International
IOR Rectifier

AUTOMOTIVE GRADE

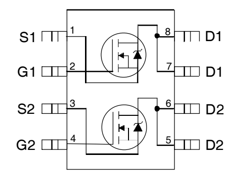
PD - 97751

AUIRF7313Q

HEXFET® Power MOSFET

Features

- Advanced Planar Technology
- Dual N Channel MOSFET
- Low On-Resistance
- Dynamic dV/dT Rating
- 175°C Operating Temperature
- Fast Switching
- Lead-Free, RoHS Compliant
- Automotive Qualified*



Top View

$V_{(BR)DSS}$	30V
$R_{DS(on)}$ typ.	23mΩ
max.	29mΩ
I_D	6.9A

Description

Specifically designed for Automotive applications, this cellular design of HEXFET® Power MOSFETs utilizes the latest processing techniques to achieve low on-resistance per silicon area. This benefit combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in Automotive and a wide variety of other applications.


SO-8
AUIRF7313Q

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	30	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	6.9	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	5.8	
I_{DM}	Pulsed Drain Current ①	58	
P_D @T_A = 25°C	Power Dissipation	2.4	W
	Linear Derating Factor	0.02	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	450	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.6	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤⑥	62.5	

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*Qualification standards can be found at http://www.irf.com/

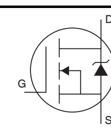
Static Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	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	——	0.03	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	23	29	mΩ	V_{GS} = 10V, I_D = 6.9A ④
		——	32	46		V_{GS} = 4.5V, I_D = 5.5A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
gfs	Forward Transconductance	7.5	——	——	S	V_{DS} = 15V, I_D = 3.5A
I_{DSS}	Drain-to-Source Leakage Current	——	——	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
		——	——	25		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	-100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	100		V_{GS} = -20V

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge	——	22	33	nC	I_D = 3.5A
Q_{gs}	Gate-to-Source Charge	——	2.6	3.9		V_{DS} = 15V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	6.8	10		V_{GS} = 10V ④
$t_{d(on)}$	Turn-On Delay Time	——	3.7	——	ns	V_{DD} = 15V
t_r	Rise Time	——	7.3	——		I_D = 3.5A
$t_{d(off)}$	Turn-Off Delay Time	——	21	——		R_G = 6.8Ω
t_f	Fall Time	——	11	——		V_{GS} =10V ④
C_{iss}	Input Capacitance	——	755	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	310	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	120	——		f = 1.0MHz

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	3.0	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	58		
V_{SD}	Diode Forward Voltage	——	——	1.0	V	T_J = 25°C, I_S = 3.5A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	27	40	ns	T_J = 25°C,I_F = 3.5A
Q_{rr}	Reverse Recovery Charge	——	43	65	nC	di/dt = 100A/μs ④

Notes:

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

② Limited by T_{Jmax}, starting T_J = 25°C, L = 76mH, R_G = 50Ω, I_{AS} = 3.5A, V_{GS} =10V. Part not recommended for use above this value.

③ $I_{SD} \leq$ 3.5A, di/dt ≤ 590A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C.

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

⑤ When mounted on 1 inch square copper board.

⑥ R_θ is measured at T_J of approximately 90°C.

Qualification Information†

<table>
<tr><td colspan="2" rowspan="2">Qualification Level</td><td colspan="2">Automotive
(per AEC-Q101) ††</td></tr>
<tr><td colspan="2">Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.</td></tr>
<tr><td colspan="2">Moisture Sensitivity Level</td><td>SO-8</td><td>MSL1</td></tr>
<tr><td rowspan="3">ESD</td><td>Machine Model</td><td colspan="2">Class M1B (+/- 100 V)†††
AEC-Q101-002</td></tr>
<tr><td>Human Body Model</td><td colspan="2">Class H1A (+/- 500 V)†††
AEC-Q101-001</td></tr>
<tr><td>Charged Device Model</td><td colspan="2">Class C5 (+/- 2000 V)†††
AEC-Q101-005</td></tr>
<tr><td colspan="2">RoHS Compliant</td><td colspan="2">Yes</td></tr>
</table>

† Qualification standards can be found at International Rectifier's web site: http//www.irf.com/

†† Exceptions (if any) to AEC-Q101 requirements are noted in the qualification report.

††† Highest passing voltage

Ordering Information

Base part number	Package Type	Standard Pack		Complete Part Number
		Form	**Quantity**	
AUIRF7313Q	SO-8	Tube	95	AUIRF7313Q
		Tape and Reel	4000	AUIRF7313QTR

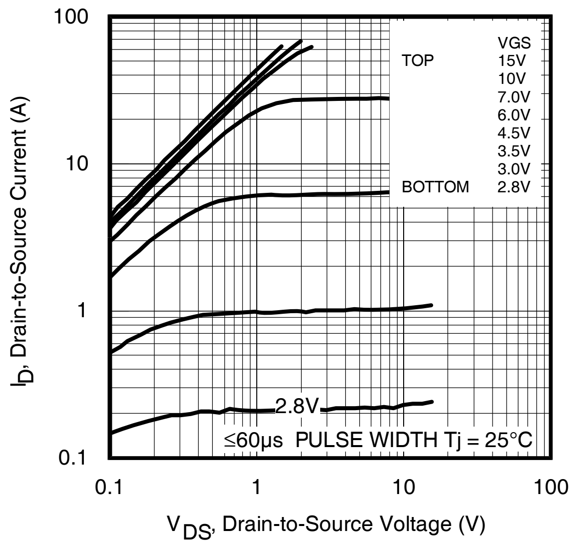


Fig 1. Typical Output Characteristics

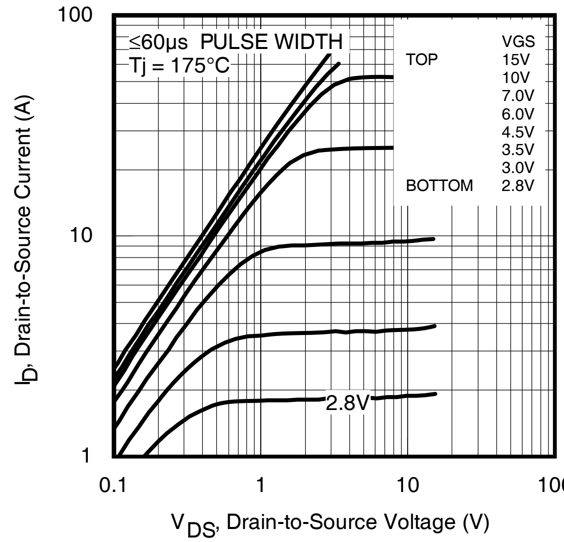


Fig 2. Typical Output Characteristics

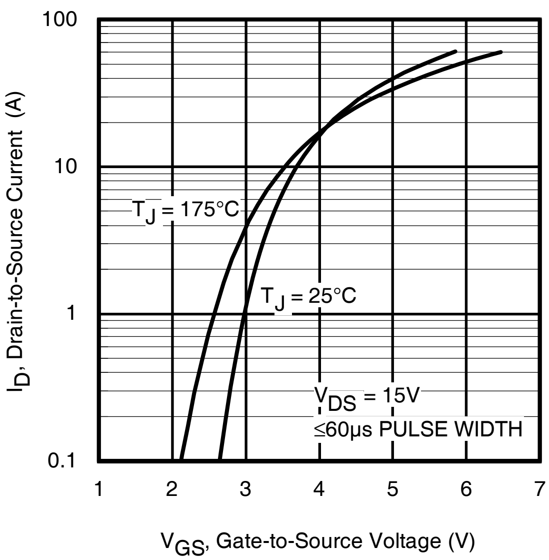


Fig 3. Typical Transfer Characteristics

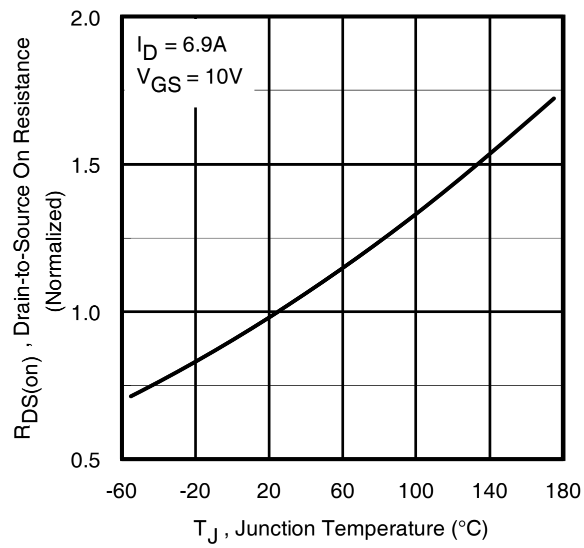


Fig 4. Normalized On-Resistance Vs. Temperature

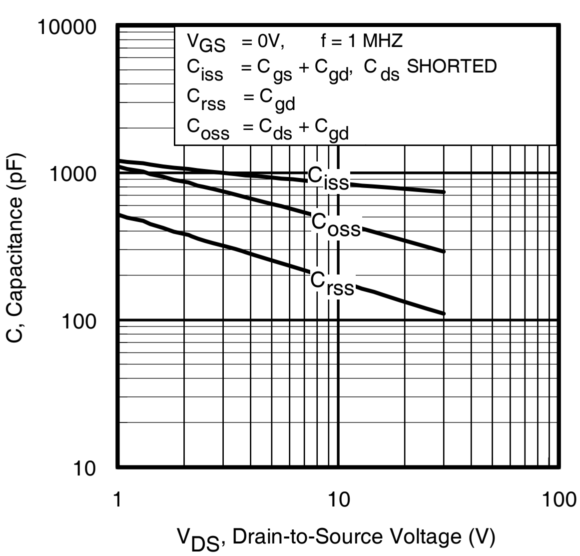


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

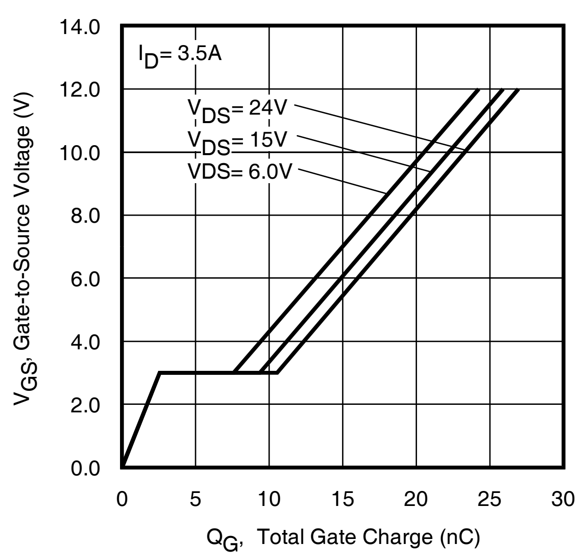


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

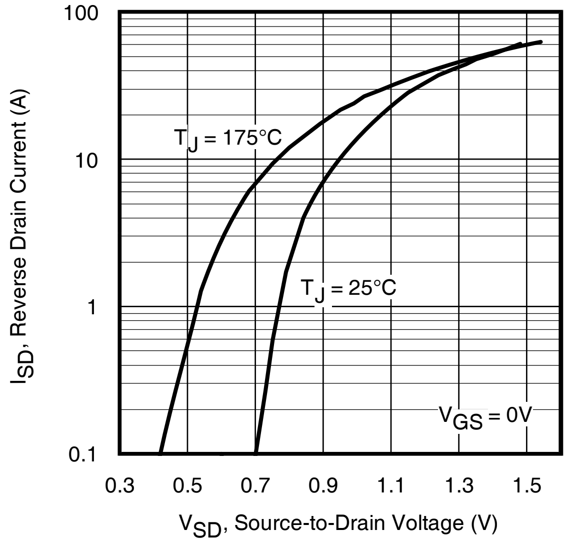


Fig 7. Typical Source-Drain Diode Forward Voltage

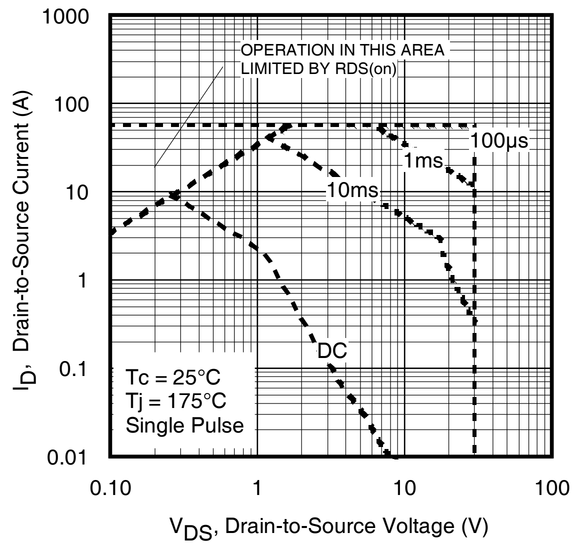


Fig 8. Maximum Safe Operating Area

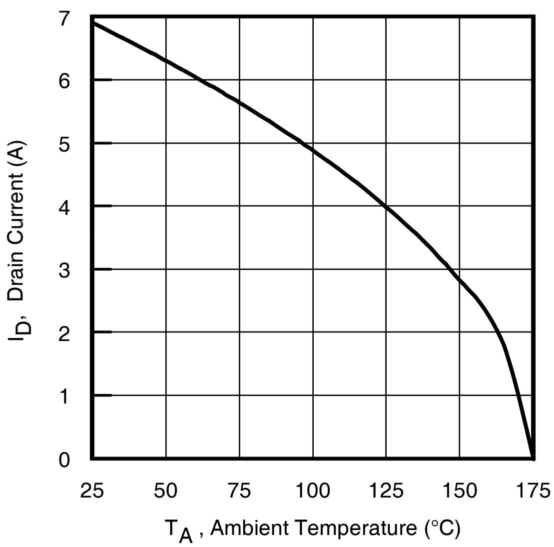


Fig 9. Maximum Drain Current Vs. Ambient Temperature

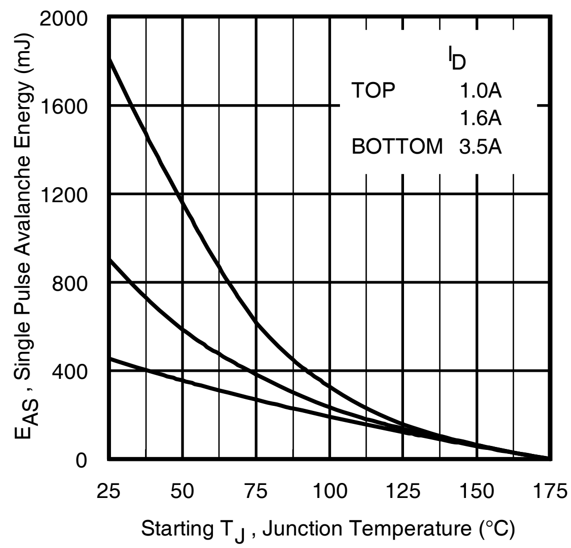


Fig 10. Maximum Avalanche Energy vs. DrainCurrent

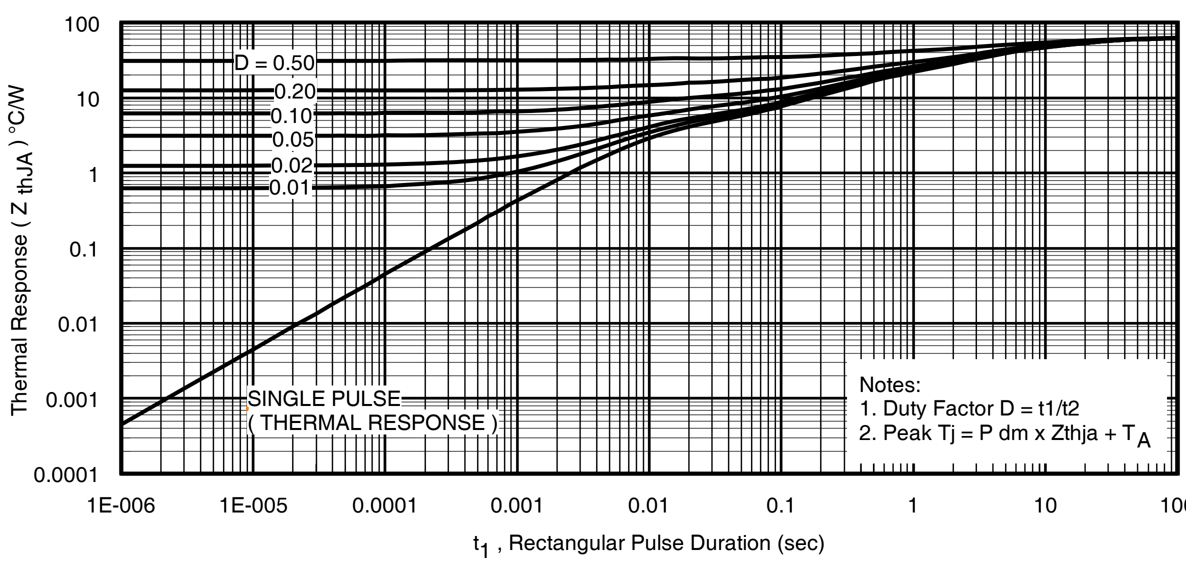


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

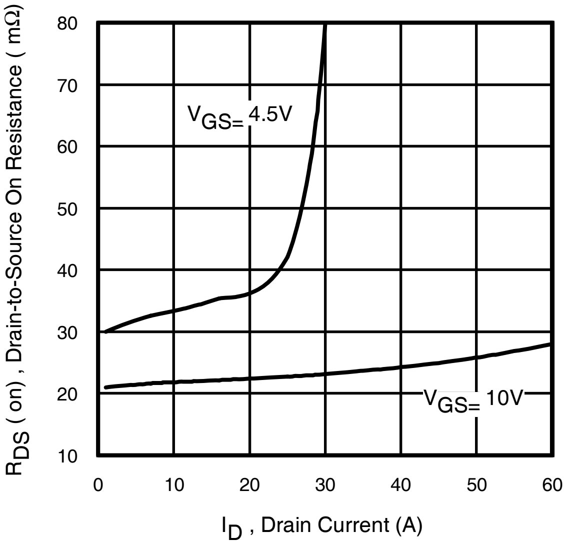


Fig 12. Typical On-Resistance Vs. Drain Current

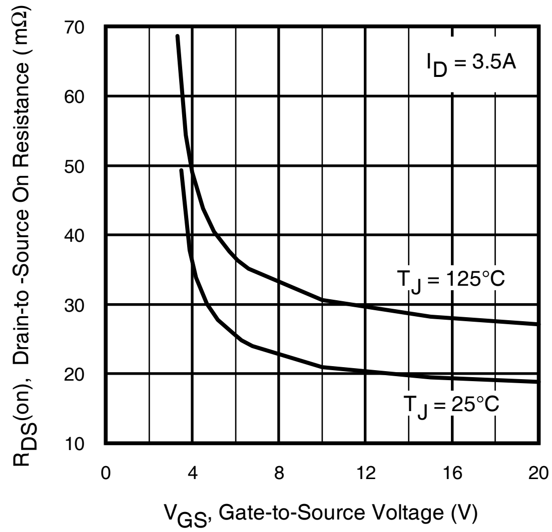


Fig 13. Typical On-Resistance Vs. Gate Voltage

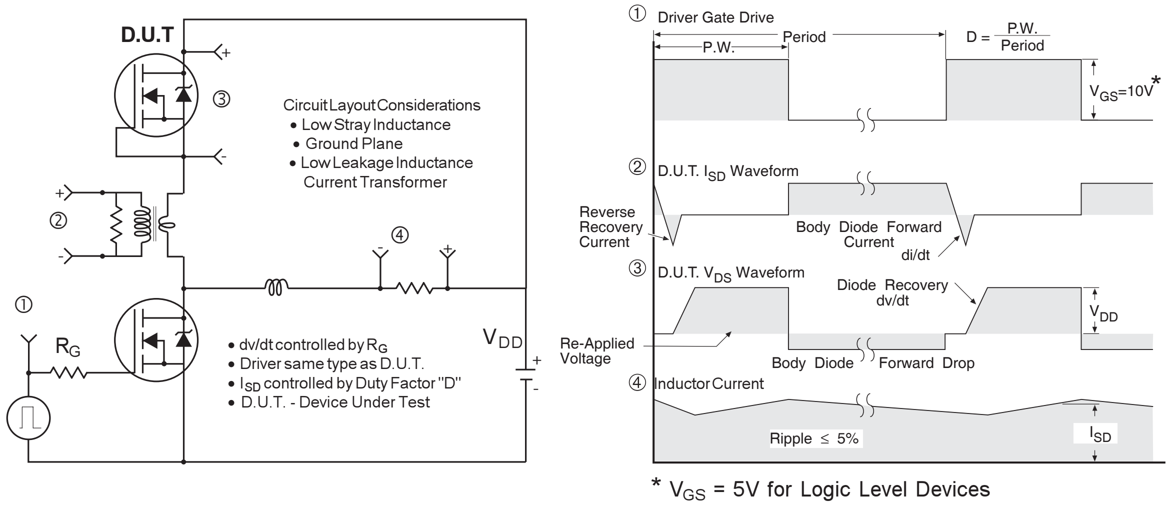


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

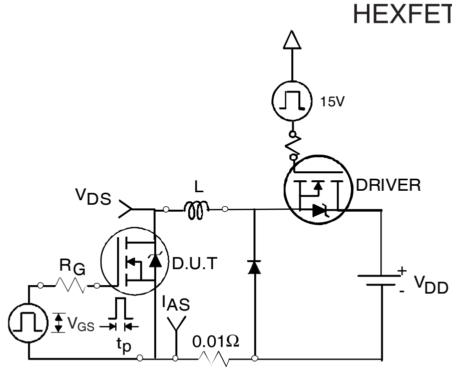


Fig 15a. Unclamped Inductive Test Circuit

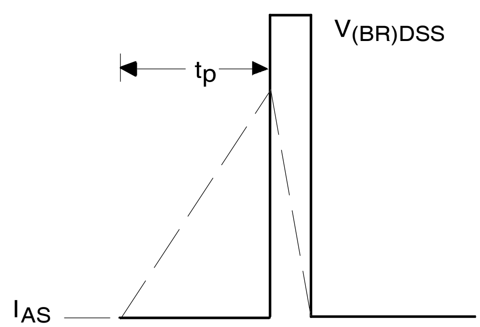


Fig 15b. Unclamped Inductive Waveforms

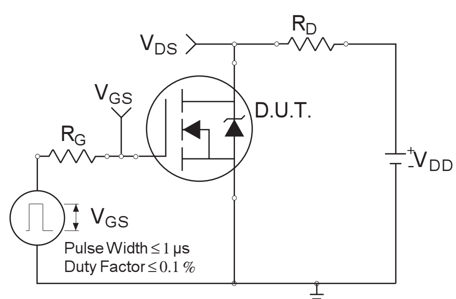


Fig 16a. Switching Time Test Circuit

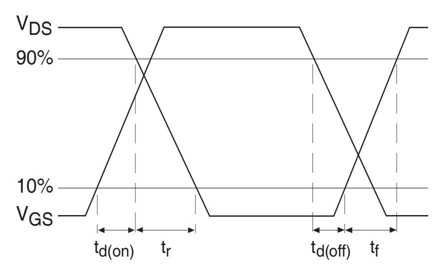


Fig 16b. Switching Time Waveforms

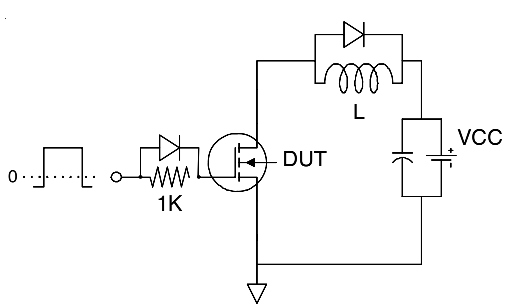


Fig 17a. Gate Charge Test Circuit

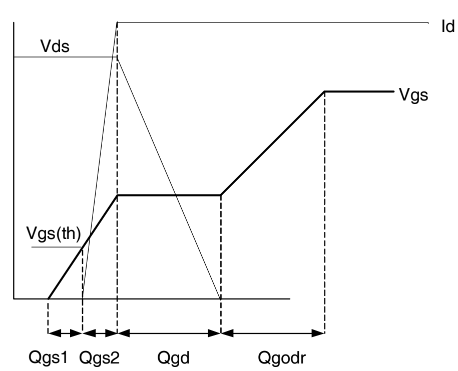
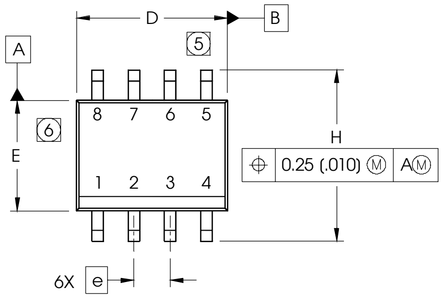


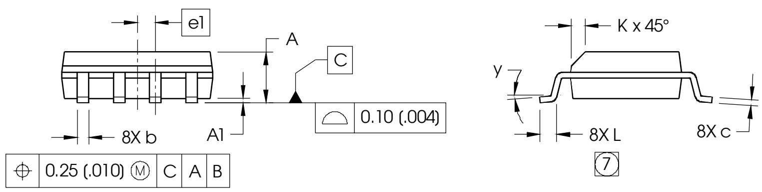
Fig 17b. Gate Charge Waveform

SO-8 Package Outline

Dimensions are shown in millimeters (inches)

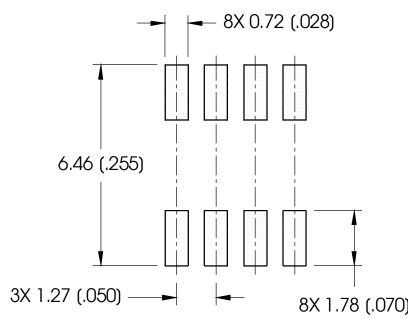


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°

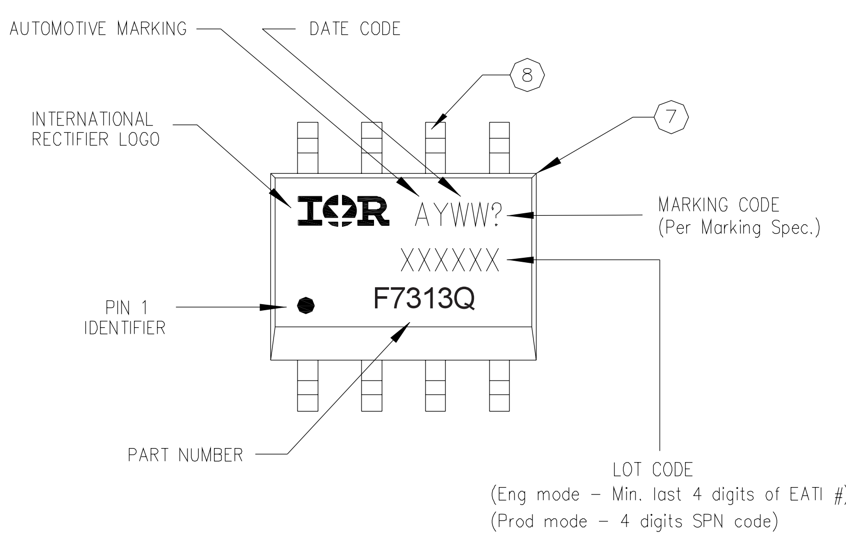


NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



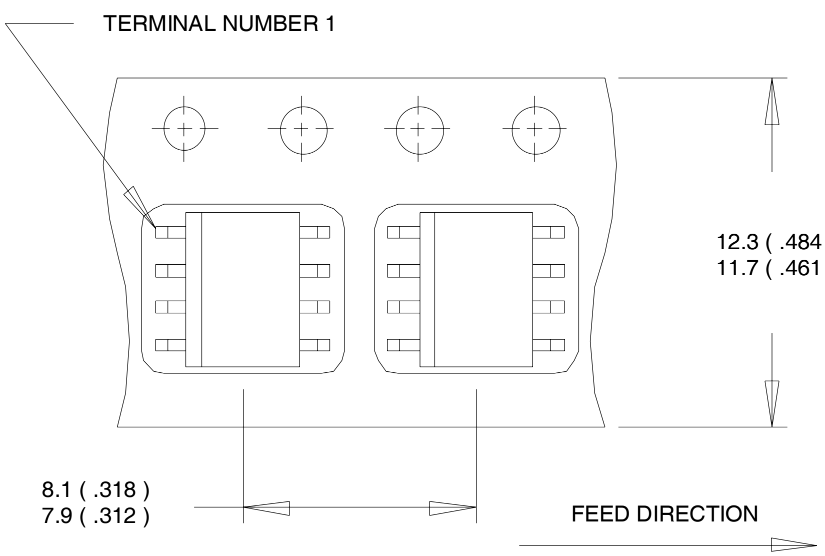
SO-8 Part Marking



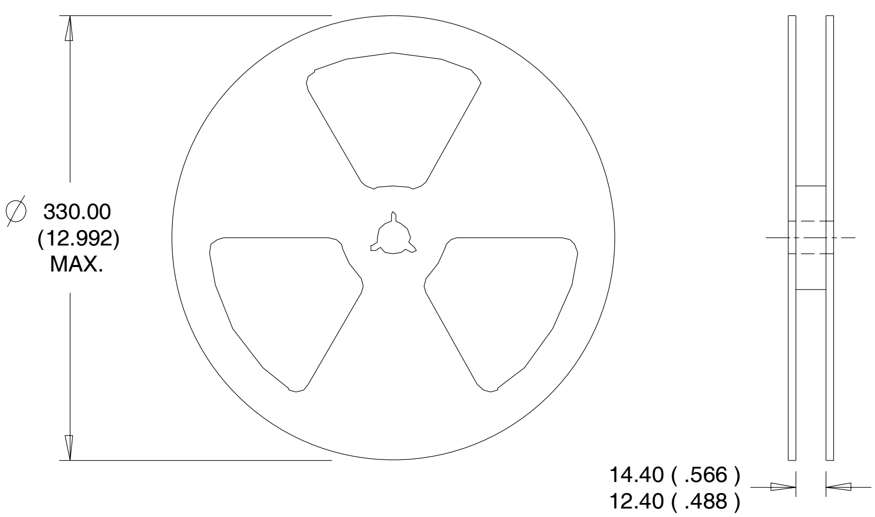
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)



NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

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For technical support, please contact IR's Technical Assistance Center
http://www.irf.com/technical-info/

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