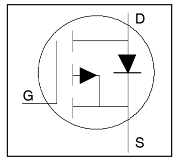
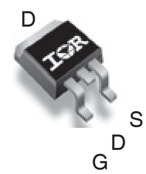
Features

HEXFET® Power MOSFET

- Advanced Planar Technology
- Low On-Resistance
- P-Channel
- Dynamic dV/dT Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified *



V_{DSS}		-150V
$R_{DS(on)}$	max.	0.29Ω
I_D		-13A



D^2Pak
AUIRF6215S

G	D	S
Gate	Drain	Source

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.

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
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ -10V	-13	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ -10V	-9.0	
I_{DM}	Pulsed Drain Current ①	-44	
P_D @T_A = 25°C	Maximum Power Dissipation	3.8	W
P_D @T_C = 25°C	Maximum Power Dissipation	110	
	Linear Derating Factor	0.71	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	310	mJ
I_{AR}	Avalanche Current ①	-6.6	A
E_{AR}	Repetitive Avalanche Energy ①	11	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑥	——	1.4	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state) ⑤	——	40	

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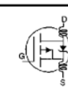
*Qualification standards can be found at http://www.irf.com/

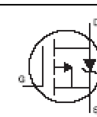
Static Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-150	---	---	V	V_{GS} = 0V, I_D = -250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	---	-0.20	---	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	---	---	0.29	Ω	V_{GS} = -10V, I_D = -6.6A ④
		---	---	0.58		V_{GS} = -10V, I_D = -6.6A, T_J=150°C ④
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	---	-4.0	V	V_{DS} = V_{GS}, I_D = -250μA
gfs	Forward Transconductance	3.6	---	---	S	V_{DS} = -25V, I_D = -6.6A
I_{DSS}	Drain-to-Source Leakage Current	---	---	-25	μA	V_{DS} = -150V, V_{GS} = 0V
		---	---	-250		V_{DS} = -120V, V_{GS} = 0V, T_J = 150°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	---	---	66	nC	I_D = -6.6A
Q_{gs}	Gate-to-Source Charge	---	---	8.1		V_{DS} = -120V
Q_{gd}	Gate-to-Drain ("Miller") Charge	---	---	35		V_{GS} = -10V ④
$t_{d(on)}$	Turn-On Delay Time	---	14	---	ns	V_{DD} = -75V
t_r	Rise Time	---	36	---		I_D = -6.6A
$t_{d(off)}$	Turn-Off Delay Time	---	53	---		R_G = 6.8Ω
t_f	Fall Time	---	37	---		R_D = 12Ω ④
L_S	Internal Source Inductance	---	7.5	---	nH	Between lead, 6mm (0.25in.), from package & center of die contact 
C_{iss}	Input Capacitance	---	860	---	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	---	220	---		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	---	130	---		ƒ = 1.0MHz, See Fig. 5

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	---	---	-11	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	---	---	-44		
V_{SD}	Diode Forward Voltage	---	---	-1.6	V	T_J = 25°C, I_S = -6.6A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	---	160	240	ns	T_J = 25°C, I_F = -6.6A
Q_{rr}	Reverse Recovery Charge	---	1.2	1.7	μC	di/dt = 100A/μs ④
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 Starting T_J = 25°C, L = 14mH, R_G = 25Ω, I_{AS} = -6.6A. (See Figure 12)

③ I_{SD} ≤ -6.6A, di/dt ≤ 620A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C.

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

⑤ When mounted on 1" square PCB (FR-4or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

⑥ R_θ is measured at T_J approximately 90°C

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		D^2Pak	MSL1
ESD	Machine Model	Class M3 (+/- 400V)†† AEC-Q101-002	
	Human Body Model	Class H1B (+/- 1000V)†† AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 1125V)†† AEC-Q101-005	
RoHS Compliant		Yes	

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

†† Highest passing voltage.

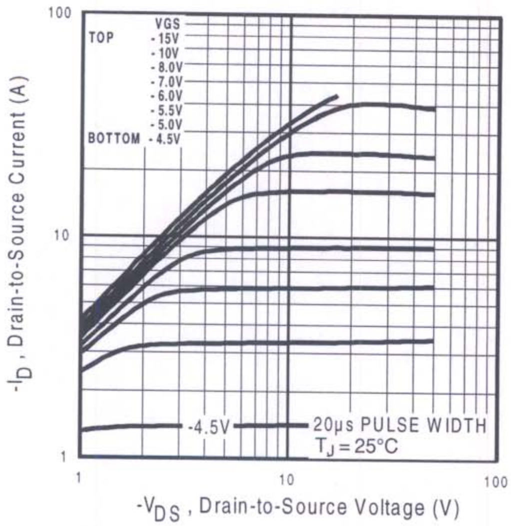


Fig 1. Typical Output Characteristics

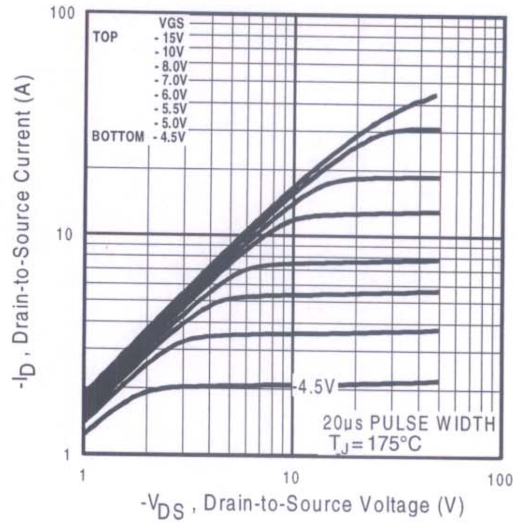


Fig 2. Typical Output Characteristics

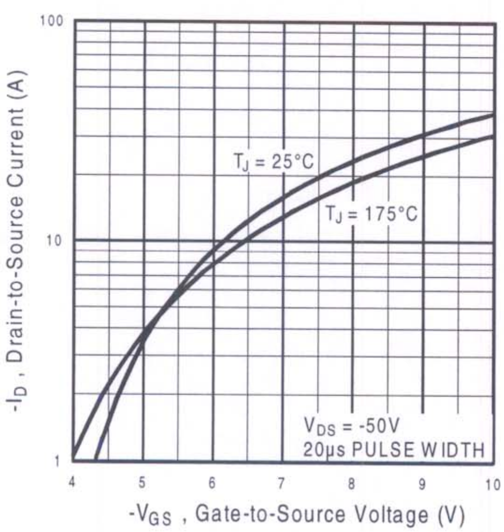


Fig 3. Typical Transfer Characteristics

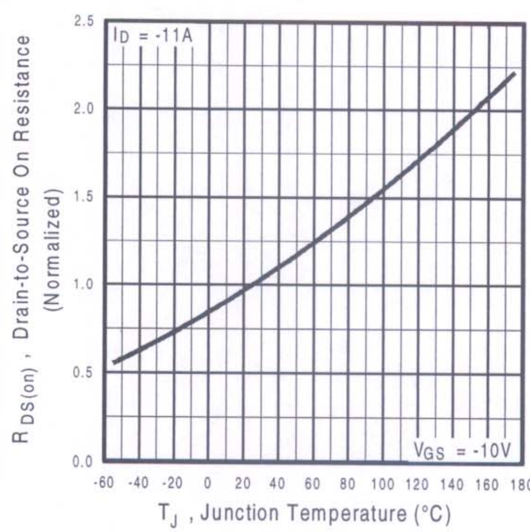


Fig 4. Normalized On-Resistance
Vs. Temperature

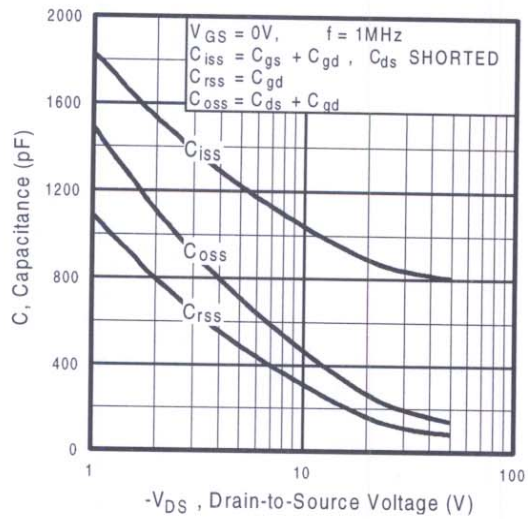


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

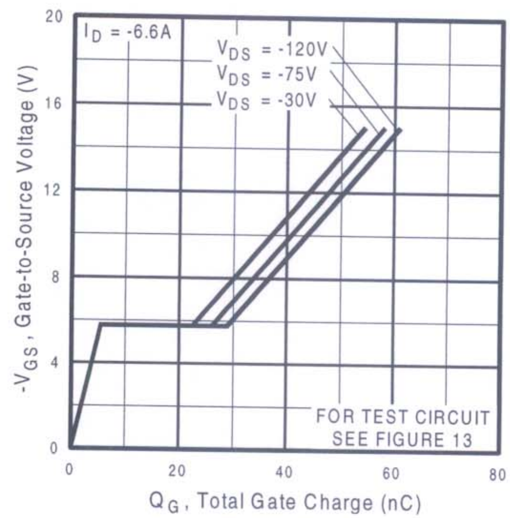


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

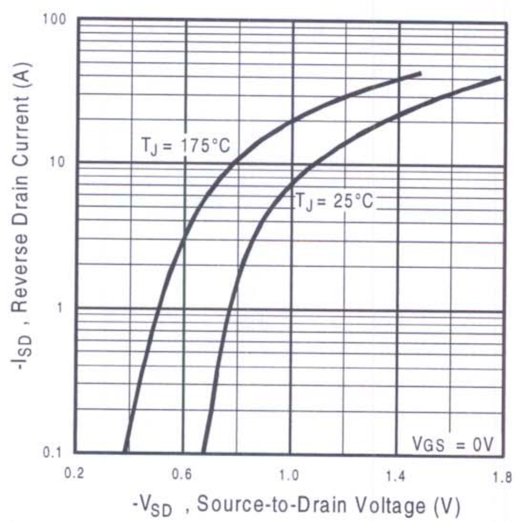


Fig 7. Typical Source-Drain Diode Forward Voltage

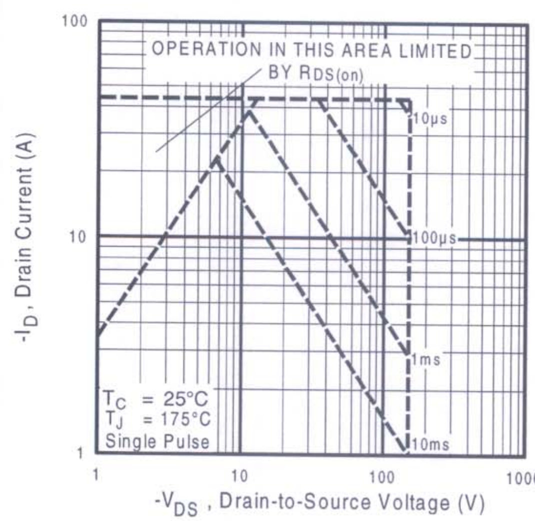


Fig 8. Maximum Safe Operating Area

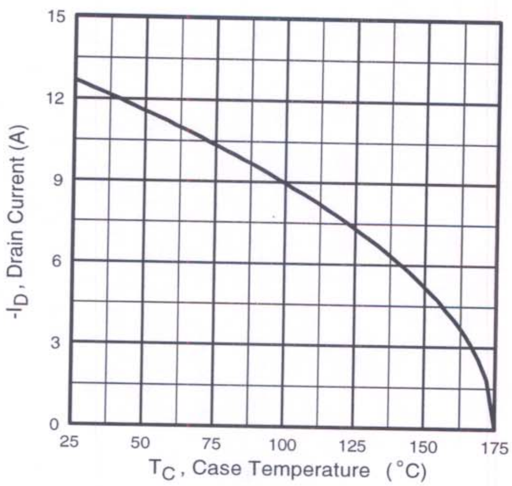


Fig 9. Maximum Drain Current Vs. Case Temperature

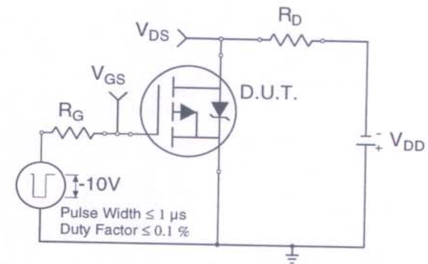


Fig 10a. Switching Time Test Circuit

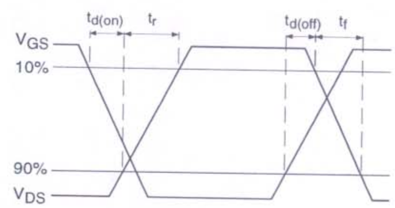


Fig 10b. Switching Time Waveforms

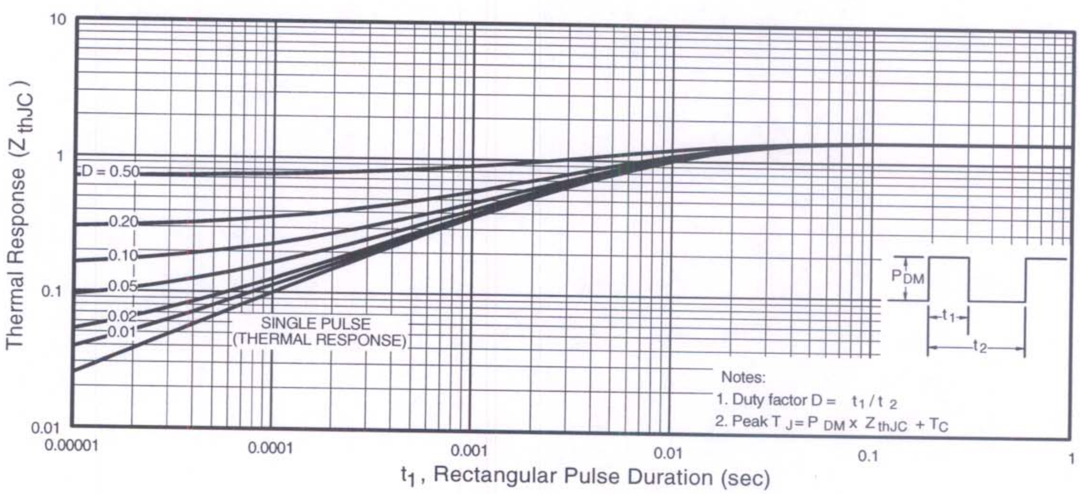


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

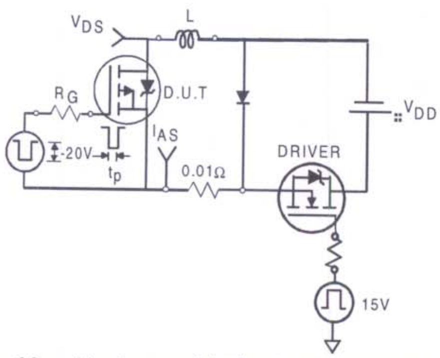


Fig 12a. Unclamped Inductive Test Circuit

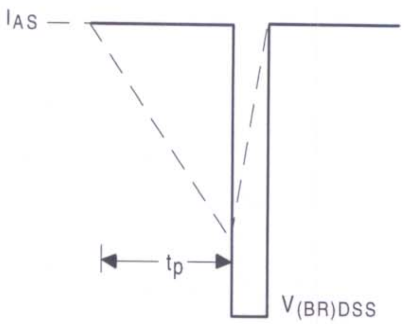


Fig 12b. Unclamped Inductive Waveforms

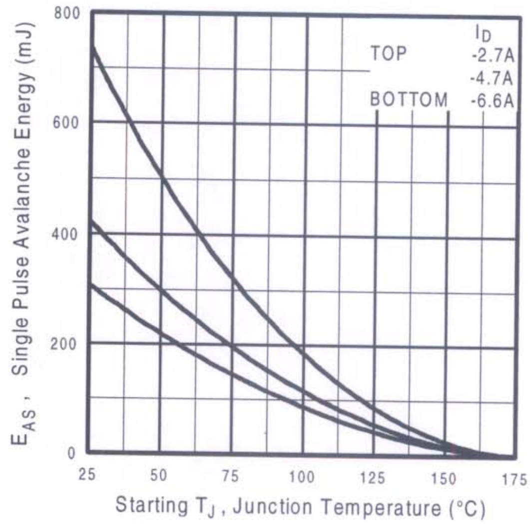


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

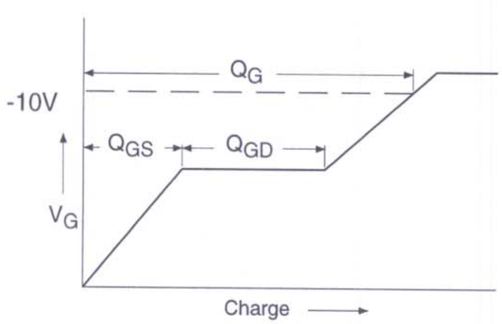


Fig 13a. Basic Gate Charge Waveform

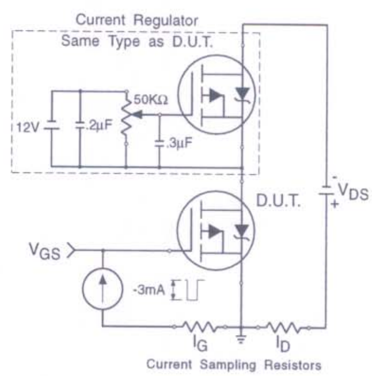


Fig 13b. Gate Charge Test Circuit

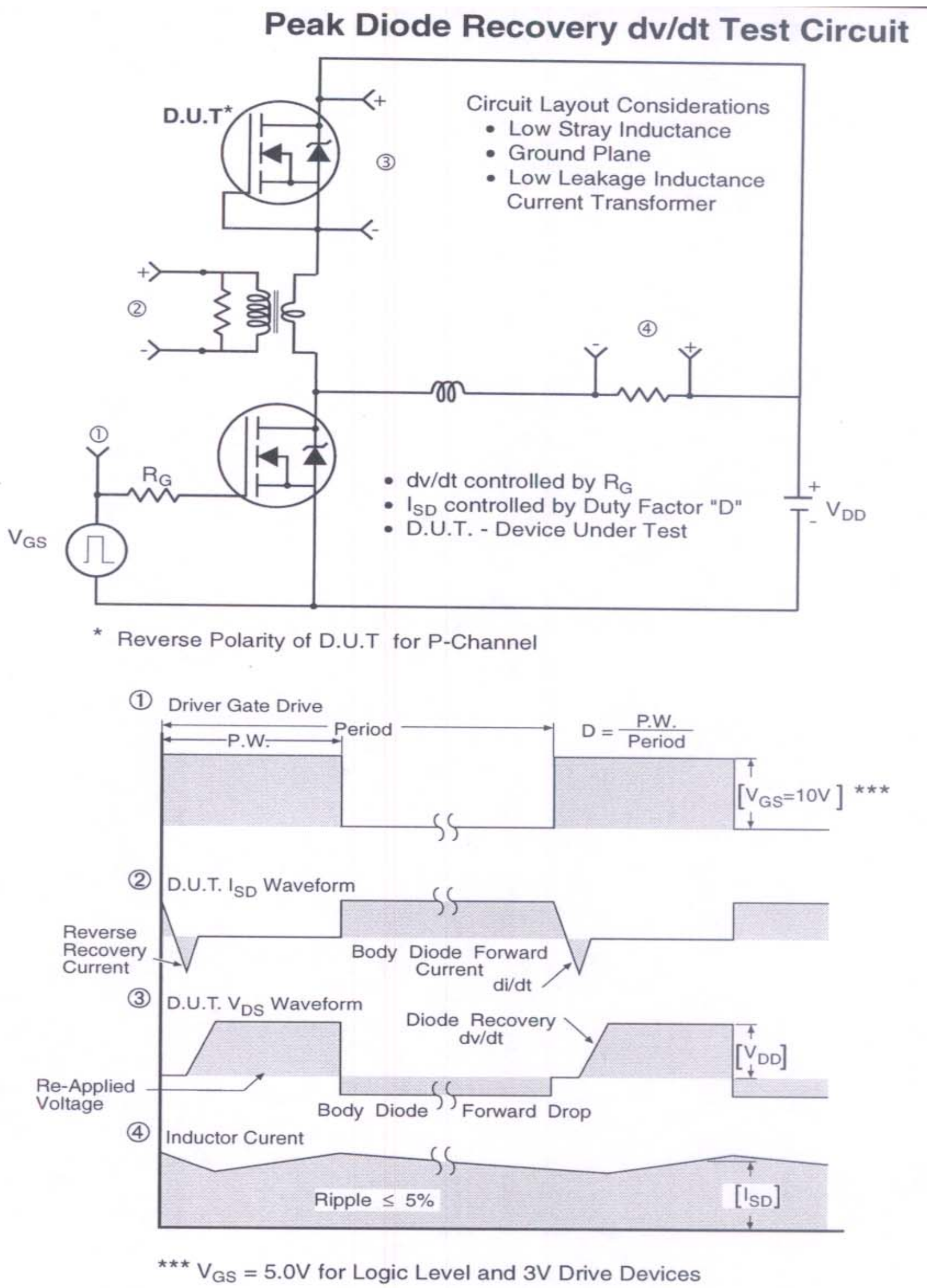
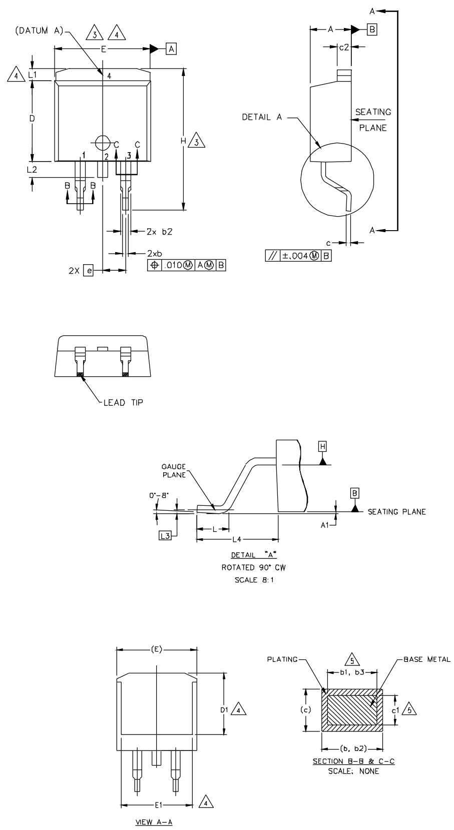


Fig 14. For P-Channel HEXFETS

D^2Pak Package Outline

(Dimensions are shown in millimeters (inches))



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	-	.270		4
E	9.65	10.67	.380	.420	3,4
E1	6.22	-	.245		4
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	-	1.65	-	.066	4
L2	1.27	1.78	-	.070	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	

LEAD ASSIGNMENTS

HEXFET

1.- GATE
2, 4.- DRAIN
3.- SOURCE

IGBTs, CoPACK

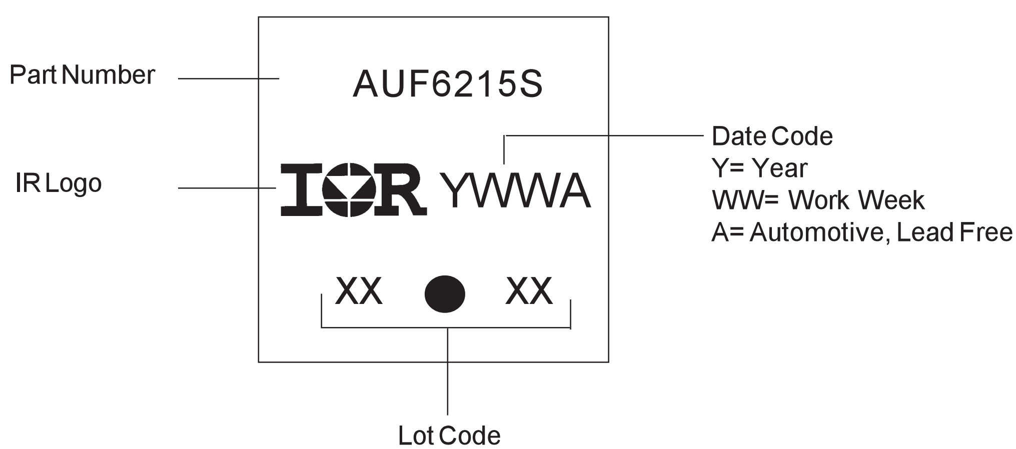
1.- GATE
2, 4.- COLLECTOR
3.- EMITTER

DIODES

1.- ANODE *
2, 4.- CATHODE
3.- ANODE

* PART DEPENDENT.

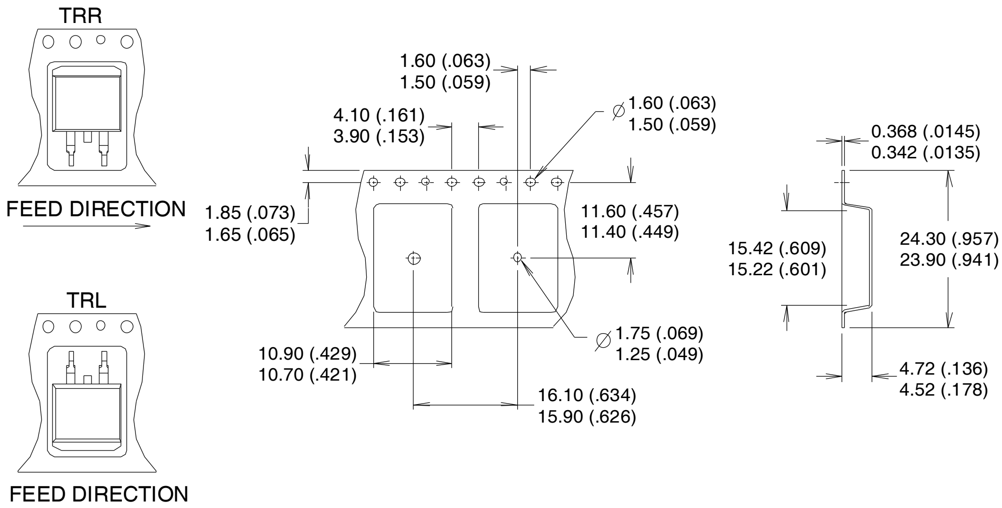
D^2Pak Part Marking Information

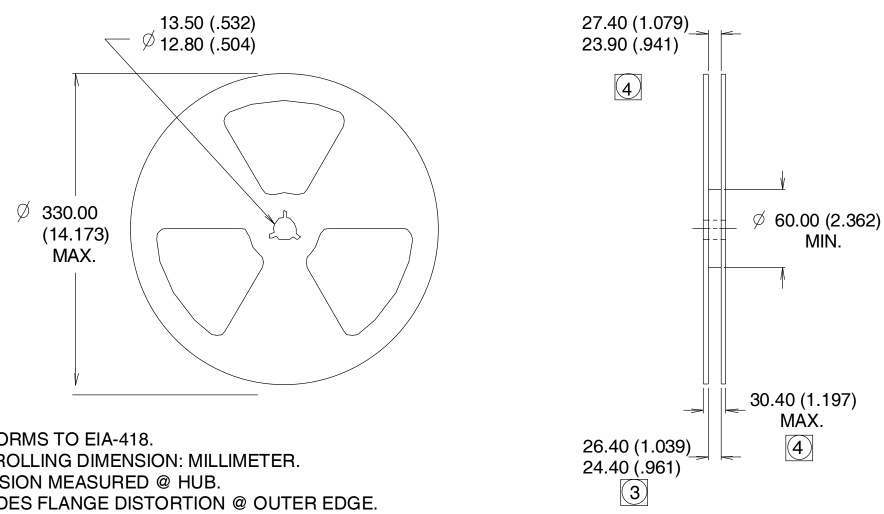


Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)





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

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

Ordering Information

Base part number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRF6215STRL	D2Pak	Tube	50	AUIRF6215S
		Tape and Reel Left	800	AUIRF6215STRL
		Tape and Reel Right	800	AUIRF6215STRR

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http://www.irf.com/technical-info/

WORLD HEADQUARTERS:
101 N. Sepulveda Blvd., El Segundo, California 90245
Tel: (310) 252-7105