

AUTOMOTIVE GRADE

AUIRFR2405

HEXFET® Power MOSFET

Features

- Advanced Planar Technology
- Dynamic dV/dT Rating
- Low On-Resistance
- 175°C Operating Temperature
- Fast Switching

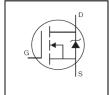
Description

- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to Tjmax

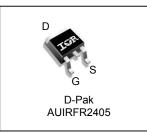
Specifically designed for Automotive applications, this Stripe Planar design of HEXFET® Power MOSFETs utilizes the latest

processing techniques to achieve low on-resistance per silicon

- · Lead-Free, RoHS Compliant
- Automotive Qualified *



V _{DSS}		55V
R _{DS(on)}	typ.	11.8mΩ
	max.	16mΩ
D (Silicon Limited)		56A®
D (Package Limited)		30A



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. G G Gate Drain Source

Base part number	Dookogo Typo	Standard Pack		Orderable Part Number
Base part number	Package Type	Form	Quantity	Orderable Part Number
ALUDED2405	D. Dok	Tube	75	AUIRFR2405
AUIRFR2405	D-Pak	Tape and Reel Left	3000	AUIRFR2405TRL

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 (Silicon Limited)	56©		
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V (Silicon Limited)	40⑥	A	
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V (Package Limited) 30			
I _{DM}	Pulsed Drain Current ①	220		
P _D @T _C = 25°C	Maximum Power Dissipation	110	W	
	Linear Derating Factor	0.71	W/°C	
V_{GS}	Gate-to-Source Voltage	± 20	V	
E _{AS} Single Pulse Avalanche Energy (Thermally Limited) ②		130	mJ	
I _{AR}	Avalanche Current ①	34	А	
E _{AR}	Repetitive Avalanche Energy ①	11	mJ	
dv/dt	Pead Diode Recovery dv/dt3	5.0	V/ns	
T_J	Operating Junction and	-55 to + 175		
T _{STG}	Storage Temperature Range		°C	
	Soldering Temperature, for 10 seconds (1.6mm from case)	300		

Thermal Resistance

Thermal Resistant	00			
Symbol	Parameter	Тур.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ®		1.4	
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑦	50	°C/W	
$R_{\theta JA}$	Junction-to-Ambient		110	

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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	55			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.052		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance		11.8	16	mΩ	V _{GS} = 10V, I _D = 34A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$
gfs	Forward Trans conductance	30			S	$V_{DS} = 25V, I_{D} = 34A $ ④
	Drain-to-Source Leakage Current			20		$V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}$
I _{DSS}				250	μA	$V_{DS} = 44V, V_{GS} = 0V, T_{J} = 150^{\circ}C$
	Gate-to-Source Forward Leakage			200	n 1	V _{GS} = 20V
I _{GSS}	Gate-to-Source Reverse Leakage			-200	nA	$V_{GS} = -20V$

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

Q_g	Total Gate Charge	 70	110		I _D = 34A
Q_{gs}	Gate-to-Source Charge	 16	23	nC	$V_{DS} = 44V$
Q_{gd}	Gate-to-Drain Charge	 19	29		V _{GS} = 10V4
$t_{d(on)}$	Turn-On Delay Time	 15			$V_{DD} = 28V$
t _r	Rise Time	 130		20	$I_D = 34A$
$t_{d(off)}$	Turn-Off Delay Time	 55		ns	$R_G = 6.8\Omega$
t _f	Fall Time	 78			V _{GS} = 10V4
L _D	Internal Drain Inductance	 4.5		nH	Between lead, 6mm (0.25in.)
L _S	Internal Source Inductance	 7.5		Ш	from package and center of die contact
C _{iss}	Input Capacitance	 2430			$V_{GS} = 0V$
C_{oss}	Output Capacitance	 470			V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	 100		_	f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance	 2040		pF	$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz$
Coss	Output Capacitance	 350			$V_{GS} = 0V, V_{DS} = 44V, f = 1.0MHz$
Coss eff.	Effective Output Capacitance	 350			V_{GS} = 0V, V_{DS} = 0V to 44V

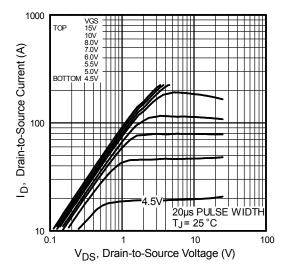
Diode Characteristics

	Parameter	Min.	Тур.	Max.	Units	Conditions
Is	Continuous Source Current (Body Diode)			56©		MOSFET symbol showing the
I _{SM}	Pulsed Source Current (Body Diode) ①			220		integral reverse p-n junction diode.
V_{SD}	Diode Forward Voltage			1.3	V	$T_J = 25^{\circ}C, I_S = 34A, V_{GS} = 0V $ ④
t _{rr}	Reverse Recovery Time		62	93	ns	$T_J = 25^{\circ}C$, $I_F = 34A$
Q_{rr}	Reverse Recovery Charge		170	260	nC	di/dt = 100A/µs④
t _{on}	Forward Turn-On Time	Intrinsio	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)			

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② $V_{DD} = 25V$, starting $T_J = 25$ °C, L = 0.22mH, $R_G = 25\Omega$, $I_{AS} = 34$ A
- $\label{eq:local_local_local_local} \ensuremath{\Im} \quad I_{SD} \leq 34A, \ di/dt \leq 190A/\mu s, \ V_{DD} \leq V_{(BR)DSS}, \ T_J \leq 175^{\circ}C.$
- 4 Pulse width \leq 300µs; duty cycle \leq 2%. 5 $C_{oss\ eff}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- © Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A.
- 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.





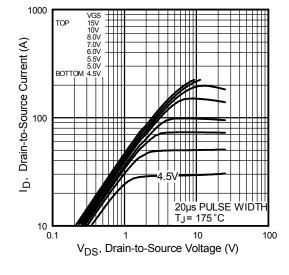


Fig. 1 Typical Output Characteristics

Fig. 2 Typical Output Characteristics

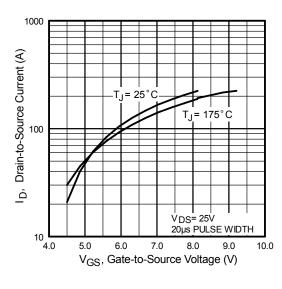


Fig. 3 Typical Transfer Characteristics

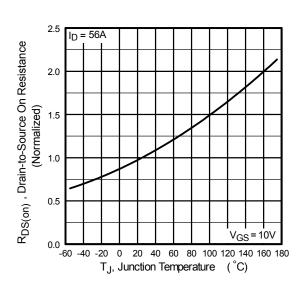


Fig. 4 Normalized On-Resistance Vs. Temperature



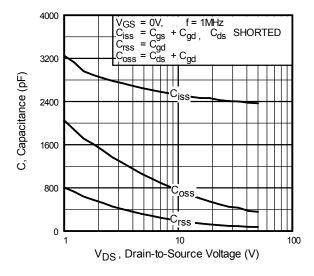


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

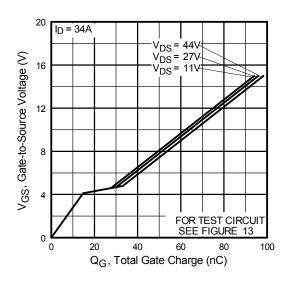


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

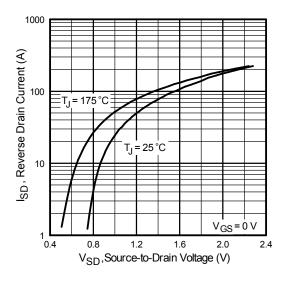


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

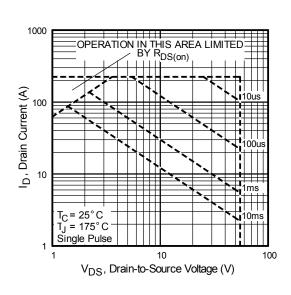


Fig 8. Maximum Safe Operating Area



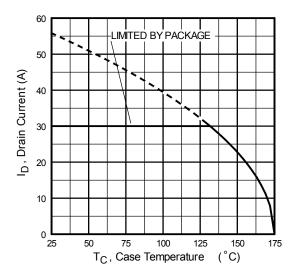


Fig 9. Maximum Drain Current Vs. Case Temperature

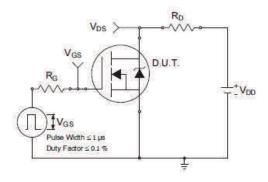


Fig 10a. Switching Time Test Circuit

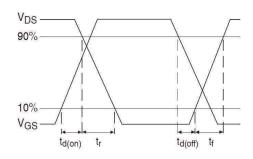


Fig 10b. Switching Time Waveforms

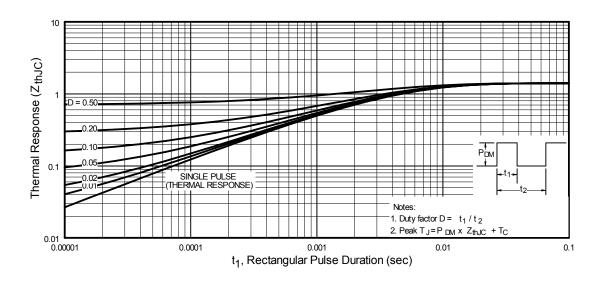


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case



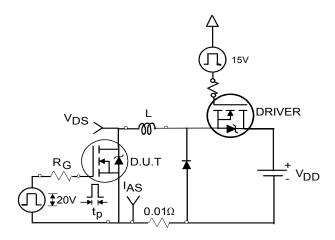


Fig 12a. Unclamped Inductive Test Circuit

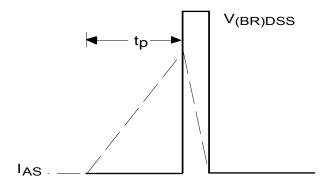


Fig 12b. Unclamped Inductive Waveforms

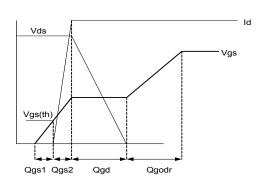


Fig 13a. Gate Charge Waveform

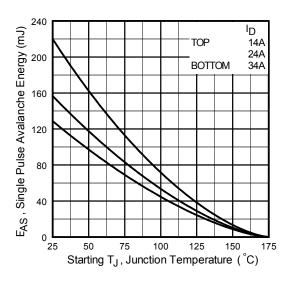


Fig 12c. Maximum Avalanche Energy vs. Drain Current

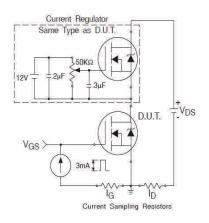
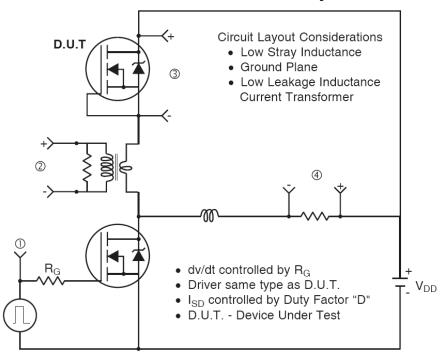


Fig 13b. Gate Charge Test Circuit



Peak Diode Recovery dv/dt Test Circuit



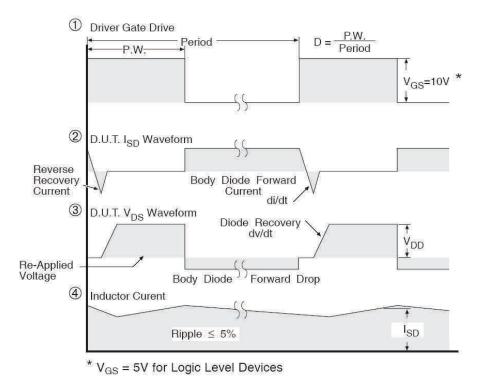
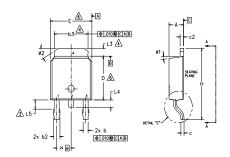


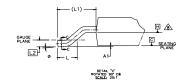
Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

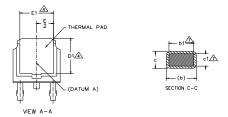


D-Pak (TO-252AA) Package Outline (Dimensions are shown in millimeters (inches))









NOTES:

- 1.- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- 2.- DIMENSION ARE SHOWN IN INCHES [MILLIMETERS].
- 3- LEAD DIMENSION UNCONTROLLED IN L5.
- A- DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.
- 5.— SECTION C-C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.
- Limited Dimension D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- A- DIMENSION 61 & c1 APPLIED TO BASE METAL ONLY.
- ♠ DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
- 9.- OUTLINE CONFORMS TO JEDEC OUTLINE TO-252AA.

S Y M	DIMENSIONS					
B	MILLIM	ETERS	INC	HES	O T E S	
L	MIN.	MAX.	MIN.	MAX.	S	
Α	2.18	2.39	.086	.094		
A1	-	0.13	-	.005		
b	0.64	0.89	.025	.035		
ь1	0.65	0.79	.025	.031	7	
b2	0.76	1.14	.030	.045		
b3	4.95	5.46	.195	.215	4	
С	0.46	0.61	.018	.024		
c1	0.41	0.56	.016	.022	7	
c2	0.46	0.89	.018	.035		
D	5.97	6.22	.235	.245	6	
D1	5.21	-	.205	-	4	
Ε	6.35	6.73	.250	.265	6	
E1	4.32	-	.170	-	4	
е	2.29	BSC	.090	.090 BSC		
Н	9.40	10.41	.370	.410		
L	1.40	1.78	.055	.070		
L1	2.74	BSC	.108	REF.		
L2	0.51	BSC	.020	BSC		
L3	0.89	1.27	.035	.050	4	
L4	-	1.02	-	.040		
L5	1.14	1.52	.045	.060	3	
ø	0,	10*	0,	10°		
ø1	0,	15*	0,	15*		
ø2	25*	35°	25*	35°		

LEAD ASSIGNMENTS

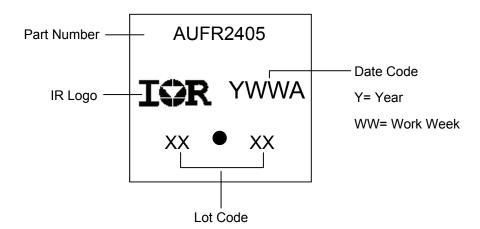
HEXFET

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

IGBT & CoPAK

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

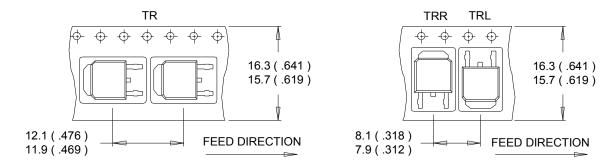
D-Pak (TO-252AA) Part Marking Information



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

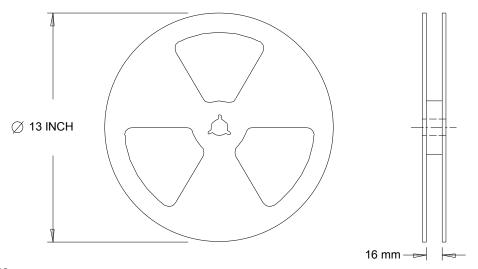


D-Pak (TO-252AA) Tape & Reel Information (Dimensions are shown in millimeters (inches))



NOTES:

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



NOTES:

1. OUTLINE CONFORMS TO EIA-481.

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



Qualification Information

<u> </u>	don miorination				
		Automotive (per AEC-Q101)			
		Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.			
Maiatuus	Moisture Sensitivity Level		MCI 4		
Woisture			MSL1		
	Machine Medal		Class M4 (+/-500V) [†]		
	Machine Model	AEC-Q101-002			
FOD	Liverson Dady Madal	Class H1C (+/-2000V) [†]			
ESD	Human Body Model	AEC-Q101-001			
	Observed Davis Madal	Class C5 (+/-2000V) [†]			
	Charged Device Model	AEC-Q101-005			
RoHS Compliant			Yes		
		1			

[†] Highest passing voltage.

Revision History

Date	Comments		
11/19/15	Updated datasheet with corporate template		
11/19/13	Corrected ordering table on page 1.		

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