International
IOR Rectifier

AUTOMOTIVE MOSFET

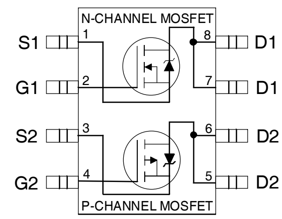
PD - 96364A

AUIRF7319Q

HEXFET® Power MOSFET

Features

- Advanced Planar Technology
- Low On-Resistance
- Dual N and P Channel MOSFET
- Surface Mount
- Fully Avalanche Rated
- Automotive [Q101] Qualified*
- Lead-Free, RoHS Compliant



Top View

	N-Ch	P-Ch
$V_{(BR)DSS}$	30V	-30V
$R_{DS(on)}$ typ.	0.023Ω	0.042Ω
max.	0.029Ω	0.058Ω
I_D	5.8A	-4.9A

SO-8

G	D	S
Gate	Drain	Source

Description

Specifically designed for Automotive applications, these HEXFET® Power MOSFET's in a Dual SO-8 package utilize the lastest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of these Automotive qualified HEXFET Power MOSFET's are a 150°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These benefits combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.

The efficient SO-8 package provides enhanced thermal characteristics and dual MOSFET die capability making it ideal in a variety of power applications. This dual, surface mount SO-8 can dramatically reduce board space and is also available in Tape & Reel.

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
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	30	-30	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	6.5	-4.9	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	5.2	-3.9	
I_{DM}	Pulsed Drain Current ①	30	-30	
I_S	Continuous Source Current(diode Conduction)	2.5	-2.5	
P_D @T_A = 25°C	Power Dissipation⑤	2.0		W
P_D @T_A = 70°C	Power Dissipation⑤	1.3		
E_{AS}	Single Pulse Avalanche Energy③	82	140	mJ
I_{AR}	Avalanche Current	4.0	-2.8	A
E_{AR}	Repetitive Avalanche Energy	0.20		mJ
V_{GS}	Gate-to-Source Voltage	± 20		V
dv/dt	Peak Diode Recovery dv/dt ②	5.0	-5.0	V/ns
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 ⑤	–––	62.5	°C/W

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

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

	Parameter		Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	N-Ch	30	—	—	V	V_{GS} = 0V, I_D = 250μA
		P-Ch	-30	—	—		V_{GS} = 0V, I_D = -250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	N-Ch	—	0.022	—	V/°C	Reference to 25°C, I_D = 1mA
		P-Ch	—	0.022	—		Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	N-Ch	—	0.023	0.029	Ω	V_{GS} = 10V, I_D = 5.8A ④
			—	0.032	0.046		V_{GS} = 4.5V, I_D = 4.7A ④
		P-Ch	—	0.042	0.058		V_{GS} = -10V, I_D = -4.9A ④
			—	0.076	0.098		V_{GS} = -4.5V, I_D = -3.6A ④
$V_{GS(th)}$	Gate Threshold Voltage	N-Ch	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
		P-Ch	-1.0	—	-3.0		V_{DS} = V_{GS}, I_D = -250μA
gfs	Forward Transconductance	N-Ch	—	14	—	S	V_{DS} = 15V, I_D = 5.8A ④
		P-Ch	—	7.7	—		V_{DS} = -15V, I_D = -4.9A ④
I_{DSS}	Drain-to-Source Leakage Current	N-Ch	—	—	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
		P-Ch	—	—	-1.0		V_{DS} = -24V, V_{GS} = 0V
		N-Ch	—	—	25		V_{DS} = 24V, V_{GS} = 0V, T_J = 55°C
		P-Ch	—	—	-25		V_{DS} = -24V, V_{GS} = 0V, T_J = 55°C
I_{GSS}	Gate-to-Source Forward Leakage		—	—	± 100	nA	V_{GS} = ± 20V

Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)

	Parameter		Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge	N-Ch	—	22	33	nC	N-Channel
		P-Ch	—	23	34		I_D = 5.8A V_{DS} = 15V, V_{GS} =10V
Q_{gs}	Gate-to-Source Charge	N-Ch	—	2.6	3.9		
		P-Ch	—	3.8	5.7		P-Channel ④
Q_{gd}	Gate-to-Drain ("Miller") Charge	N-Ch	—	6.4	9.6		I_D = -4.9A V_{DS} = -15V, V_{GS} =-10V
		P-Ch	—	5.9	8.9		
$t_{d(on)}$	Turn-On Delay Time	N-Ch	—	8.1	12	ns	N-Channel
		P-Ch	—	13	19		V_{DD} = 15V, ID=1.0A, RG = 6.0Ω
t_r	Rise Time	N-Ch	—	8.9	13		R_D = 15Ω
		P-Ch	—	13	20		P-Channel ④
$t_{d(off)}$	Turn-Off Delay Time	N-Ch	—	26	39		V_{DD} = -15V, ID=-1.0A, RG = 6.0Ω
		P-Ch	—	34	51		R_D = 15Ω
t_f	Fall Time	N-Ch	—	17	26		
		P-Ch	—	32	48		
C_{iss}	Input Capacitance	N-Ch	—	650	—	pF	N-Channel
		P-Ch	—	710	—		VGS = 0V, V_{DS} = 25V, f =1.0Mhz
C_{oss}	Output Capacitance	N-Ch	—	320	—		
		P-Ch	—	380	—		P-Channel
C_{rss}	Reverse Transfer Capacitance	N-Ch	—	130	—		VGS = 0V, V_{DS} = -25V, f =1.0Mhz
		P-Ch	—	180	—		

Diode Characteristics

	Parameter		Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current	N-Ch	—	—	2.5	A	
	(Body Diode)	P-Ch	—	—	-2.5		
I_{SM}	Pulsed Source Current	N-Ch	—	—	30		
	(Body Diode) ①	P-Ch	—	—	-30		
V_{SD}	Diode Forward Voltage	N-Ch	—	0.78	1.0	V	T_J = 25°C, I_S = 1.7A, V_{GS} = 0V ③
		P-Ch	—	-0.78	-1.0		T_J = 25°C, I_S = -1.7A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	N-Ch	—	45	68	ns	N-Channel
		P-Ch	—	44	66		T_J = 25°C, I_F = 1.7A di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	N-Ch	—	58	87	nC	P-Channel ④
		P-Ch	—	42	63		T_J = 25°C, I_F = -1.7A di/dt = 100A/μs

Notes ① through ⑤ are on page 10

Qualification Information†

Qualification Level		Automotive (per AEC-Q101) ††	
		Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		SO-8	MSL1
ESD	Machine Model	Class M2(+/- 200V)††† (per AEC-Q101-002)	
	Human Body Model	Class H1A(+/- 500V)††† (per AEC-Q101-001)	
	Charged Device Model	Class C5(+/- 2000V)††† (per AEC-Q101-005)	
RoHS Compliant		Yes	

† 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

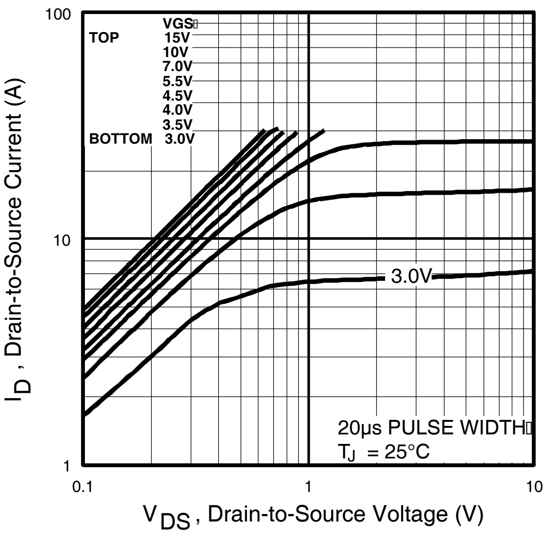


Fig 1. Typical Output Characteristics

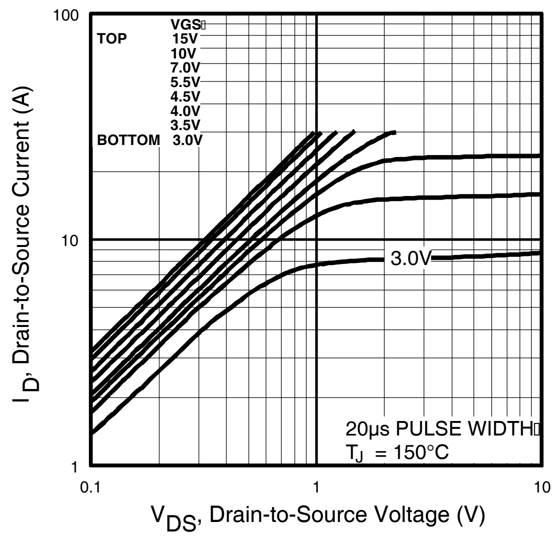


Fig 2. Typical Output Characteristics

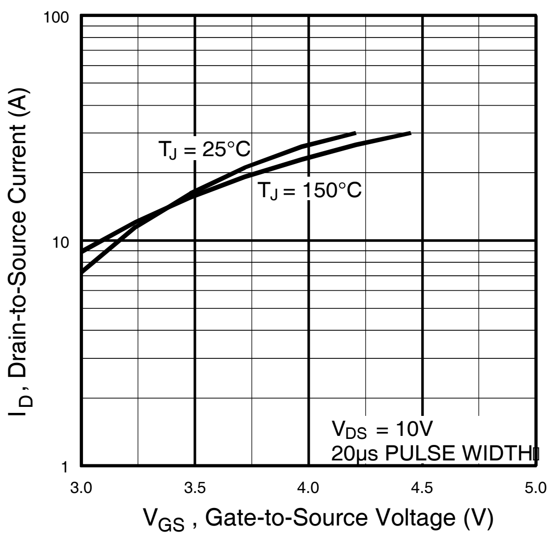


Fig 3. Typical Transfer Characteristics

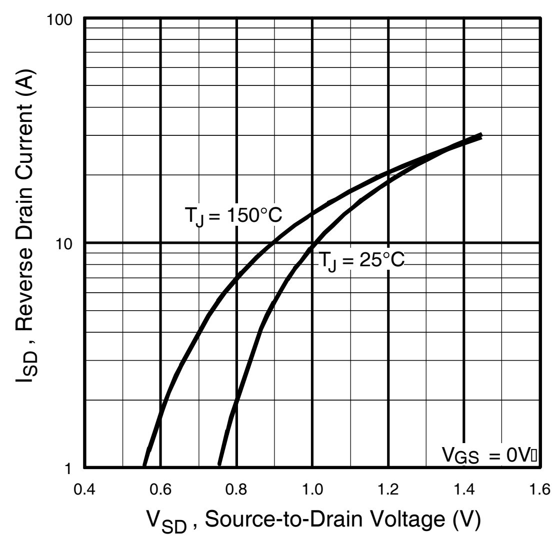


Fig 4. Typical Source-Drain Diode Forward Voltage

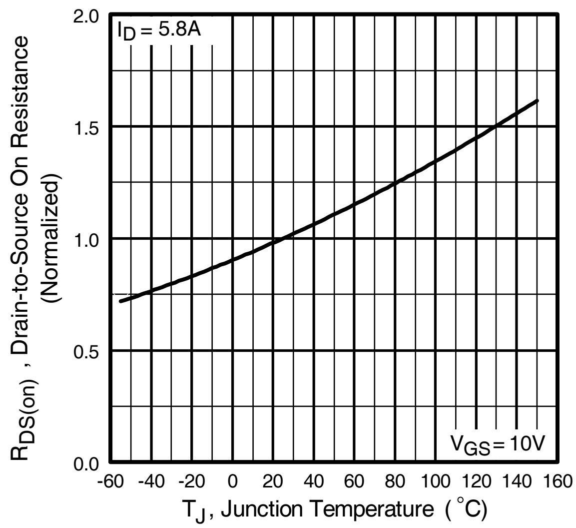


Fig 5. Normalized On-Resistance Vs. Temperature

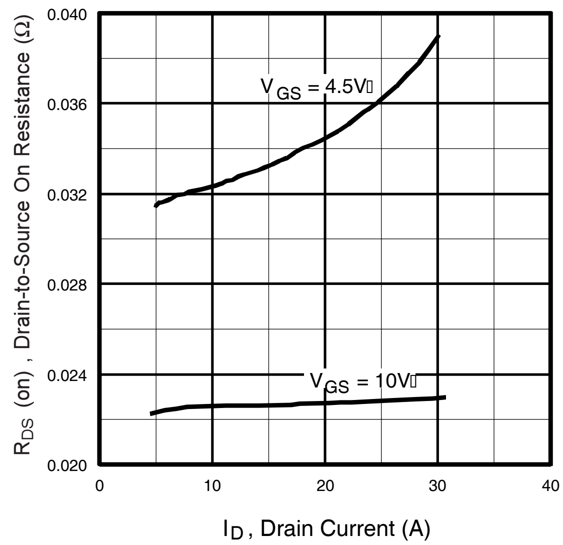


Fig 6. Typical On-Resistance Vs. Drain Current

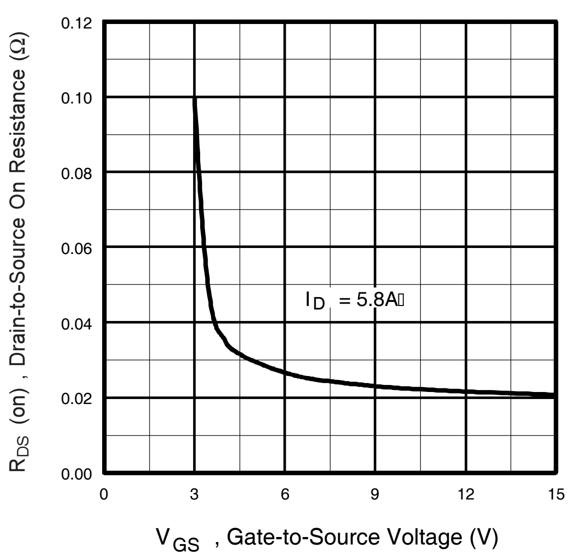


Fig 7. Typical On-Resistance Vs. Gate Voltage

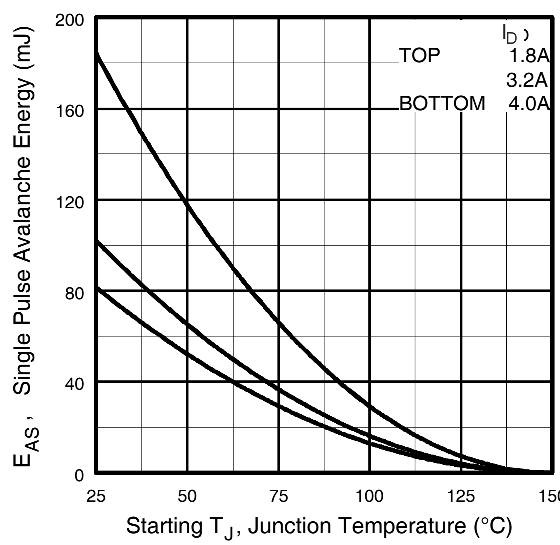
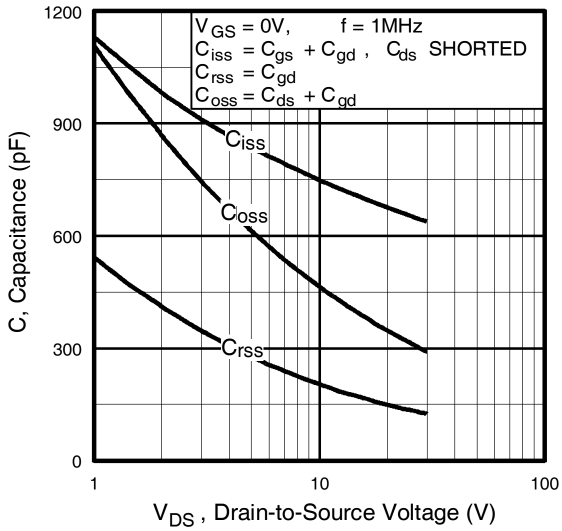


Fig 8. Maximum Avalanche Energy Vs. Drain Current



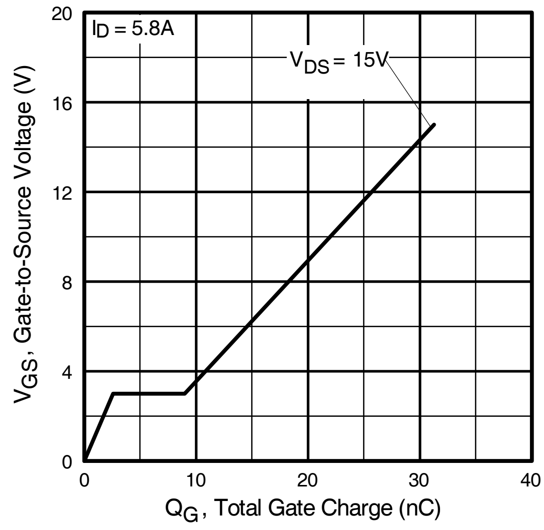


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

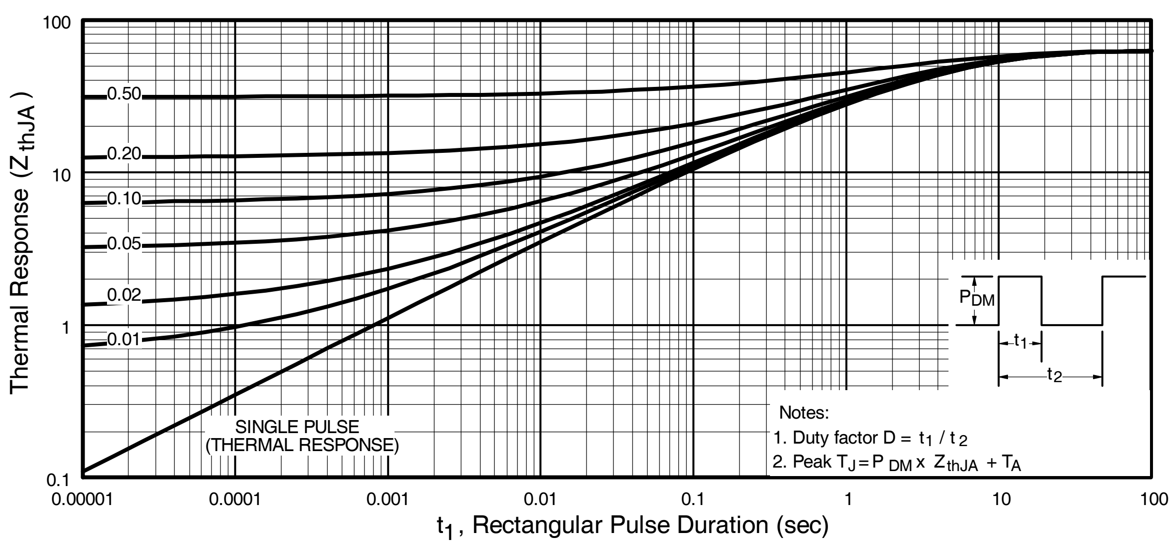


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

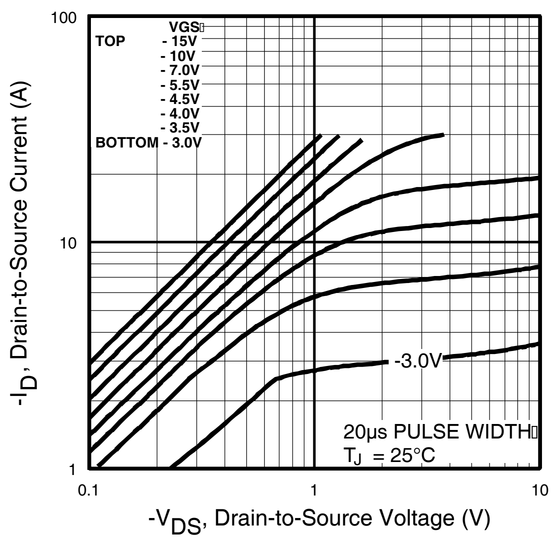


Fig 12. Typical Output Characteristics

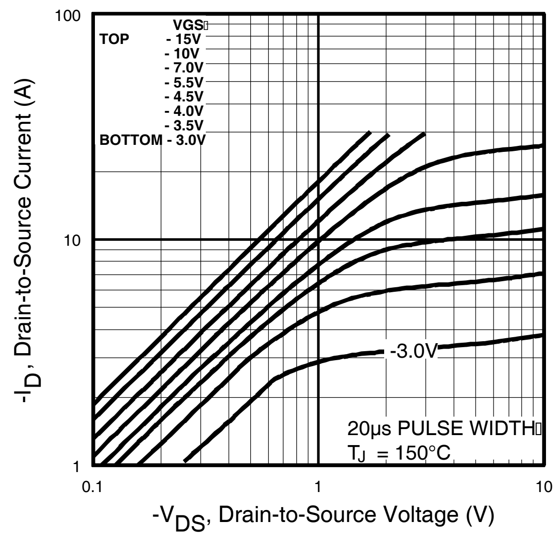


Fig 13. Typical Output Characteristics

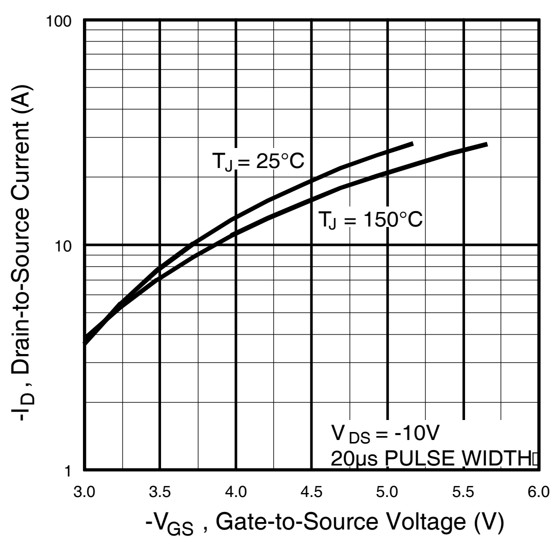


Fig 14. Typical Transfer Characteristics

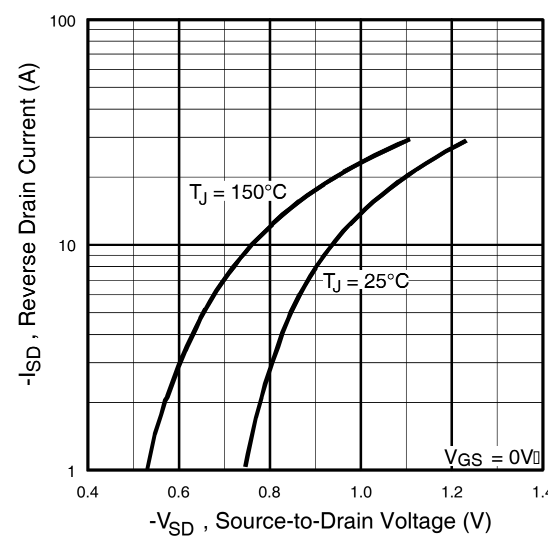


Fig 15. Typical Source-Drain Diode Forward Voltage

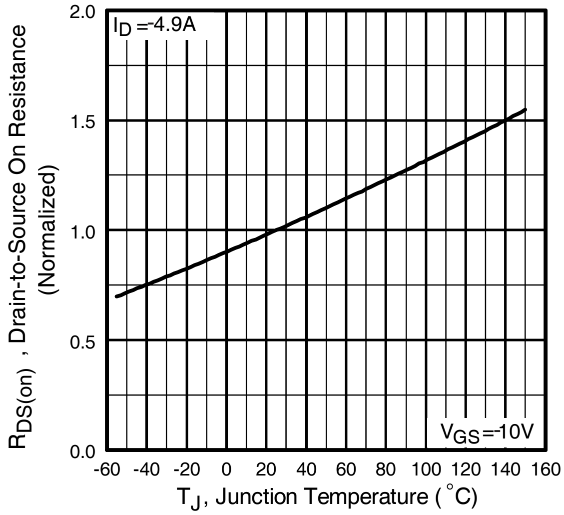


Fig 16. Normalized On-Resistance Vs. Temperature

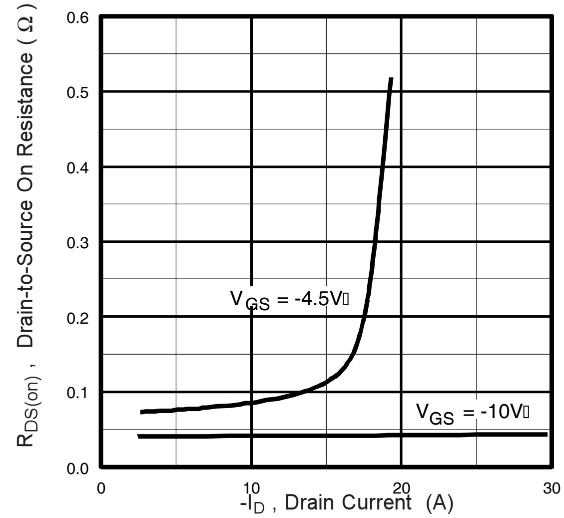


Fig 17. Typical On-Resistance Vs. Drain Current

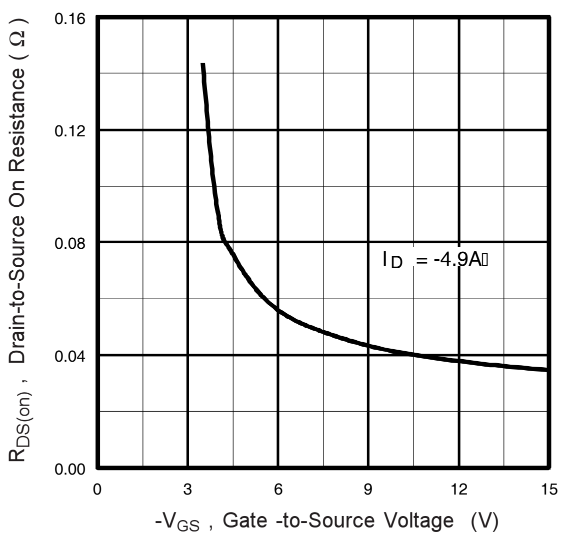


Fig 18. Typical On-Resistance Vs. Gate Voltage

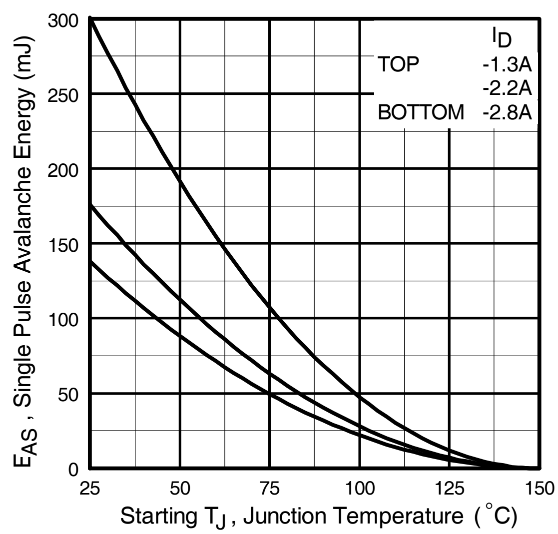


Fig 19. Maximum Avalanche Energy Vs. Drain Current

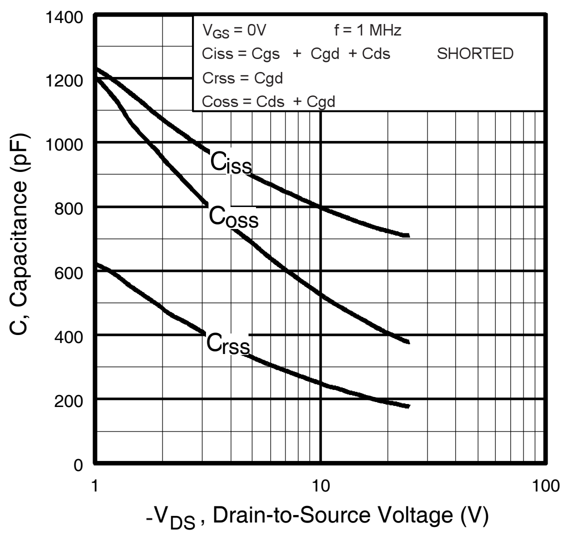


Fig 20. Typical Capacitance Vs. Drain-to-Source Voltage

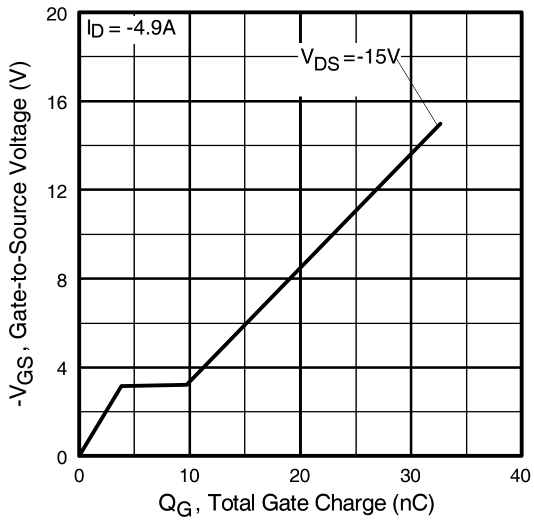


Fig 21. Typical Gate Charge Vs. Gate-to-Source Voltage

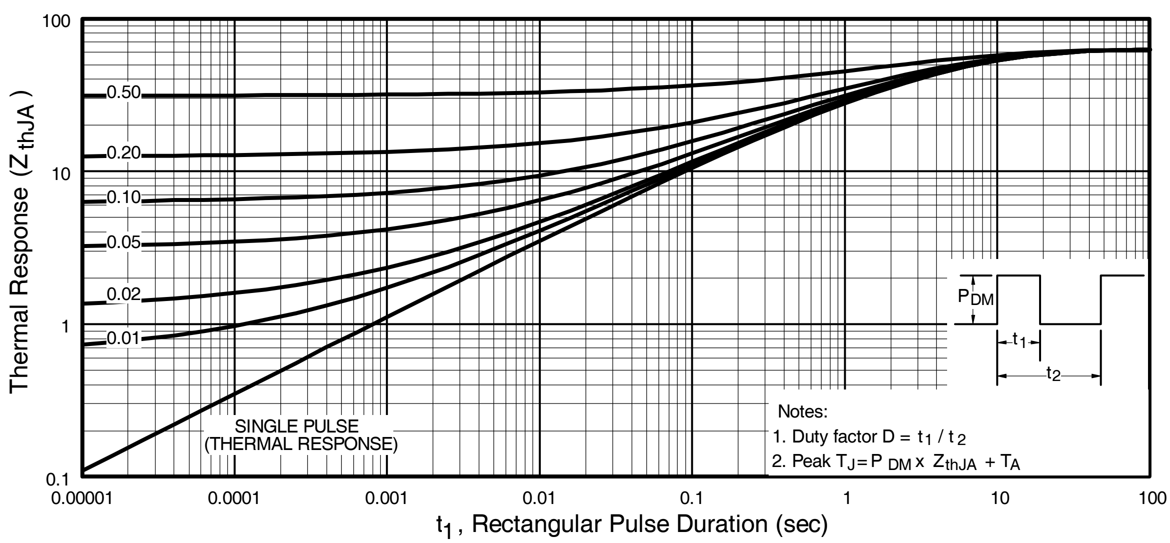
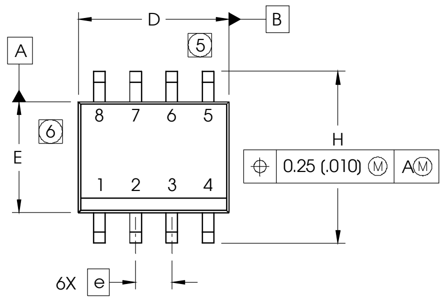


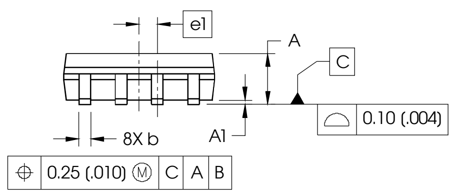
Fig 22. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

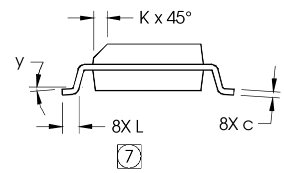
SO-8 Package Outline

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°





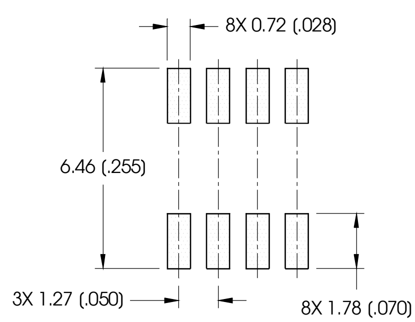
NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

5 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].

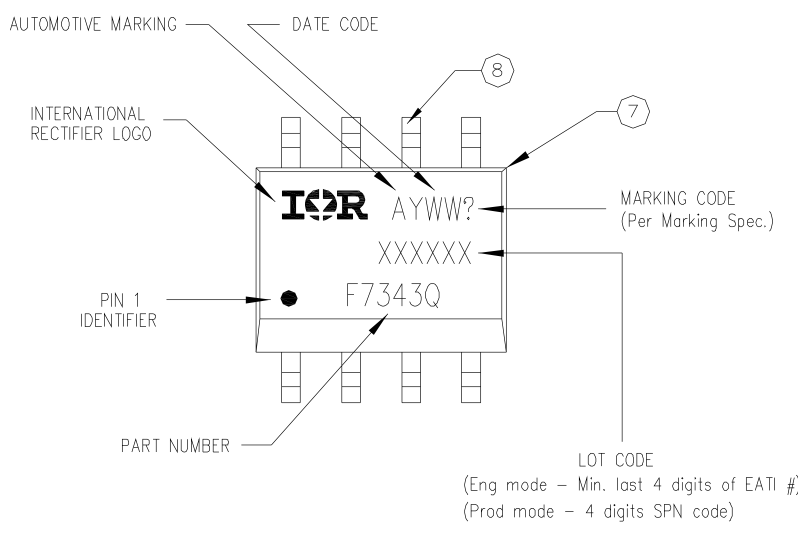
6 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].

7 DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



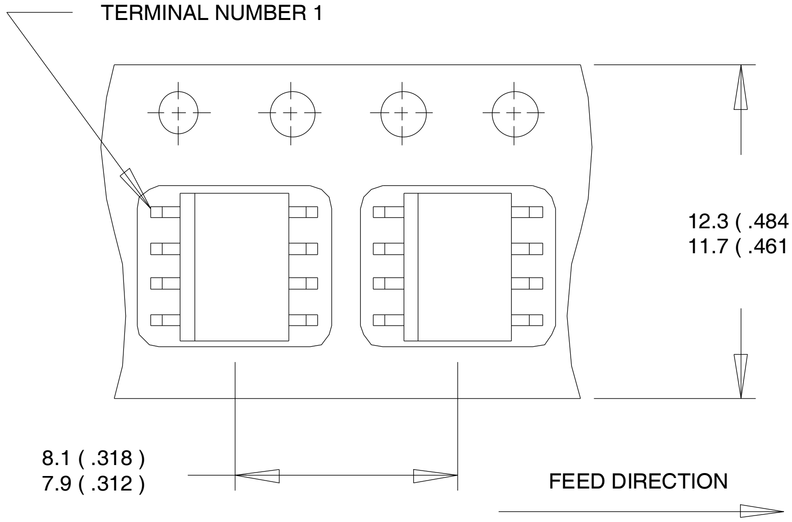
SO-8 Part Marking



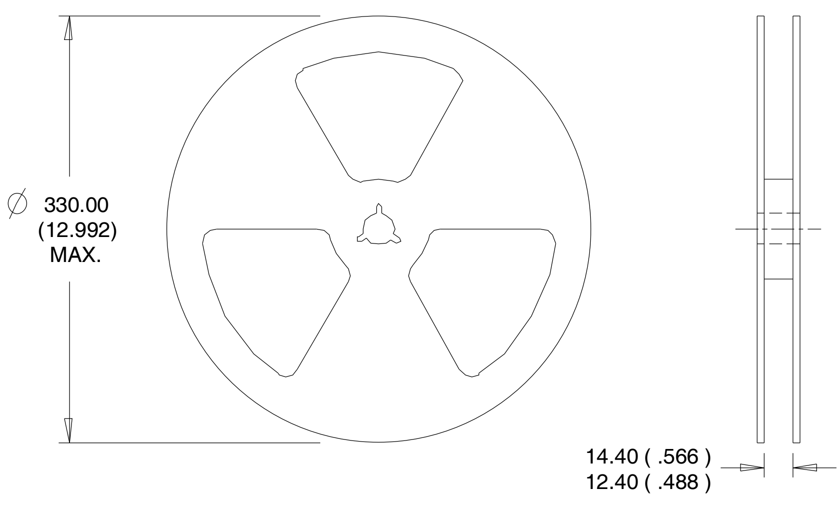
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

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.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 22)
② N-Channel $I_{SD} \leq 4.0A$, $di/dt \leq 74A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150°C$
P-Channel $I_{SD} \leq -2.8A$, $di/dt \leq 150A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150°C$
③ N-Channel Starting $T_J = 25°C$, $L = 10mH$ $R_G = 25\Omega$, $I_{AS} = 4.0A$. (See Figure 12)
P-Channel Starting $T_J = 25°C$, $L = 35mH$ $R_G = 25\Omega$, $I_{AS} = -2.8A$.
④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
⑤ Surface mounted on FR-4 board, t ≤ 10sec.

Ordering Information

Base part	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRF7319Q	SO-8	Tube	95	AUIRF7319Q
		Tape and Reel	4000	AUIRF7319QTR

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

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