PD - 95250A

International
IOR Rectifier

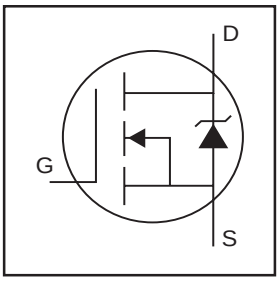
AUTOMOTIVE MOSFET

IRFL024ZPbF

HEXFET® Power MOSFET

Features

- Advanced Process Technology
- Ultra Low On-Resistance
- 150°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free



V_{DSS} = 55V

$R_{DS(on)}$ = 57.5mΩ

I_D = 5.1A

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 150°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.

SOT-223

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited) ⑦	5.1	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V ⑦	4.1	
I_{DM}	Pulsed Drain Current ①	41	
P_D @T_A = 25°C	Power Dissipation ⑦	2.8	W
P_D @T_A = 25°C	Power Dissipation ⑧	1.0	
	Linear Derating Factor ⑦	0.02	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy②	13	mJ
E_{AS} (Tested)	Single Pulse Avalanche Energy Tested Value ⑥	32	
I_{AR}	Avalanche Current ①	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy ⑤		mJ
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

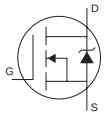
	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient (PCB mount, steady state) ⑦	—	45	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount, steady state) ⑧	—	120	
$R_{\theta JL}$	Junction-to-Drain Lead	—	15	

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	—	0.053	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	46.2	57.5	mΩ	V_{GS} = 10V, I_D = 3.1A ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
gfs	Forward Transconductance	6.2	—	—	S	V_{DS} = 25V, I_D = 3.1A
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} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V_{GS} = -20V
Q_g	Total Gate Charge	—	9.1	14		I_D = 3.1A
Q_{gs}	Gate-to-Source Charge	—	1.9	—	nC	V_{DS} = 44V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	3.9	—		V_{GS} = 10V ③
$t_{d(on)}$	Turn-On Delay Time	—	7.8	—		V_{DD} = 28V
t_r	Rise Time	—	21	—	ns	I_D = 3.1A
$t_{d(off)}$	Turn-Off Delay Time	—	30	—		R_G = 53 Ω
t_f	Fall Time	—	23	—		V_{GS} = 10V ③
C_{iss}	Input Capacitance	—	340	—		V_{GS} = 0V
C_{oss}	Output Capacitance	—	68	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	39	—	pF	f = 1.0MHz
C_{oss}	Output Capacitance	—	210	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	55	—		V_{GS} = 0V, V_{DS} = 44V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	—	93	—		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 (Body Diode)	—	—	5.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	41		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 3.1A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	15	23	ns	T_J = 25°C, I_F = 3.1A, V_{DD} = 28V
Q_{rr}	Reverse Recovery Charge	—	9.8	15	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)				



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 = 2.8mH R_G = 25Ω, I_{AS} = 3.1A, 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.

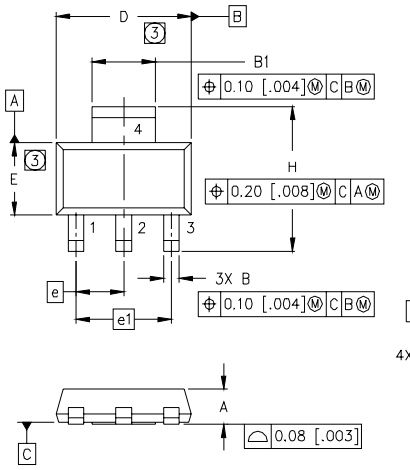
⑥ This value determined from sample failure population. 100% tested to this value in production.

⑦ When mounted on 1 inch square copper board.

⑧ When mounted on FR-4 board using minimum recommended footprint.

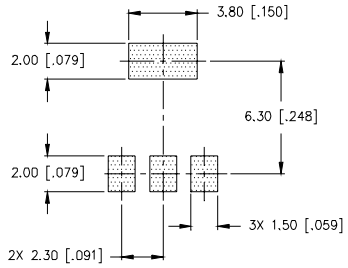
SOT-223 (TO-261AA) Package Outline

Dimensions are shown in milimeters (inches)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.55	1.80	.061	.071
B	0.65	0.85	.026	.033
B1	2.95	3.15	.116	.124
C	0.25	0.35	.010	.014
D	6.30	6.70	.248	.264
E	3.30	3.70	.130	.146
e	2.30 BSC		.0905 BSC	
e1	4.60 BSC		.181 BSC	
H	6.71	7.29	.264	.287
L	0.91	—	.036	—
L1	0.061 BSC		.0024 BSC	
θ	—	10°	—	10°

MINIMUM RECOMMENDED FOOTPRINT



LEAD ASSIGNMENTS

1 = GATE
2 = DRAIN
3 = SOURCE
4 = DRAIN

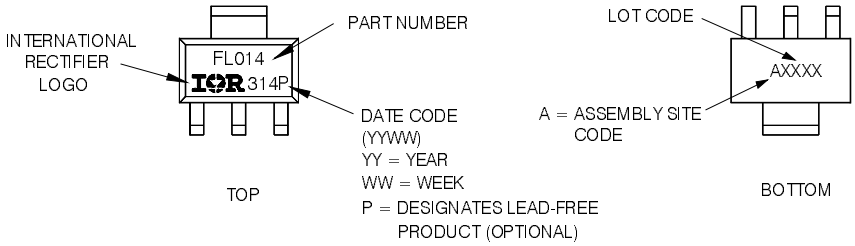
NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD FLASH.
4. OUTLINE CONFORMS TO JEDEC OUTLINE TO-261AA.
5. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

SOT-223 (TO-261AA) Part Marking Information

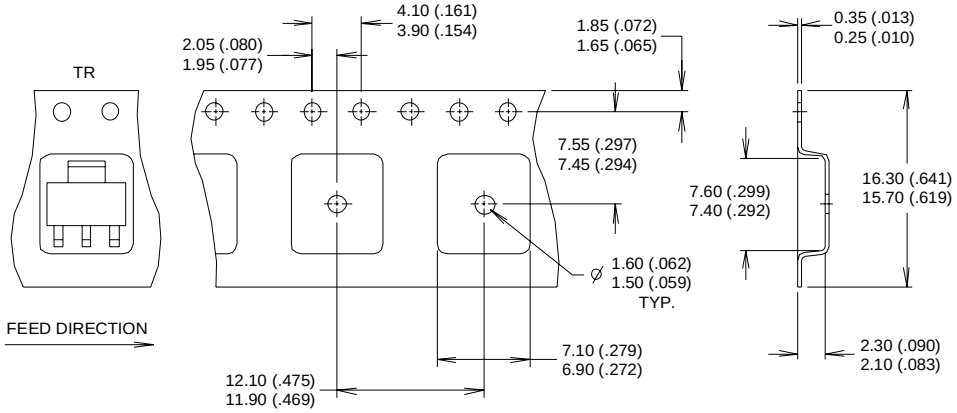
HEXFET PRODUCT MARKING

EXAMPLE: THIS IS AN IRFL014

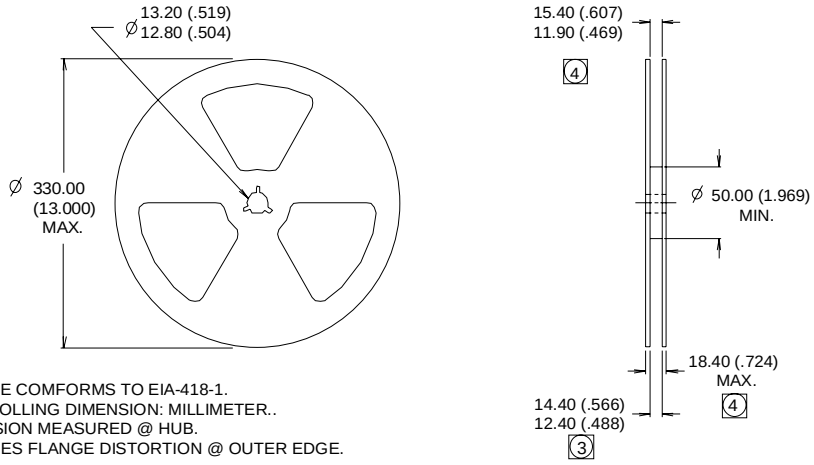


SOT-223 (TO-261AA) Tape & Reel Information

Dimensions are shown in milimeters (inches)



NOTES :
1. CONTROLLING DIMENSION: MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.
3. EACH Ø330.00 (13.00) REEL CONTAINS 2,500 DEVICES.



NOTES :
1. OUTLINE COMFORMS TO EIA-418-1.
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 for the Automotive [Q101] market.
Qualification Standards can be found on IR's Web site.

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