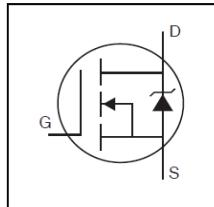
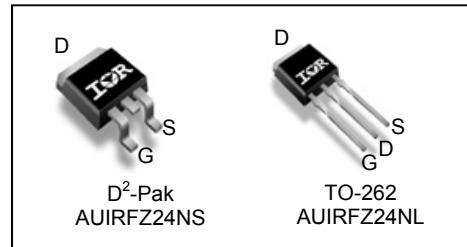


**Features**

- 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.	0.07Ω
$I_D$	17A



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	
AUIRFZ24NL	TO-262	Tube	50	AUIRFZ24NL
AUIRFZ24NS	D²-Pak	Tube	50	AUIRFZ24NS
		Tape and Reel Left	800	AUIRFZ24NSTRL

**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, $V_{GS}$ @ 10V	17	A
$I_D$ @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	12	
$I_{DM}$	Pulsed Drain Current ①	68	
$P_D$ @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation	3.8	W
$P_D$ @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation	45	
	Linear Derating Factor	0.3	W/°C
$V_{GS}$	Gate-to-Source Voltage	± 20	V
$E_{AS}$	Single Pulse Avalanche Energy (Thermally Limited) ②	71	mJ
$I_{AR}$	Avalanche Current ①	10	A
$E_{AR}$	Repetitive Avalanche Energy ①	4.5	mJ
$dv/dt$	Peak Diode Recovery ③	6.8	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
$R_{\theta JC}$	Junction-to-Case	—	3.3	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount), D² Pak <sup>⑤</sup>	—	40	

HEXFET® is a registered trademark of Infineon.

\*Qualification standards can be found at [www.infineon.com](http://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 $25^\circ\text{C}$ , $I_D = 1\text{mA}$
$R_{\text{DS}(\text{on})}$	Static Drain-to-Source On-Resistance	—	—	0.07	$\Omega$	$V_{\text{GS}} = 10\text{V}$ , $I_D = 10\text{A}$ ④
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{\text{DS}} = V_{\text{GS}}$ , $I_D = 250\mu\text{A}$
$g_{\text{fs}}$	Forward Trans conductance	4.5	—	—	S	$V_{\text{DS}} = 25\text{V}$ , $I_D = 10\text{A}$
$I_{\text{DSS}}$	Drain-to-Source Leakage Current	—	—	25	$\mu\text{A}$	$V_{\text{DS}} = 55\text{V}$ , $V_{\text{GS}} = 0\text{V}$
		—	—	250		$V_{\text{DS}} = 44\text{V}$ , $V_{\text{GS}} = 0\text{V}$ , $T_J = 150^\circ\text{C}$
$I_{\text{GSS}}$	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)**

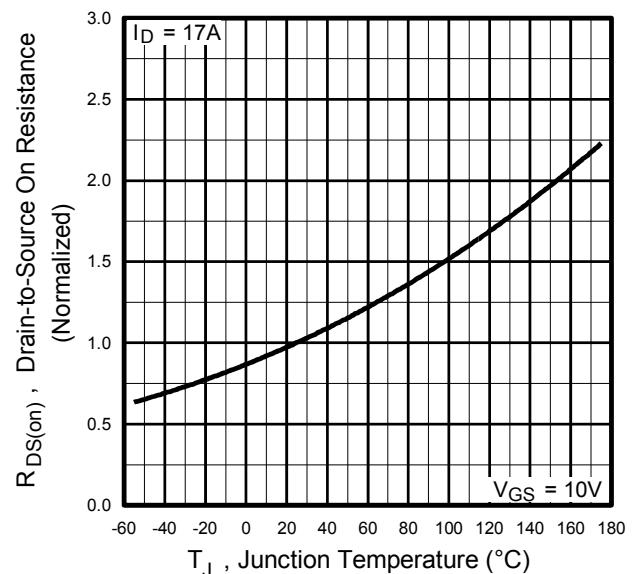
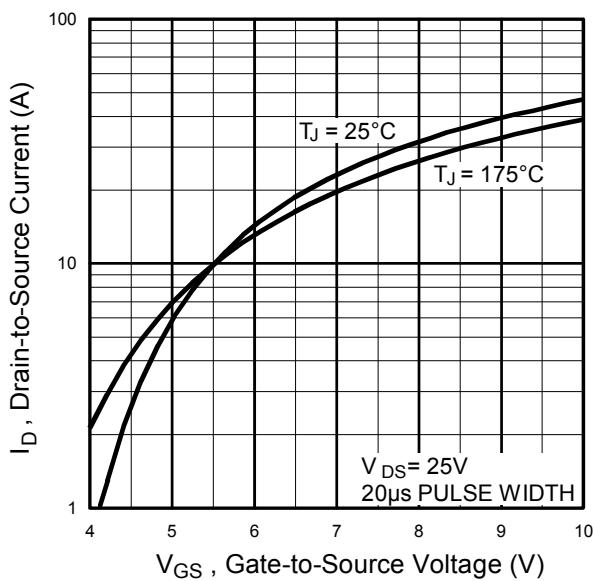
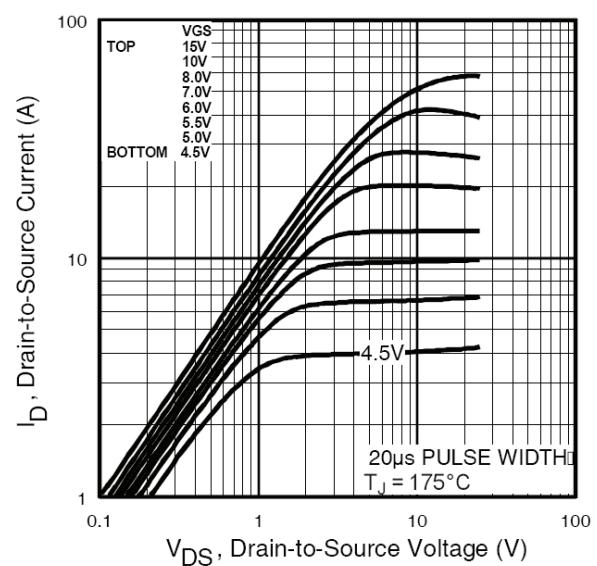
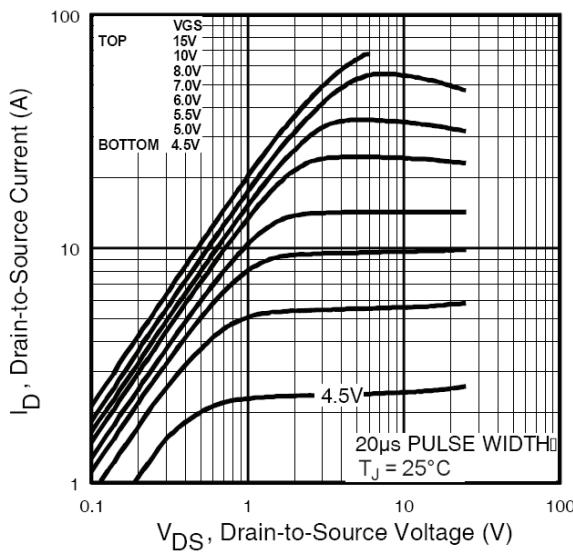
$Q_g$	Total Gate Charge	—	—	20	nC	$I_D = 10\text{A}$
$Q_{\text{gs}}$	Gate-to-Source Charge	—	—	5.3		$V_{\text{DS}} = 44\text{V}$
$Q_{\text{gd}}$	Gate-to-Drain Charge	—	—	7.6		$V_{\text{GS}} = 10\text{V}$ , See Fig. 6 and 13 ④
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	—	4.9	—	ns	$V_{\text{DD}} = 28\text{V}$
$t_r$	Rise Time	—	34	—		$I_D = 10\text{A}$
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time	—	19	—		$R_G = 24\Omega$
$t_f$	Fall Time	—	27	—		$R_D = 2.6\Omega$ , See Fig. 10 ④
$L_s$	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
$C_{\text{iss}}$	Input Capacitance	—	370	—	pF	$V_{\text{GS}} = 0\text{V}$
$C_{\text{oss}}$	Output Capacitance	—	140	—		$V_{\text{DS}} = 25\text{V}$
$C_{\text{rss}}$	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)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{\text{SM}}$	Pulsed Source Current (Body Diode) ①	—	—	68		
$V_{\text{SD}}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$ , $I_s = 10\text{A}$ , $V_{\text{GS}} = 0\text{V}$ ④
$t_{\text{rr}}$	Reverse Recovery Time	—	56	83		$T_J = 25^\circ\text{C}$ , $I_F = 10\text{A}$
$Q_{\text{rr}}$	Reverse Recovery Charge	—	120	180	nC	$\text{di}/\text{dt} = 100\text{A}/\mu\text{s}$ ④
$t_{\text{on}}$	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  $T_{\text{Jmax}}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 1.0\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{\text{AS}} = 10\text{A}$ ,  $V_{\text{GS}} = 10\text{V}$ . (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  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994



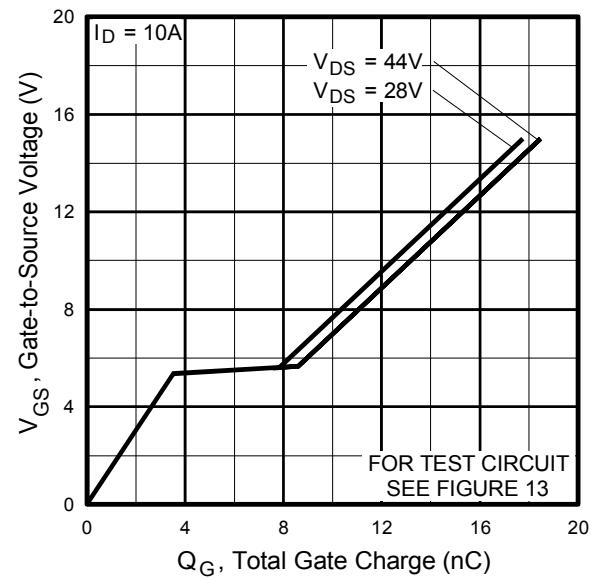
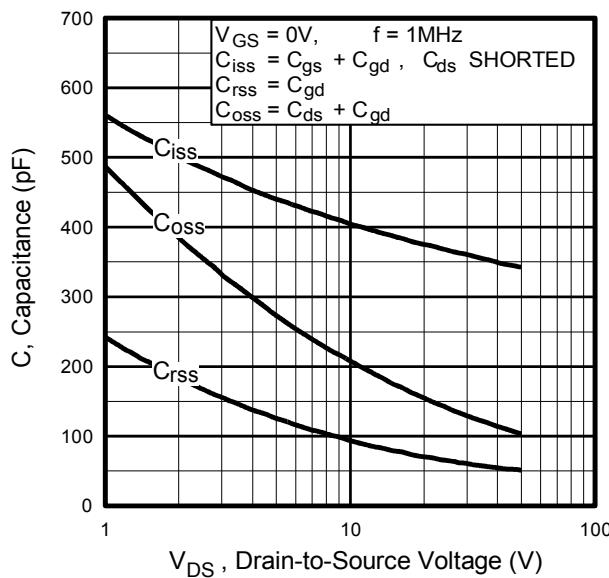
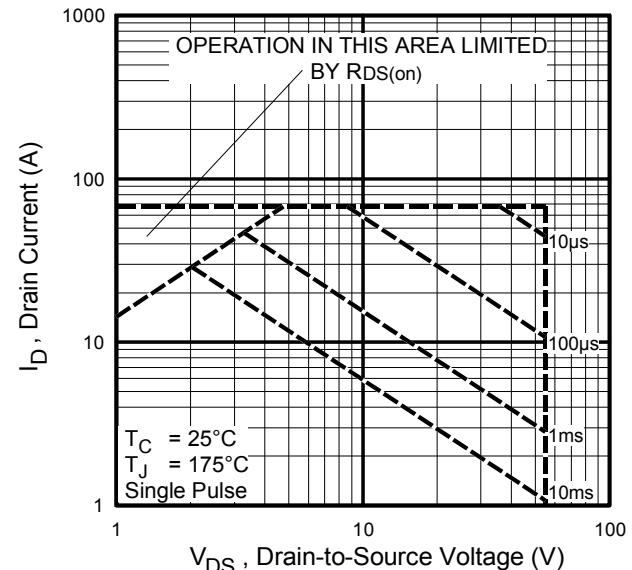
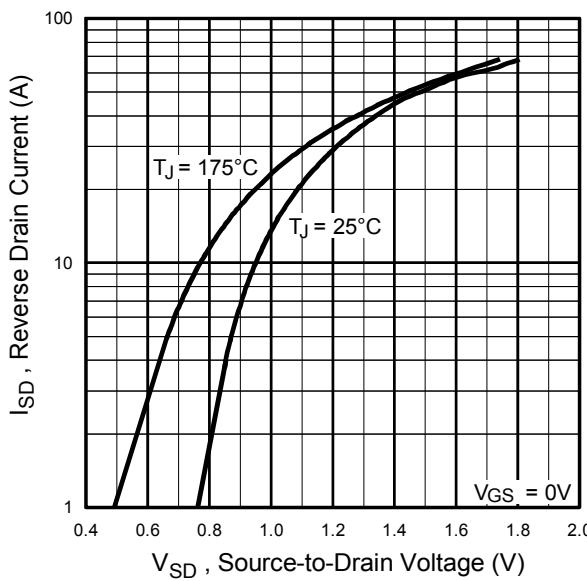
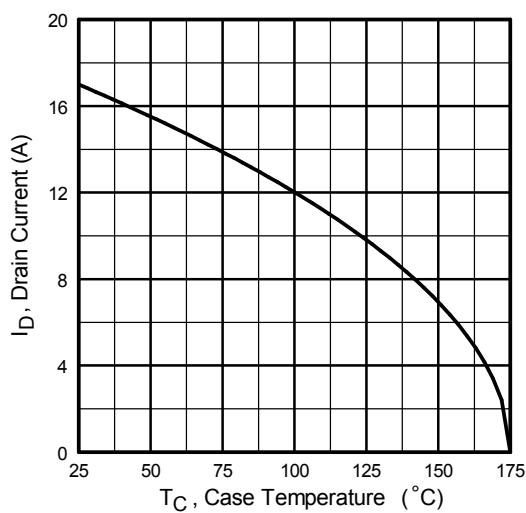


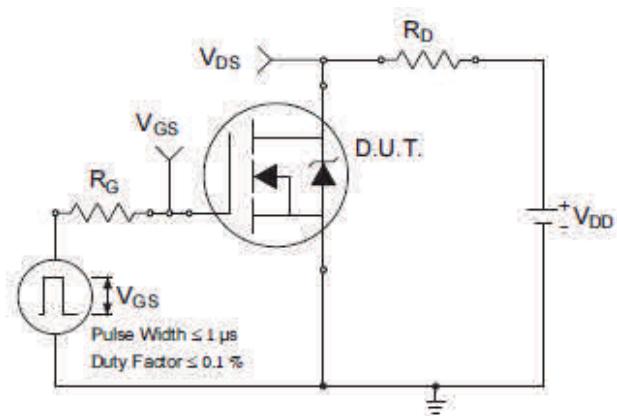
Fig. 5. Typical Capacitance vs. Drain-to-Source Voltage

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

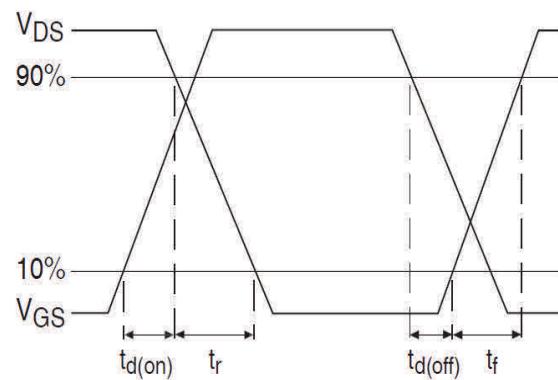




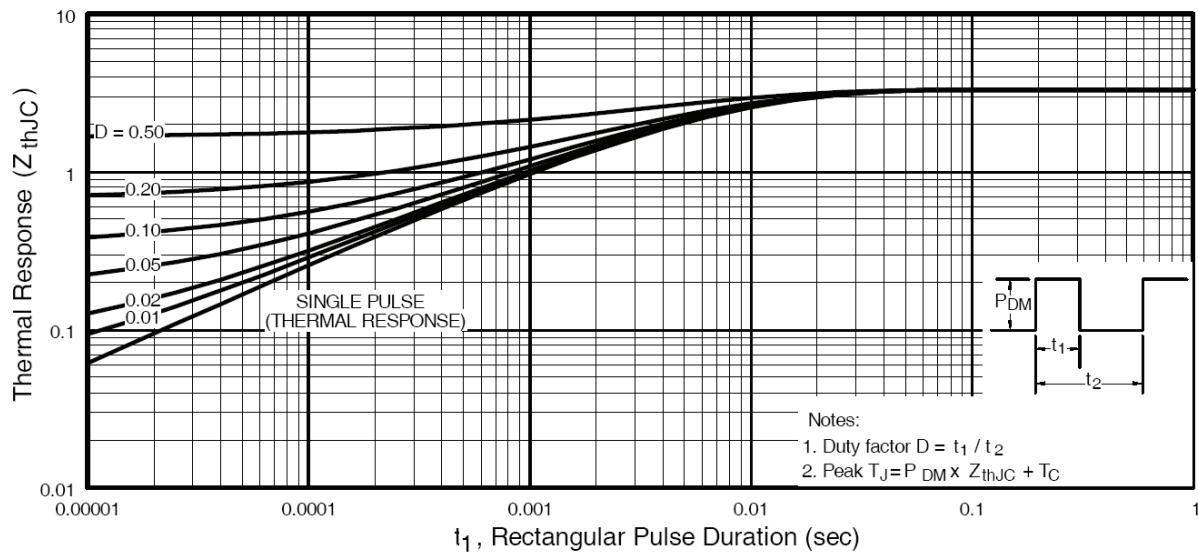
**Fig 9.** Maximum Drain Current vs. Case Temperature



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



**Fig 10b.** Switching Time Waveforms



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

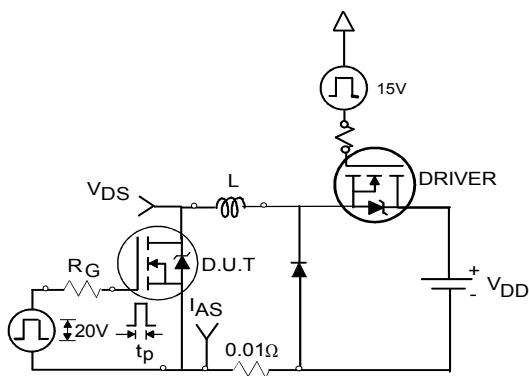


Fig 12a. Unclamped Inductive Test Circuit

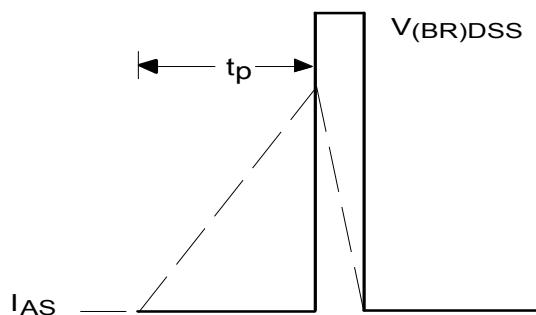


Fig 12b. Unclamped Inductive Waveforms

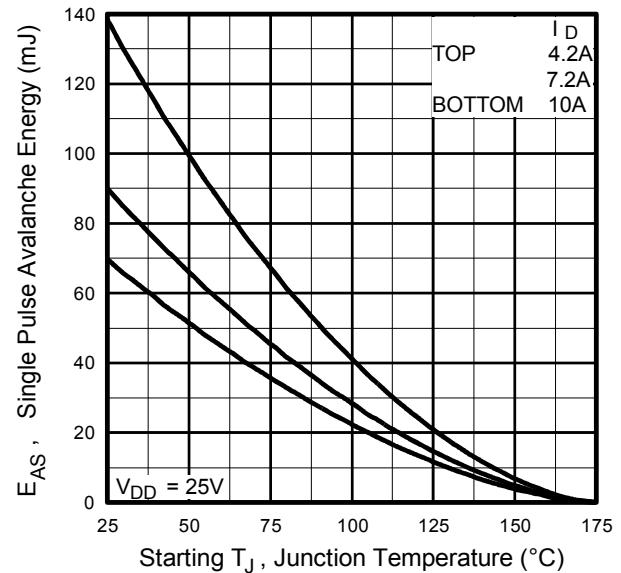


Fig 12c. Maximum Avalanche Energy vs. Drain Current

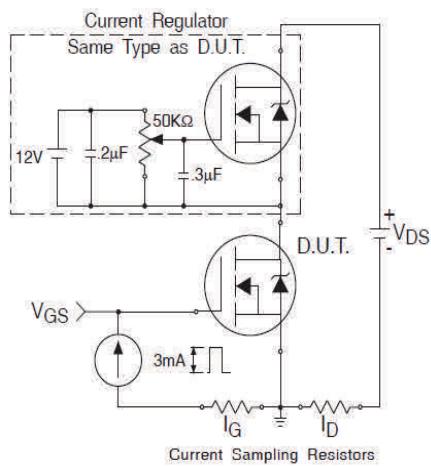


Fig 13a. Gate Charge Test Circuit

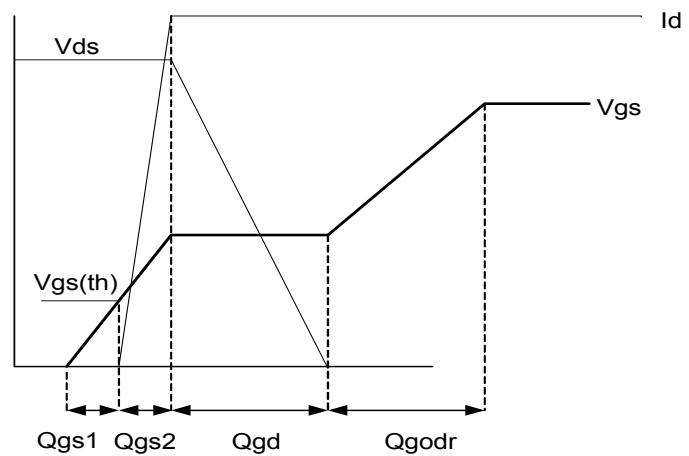


Fig 13b. Gate Charge Waveform

## Peak Diode Recovery dv/dt Test Circuit

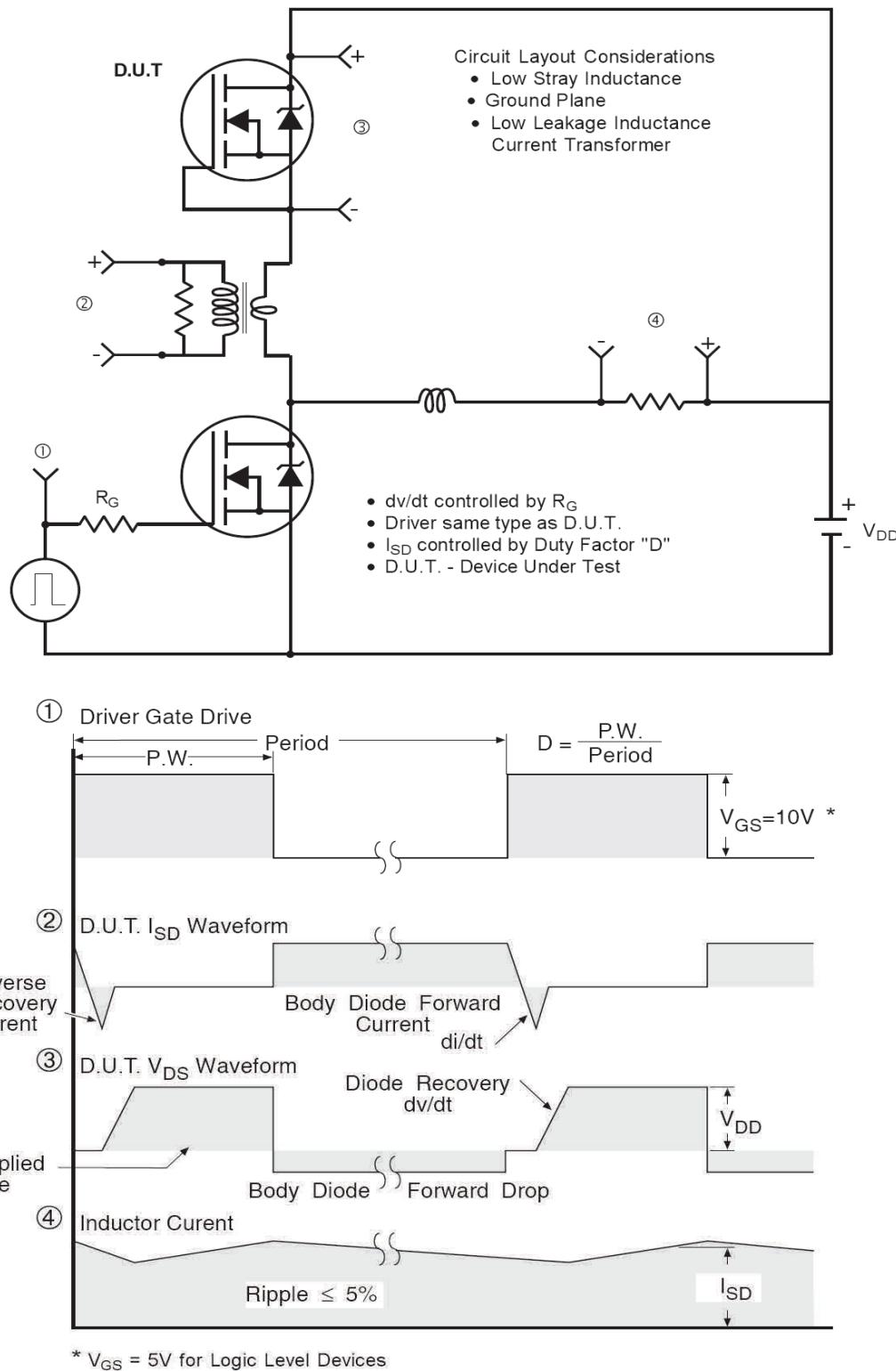
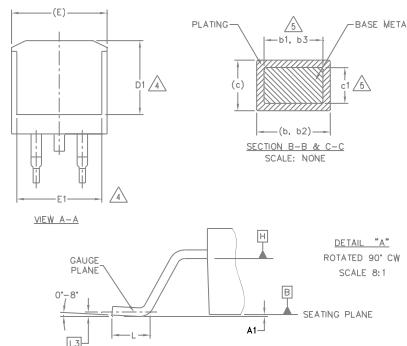
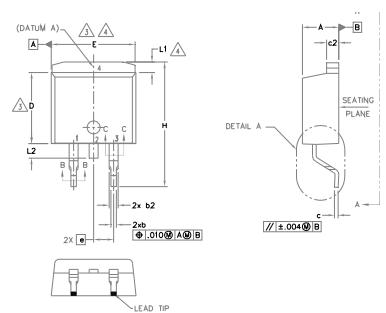


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

**D<sup>2</sup>- Pak (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**

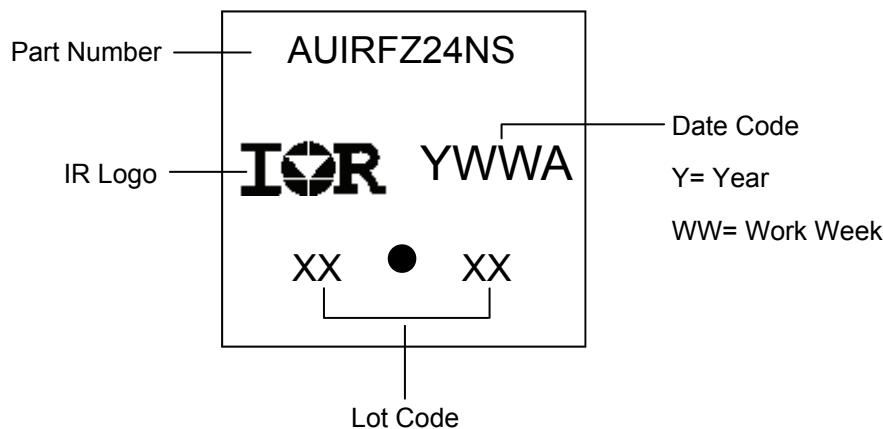
1. - ANODE (TWO DIE) / OPEN (ONE DIE)
2. 4. - CATHODE
3. - ANODE

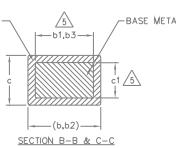
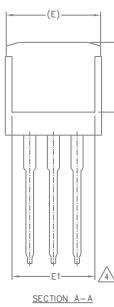
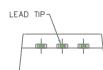
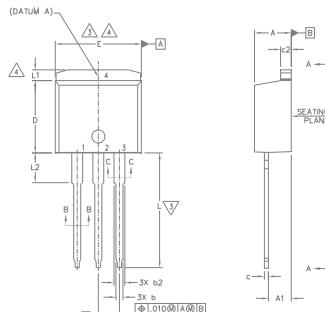
**HEXFET**

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

**IGRTs, CoPACK**

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

**D<sup>2</sup>- Pak (TO-263AB) Part Marking Information**


**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 [0.005"] 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.

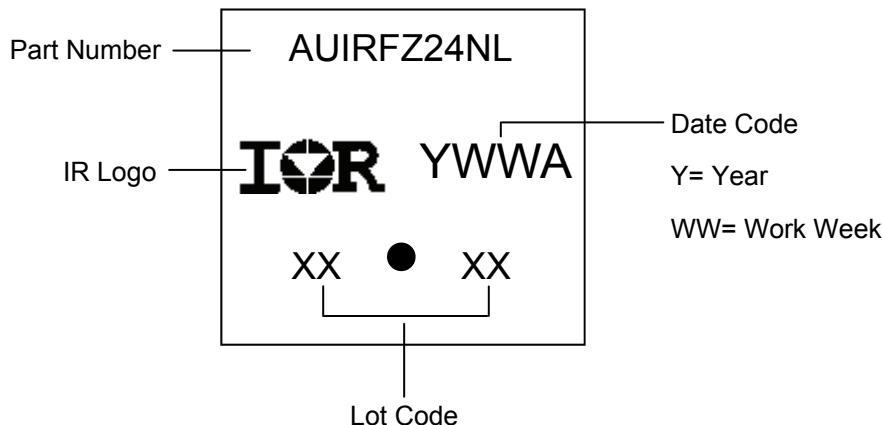
**LEAD ASSIGNMENTS**
**IGBTs, CoPACK**

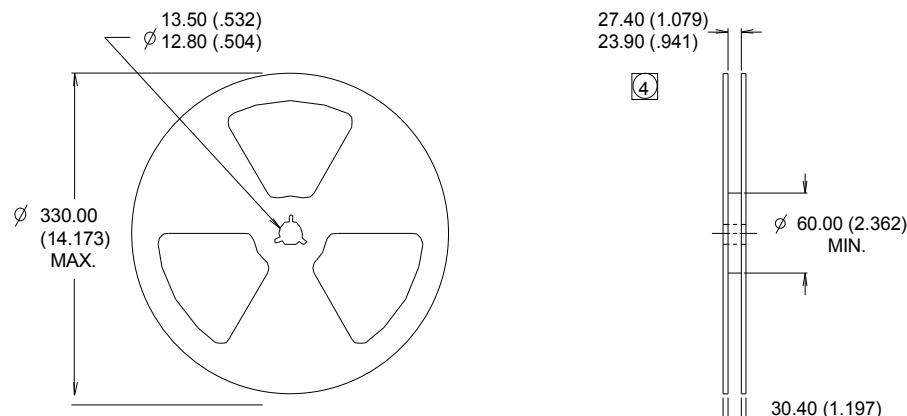
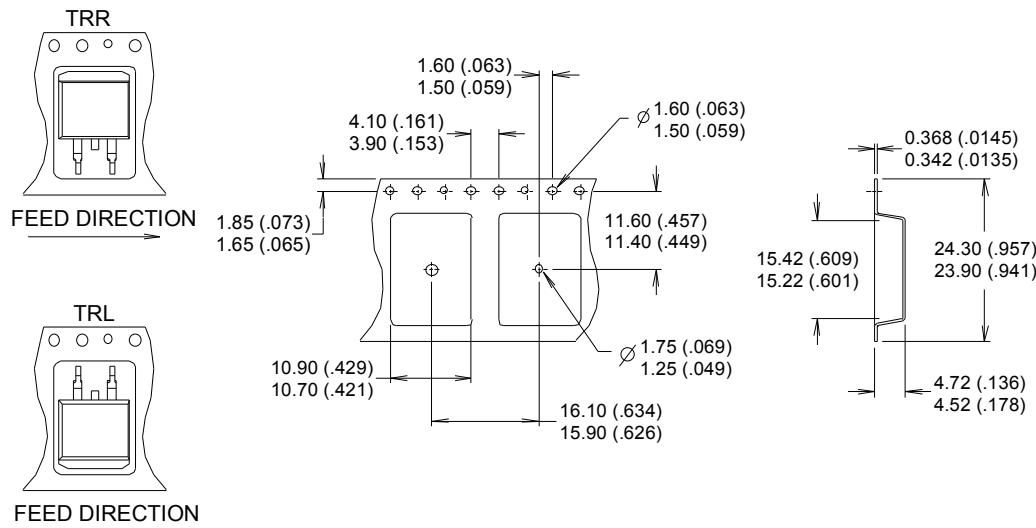
1. GATE
2. COLLECTOR
3. Emitter
4. COLLECTOR

**HEXFET**
**DIODES**

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

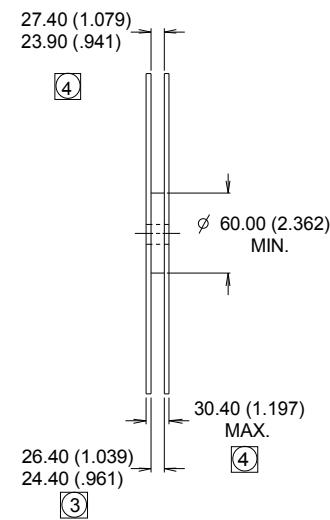
S Y M B O L	DIMENSIONS				N O T E S	
	MILLIMETERS		INCHES			
	MIN.	MAX.	MIN.	MAX.		
A	4.06	4.83	.160	.190		
A1	2.03	3.02	.080	.119		
b	0.51	0.99	.020	.039		
b1	0.51	0.89	.020	.035	5	
b2	1.14	1.78	.045	.070		
b3	1.14	1.73	.045	.068	5	
c	0.38	0.74	.015	.029		
c1	0.38	0.58	.015	.023	5	
c2	1.14	1.65	.045	.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**


D<sup>2</sup>- Pak (TO-263AB) Tape & Reel Information (Dimensions are shown in millimeters (inches))

NOTES :

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



## 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 <sup>2</sup> -Pak	MSL1			
		TO-262				
ESD	Machine Model	Class M2 (+/- 150V) <sup>†</sup> AEC-Q101-002				
	Human Body Model	Class H1A (+/- 500V) <sup>†</sup> AEC-Q101-001				
	Charged Device Model	Class C5 (+/- 2000V) <sup>†</sup> AEC-Q101-005				
RoHS Compliant		Yes				

† Highest passing voltage.

## Revision History

Date	Comments
10/27/2015	<ul style="list-style-type: none"> <li>• Updated datasheet with corporate template</li> <li>• Corrected ordering table on page 1.</li> </ul>
10/13/2017	<ul style="list-style-type: none"> <li>• Corrected typo error on part marking on page 8,9.</li> </ul>

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Authorized Distributor

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