

# IRFL4315PbF

HEXFET® Power MOSFET

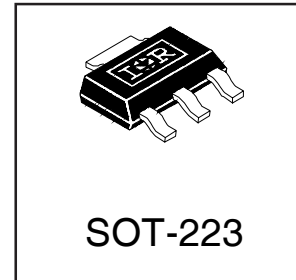
## Applications

- High frequency DC-DC converters

$V_{DSS}$	$R_{DS(on) \text{ max}}$	$I_D$
150V	185mΩ@ $V_{GS} = 10V$	2.6A

## Benefits

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective  $C_{OSS}$  to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current
- Lead-Free



## Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.6	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.1	
$I_{DM}$	Pulsed Drain Current ①	21	
$P_D @ T_A = 25^\circ C$	Power Dissipation②	2.8	W
	Linear Derating Factor	0.02	W/°C
$V_{GS}$	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	6.3	V/ns
$T_J$	Operating Junction and Storage Temperature Range	-55 to + 150	°C
$T_{STG}$			

## Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state)④	—	45	°C/W

Notes ① through ⑥ are on page 8  
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## Static @ 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	150	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient	—	0.19	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA ③
R <sub>DSON</sub>	Static Drain-to-Source On-Resistance	—	—	185	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.6A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	3.0	—	5.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	25	μA	V <sub>DS</sub> = 150V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 120V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 30V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -30V

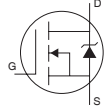
## Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)

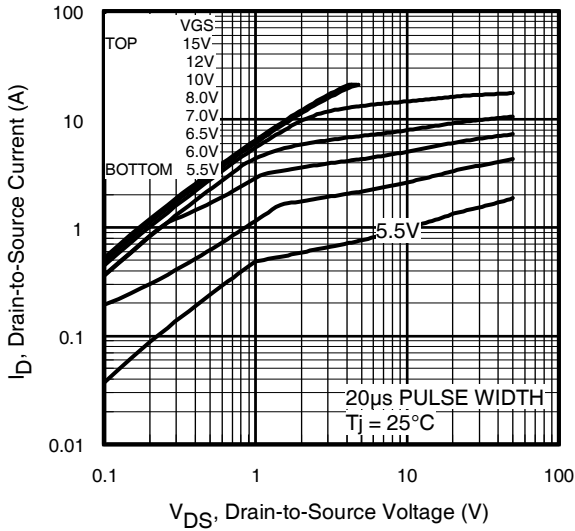
	Parameter	Min.	Typ.	Max.	Units	Conditions
g <sub>fs</sub>	Forward Transconductance	3.5	—	—	S	V <sub>DS</sub> = 50V, I <sub>D</sub> = 1.6A
Q <sub>g</sub>	Total Gate Charge	—	12	19	nC	I <sub>D</sub> = 1.6A
Q <sub>gs</sub>	Gate-to-Source Charge	—	2.1	3.1		V <sub>DS</sub> = 120V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	6.8	10		V <sub>GS</sub> = 10V
t <sub>d(on)</sub>	Turn-On Delay Time	—	8.4	—	ns	V <sub>DD</sub> = 75V
t <sub>r</sub>	Rise Time	—	21	—		I <sub>D</sub> = 1.6A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	20	—		R <sub>G</sub> = 15Ω
t <sub>f</sub>	Fall Time	—	19	—		V <sub>GS</sub> = 10V ③
C <sub>iss</sub>	Input Capacitance	—	420	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	100	—		V <sub>DS</sub> = 25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	25	—		f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	720	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1.0V, f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	48	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 120V, f = 1.0MHz
C <sub>oss eff.</sub>	Effective Output Capacitance	—	98	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 120V ③

## Avalanche Characteristics

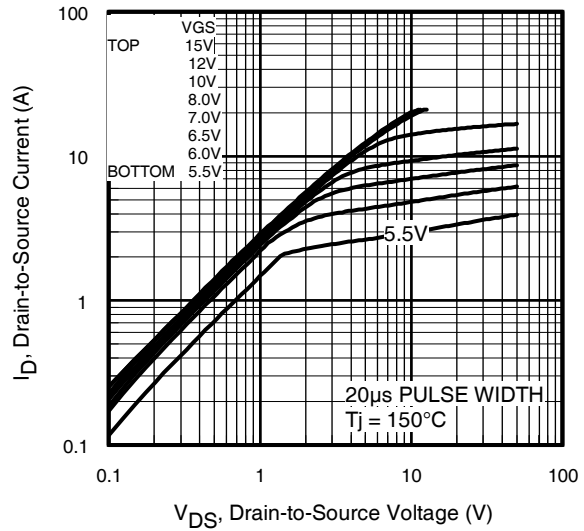
	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②	—	38	mJ
I <sub>AR</sub>	Avalanche Current①	—	3.1	A

## Diode Characteristics

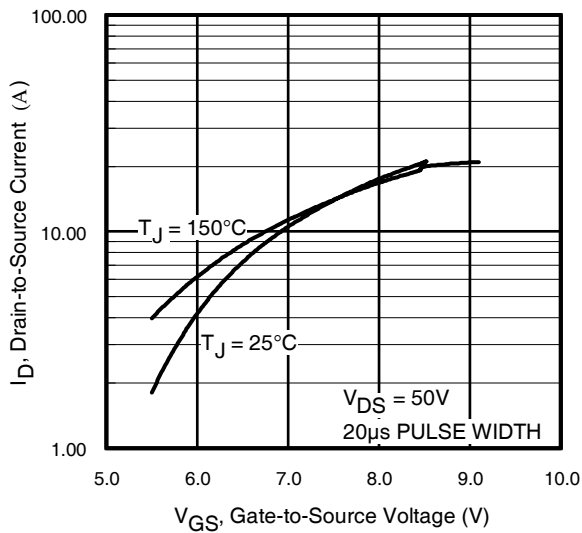
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	2.6	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	21		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.5	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 2.1A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	61	91	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 1.6A
Q <sub>rr</sub>	Reverse Recovery Charge	—	160	240	nC	di/dt = 100A/μs ③



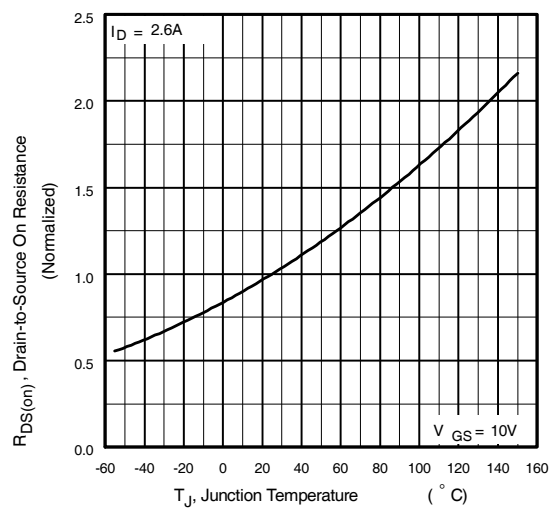
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



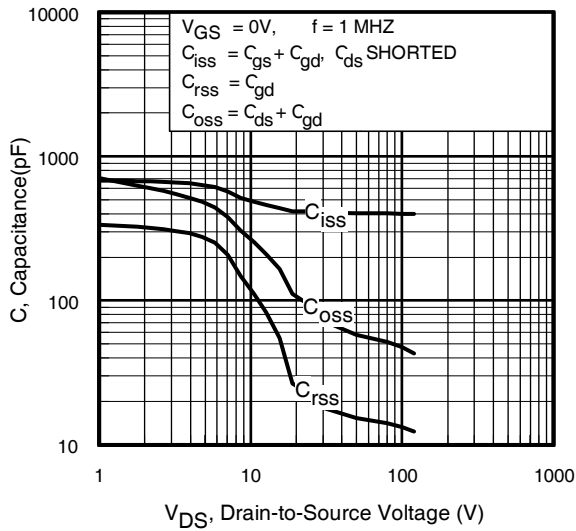
**Fig 3.** Typical Transfer Characteristics



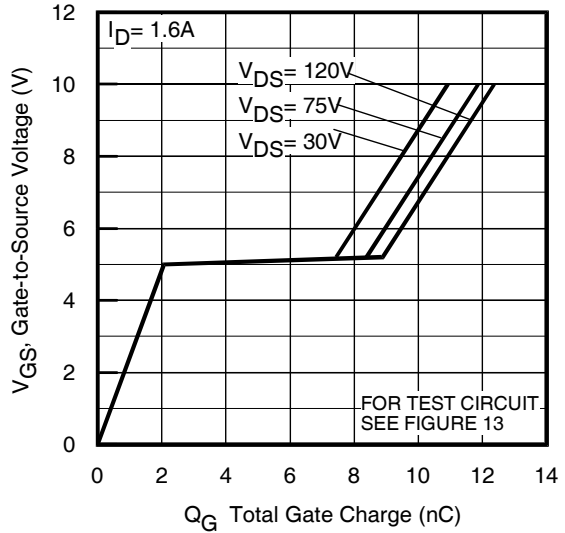
**Fig 4.** Normalized On-Resistance Vs. Temperature

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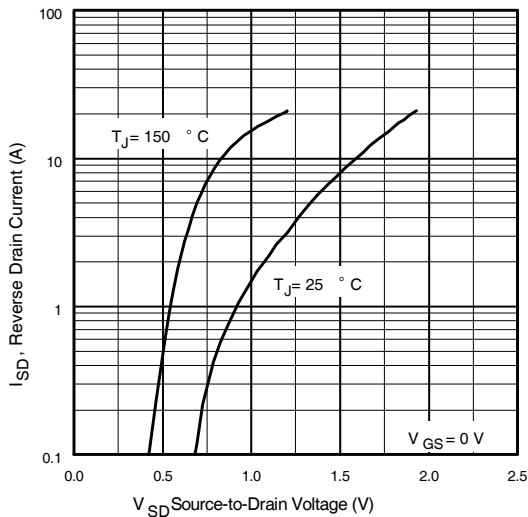
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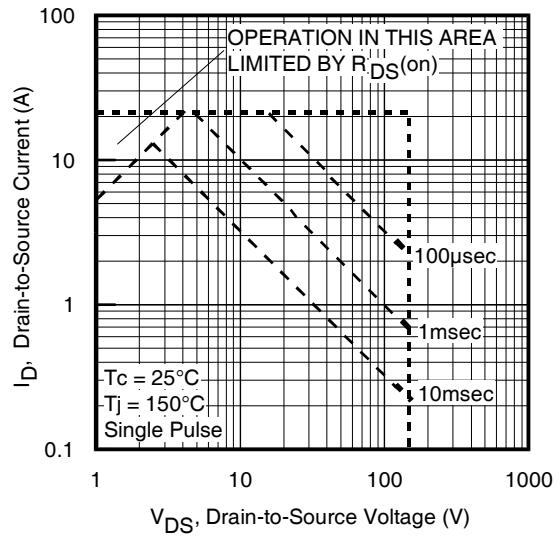
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



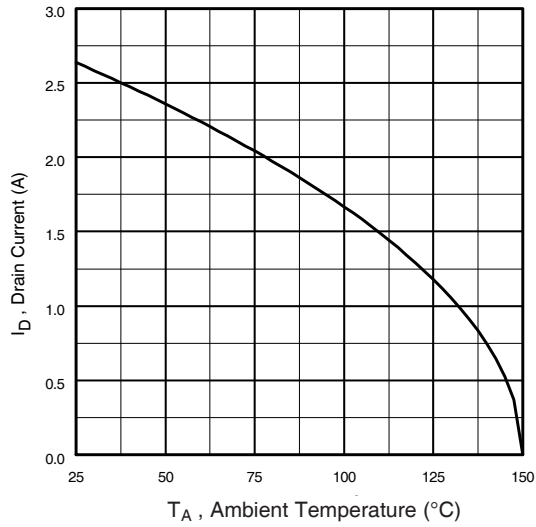
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



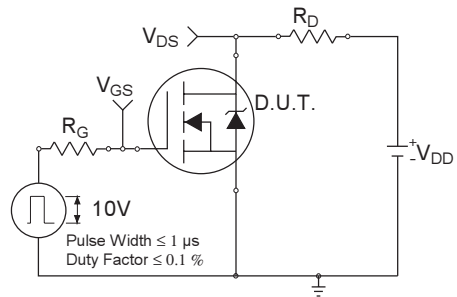
**Fig 7.** Typical Source-Drain Diode Forward Voltage



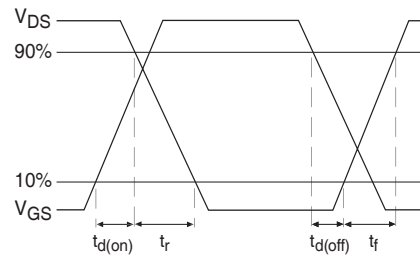
**Fig 8.** Maximum Safe Operating Area



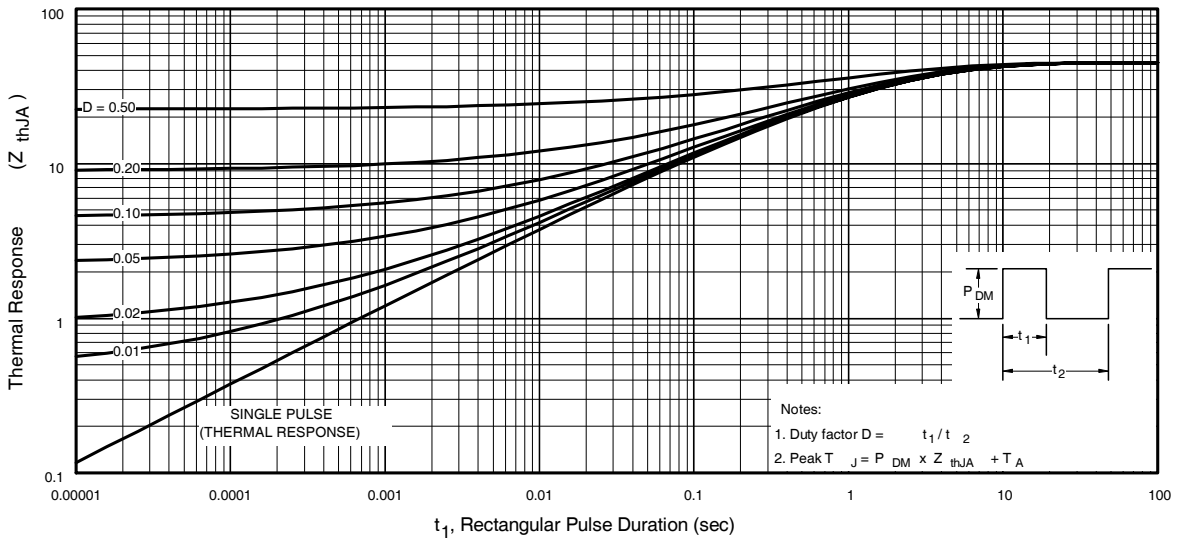
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



**Fig 10a.** Switching Time Test Circuit



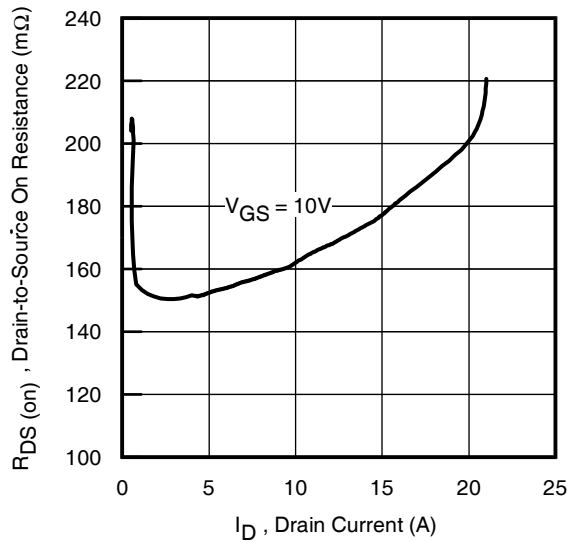
**Fig 10b.** Switching Time Waveforms



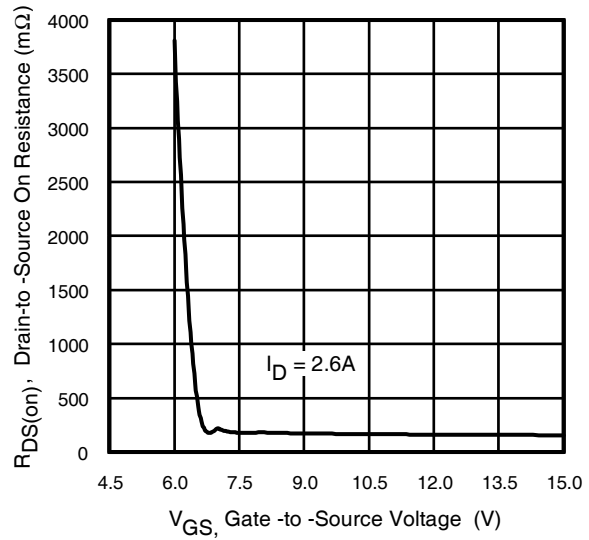
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

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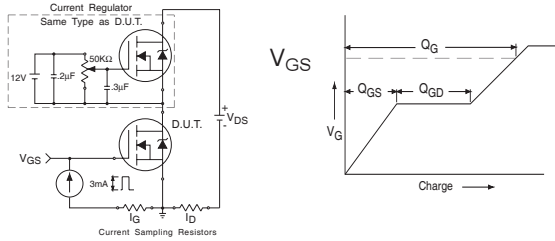
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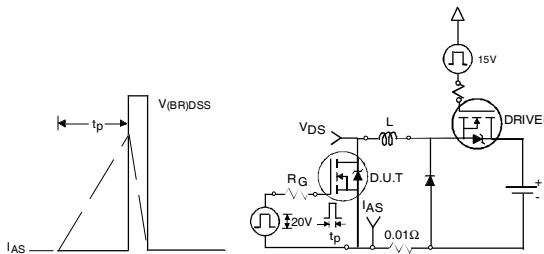
**Fig 12.** On-Resistance Vs. Drain Current



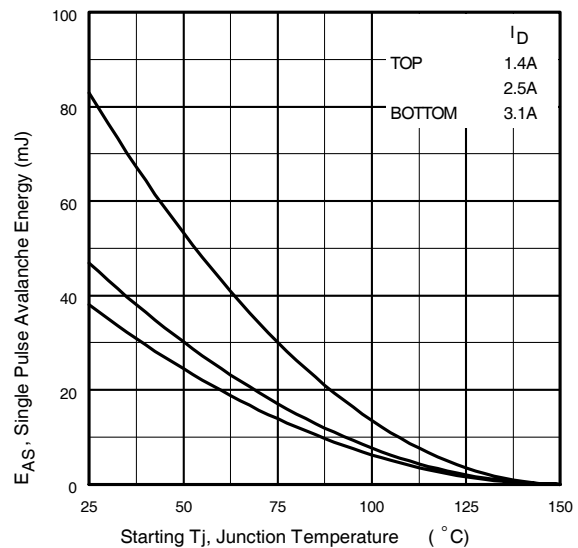
**Fig 13.** On-Resistance Vs. Gate Voltage



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



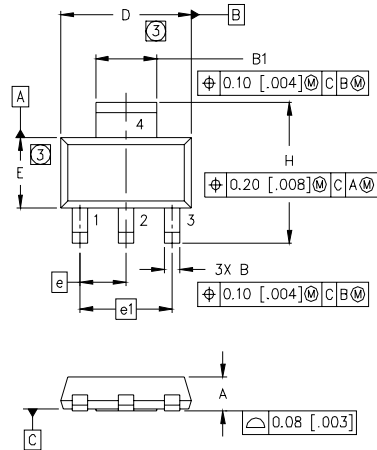
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

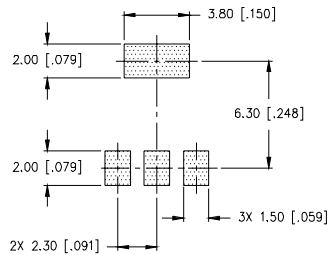
## SOT-223 (TO-261AA) Package Outline

Dimensions are shown in millimeters (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

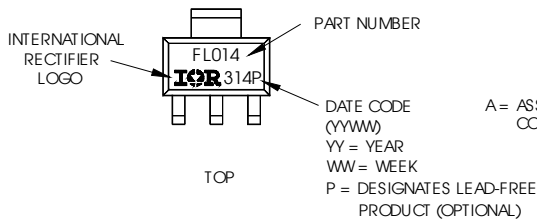
### NOTES:

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



### Notes:

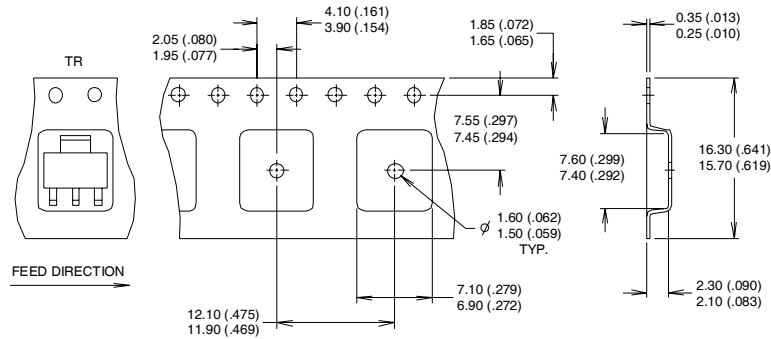
1. For an Automotive Qualified version of this part please see <http://www.irf.com/product-info/auto/>
2. For the most current drawing please refer to IR website at <http://www.irf.com/package/>

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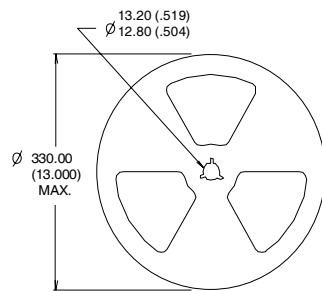
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## SOT-223 (TO-261AA) Tape & Reel Information

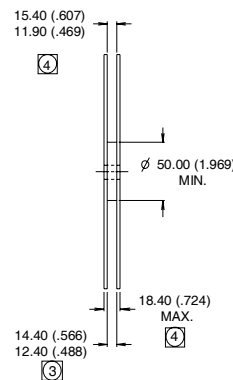
Dimensions are shown in millimeters (inches)



- NOTES :
1. CONTROLLING DIMENSION: MILLIMETER.
  2. OUTLINE CONFORMS TO EIA-481 & EIA-541.
  3. EACH  $\varnothing 330.00$  (13.00) REEL CONTAINS 2,500 DEVICES.



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



### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 7.8\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 3.1\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.
- 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  $I_{SD} \leq 1.6\text{A}$ ,  $di/dt \leq 230\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  
 $T_J \leq 150^\circ\text{C}$ .

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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