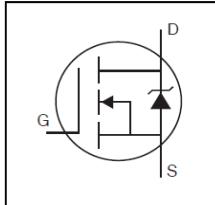
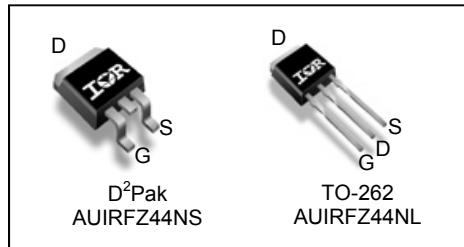


Features

- Advanced Planar Technology
- Low On-Resistance
- Dynamic dV/dT and dI/dT capability
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to T_{jmax}
- Lead-Free, RoHS Compliant
- Automotive Qualified *



V_{DSS}	55V
$R_{DS(on)}$ max.	17.5mΩ
I_D	49A



G	D	S
Gate	Drain	Source

Description

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

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRFZ44NL	TO-262	Tube	50	AUIRFZ44NL
AUIRFZ44NS	D ² -Pak	Tube	50	AUIRFZ44NS
		Tape and Reel Left	800	AUIRFZ44NSTRL

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 @ $T_c = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	49	A
I_D @ $T_c = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	35	
I_{DM}	Pulsed Drain Current ①	160	
P_D @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation	3.8	W
P_D @ $T_c = 25^\circ\text{C}$	Maximum Power Dissipation	94	
	Linear Derating Factor	0.63	$\text{W}/^\circ\text{C}$
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS} (Thermally Limited)	Single Pulse Avalanche Energy (Thermally Limited) ⑥	150	mJ
E_{AS} (Tested)	Single Pulse Avalanche Energy (Tested Limited) ⑤	530	
I_{AR}	Avalanche Current ①	25	A
E_{AR}	Repetitive Avalanche Energy ①	9.4	mJ
dv/dt	Peak Diode Recovery ③	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount), D ² Pak	—	40	

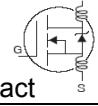
HEXFET® is a registered trademark of Infineon.

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

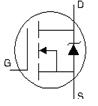
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	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	—	0.058	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{\text{DS}(\text{on})}$	Static Drain-to-Source On-Resistance	—	—	17.5	$\text{m}\Omega$	$V_{\text{GS}} = 10\text{V}$, $I_D = 25\text{A}$ 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	19	—	—	S	$V_{\text{DS}} = 25\text{V}$, $I_D = 25\text{A}$
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)

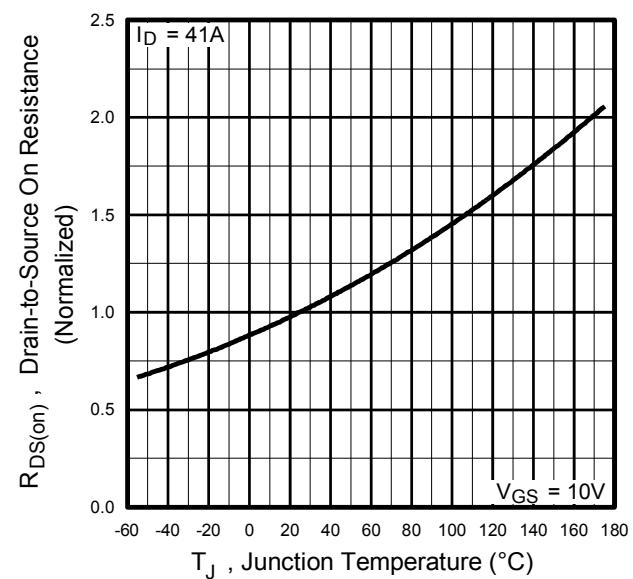
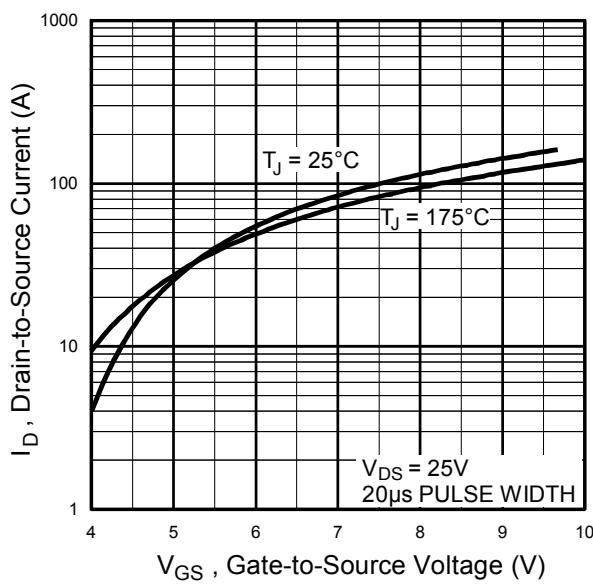
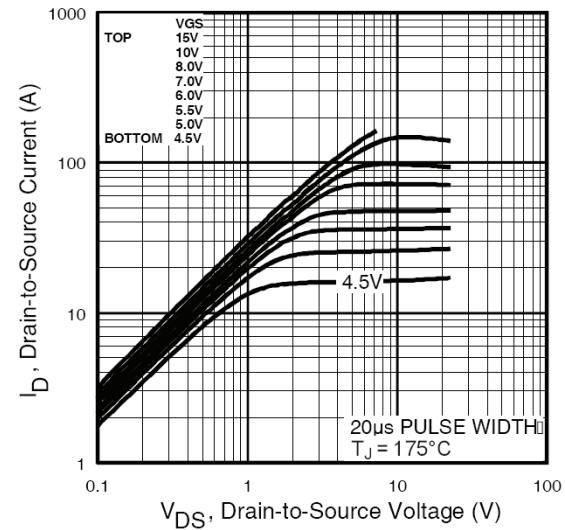
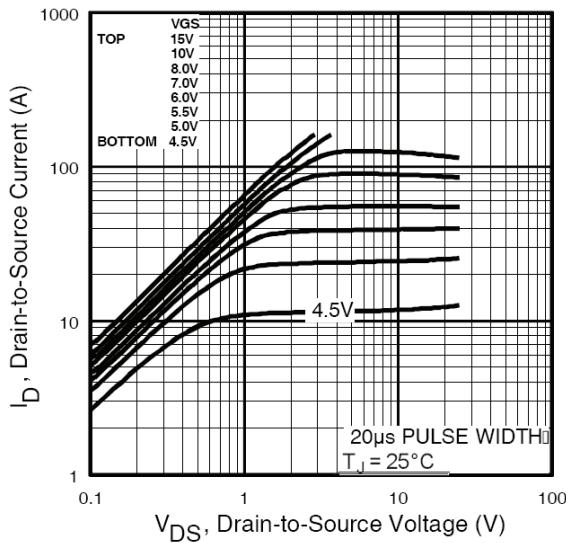
Q_g	Total Gate Charge	—	—	63	nC	$I_D = 25\text{A}$ $V_{\text{DS}} = 44\text{V}$ $V_{\text{GS}} = 10\text{V}$, See Fig. 6 and 13 ④
Q_{gs}	Gate-to-Source Charge	—	—	14		
Q_{gd}	Gate-to-Drain Charge	—	—	23		
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	—	12	—	ns	$V_{\text{DD}} = 28\text{V}$ $I_D = 25\text{A}$ $R_G = 12\Omega$ $V_{\text{GS}} = 10\text{V}$, See Fig. 10 ④
t_r	Rise Time	—	60	—		
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time	—	44	—		
t_f	Fall Time	—	45	—		
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	1470	—	pF	$V_{\text{GS}} = 0\text{V}$
C_{oss}	Output Capacitance	—	360	—		$V_{\text{DS}} = 25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	88	—		$f = 1.0\text{MHz}$, See Fig. 5

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	49	A	MOSFET symbol showing the integral reverse p-n junction diode.
	Pulsed Source Current (Body Diode) ①	—	—	160		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$, $I_S = 25\text{A}$, $V_{\text{GS}} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	63	95	ns	$T_J = 25^\circ\text{C}$, $I_F = 25\text{A}$
	Reverse Recovery Charge	—	170	260		$di/dt = 100\text{A}/\mu\text{s}$ ④
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 Limited by T_{Jmax} , starting $T_J = 25^\circ\text{C}$, $L = 0.48\text{mH}$, $R_G = 25\Omega$, $I_{\text{AS}} = 25\text{A}$, $V_{\text{GS}} = 10\text{V}$. (See fig.12)
- ③ $I_{\text{SD}} \leq 25\text{A}$, $di/dt \leq 230\text{A}/\mu\text{s}$, $V_{\text{DD}} \leq V_{(\text{BR})\text{DSS}}$, $T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ This is a typical value at device destruction and represents operation outside rated limits.
- ⑥ This is a calculated value limited to $T_J = 175^\circ\text{C}$.



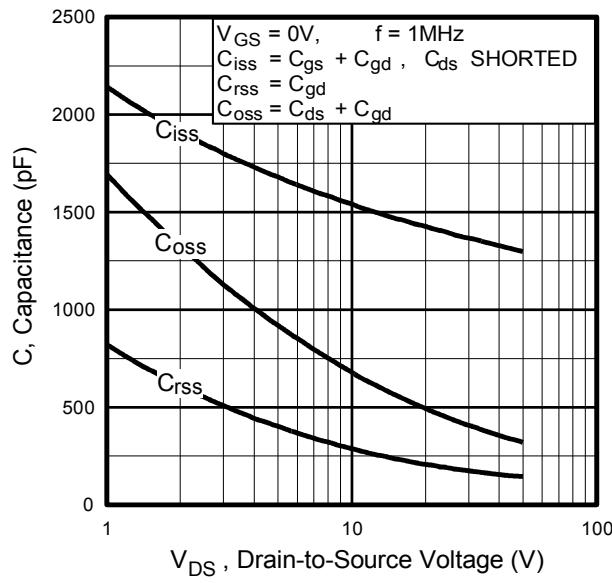


Fig. 5. Typical Capacitance vs. Drain-to-Source Voltage

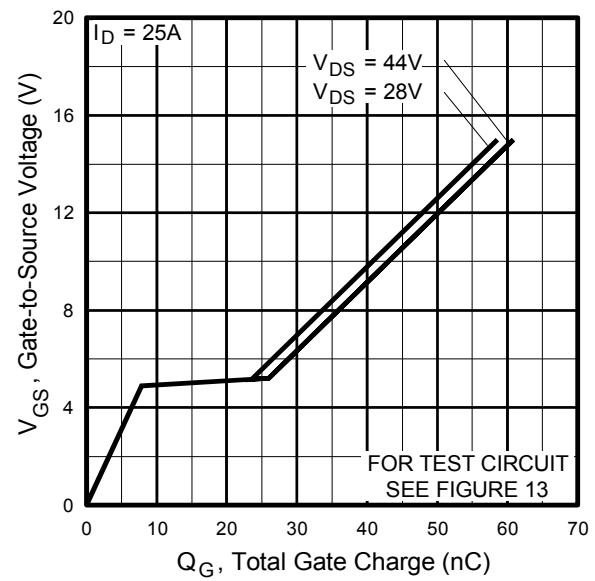


Fig. 6. Typical Gate Charge vs. Gate-to-Source Voltage

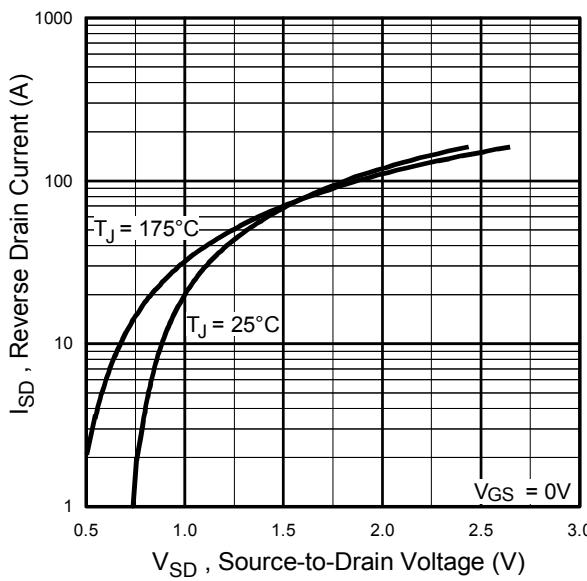


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

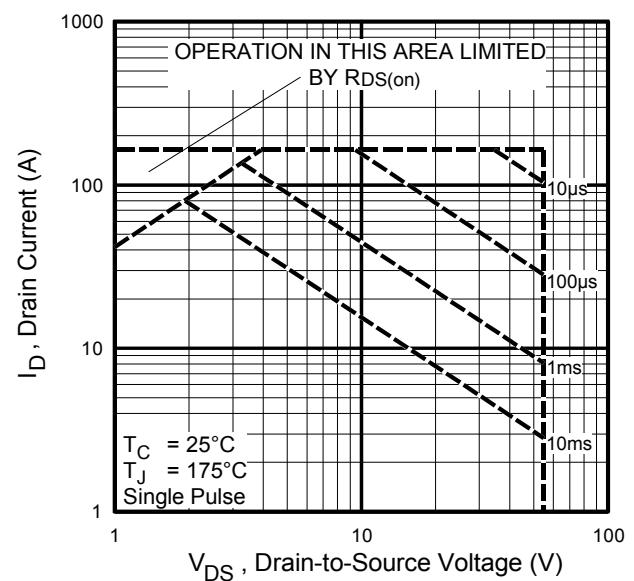


Fig. 8. Maximum Safe Operating Area

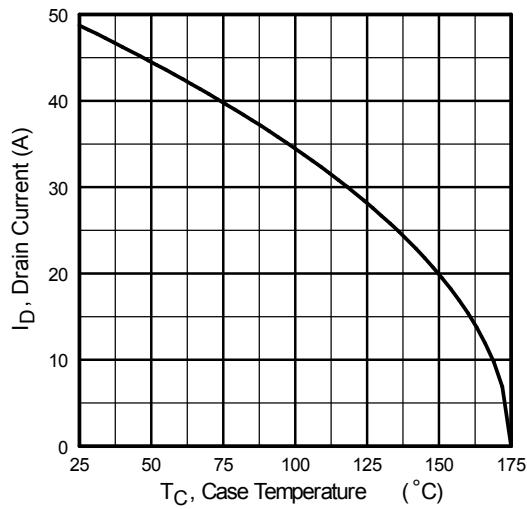


Fig 9. Maximum Drain Current vs. Case Temperature

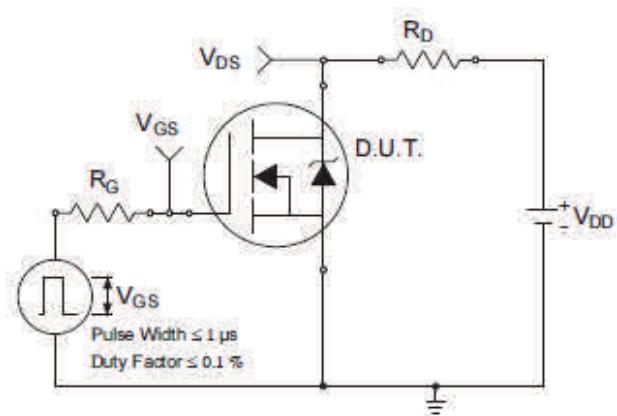


Fig 10a. Switching Time Test Circuit

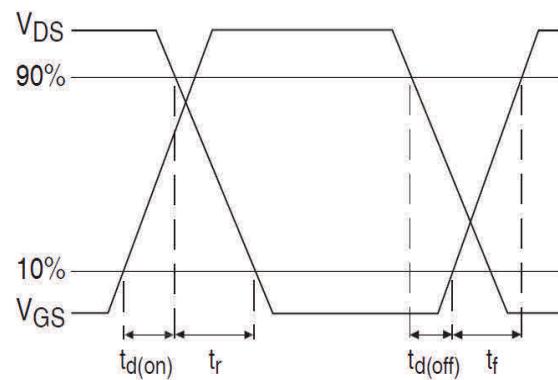


Fig 10b. Switching Time Waveforms

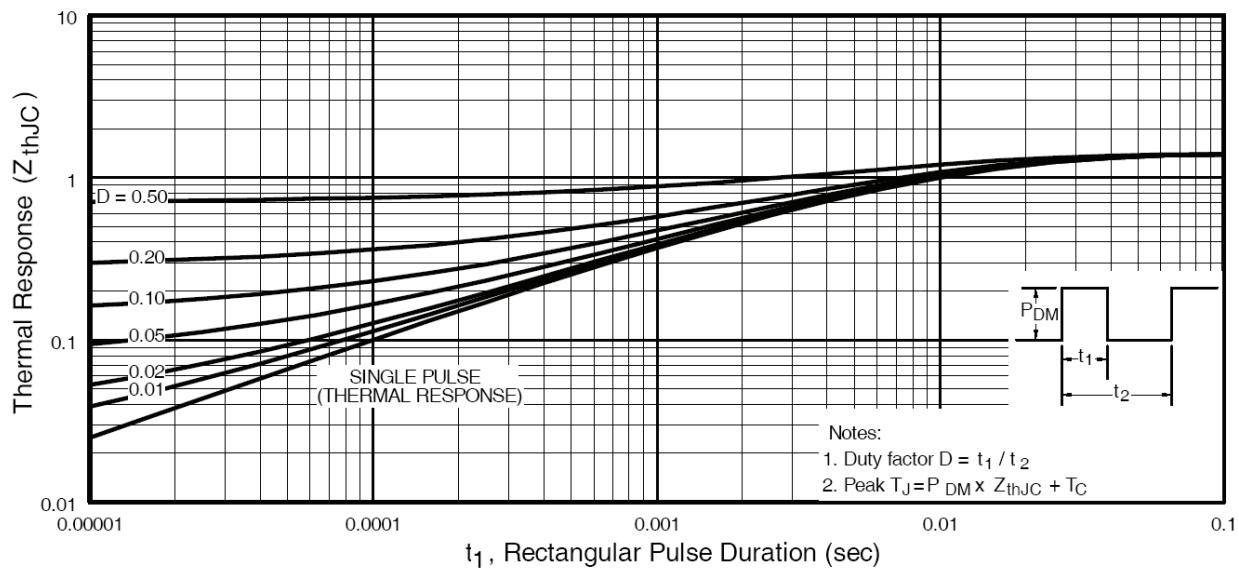


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

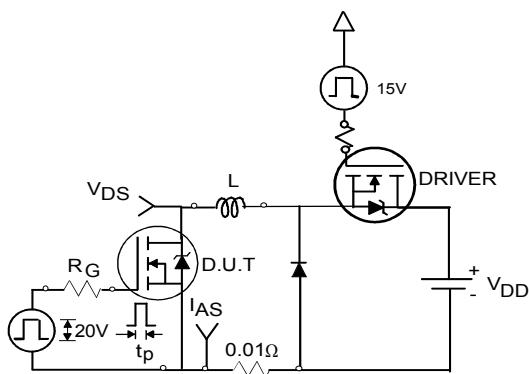


Fig 12a. Unclamped Inductive Test Circuit

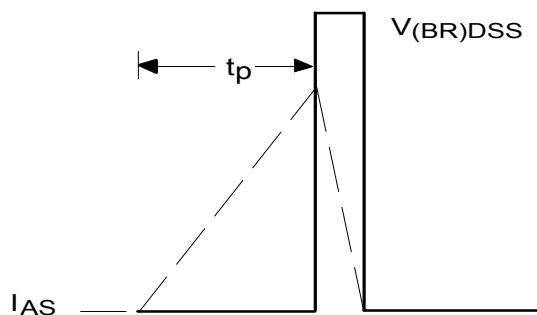


Fig 12b. Unclamped Inductive Waveforms

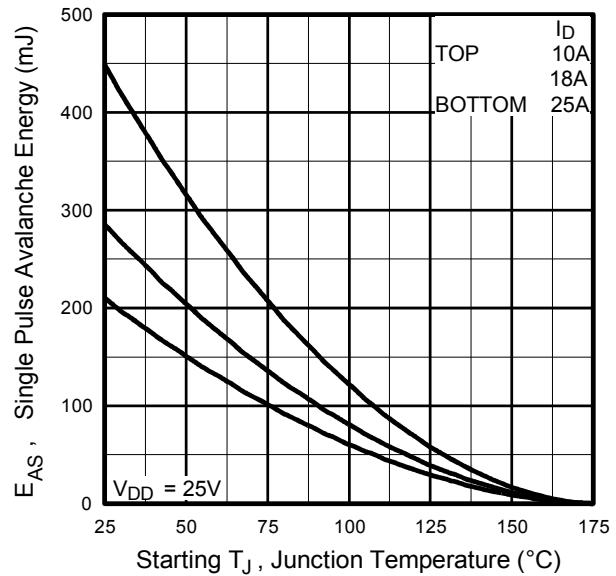


Fig 12c. Maximum Avalanche Energy vs. Drain Current

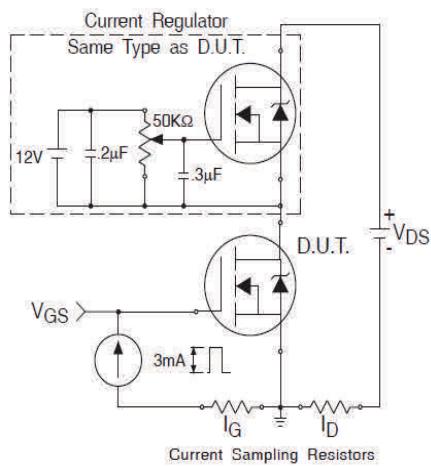


Fig 13a. Gate Charge Test Circuit

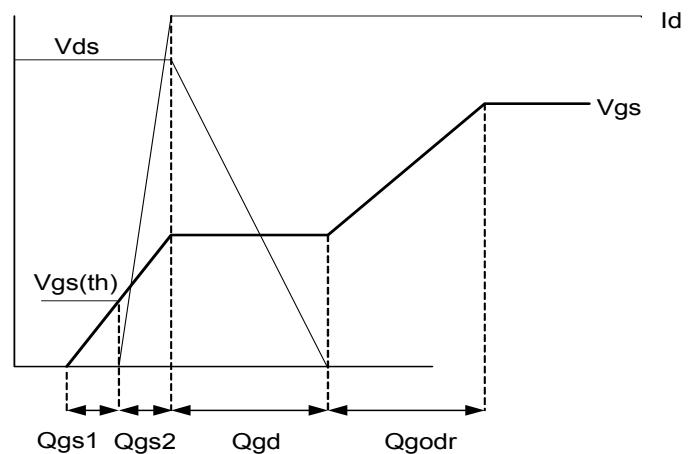


Fig 13b. Gate Charge Waveform

Peak Diode Recovery dv/dt Test Circuit

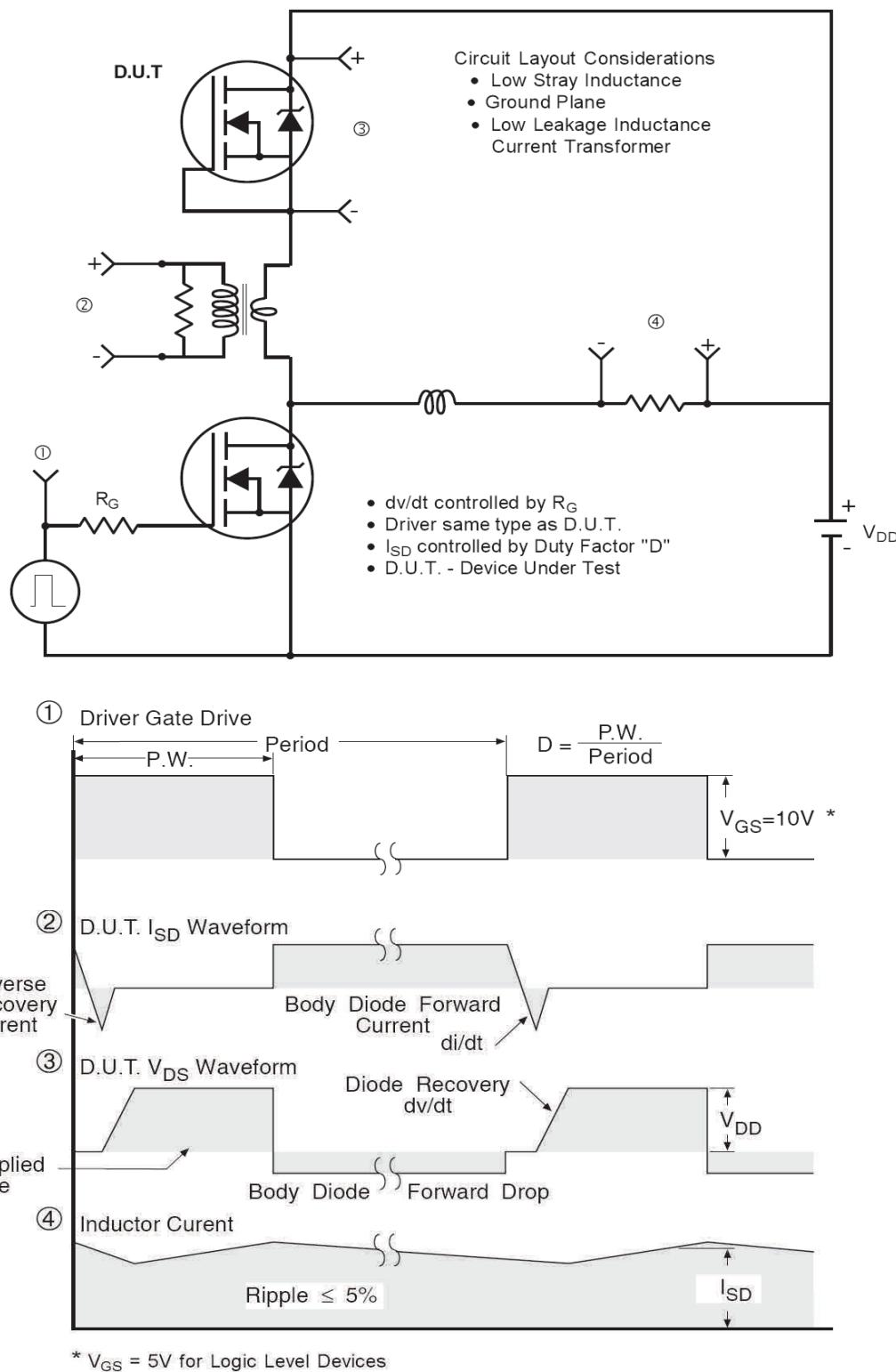
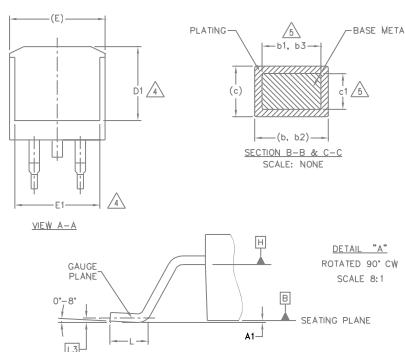
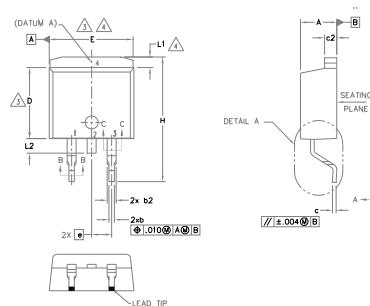


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

D²Pak (TO-263AB) 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	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	—	1.68	—	.066	4	
L2	—	1.78	—	.070		
L3	0.25	BSC	.010	BSC		

LEAD ASSIGNMENTS

DIODES

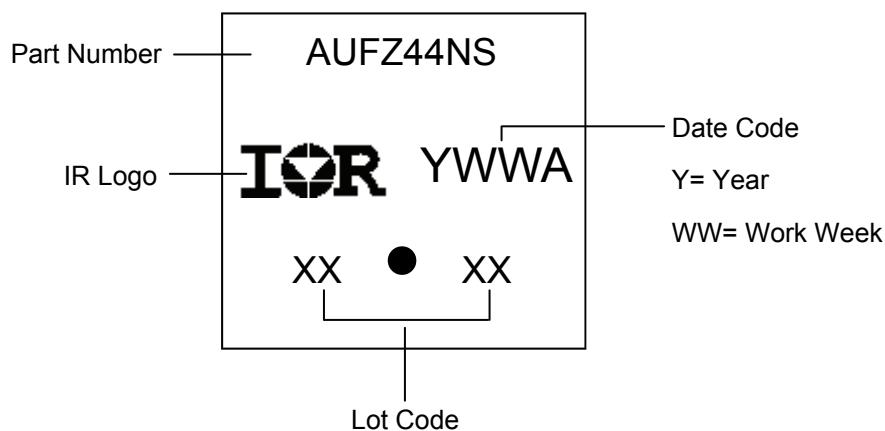
- 1.- ANODE (TWO DIE) / OPEN (ONE DIE)
2. 4.- CATHODE
- 3.- ANODE

HEXFET

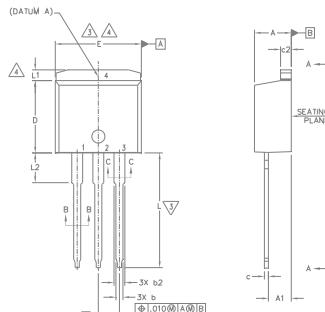
- 1.- GATE
2. 4.- DRAIN
- 3.- SOURCE

IGRTs, CoPACK

- 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)


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.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 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

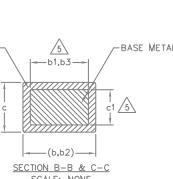
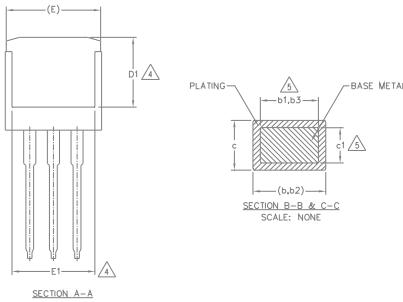
IGBTs, CoPACK

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

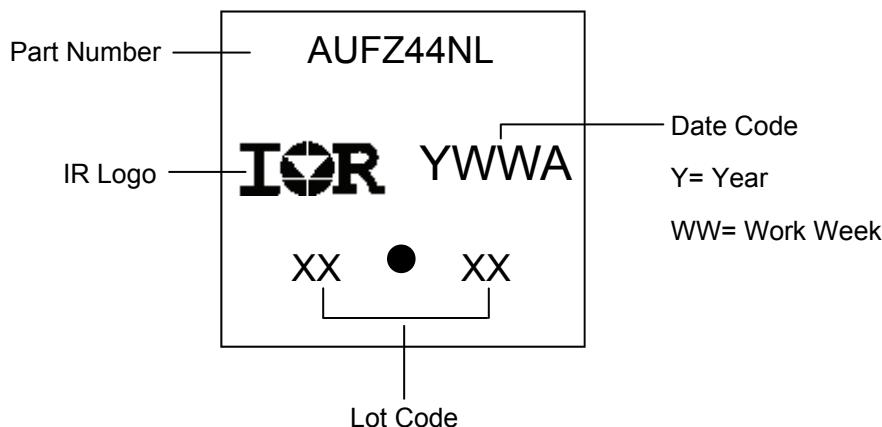
HEXFET

DIODES

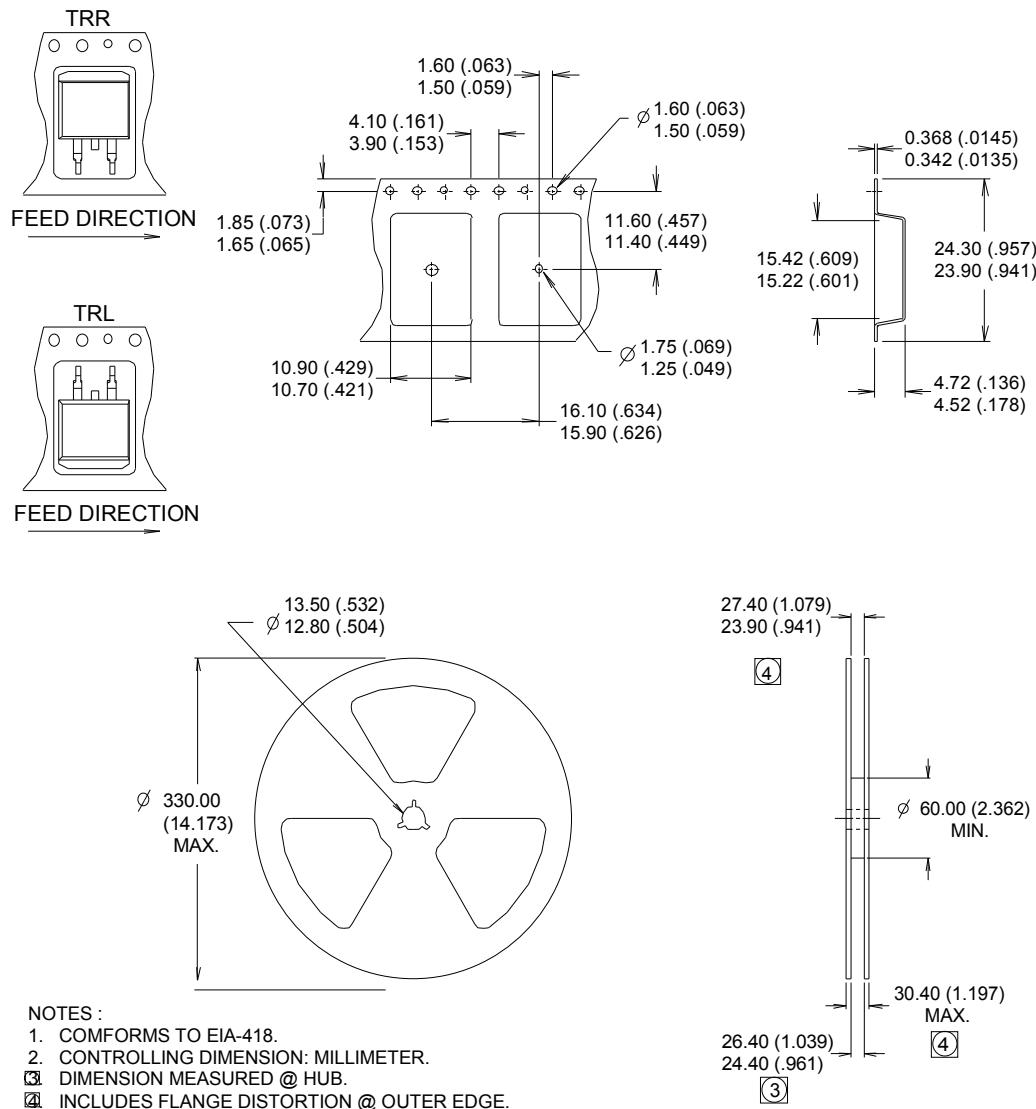
1. GATE	1 - ANODE (TWO DIE) / OPEN (ONE DIE)
2. DRAIN	2, 4. - CATHODE
3. SOURCE	3. - ANODE
4. DRAIN	



S Y M B O L	DIMENSIONS				N O T E S	
	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		
L2	3.56	3.71	.140	.146	4	

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))

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 ² -Pak	MSL1			
		TO-262				
ESD	Machine Model	Class M3 (+/- 400V) [†] AEC-Q101-002				
	Human Body Model	Class H1B (+/- 1000V) [†] AEC-Q101-001				
	Charged Device Model	Class C5 (+/- 2000V) [†] AEC-Q101-005				
RoHS Compliant		Yes				

† Highest passing voltage.

Revision History

Date	Comments
10/27/2015	<ul style="list-style-type: none"> • Updated datasheet with corporate template • Corrected ordering table on page 1.

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