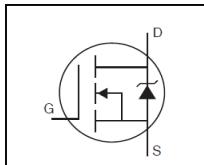
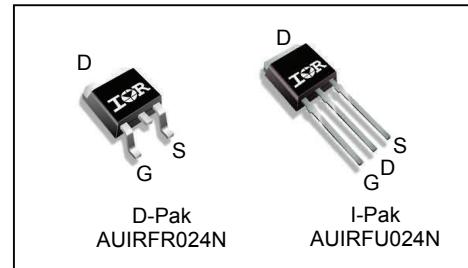


Features

- Advanced Planar Technology
- Low On-Resistance
- 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}	55V
R_{DS(on)} max.	0.075Ω
I_D	17A^⑤



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.

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRFU024N	I-Pak	Tube	75	AUIRFU024N
AUIRFR024N	D-Pak	Tube	75	AUIRFR024N
		Tape and Reel Left	3000	AUIRFR024NTRL

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	17	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	12	
I _{DM}	Pulsed Drain Current ①⑥	68	
P _D @ T _C = 25°C	Maximum Power Dissipation	45	W
	Linear Derating Factor	0.3	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
E _{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②⑥	71	mJ
I _{AR}	Avalanche Current ①	10	A
E _{AR}	Repetitive Avalanche Energy ①	4.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑥	5.0	V/ns
T _J	Operating Junction and	-55 to + 175	°C
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	3.3	°C/W
R _{θJA}	Junction-to-Ambient (PCB Mount) ⑦	—	50	
R _{θJA}	Junction-to-Ambient	—	110	

HEXFET® is a registered trademark of Infineon.

*Qualification standards can be found at www.infineon.com

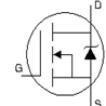
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(\text{BR})\text{DSS}}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{\text{GS}} = 0\text{V}$, $I_D = 250\mu\text{A}$
$\Delta V_{(\text{BR})\text{DSS}}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.052	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{\text{DS}(\text{on})}$	Static Drain-to-Source On-Resistance	—	—	0.075	Ω	$V_{\text{GS}} = 10\text{V}$, $I_D = 10\text{A}$ ④
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 250\mu\text{A}$
g_{fs}	Forward Trans conductance	4.5	—	—	S	$V_{\text{DS}} = 25\text{V}$, $I_D = 10\text{A}$ ⑥
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{\text{DS}} = 55\text{V}$, $V_{\text{GS}} = 0\text{V}$
		—	—	250		$V_{\text{DS}} = 44\text{V}$, $V_{\text{GS}} = 0\text{V}$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{\text{GS}} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{\text{GS}} = -20\text{V}$

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

Q_g	Total Gate Charge	—	—	20	nC	$I_D = 10\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	5.3		$V_{\text{DS}} = 44\text{V}$
Q_{gd}	Gate-to-Drain Charge	—	—	7.6		$V_{\text{GS}} = 10\text{V}$, See Fig 6 and 13 ④⑥
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	—	4.9	—		$V_{\text{DD}} = 28\text{V}$
t_r	Rise Time	—	34	—	ns	$I_D = 10\text{A}$
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time	—	19	—		$R_G = 24\Omega$
t_f	Fall Time	—	27	—		$R_D = 2.6\Omega$, See Fig 10 ④⑥
L_D	Internal Drain Inductance	—	4.5	—		Between lead, 6mm (0.25in.) from package and center of die contact ⑤
L_S	Internal Source Inductance	—	7.5	—	nH	
C_{iss}	Input Capacitance	—	370	—	pF	$V_{\text{GS}} = 0\text{V}$
C_{oss}	Output Capacitance	—	140	—		$V_{\text{DS}} = 25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	65	—		$f = 1.0\text{MHz}$, See Fig. 5

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	17⑤	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	68		
V_{SD}	Diode Forward Voltage	—	—	1.3		$T_J = 25^\circ\text{C}$, $I_S = 10\text{A}$, $V_{\text{GS}} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	56	83		$T_J = 25^\circ\text{C}$, $I_F = 10\text{A}$
Q_{rr}	Reverse Recovery Charge	—	120	180	nC	$\text{di}/\text{dt} = 100\text{A}/\mu\text{s}$ ④⑥
t_{on}	Forward Turn-On Time	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. (See fig. 11)
- ② $V_{\text{DD}} = 25\text{V}$, starting $T_J = 25^\circ\text{C}$, $L = 1\text{mH}$, $R_G = 25\Omega$, $I_{\text{AS}} = 10\text{A}$, $V_{\text{GS}} = 10\text{V}$. (See Fig.12)
- ③ $I_{\text{SD}} \leq 10\text{A}$, $\text{di}/\text{dt} \leq 280\text{A}/\mu\text{s}$, $V_{\text{DD}} \leq V_{(\text{BR})\text{DSS}}$, $T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ This is applied for I-PAK, L_S of D-PAK is measured between lead and center of die contact.
- ⑥ Uses IRFZ24N data and test conditions.
- ⑦ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994

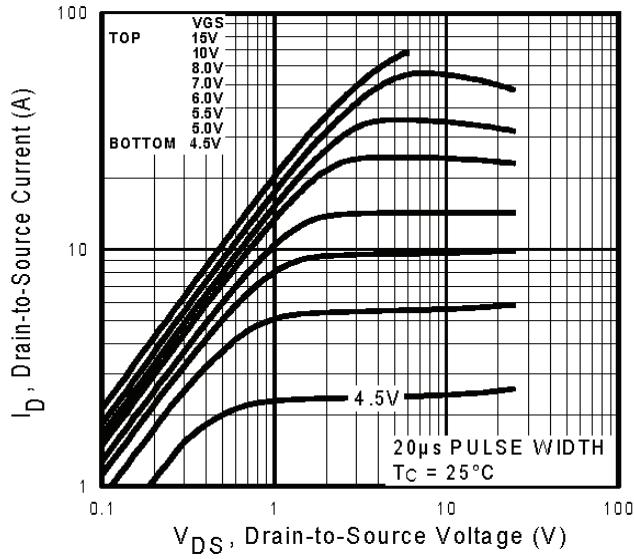


Fig. 1 Typical Output Characteristics

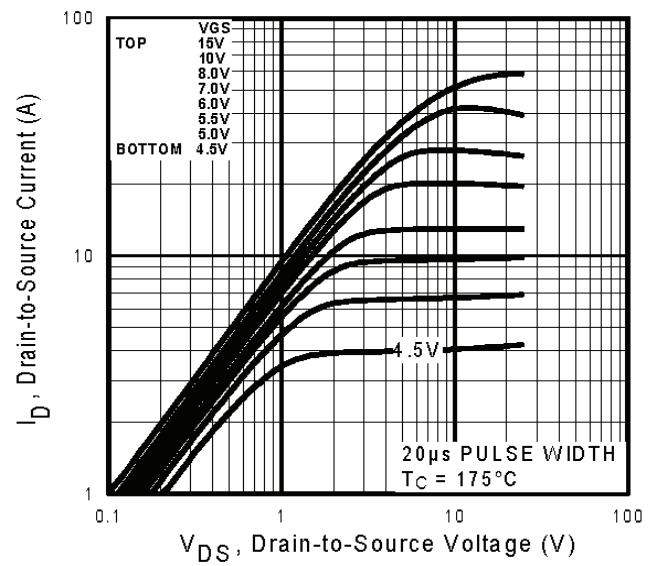


Fig. 2 Typical Output Characteristics

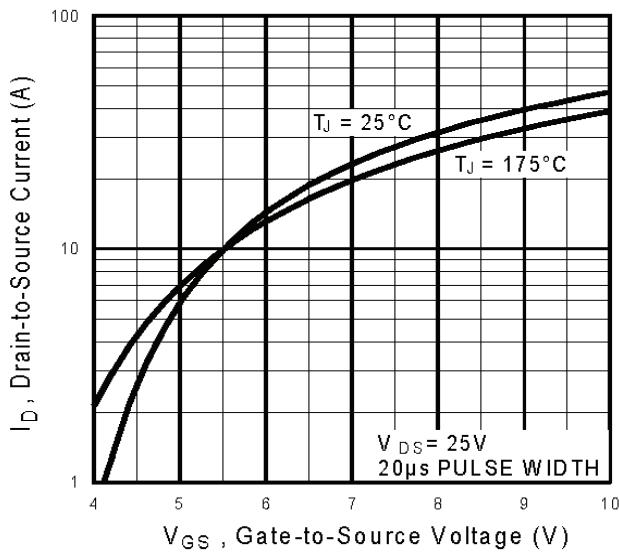


Fig. 3 Typical Transfer Characteristics

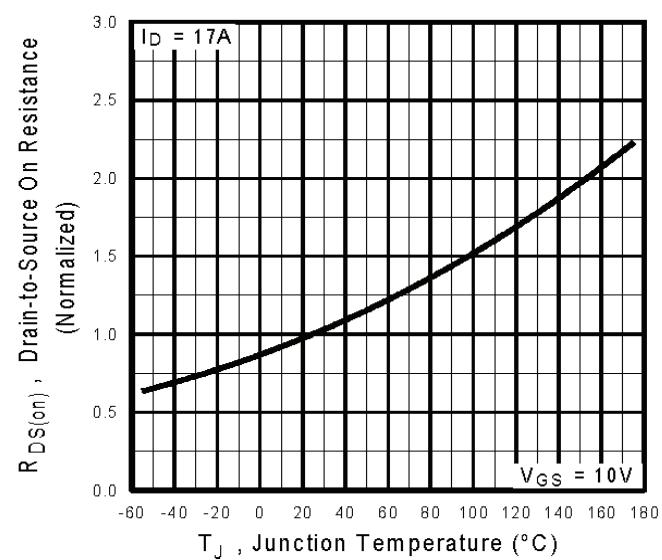


Fig. 4 Normalized On-Resistance vs. Temperature

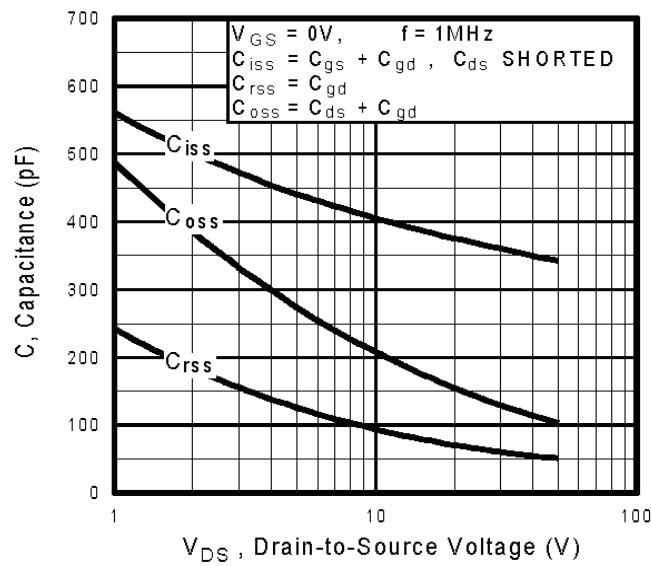


Fig 5. Typical Capacitance vs.
Drain-to-Source Voltage

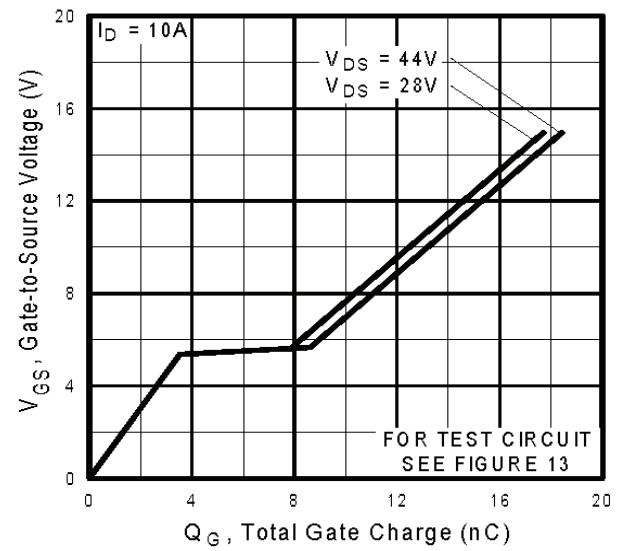


Fig 6. Typical Gate Charge vs.
Gate-to-Source Voltage

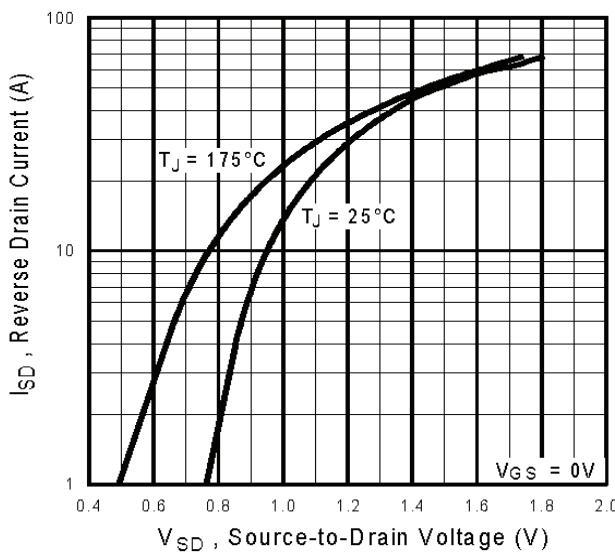


Fig. 7 Typical Source-to-Drain Diode
Forward Voltage

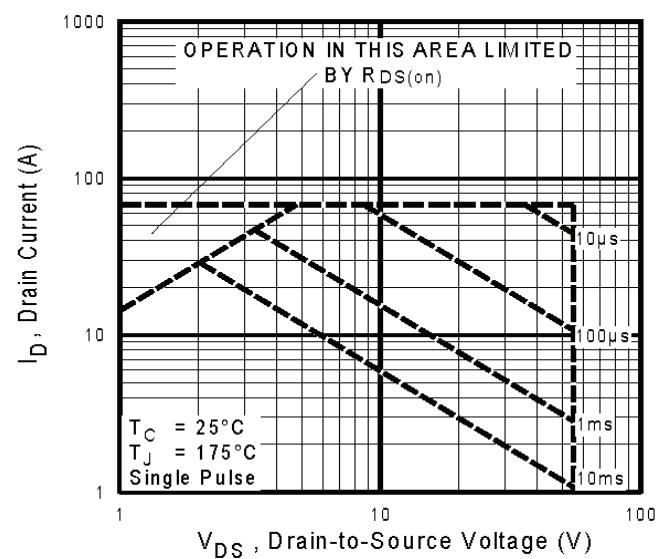


Fig 8. Maximum Safe Operating Area

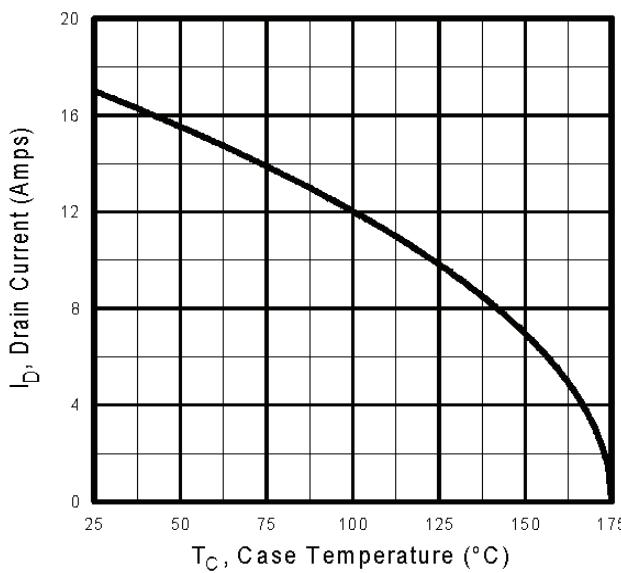


Fig 9. Maximum Drain Current vs. Case Temperature

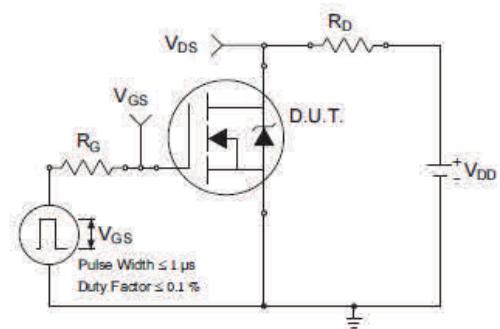


Fig 10a. Switching Time Test Circuit

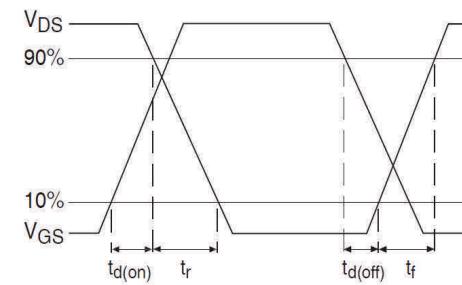


Fig 10b. Switching Time Waveforms

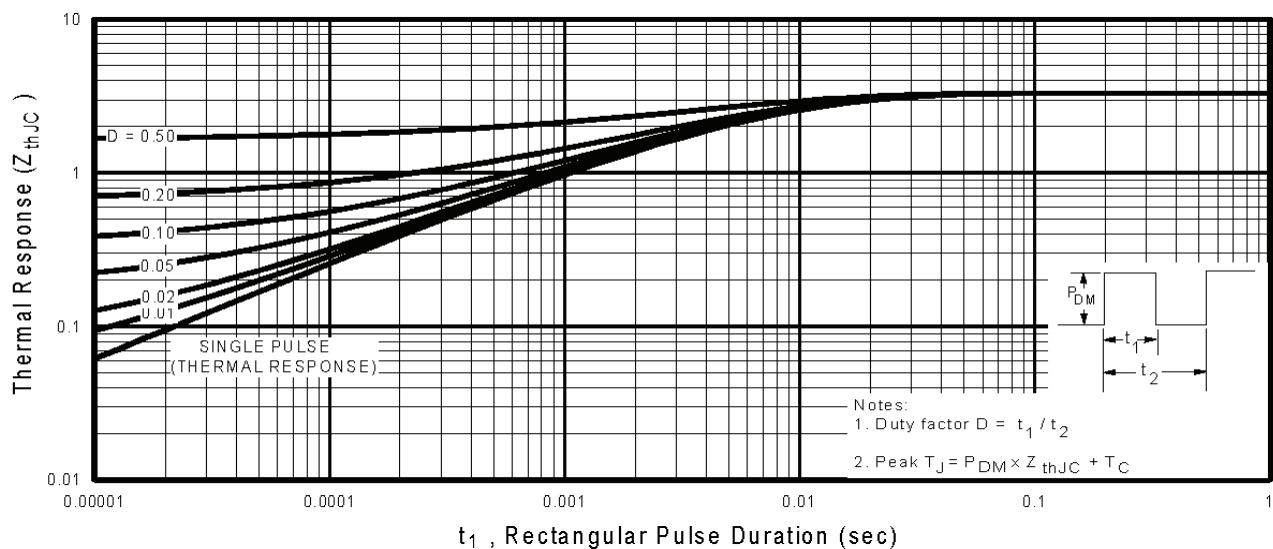


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

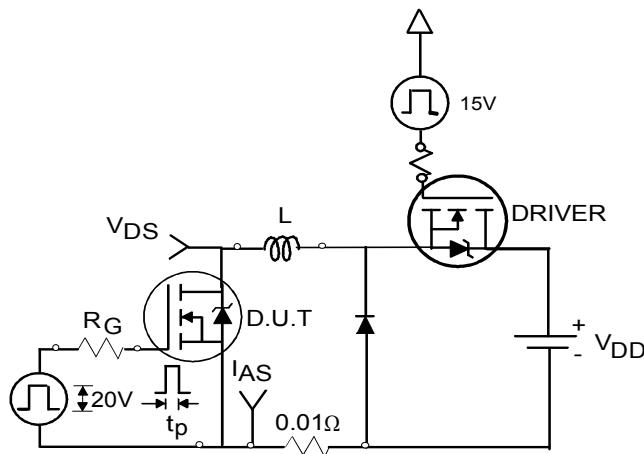


Fig 12a. Unclamped Inductive Test Circuit

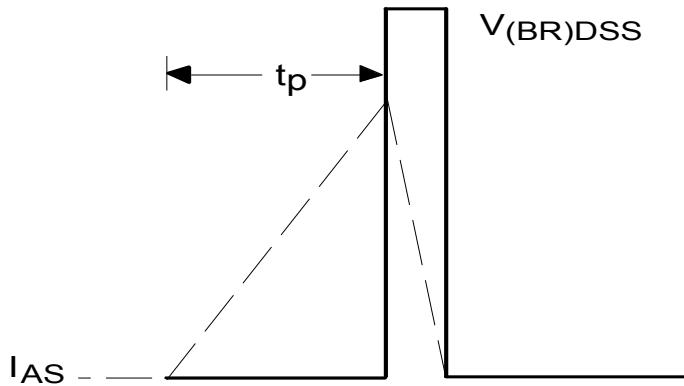


Fig 12b. Unclamped Inductive Waveforms

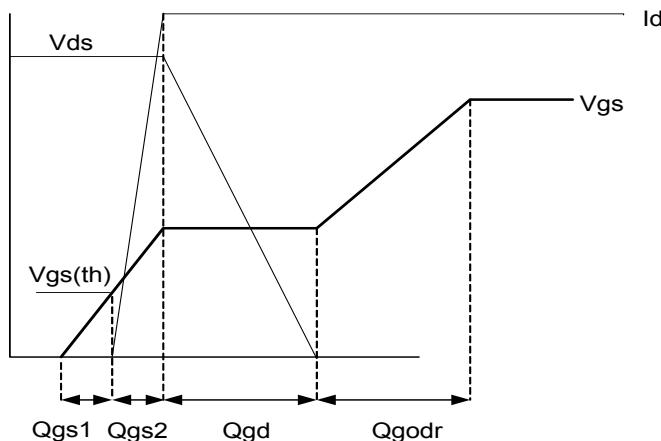


Fig 13a. Gate Charge Waveform

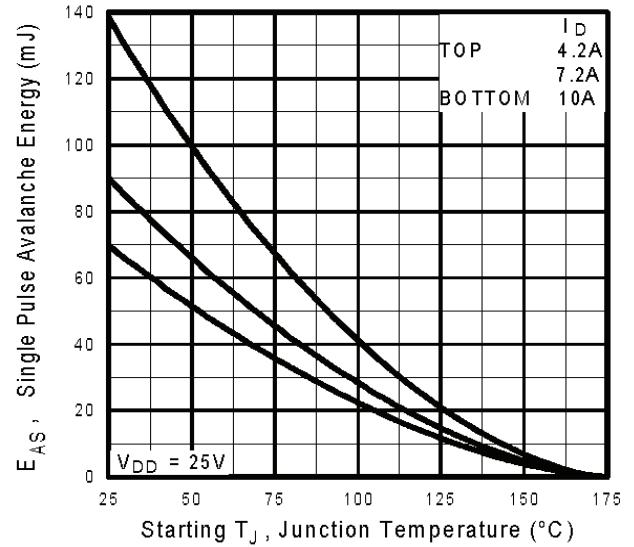


Fig 12c. Maximum Avalanche Energy vs. Drain Current

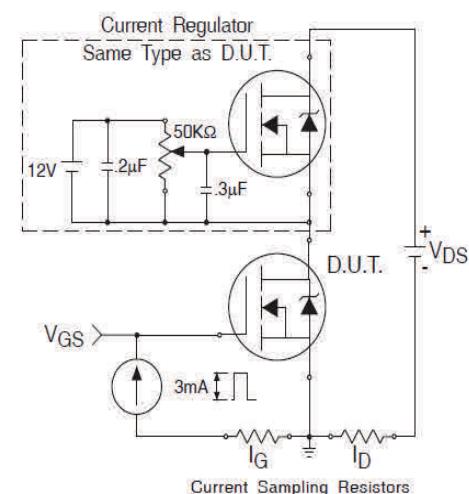
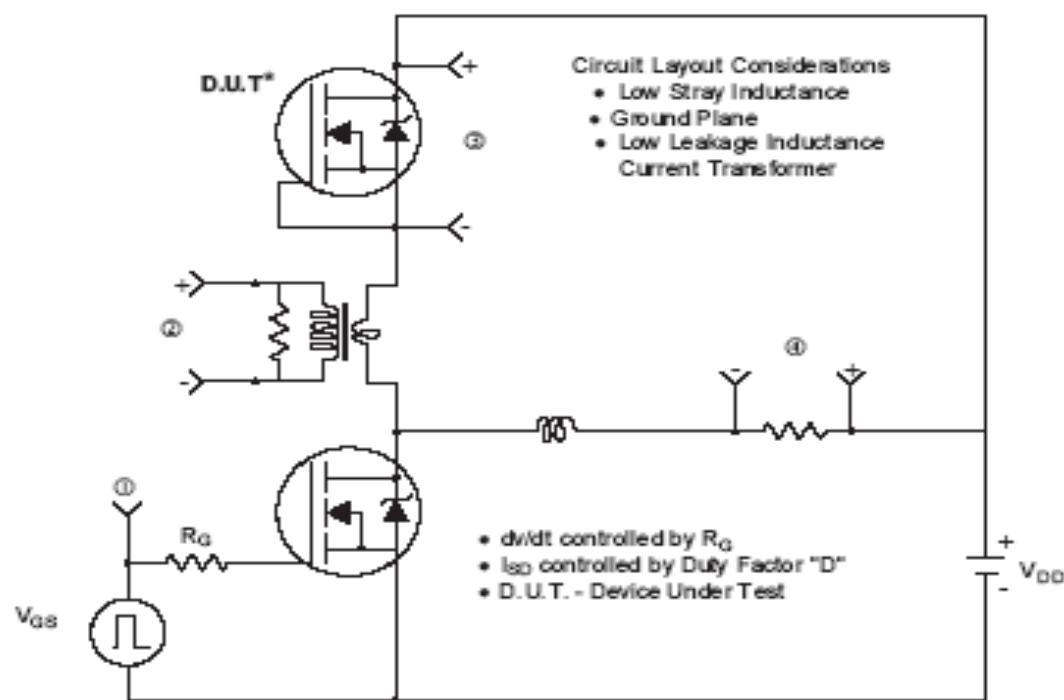
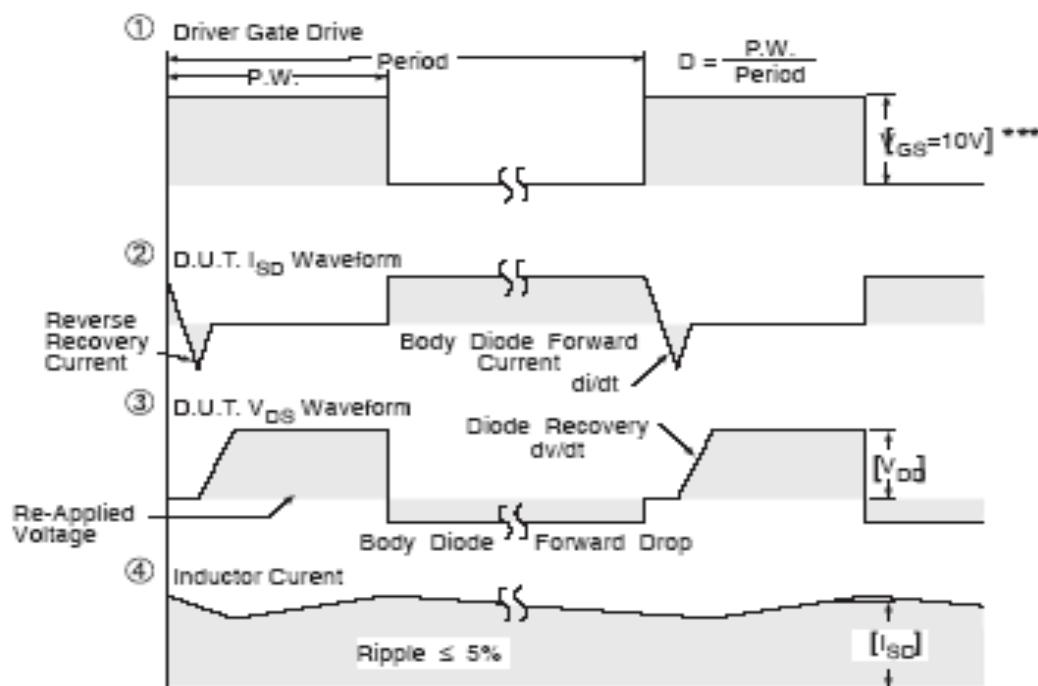


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

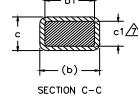
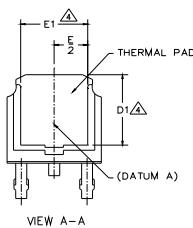
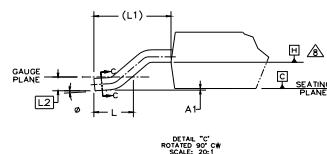
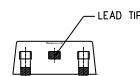
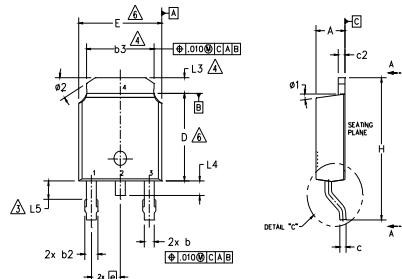
* Reverse Polarity of D.U.T for P-Channel



*** $V_{GS} = 5.0V$ for Logic Level and 3V Drive Devices

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.
4. - 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.
6. - 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.
7. - DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.
8. - DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
9. - OUTLINE CONFORMS TO JEDEC OUTLINE TO-252AA.

S Y M B O L	DIMENSIONS				N O T E S	
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	2.18	2.39	.086	.094		
A1	—	0.13	—	.005		
b	0.64	0.89	.025	.035		
b1	0.65	0.79	.025	.031	7	
b2	0.76	1.14	.030	.045		
b3	4.95	5.46	.195	.215	4	
c	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	
E	6.35	6.73	.250	.265	6	
E1	4.32	—	.170	—	4	
e	2.29	BSC	.090	BSC		
H	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

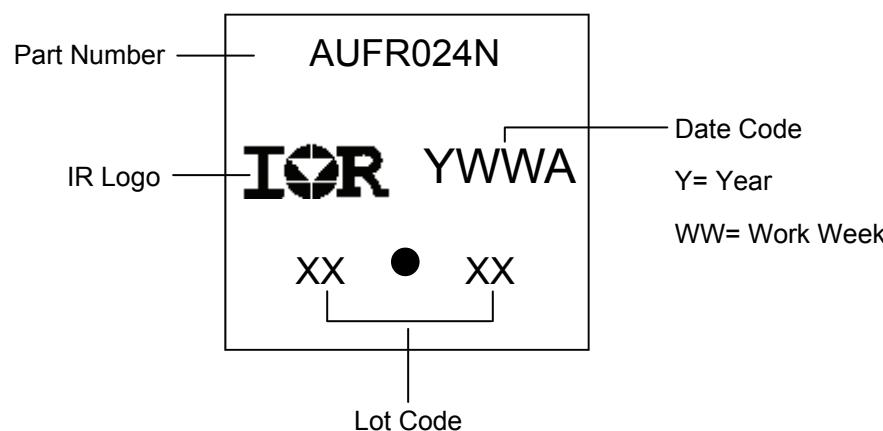
HEXFET

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

IGBT & CoPAK

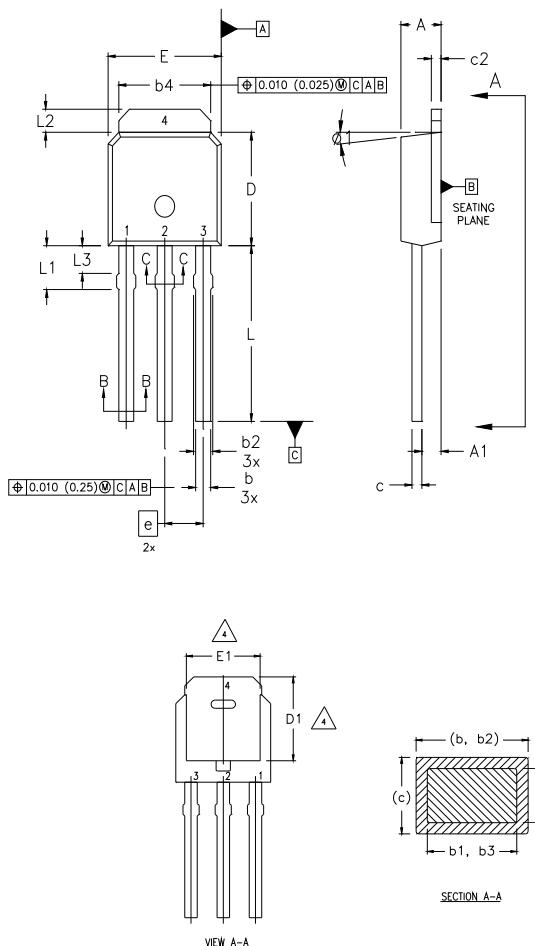
1. - GATE
2. - COLLECTOR
3. - Emitter
4. - COLLECTOR

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



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

I-Pak (TO-251AA) Package Outline (Dimensions are shown in millimeters (inches))



NOTES:

- 1 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
- 2 DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- 3 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 4 THERMAL PAD CONTOUR OPTION WITHIN DIMENSION b4, L2, E1 & D1.
- 5 LEAD DIMENSION UNCONTROLLED IN L3.
- 6 DIMENSION b1, b3 APPLY TO BASE METAL ONLY.
- 7 OUTLINE CONFORMS TO JEDEC OUTLINE TO-251AA.
- 8 CONTROLLING DIMENSION : INCHES.

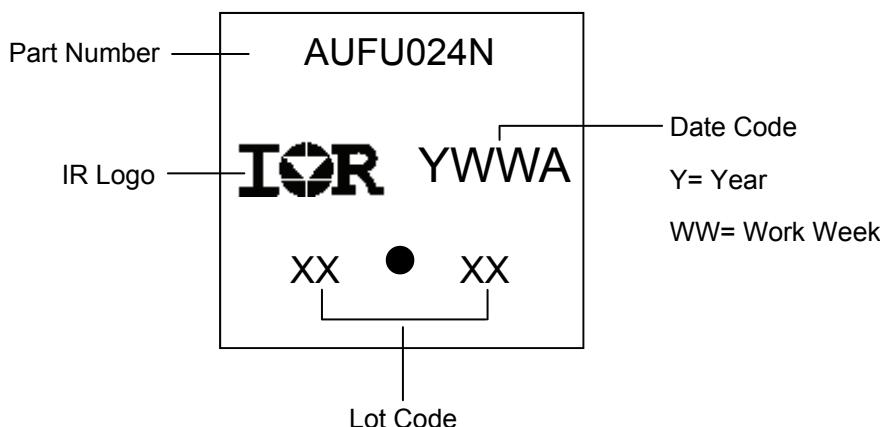
LEAD ASSIGNMENTS

SYMBOL	DIMENSIONS				NOTES	
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	2.18	2.39	0.086	.094		
A1	0.89	1.14	0.035	0.045		
b	0.64	0.89	0.025	0.035		
b1	0.64	0.79	0.025	0.031	4	
b2	0.76	1.14	0.030	0.045		
b3	0.76	1.04	0.030	0.041		
b4	5.00	5.46	0.195	0.215	4	
c	0.46	0.61	0.018	0.024		
c1	0.41	0.56	0.016	0.022		
c2	.046	0.86	0.018	0.035		
D	5.97	6.22	0.235	0.245	3, 4	
D1	5.21	—	0.205	—	4	
E	6.35	6.73	0.250	0.265	3, 4	
E1	4.32	—	0.170	—	4	
e	2.29		0.090 BSC			
L	8.89	9.60	0.350	0.380		
L1	1.91	2.29	0.075	0.090		
L2	0.89	1.27	0.035	0.050	4	
L3	1.14	1.52	0.045	0.060	5	
ø1	0°	15°	0°	15°		

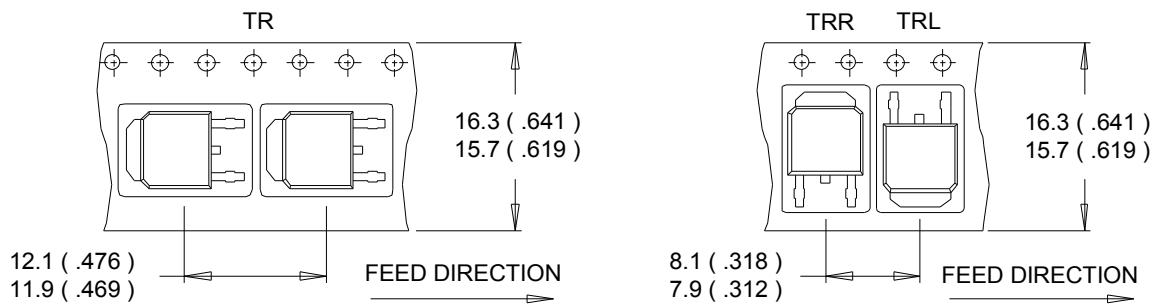
HEXFET

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

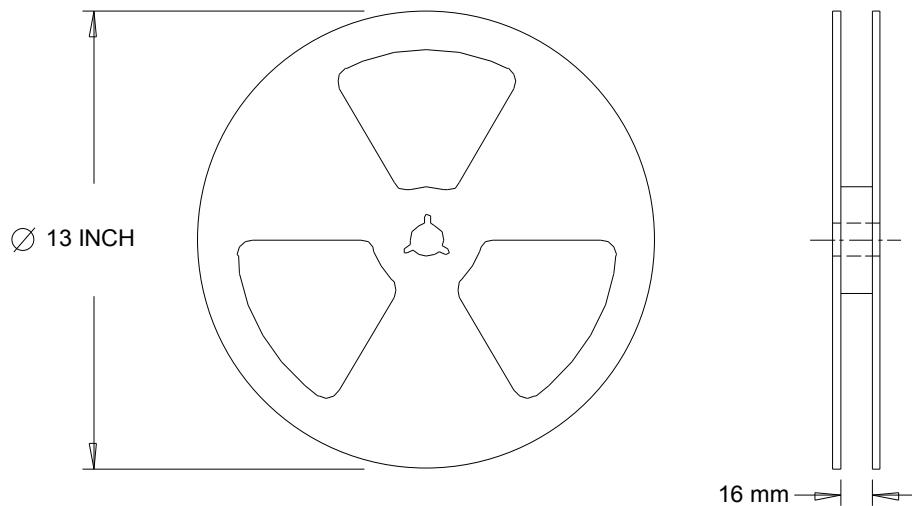
I-Pak (TO-251AA) Part Marking Information



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

Qualification Level		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.		
Moisture Sensitivity Level		D-Pak	MSL1	
		I-Pak		
ESD	Machine Model	Class M2 (+/- 150V) [†] AEC-Q101-002		
	Human Body Model	Class H1A (+/- 500V) [†] AEC-Q101-001		
	Charged Device Model	Class C5 (+/- 2000V) [†] AEC-Q101-005		
RoHS Compliant		Yes		

[†] Highest passing voltage.

Revision History

Date	Comments
10/12/2015	<ul style="list-style-type: none"> • Updated datasheet with corporate template • Corrected ordering table on page 1.

Published by
Infineon Technologies AG
81726 München, Germany
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