

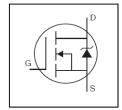
AUTOMOTIVE GRADE

AUIRFS4115 AUIRFSL4115

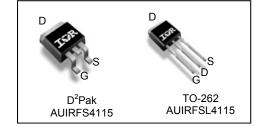
HEXFET® Power MOSFET

Features

- Advanced Process Technology
- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Timax
- Lead-Free, RoHS Compliant
- Automotive Qualified *



V _{DSS}	150V
R _{DS(on)} typ.	10.3mΩ
max.	12.1mΩ
I _D	99A



G	D	S
Gate	Drain	Source

DescriptionSpecifically

Specifically designed for Automotive applications, this HEXFET® Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications

Page part number	Standard Pack			Orderable Part Number
Base part number	Package Type	Form	Quantity	Orderable Part Number
AUIRFSL4115	TO-262	Tube	50	AUIRFSL4115
AUIRFS4115	D²-Pak	Tube	50	AUIRFS4115
AUIRF54115	D-Pak	Tape and Reel Left	800	AUIRFS4115TRL

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 (TA) is 25°C, unless otherwise specified.

Symbol	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	99	
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	70	A
I _{DM} Pulsed Drain Current ①		396	
$P_D @ T_C = 25^{\circ}C$	Maximum Power Dissipation	375	W
	Linear Derating Factor	2.5	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ③	18	V/ns
E _{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	230	mJ
TJ	Operating Junction and	-55 to + 175	
T _{STG}	Storage Temperature Range		°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Thermal Resistance

Symbol Parameter		Тур.	Max.	Units
$R_{ heta JC}$	Junction-to-Case ® ®		0.40	°C/\\
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount), D² Pak ⑦		40	°C/W

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^{*}Qualification standards can be found at www.infineon.com



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

	Parameter	Min.	Тур.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	150			٧	$V_{GS} = 0V, I_{D} = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.18		V/°C	Reference to 25°C, I _D = 3.5mA①
R _{DS(on)}	Static Drain-to-Source On-Resistance		10.3	12.1	mΩ	V _{GS} = 10V, I _D = 62A ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0		5.0	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$
gfs	Forward Trans conductance	97			S	$V_{DS} = 50V, I_{D} = 62A$
	Drain to Course Leakens Current			20		V _{DS} = 150V, V _{GS} = 0V
I _{DSS}	Drain-to-Source Leakage Current			250	μΑ	$V_{DS} = 150V, V_{GS} = 0V, T_{J} = 125^{\circ}C$
I _{GSS}	Gate-to-Source Forward Leakage			100	A	V _{GS} = 20V
	Gate-to-Source Reverse Leakage			-100	nA	V _{GS} = -20V
R_G	Internal Gate Resistance		2.3		Ω	

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

	Total Gate Charge	77	120		I _D = 62A
Q_g	3	 	120		
Q_{gs}	Gate-to-Source Charge	 28			$V_{DS} = 75V$
$Q_{\sf gd}$	Gate-to-Drain Charge	 26		nC	V _{GS} = 10V⊕
Q_{sync}	Total Gate Charge Sync. (Q _g - Q _{gd})	 51			
$t_{d(on)}$	Turn-On Delay Time	 18			$V_{DD} = 98V$
t _r	Rise Time	 73		ns	$I_D = 62A$
$t_{d(off)}$	Turn-Off Delay Time	 41		115	$R_G = 2.2\Omega$
t _f	Fall Time	 39			V _{GS} = 10V4
C_{iss}	Input Capacitance	 5270			$V_{GS} = 0V$
C_{oss}	Output Capacitance	 490			$V_{DS} = 50V$
C _{rss}	Reverse Transfer Capacitance	 105		рF	f = 1.0MHz, See Fig. 5
Coss eff.(ER)	Effective Output Capacitance (Energy Related)	 460			$V_{GS} = 0V, V_{DS} = 0V \text{ to } 120V$
C _{oss eff.(TR)}	Effective Output Capacitance (Time Related)	 530			V _{GS} = 0V, V _{DS} = 0V to 120V⑤

Diode Characteristics

	Parameter	Min.	Тур.	Max.	Units	Conditions
	Continuous Source Current			00		MOSFET symbol
l _S	(Body Diode)			– 99	A	showing the
ı	Pulsed Source Current			396	A	integral reverse
I _{SM}	(Body Diode) ①			390		p-n junction diode.
V_{SD}	Diode Forward Voltage			1.3	V	$T_J = 25^{\circ}C, I_S = 62A, V_{GS} = 0V $ ④
4	Doverse Deceyory Time		86		no	$T_J = 25^{\circ}C$ $V_{DD} = 130V$
t _{rr}	Reverse Recovery Time		110		ns	$T_{J} = 125^{\circ}C$ $I_{F} = 62A$,
C	Daviera Dagavery Charge		300		~ C	$T_J = 25^{\circ}C$ di/dt = 100A/µs @
Q_{rr}	Reverse Recovery Charge		450		nC	$T_{J} = 125^{\circ}C$
I _{RRM}	Reverse Recovery Current		6.5		Α	T _J = 25°C
t _{on}	Forward Turn-On Time Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)					

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax} , starting $T_J = 25$ °C, L = 0.115mH, $R_G = 25\Omega$, $I_{AS} = 63$ A, $V_{GS} = 10$ V. Part not recommended for use above this value.
- $\label{eq:loss_space} \mbox{\Im} \quad I_{SD} \leq 62A, \ di/dt \leq 1040A/\mu s, \ V_{DD} \leq V_{(BR)DSS}, \ T_J \leq 175^{\circ}C.$
- 4 Pulse width $\leq 400 \mu s$; duty cycle $\leq 2\%$.
- $^{\circ}$ C_{oss} eff. (TR) is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}. $^{\circ}$ C_{oss} eff. (ER) is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.
- When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994
- ® R_θ is measured at T_J approximately 90°C.



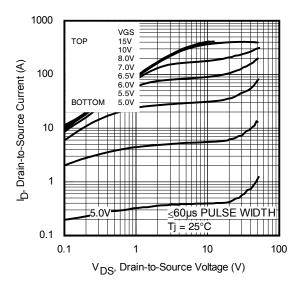


Fig. 1 Typical Output Characteristics

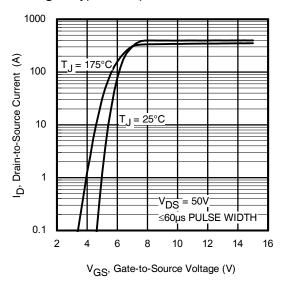


Fig. 3 Typical Transfer Characteristics

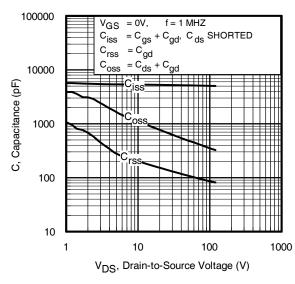


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

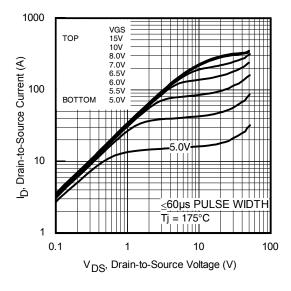


Fig. 2 Typical Output Characteristics

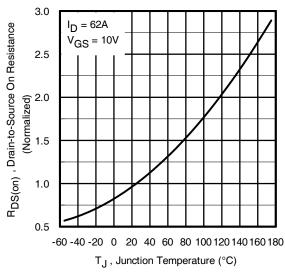


Fig. 4 Normalized On-Resistance vs. Temperature

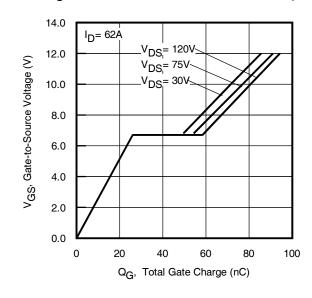


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage



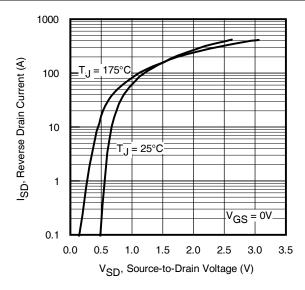


Fig. 7 Typical Source-to-Drain Diode Forward Voltage 120 100 I_D, Drain Current (A) 80 60 40 20 0 175 25 50 75 100 125 150 T_C , Case Temperature (°C)

Fg 9. Maximum Drain Current vs. Case Temperature

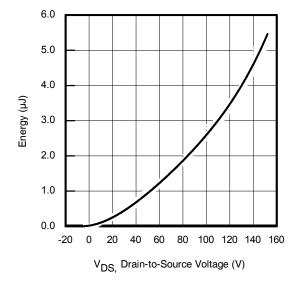


Fig 11. Typical Coss Stored Energy

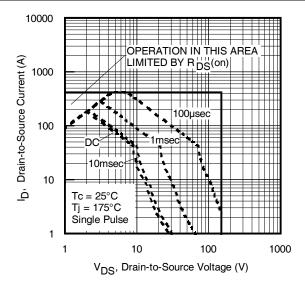


Fig 8. Maximum Safe Operating Area

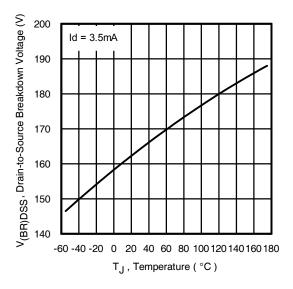


Fig 10. Drain-to-Source Breakdown Voltage

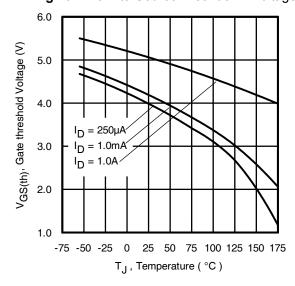


Fig 12. Maximum Avalanche Energy vs. Drain Current



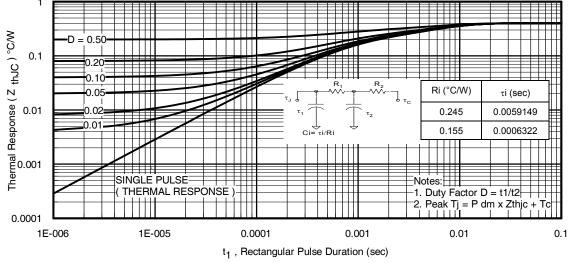


Fig 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

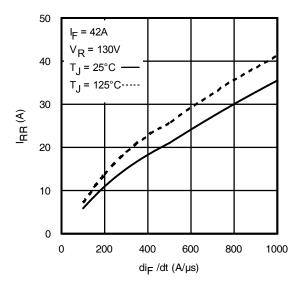


Fig. 14 - Typical Recovery Current vs. dif/dt

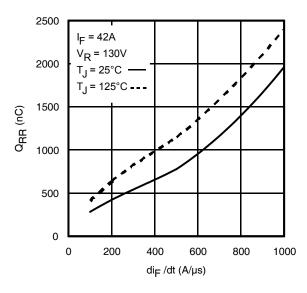


Fig. 16 - Typical Stored Charge vs. dif/dt

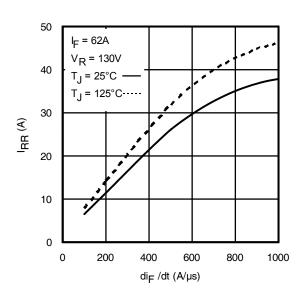


Fig. 15 - Typical Recovery Current vs. dif/dt

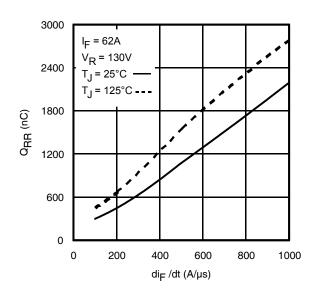


Fig. 17 - Typical Stored Charge vs. dif/dt



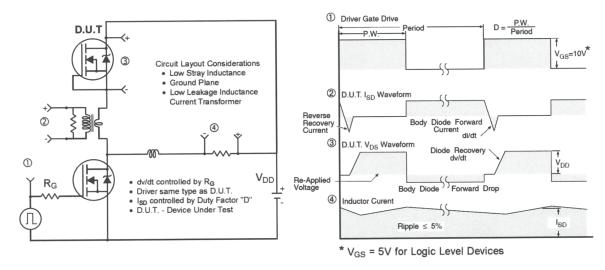


Fig 18. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

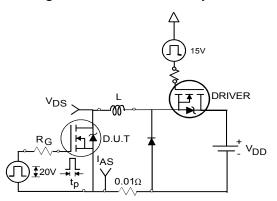


Fig 19a. Unclamped Inductive Test Circuit

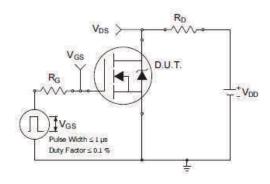


Fig 20a. Switching Time Test Circuit

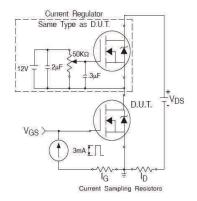


Fig 21a. Gate Charge Test Circuit

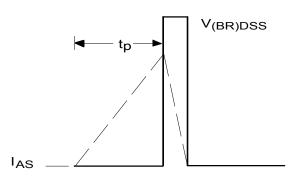


Fig 19b. Unclamped Inductive Waveforms

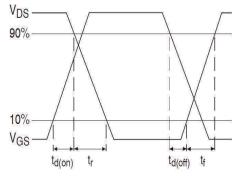


Fig 20b. Switching Time Waveforms

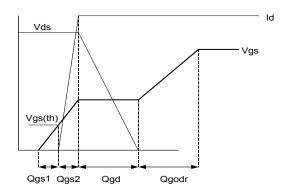
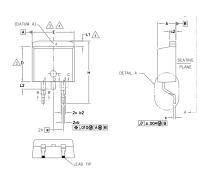
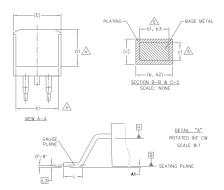


Fig 21b. Gate Charge Waveform



D²Pak (TO-263AB) Package Outline (Dimensions are shown in millimeters (inches))





- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.

4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.

5. DIMENSION 61, 63 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.

S			N		
M B	MILLIM	ETERS	INC	INCHES	
O L	MIN.	MAX.	MIN.	MAX.	NOTES
А	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
Ь	0.51	0.99	.020	.039	
ь1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
ь3	1.14	1.73	.045	.068	5
С	0.38	0.74	.015	.029	
с1	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
е	2.54	BSC	.100	BSC	
Н	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	_	1.68	_	.066	4
L2	_	1.78	_	.070	
L3	0.25	BSC	.010	BSC	

LEAD ASSIGNMENTS

DIODES

1.— ANODE (TWO DIE) / OPEN (ONE DIE) 2, 4.— CATHODE 3.— ANODE

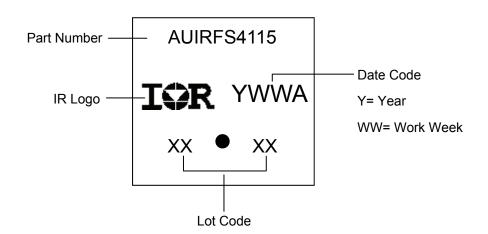
HEXFET

IGBTs, CoPACK

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

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

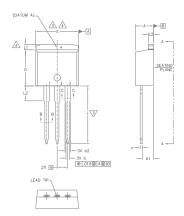
D²Pak (TO-263AB) Part Marking Information

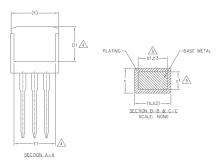


Note: For the most current drawing please refer to IR website at http://www.irf.com/package/



TO-262 Package Outline (Dimensions are shown in millimeters (inches)





- 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 O.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.

4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.

5. DIMENSION 61 AND c1 APPLY TO BASE METAL ONLY.

- 6. CONTROLLING DIMENSION: INCH.
- 7.- OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

LEAD ASSIGNMENTS

IGBTs, CoPACK

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

HEXFET

DIODES

1.- ANODE (TWO DIE) / OPEN (ONE DIE) 1.- GATE

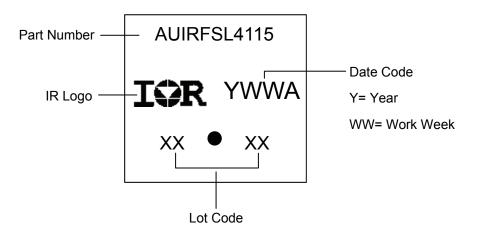
2.- DRAIN 3.- SOURCE

2, 4.- CATHODE 3.- ANODE

4.- DRAIN

S Y M		DIMENSIONS				
В	MILLIM	ETERS	IN	INCHES		
0 L	MIN.	MAX.	MIN.	MAX.	O T E S	
Α	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		
ь3	1.14	1.73	.045	.068	5	
С	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	
е	2.54	BSC	.100	BSC		
L	13.46	14.10	.530	.555		
L1	_	1.65	-	.065	4	
L2	3.56	3.71	.140	.146		

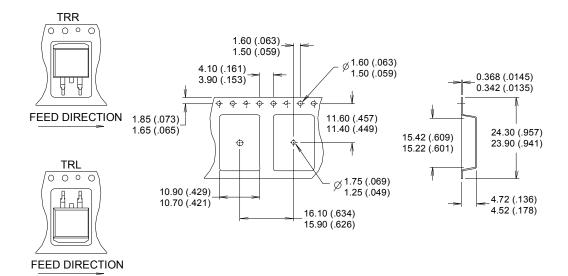
TO-262 Part Marking Information

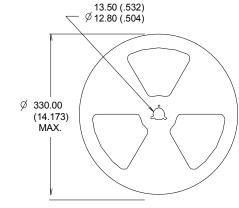


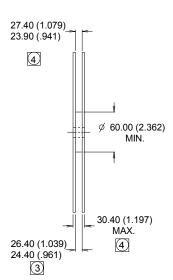
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/



D²Pak (TO-263AB) Tape & Reel Information (Dimensions are shown in millimeters (inches))







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

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



Qualification Information

		Automotive						
			(per AEC-Q101)					
Qualificati	ion Level	Comments: Th	is part number(s) passed Automotive qualification. Infineon's					
		Industrial and C	Consumer qualification level is granted by extension of the higher					
		Automotive leve	Automotive level.					
Moisture Sensitivity Level		D ² -Pak	MSL1					
Moistare	Constitutely Love:	TO-262	WOL					
	Lluman Dady Madal		Class H2 (+/- 4000V) [†]					
FOD	Human Body Model	AEC-Q101-001						
E2D	ESD	Class C5 (+/- 2000V) [†]						
Charged Device Model		AEC-Q101-005						
RoHS Compliant		Yes						

[†] Highest passing voltage.

Revision History

Date	Comments
10/27/2015	Updated datasheet with corporate template
	Corrected ordering table on page 1.

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