International
IOR Rectifier

PD - 95539

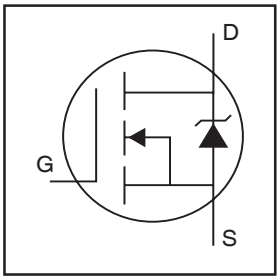
AUTOMOTIVE MOSFET

IRLZ44ZPbF
IRLZ44ZSPbF
IRLZ44ZLPbF

HEXFET® Power MOSFET

Features

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



V_{DSS} = 55V

$R_{DS(on)}$ = 13.5mΩ

I_D = 51A

Description

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

TO-220AB IRLZ44Z | D^2Pak IRLZ44ZS | TO-262 IRLZ44ZL

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	51	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	36	
I_{DM}	Pulsed Drain Current ①	204	
P_D @T_C = 25°C	Power Dissipation	80	W
	Linear Derating Factor	0.53	W/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy②	78	mJ
E_{AS} (Tested)	Single Pulse Avalanche Energy Tested Value ⑥	110	
I_{AR}	Avalanche Current ①	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy ⑤		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 ⑦	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑨	—	1.87	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat Greased Surface ⑦⑨	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient ⑦⑨	—	62	
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑧⑨	—	40	

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

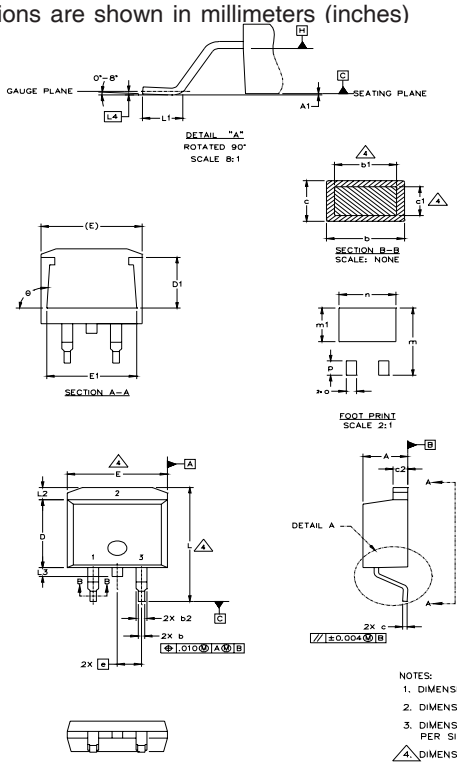
	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.05	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	11	13.5	mΩ	V_{GS} = 10V, I_D = 31A ③
		—	—	20	mΩ	V_{GS} = 5.0V, I_D = 30A ③
		—	—	22.5	mΩ	V_{GS} = 4.5V, I_D = 15A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250µA
gfs	Forward Transconductance	27	—	—	V	V_{DS} = 25V, I_D = 31A
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	V_{DS} = 55V, V_{GS} = 0V
		—	—	250		V_{DS} = 55V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V_{GS} = 16V
	Gate-to-Source Reverse Leakage	—	—	-200		V_{GS} = -16V
Q_g	Total Gate Charge	—	24	36		I_D = 31A
Q_{gs}	Gate-to-Source Charge	—	7.5	—	nC	V_{DS} = 44V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	12	—		V_{GS} = 5.0V ③
$t_{d(on)}$	Turn-On Delay Time	—	14	—		V_{DD} = 50V
t_r	Rise Time	—	160	—		I_D = 31A
$t_{d(off)}$	Turn-Off Delay Time	—	25	—	ns	R_G = 7.5 Ω
t_f	Fall Time	—	42	—		V_{GS} = 5.0V ③
L_D	Internal Drain Inductance	—	4.5	—		Between lead,
					nH	6mm (0.25in.)
L_S	Internal Source Inductance	—	7.5	—		from package
						and center of die contact
C_{iss}	Input Capacitance	—	1620	—		V_{GS} = 0V
C_{oss}	Output Capacitance	—	230	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	130	—	pF	f = 1.0MHz
C_{oss}	Output Capacitance	—	860	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	180	—		V_{GS} = 0V, V_{DS} = 44V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	—	280	—		V_{GS} = 0V, V_{DS} = 0V to 44V ④

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current	—	—	51		MOSFET symbol
	(Body Diode)				A	showing the
I_{SM}	Pulsed Source Current	—	—	204		integral reverse
	(Body Diode) ①					p-n junction diode.
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 31A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	21	32	ns	T_J = 25°C, I_F = 31A, V_{DD} = 28V
Q_{rr}	Reverse Recovery Charge	—	16	24	nC	di/dt = 100A/µs ③
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

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

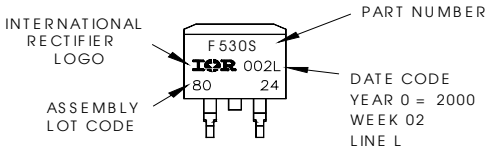
* PART DEPENDENT.

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.

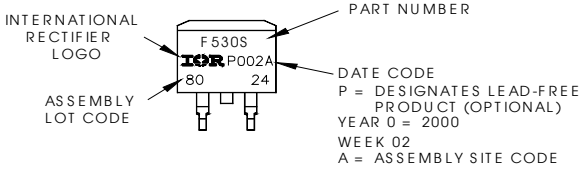
D²Pak Part Marking Information (Lead-Free)

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



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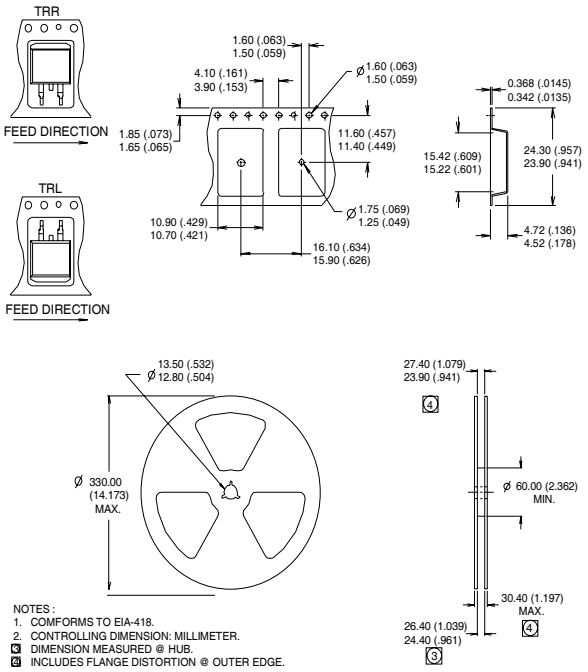
D²Pak Tape & Reel Infomation



Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.166mH R_G = 25Ω, I_{AS} = 31A, V_{GS} =10V. Part not recommended for use above this value.

③ Pulse width ≤ 1.0ms; duty cycle ≤ 2%.

④ 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} .

⑤ Limited by T_{Jmax} , see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.

⑥ This value determined from sample failure population. 100% tested to this value in production.

⑦ This is only applied to TO-220AB pakcage.

⑧ This is applied to D²Pak, when mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

⑨ R_θ is measured at T_J approximately 90°C

TO-220AB package is not recommended for Surface Mount Application.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Automotive [Q101]market.
Qualification Standards can be found on IR's Web site.

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