International
IOR Rectifier

PD - 94445

IRFL4315

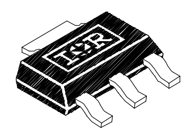
SMPS MOSFET

HEXFET® Power MOSFET

Applications
- High frequency DC-DC converters

V_{DSS}	$R_{DS(on)}$ 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



SOT-223

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	2.6	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	2.1	A
I_{DM}	Pulsed Drain Current ①	21	
P_D @T_A = 25°C	Power Dissipation④	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 ⑥	6.3	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

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

06/14/02

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	150	——	——	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.19	——	V/°C	Reference to 25°C, I_D = 1mA ③
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	185	mΩ	V_{GS} = 10V, I_D = 1.6A ③
$V_{GS(th)}$	Gate Threshold Voltage	3.0	——	5.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	25	µA	V_{DS} = 150V, V_{GS} = 0V
		——	——	250		V_{DS} = 120V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 30V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -30V

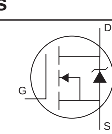
Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	3.5	——	——	S	V_{DS} = 50V, I_D = 1.6A
Q_g	Total Gate Charge	——	12	19	nC	I_D = 1.6A
Q_{gs}	Gate-to-Source Charge	——	2.1	3.1		V_{DS} = 120V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	6.8	10		V_{GS} = 10V
$t_{d(on)}$	Turn-On Delay Time	——	8.4	——	ns	V_{DD} = 75V
t_r	Rise Time	——	21	——		I_D = 1.6A
$t_{d(off)}$	Turn-Off Delay Time	——	20	——		R_G = 15Ω
t_f	Fall Time	——	19	——		V_{GS} = 10V ③
C_{iss}	Input Capacitance	——	420	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	100	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	25	——		f = 1.0MHz
C_{oss}	Output Capacitance	——	720	——		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	——	48	——		V_{GS} = 0V, V_{DS} = 120V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	——	98	——		V_{GS} = 0V, V_{DS} = 0V to 120V ⑤

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	38	mJ
I_{AR}	Avalanche Current①	——	3.1	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	2.6	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	21		
V_{SD}	Diode Forward Voltage	——	——	1.5	V	T_J = 25°C, I_S = 2.1A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	61	91	ns	T_J = 25°C, I_F = 1.6A
Q_{rr}	Reverse RecoveryCharge	——	160	240	nC	di/dt = 100A/µs ③

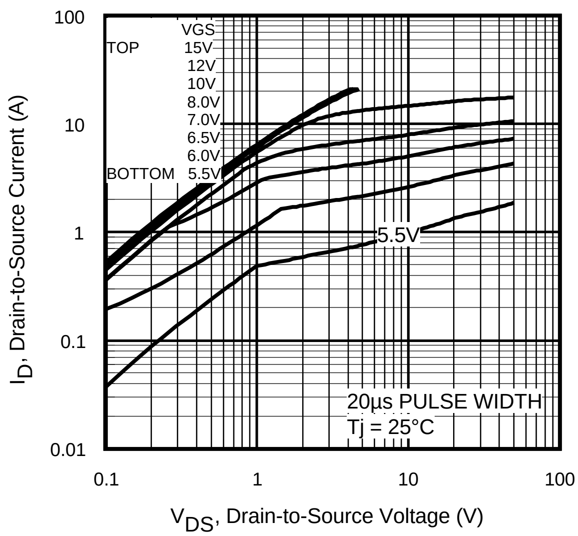


Fig 1. Typical Output Characteristics

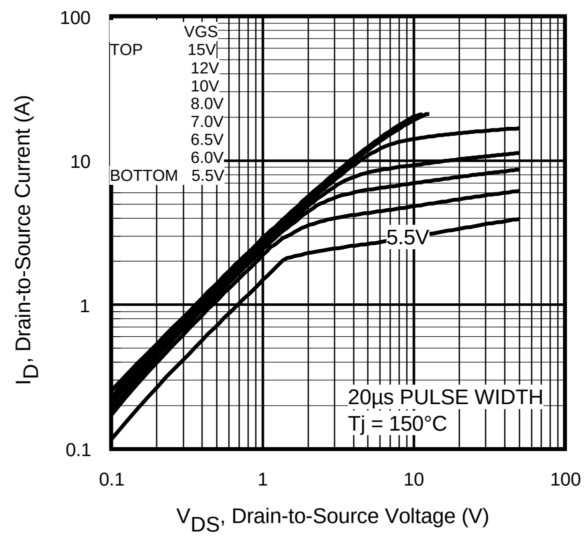


Fig 2. Typical Output Characteristics

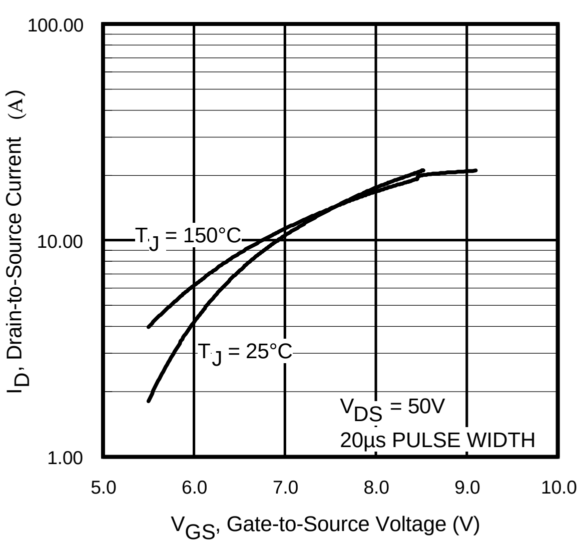


Fig 3. Typical Transfer Characteristics

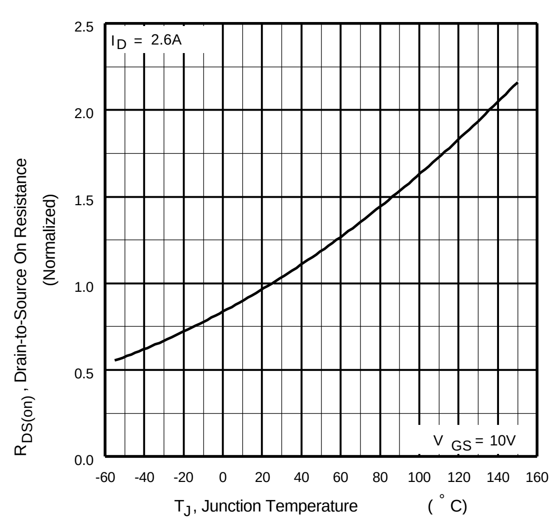


Fig 4. Normalized On-Resistance Vs. Temperature

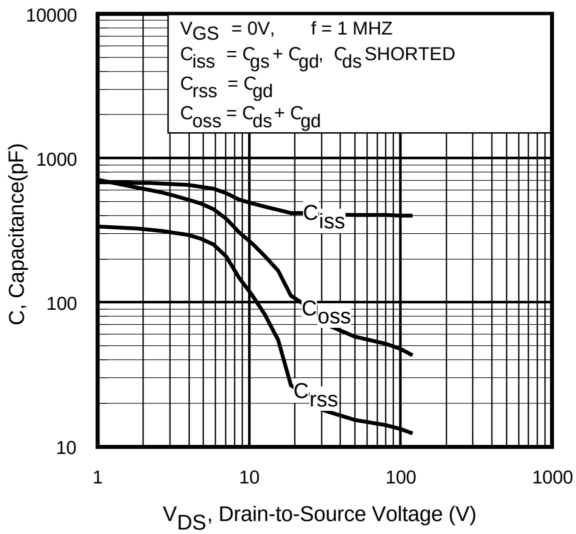


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

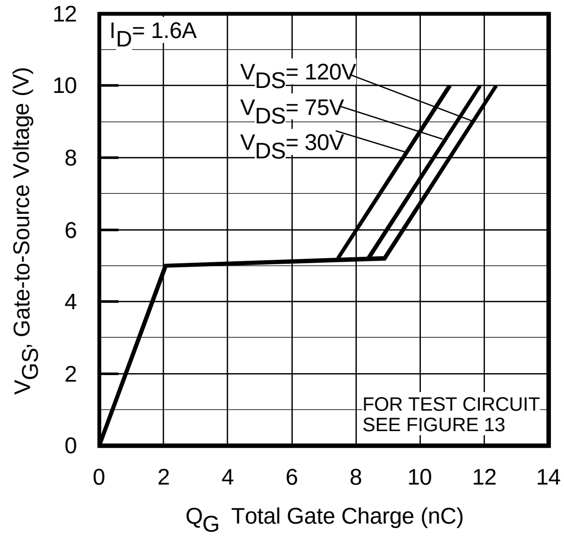


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

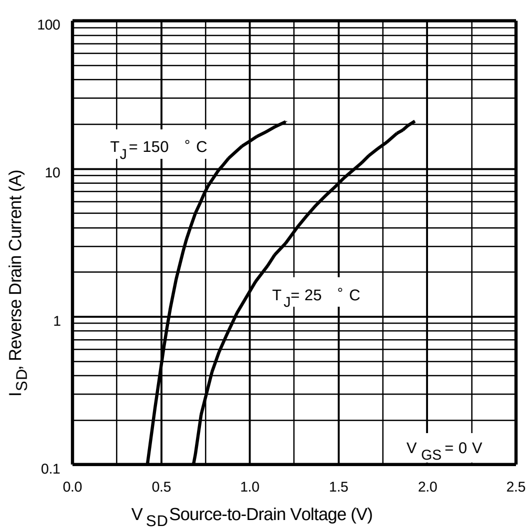


Fig 7. Typical Source-Drain Diode Forward Voltage

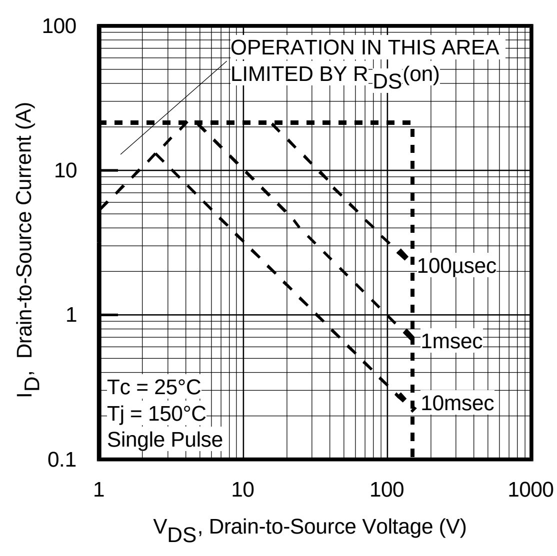


Fig 8. Maximum Safe Operating Area

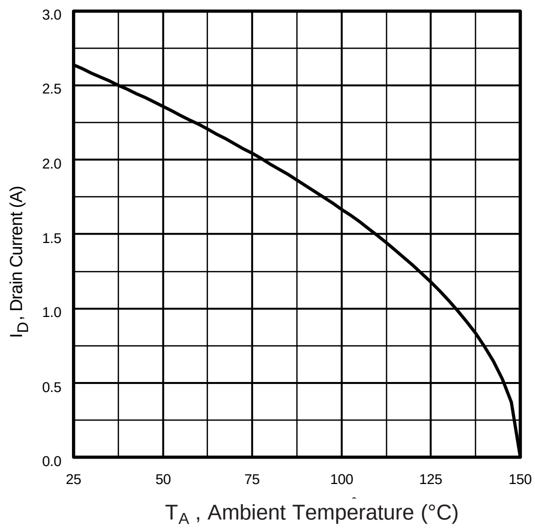


Fig 9. Maximum Drain Current Vs. Ambient Temperature

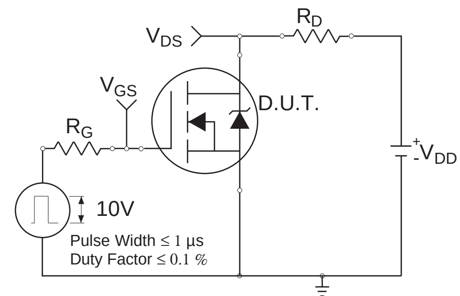


Fig 10a. Switching Time Test Circuit

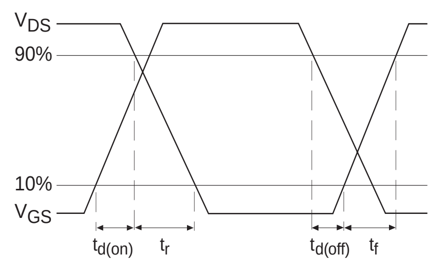


Fig 10b. Switching Time Waveforms

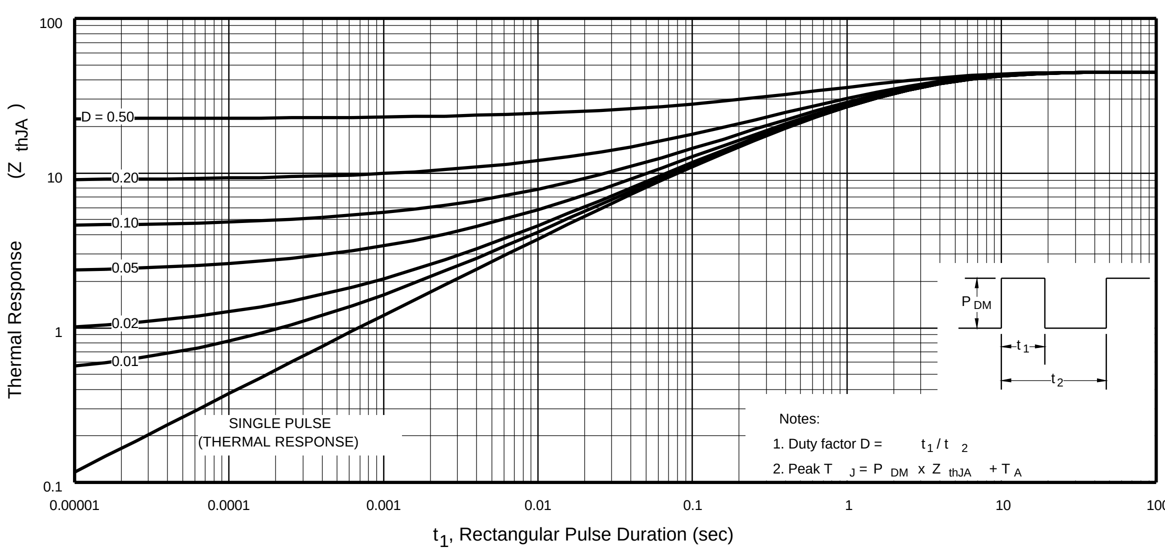


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

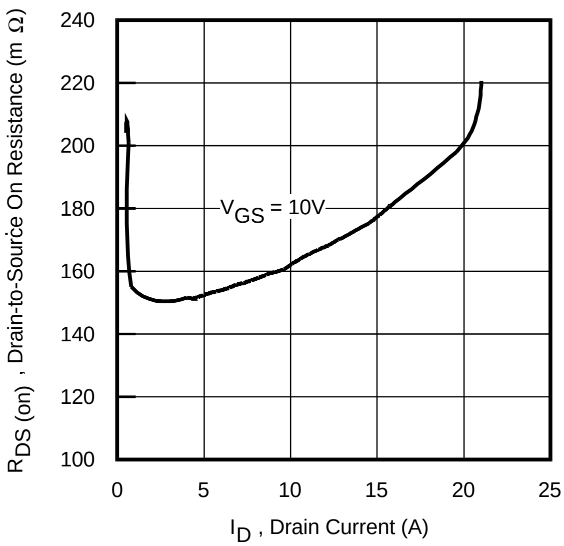


Fig 12. On-Resistance Vs. Drain Current

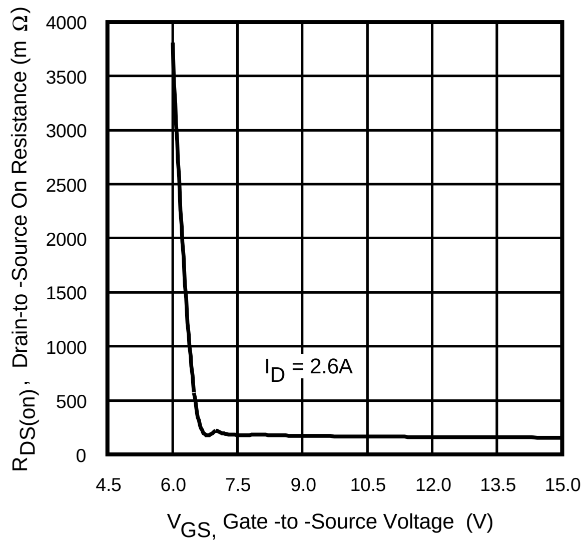


Fig 13. On-Resistance Vs. Gate Voltage

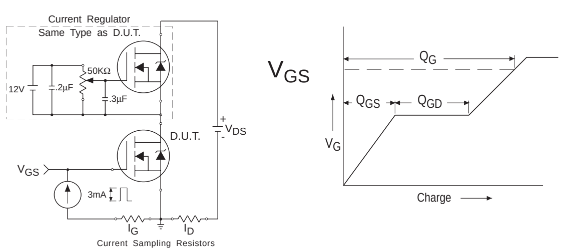


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform

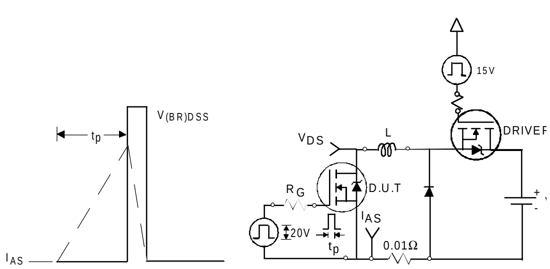


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

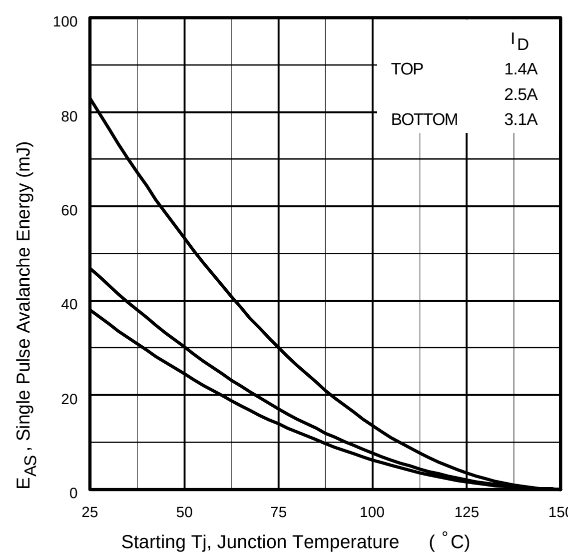
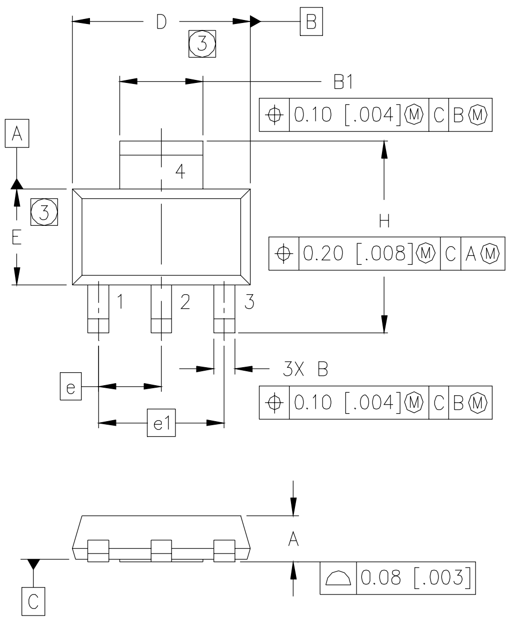
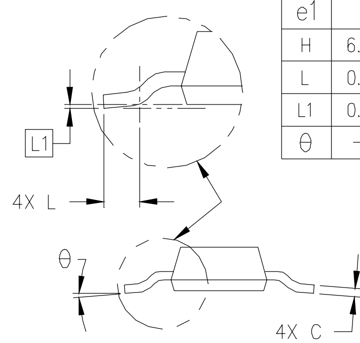


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

Package Outline

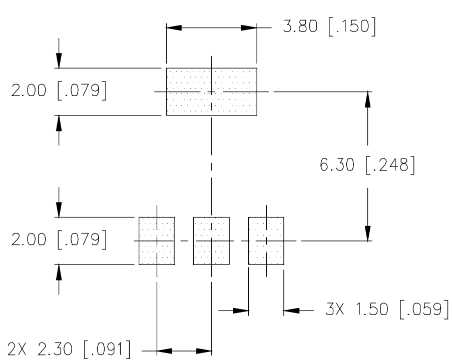
SOT-223 (TO-261AA) Outline





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

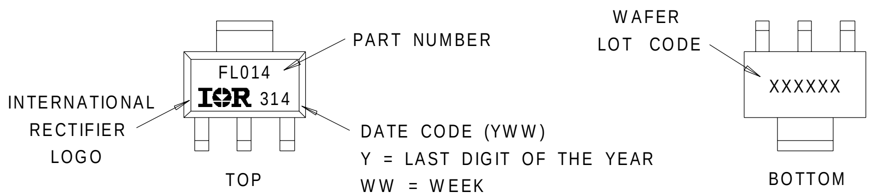
NOTES:

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].

Part Marking Information

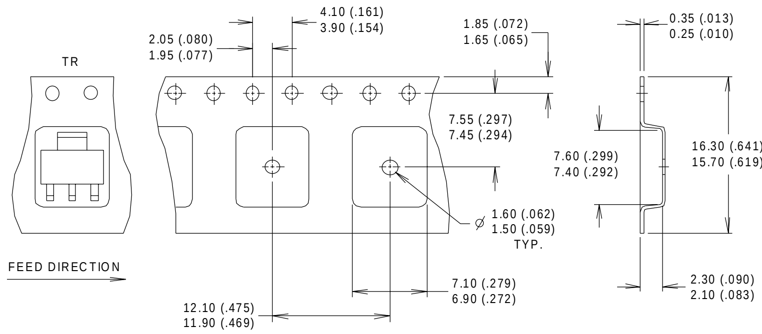
SOT-223

EXAMPLE: THIS IS AN IRFL014

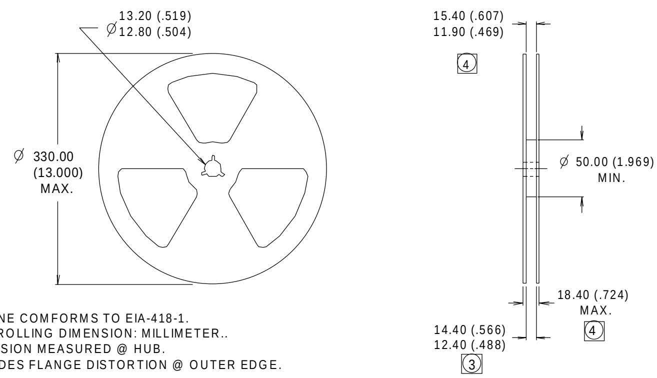


Tape & Reel Information

SOT-223 Outline



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.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting $T_J = 25°C$, L = 7.8mH $R_G = 25\Omega$, $I_{AS} = 3.1A$.

③ Pulse width ≤ 400µs; duty cycle ≤ 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 $I_{SD} \leq 1.6A$, di/dt ≤ 230A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150°C$.

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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