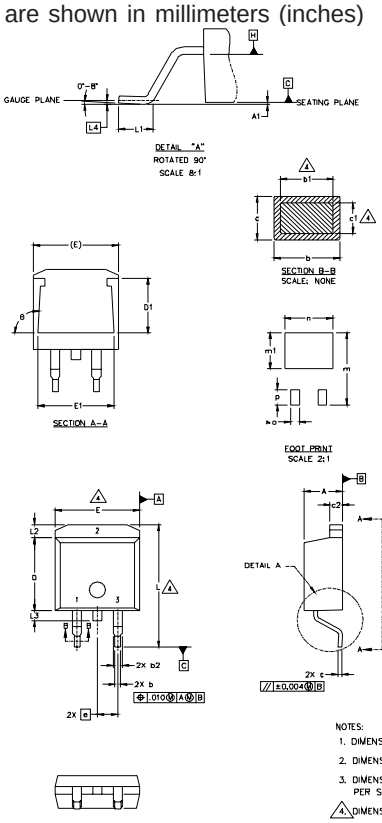
④ Pulse width ≤ 400µs; duty cycle ≤ 2%.

⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .

⑥ Limited by T_{Jmax} , see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.

D²Pak Package Outline

Dimensions are shown in millimeters (inches)



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

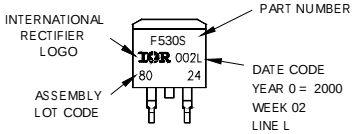
* PART DEPENDENT.

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.

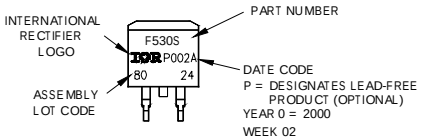
D²Pak Part Marking Information

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

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

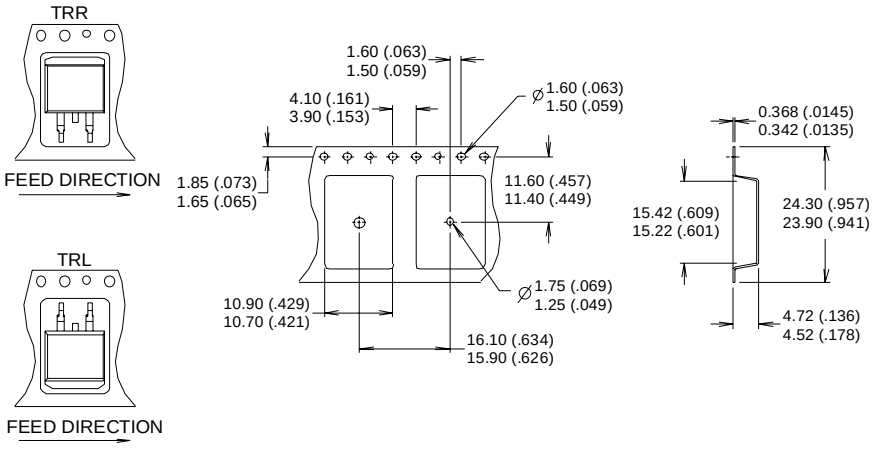


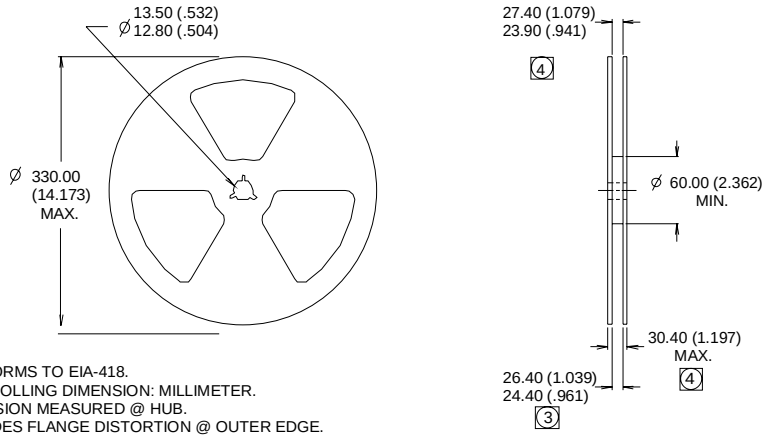
OR



D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)





NOTES :
1. COMFORMS 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.
This product has been designed and qualified for Industrial market.

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