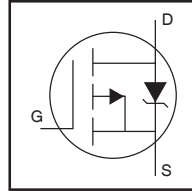


# AUIRF6218S AUIRF6218L

HEXFET® Power MOSFET

## Features

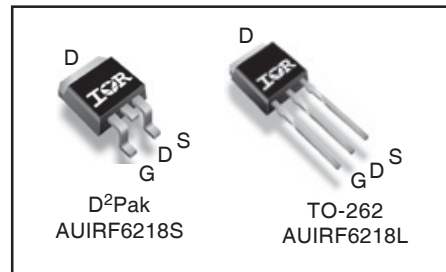
- Advanced Planar Technology
- Low On-Resistance
- P-Channel
- Dynamic dV/dT Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to T<sub>Jmax</sub>
- Lead-Free, RoHS Compliant
- Automotive Qualified \*



<b>V<sub>(BR)DSS</sub></b>	<b>-150V</b>
<b>R<sub>DS(on)</sub> max</b>	<b>150mΩ</b>
<b>I<sub>D</sub></b>	<b>-27A</b>

## 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.



<b>G</b>	<b>D</b>	<b>S</b>
Gate	Drain	Source

## 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<sub>A</sub>) is 25°C, unless otherwise specified.

	Parameter	Max.	Units	
V <sub>DS</sub>	Drain-to-Source Voltage	-150	V	
V <sub>GS</sub>	Gate-to-Source Voltage	± 20		
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	-27	A	
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	-19		
I <sub>DM</sub>	Pulsed Drain Current ①	-110		
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation	250	W	
	Linear Derating Factor	1.6	W/°C	
E <sub>AS</sub>	Single Pulse Avalanche Energy (Thermally Limited) ②	210	mJ	
I <sub>AR</sub>	Avalanche Current ①	-16	A	
dv/dt	Peak Diode Recovery dv/dt ③	8.2	V/ns	
T <sub>J</sub>	Operating Junction and	-55 to + 175	°C	
T <sub>STG</sub>	Storage Temperature Range			
	Soldering Temperature, for 10 seconds (1.6mm from cas			300
	Mounting torque, 6-32 or M3 screw			10 lbf•in (1.1N•m)

## Thermal Resistance

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case ⑤	—	0.61	°C/W
R <sub>θJA</sub>	Junction-to-Ambient (P CB Mounted, steady state) ⑥	—	40	

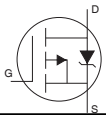
### Static Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-150	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.17	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	120	150	m $\Omega$	$V_{GS} = -10V, I_D = -16A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	-3.0	—	-5.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$g_{fs}$	Forward Transconductance	11	—	—	S	$V_{DS} = -50V, I_D = -16A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-25	$\mu A$	$V_{DS} = -120V, V_{GS} = 0V$
		—	—	-250		$V_{DS} = -120V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$

### Dynamic Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$Q_g$	Total Gate Charge	—	71	110	nC	$I_D = -16A$ $V_{DS} = -120V$ $V_{GS} = -10V$ ④
$Q_{gs}$	Gate-to-Source Charge	—	21	—		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	32	—		
$t_{d(on)}$	Turn-On Delay Time	—	21	—	ns	$V_{DD} = -75V$ $I_D = -16A$ $R_G = 3.9\Omega$ $V_{GS} = -10V$ ④
$t_r$	Rise Time	—	70	—		
$t_{d(off)}$	Turn-Off Delay Time	—	35	—		
$t_f$	Fall Time	—	30	—	pF	$V_{GS} = 0V$ $V_{DS} = -25V$ $f = 1.0\text{MHz}$ $V_{GS} = 0V, V_{DS} = -1.0V, f = 1.0\text{MHz}$ $V_{GS} = 0V, V_{DS} = -120V, f = 1.0\text{MHz}$ $V_{GS} = 0V, V_{DS} = 0V \text{ to } -120V$
$C_{iss}$	Input Capacitance	—	2210	—		
$C_{oss}$	Output Capacitance	—	370	—		
$C_{rss}$	Reverse Transfer Capacitance	—	89	—		
$C_{oss}$	Output Capacitance	—	2220	—		
$C_{oss}$	Output Capacitance	—	170	—		
$C_{oss \text{ eff.}}$	Effective Output Capacitance	—	340	—		

### Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-27	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-110		
$V_{SD}$	Diode Forward Voltage	—	—	-1.6	V	$T_J = 25^\circ\text{C}, I_S = -16A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	150	—	ns	$T_J = 25^\circ\text{C}, I_F = -16A, V_{DD} = -25V$
$Q_{rr}$	Reverse Recovery Charge	—	860	—	nC	$di/dt = -100A/\mu s$ ④

#### Notes:

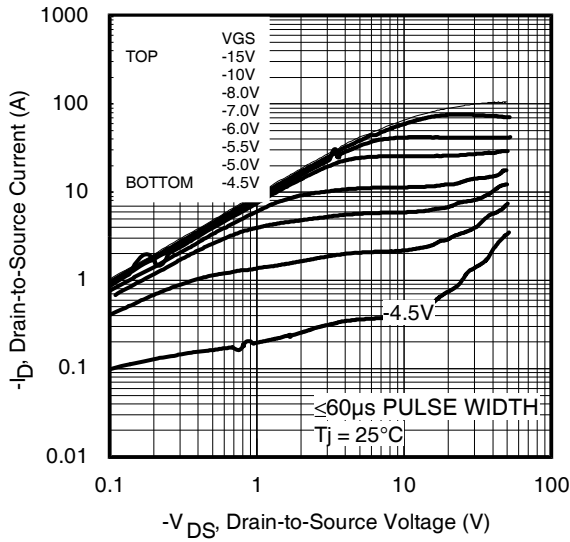
- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 1.6\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = -17A$ .
- ③  $I_{SD} \leq -17A$ ,  $di/dt \leq -520A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$ .
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .
- ⑥ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

### Qualification Information<sup>†</sup>

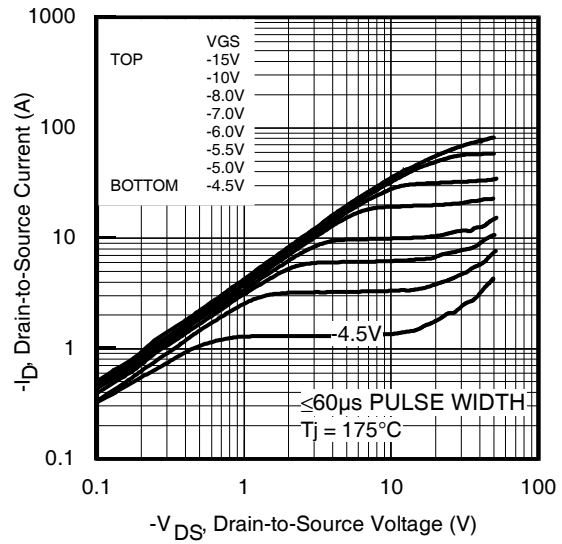
<b>Qualification Level</b>		Automotive (per AEC-Q101)	
		Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
<b>Moisture Sensitivity Level</b>		TO-262	N/A
		D <sup>2</sup> Pak	MSL1
<b>ESD</b>	Machine Model	Class M4 (+/- 600V) <sup>††</sup> AEC-Q101-002	
	Human Body Model	Class H2 (+/- 3000V) <sup>††</sup> AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 2000V) <sup>††</sup> AEC-Q101-005	
<b>RoHS Compliant</b>		Yes	

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

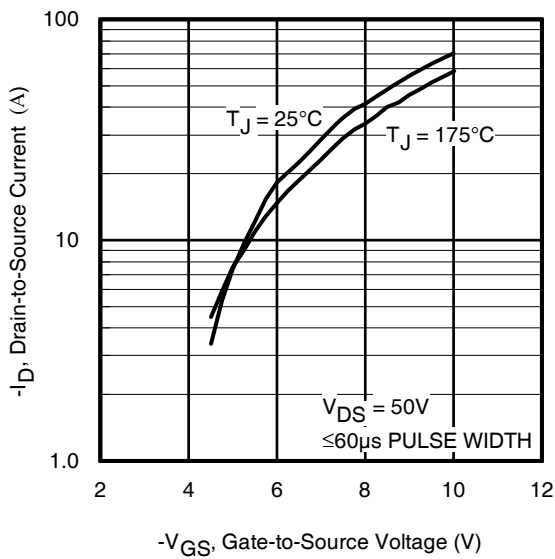
†† Highest passing voltage.



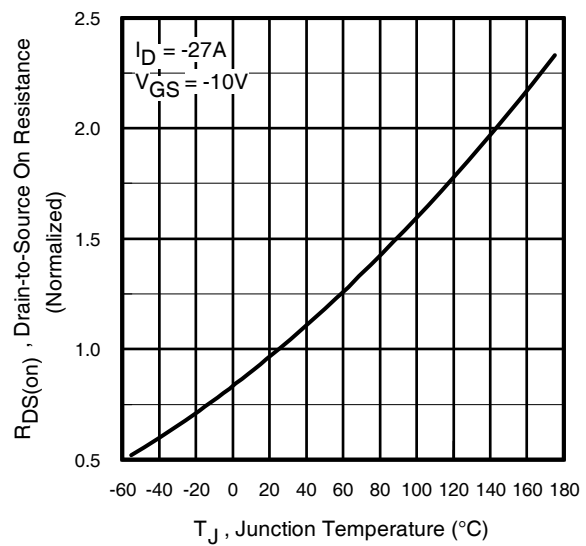
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



**Fig 3.** Typical Transfer Characteristics



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

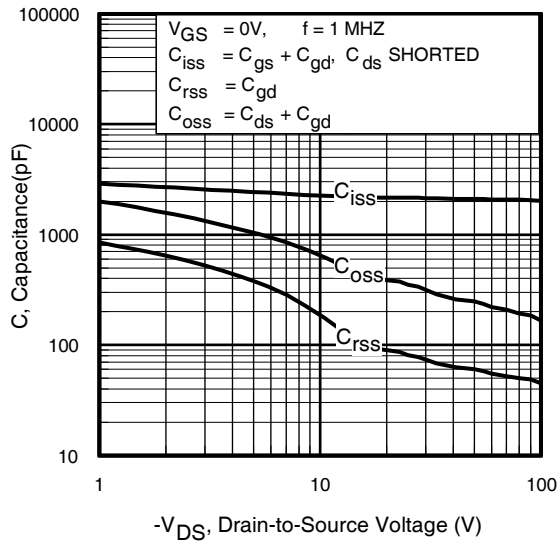


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

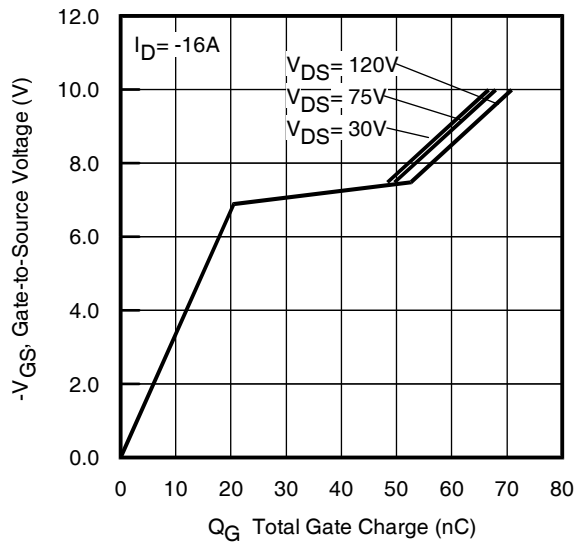


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

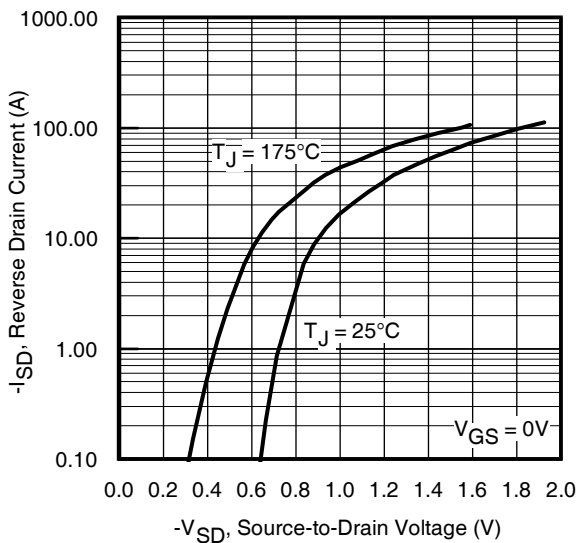


Fig 7. Typical Source-Drain Diode Forward Voltage

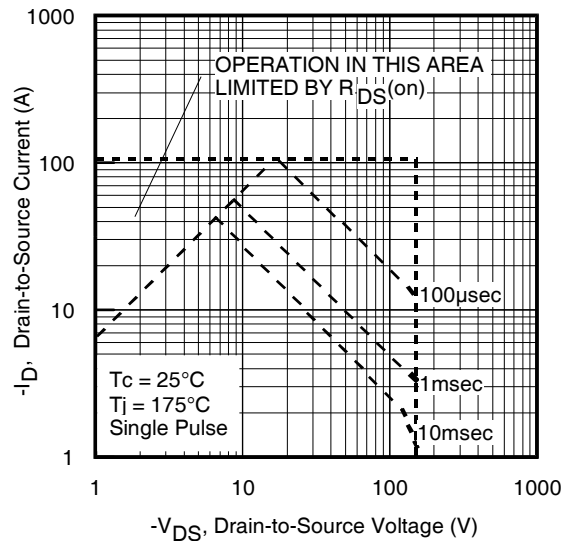
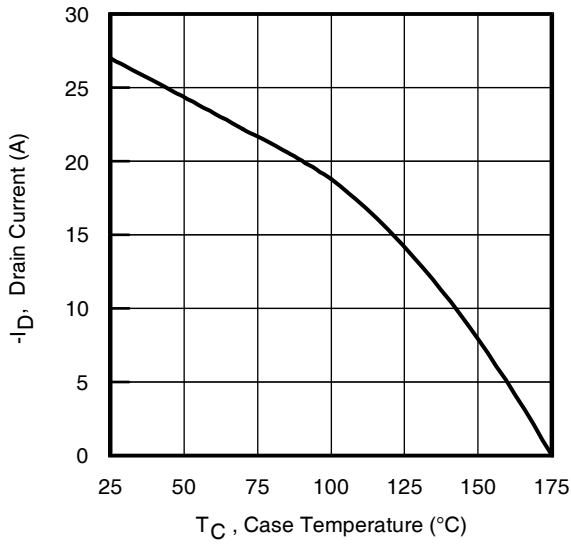
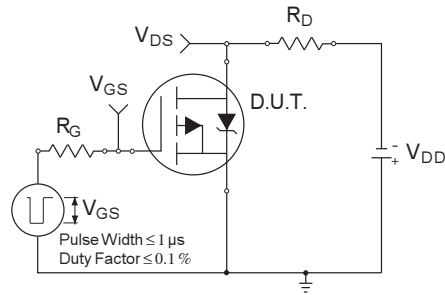


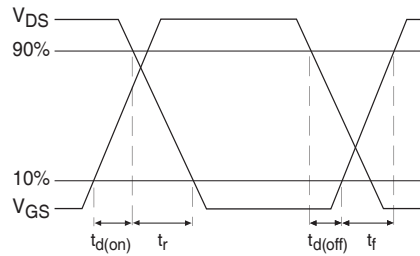
Fig 8. Maximum Safe Operating Area



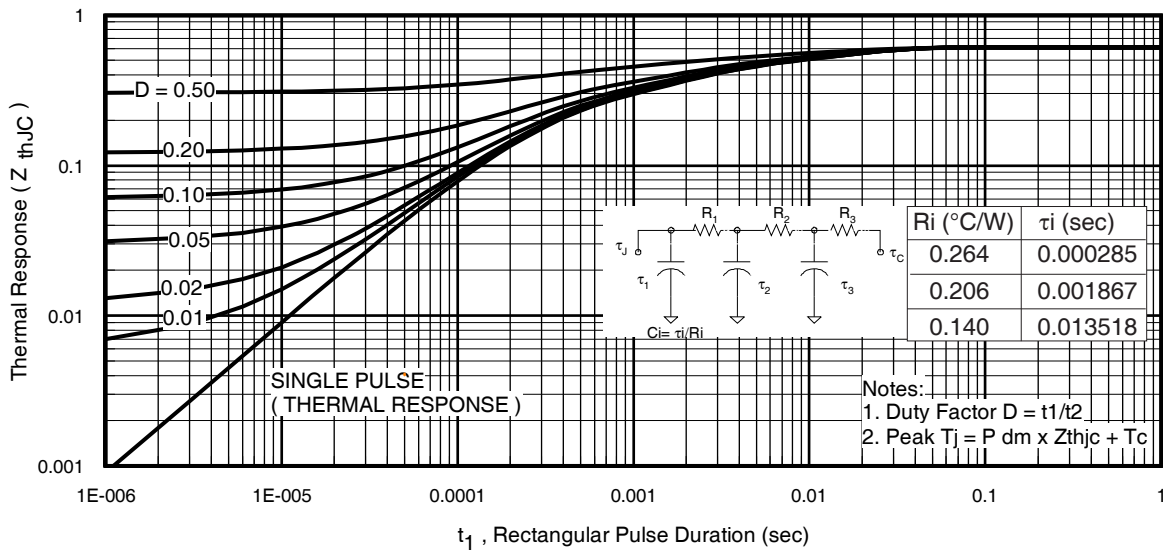
**Fig 9.** Maximum Drain Current vs. Ambient Temperature



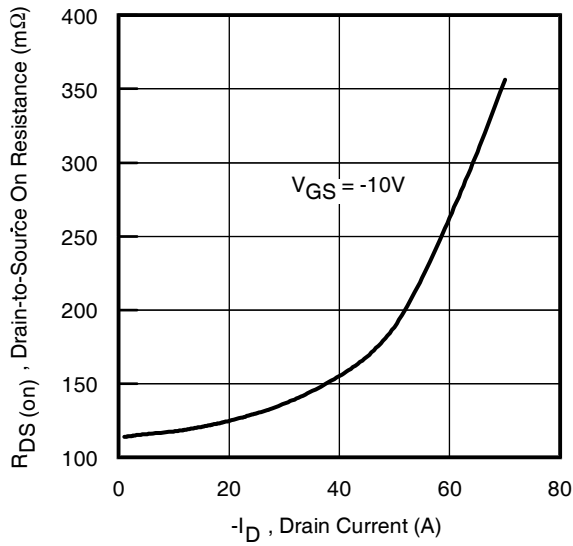
**Fig 10a.** Switching Time Test Circuit



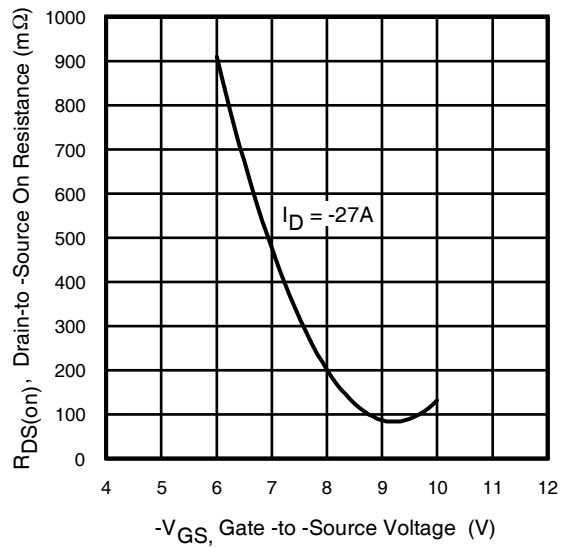
**Fig 10b.** Switching Time Waveforms



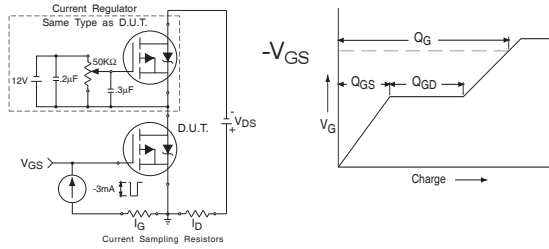
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



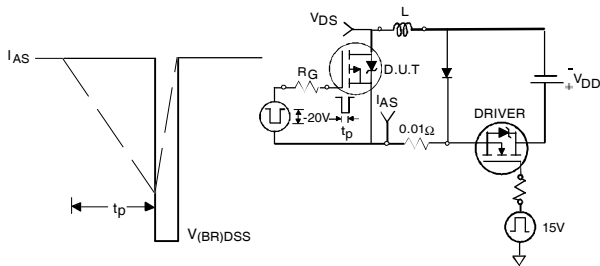
**Fig 12.** On-Resistance vs. Drain Current



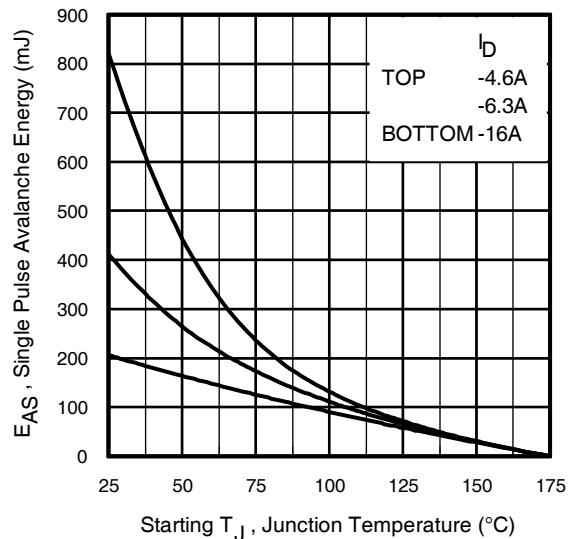
**Fig 13.** On-Resistance vs. Gate Voltage



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



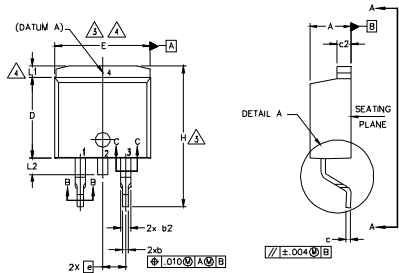
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



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

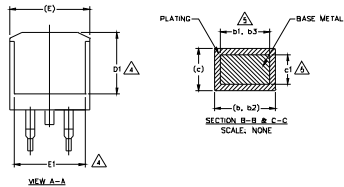
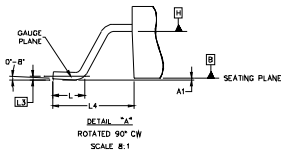
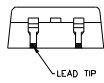
## D<sup>2</sup>Pak Package Outline

(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 [0.005"] 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**

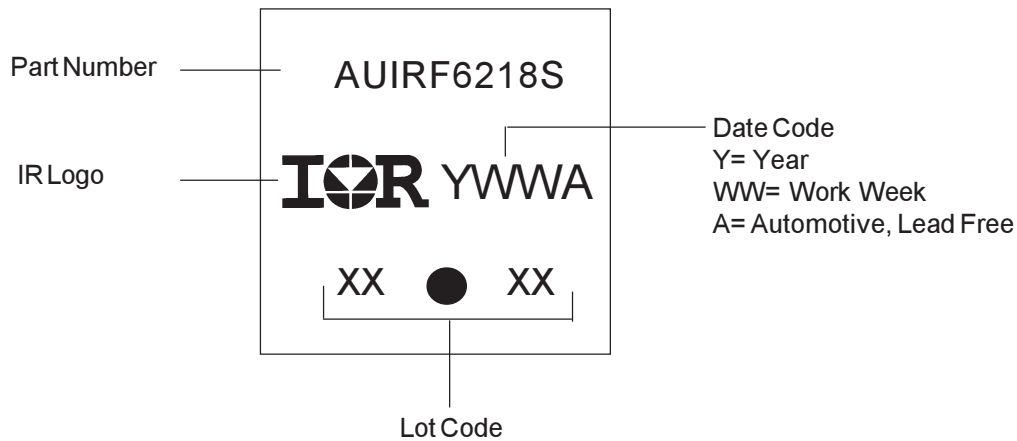
1. - GATE
- 2, 4. - COLLECTOR
3. - EMITTER

**DIODES**

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

\* PART DEPENDENT.

## D<sup>2</sup>Pak Part Marking Information

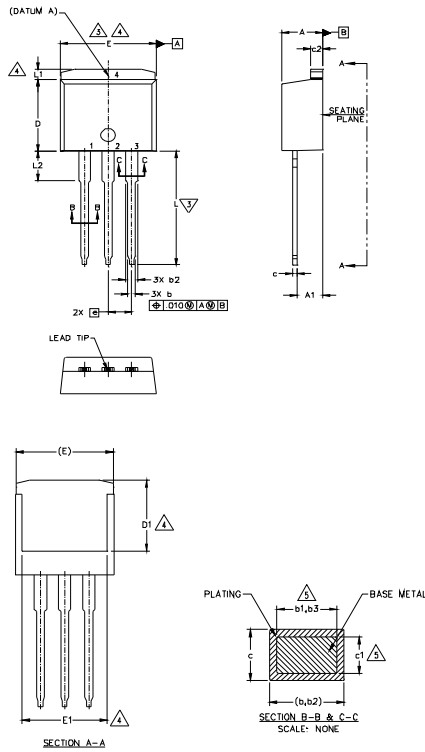


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>



## TO-262 Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	3.02	.080	.119	
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		
L	13.46	14.10	.530	.555	
L1	—	1.65	—	.065	4
L2	3.56	3.71	.140	.146	

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 0.075 (0.03) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.  
 4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION L, L1, D1 & E1.  
 5. DIMENSION L1 AND E1 APPLY TO BASE METAL ONLY.  
 6. CONTROLLING DIMENSION: INCH.  
 7. — OUTLINE CONFORM TO ASIC TO-262 EXCEPT AS (max.), (min.) AND D1 (min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

LEAD ASSIGNMENTS

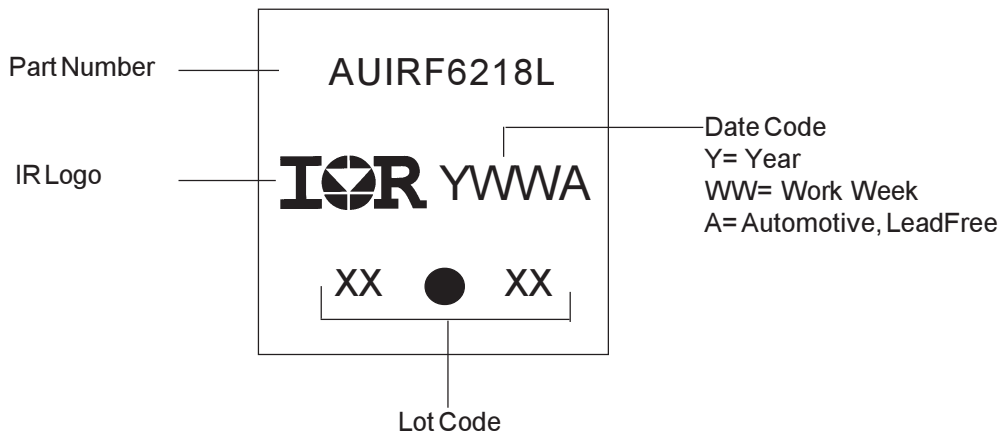
IRBTL: DIPACK

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

IRBEEET      DIODES

1- GATE      1- ANODE (TO DI) / OPEN (ON DI)  
 2- DRAIN      2- A- CATHODE  
 3- SOURCE      3- ANODE  
 4- DRAIN

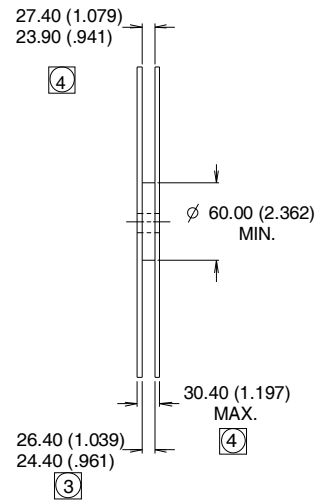
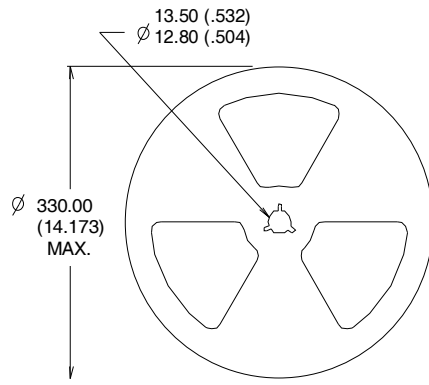
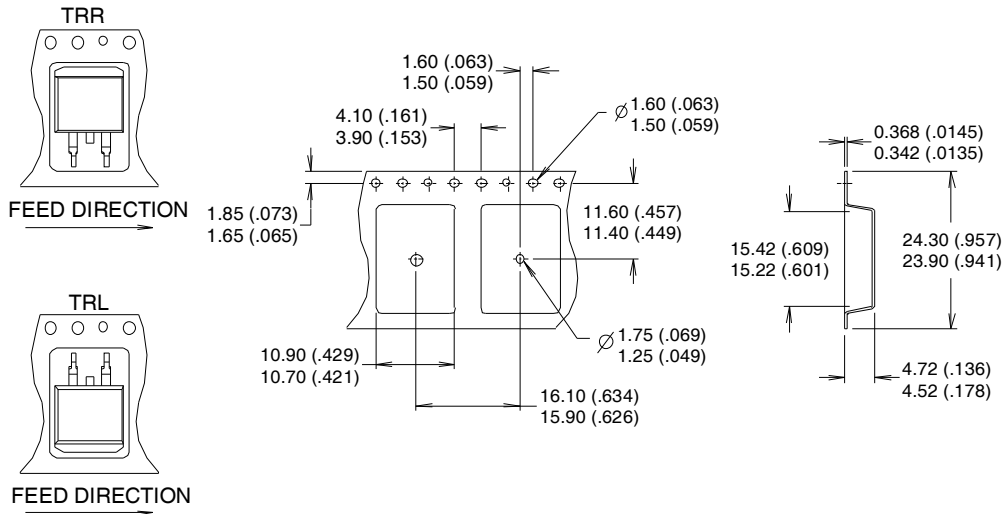
## TO-262 Part Marking Information



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

## D<sup>2</sup>Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



**NOTES :**

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

## Ordering Information

Base part number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRF6218L	TO-262	Tube	50	AUIRF6218L
AUIRF6218S	D2Pak	Tube	50	AUIRF6218S
		Tape and Reel Left	800	AUIRF6218STRL
		Tape and Reel Right	800	AUIRF6218STRR

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

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