

**Features**

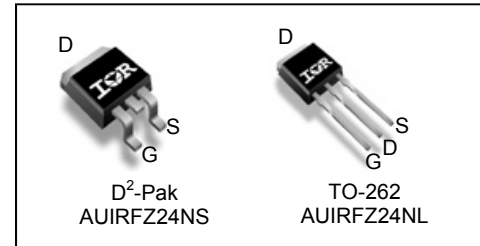
- Advanced Planar Technology
- Low On-Resistance
- Dynamic dV/dT and dI/dT capability
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified \*



$V_{DSS}$	<b>55V</b>
$R_{DS(on)}$ max.	<b>0.07Ω</b>
$I_D$	<b>17A</b>

**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



<b>G</b>	<b>D</b>	<b>S</b>
Gate	Drain	Source

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, $V_{GS} @ 10\text{V}$	17	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	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	
$V_{GS}$	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)		

**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 ⑤	—	40	

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\*Qualification standards can be found at [www.infineon.com](http://www.infineon.com)

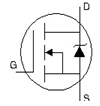
**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	55	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.052	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	0.07	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Trans conductance	4.5	—	—	S	V <sub>DS</sub> = 25V, I <sub>D</sub> = 10A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	25	μA	V <sub>DS</sub> = 55V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 44V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V

**Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

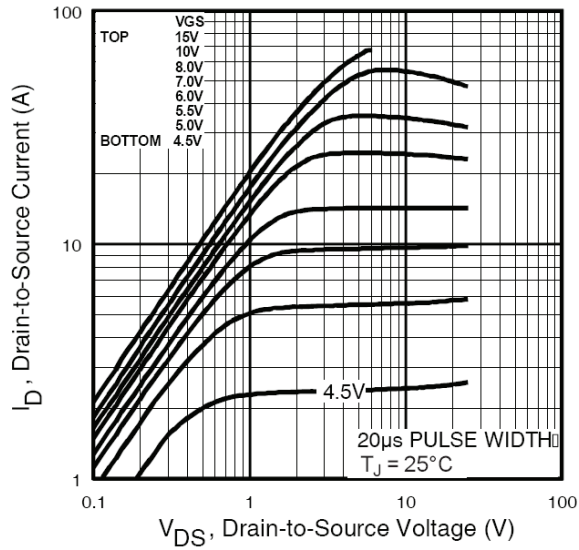
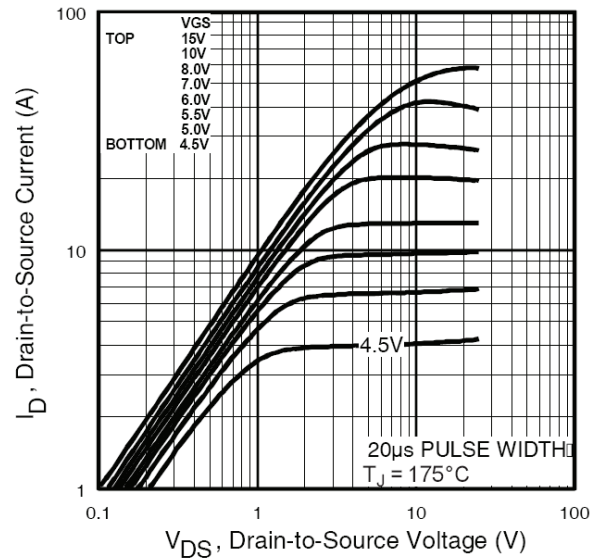
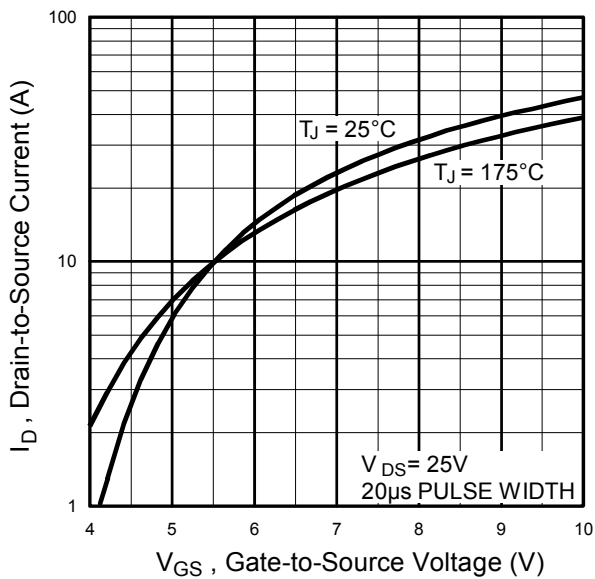
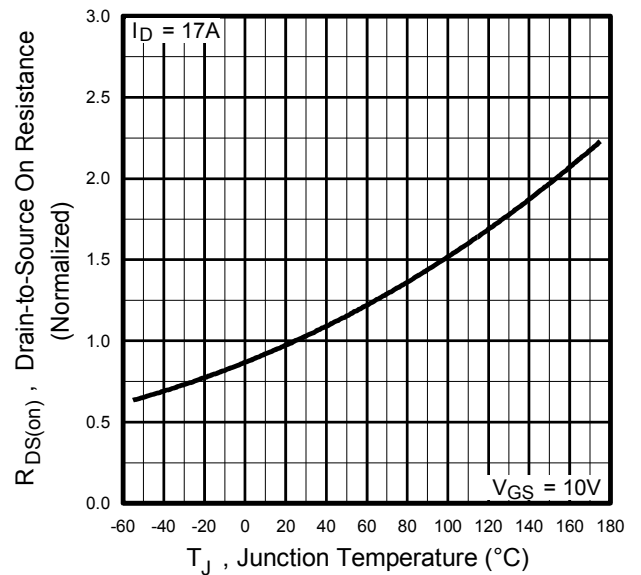
Q <sub>g</sub>	Total Gate Charge	—	—	20	nC	I <sub>D</sub> = 10A V <sub>DS</sub> = 44V V <sub>GS</sub> = 10V, See Fig. 6 and 13 ④
Q <sub>gs</sub>	Gate-to-Source Charge	—	—	5.3		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	—	7.6		
t <sub>d(on)</sub>	Turn-On Delay Time	—	4.9	—	ns	V <sub>DD</sub> = 28V I <sub>D</sub> = 10A R <sub>G</sub> = 24Ω R <sub>D</sub> = 2.6Ω, See Fig. 10 ④
t <sub>r</sub>	Rise Time	—	34	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	19	—		
t <sub>f</sub>	Fall Time	—	27	—		
L <sub>S</sub>	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
C <sub>iss</sub>	Input Capacitance	—	370	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1.0MHz, See Fig. 5
C <sub>oss</sub>	Output Capacitance	—	140	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	65	—		

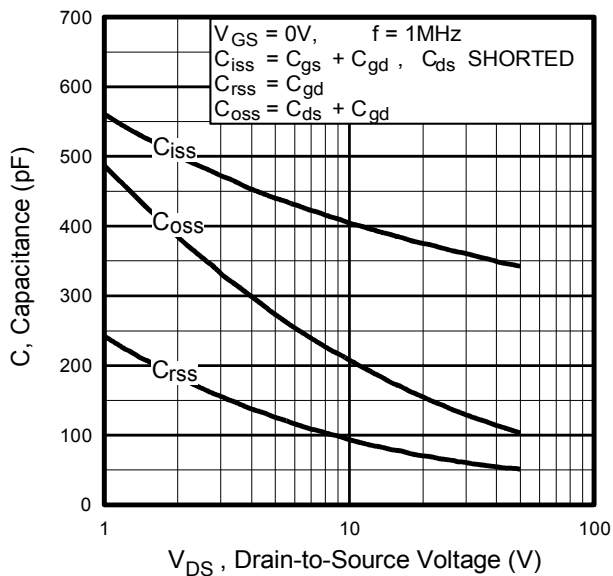
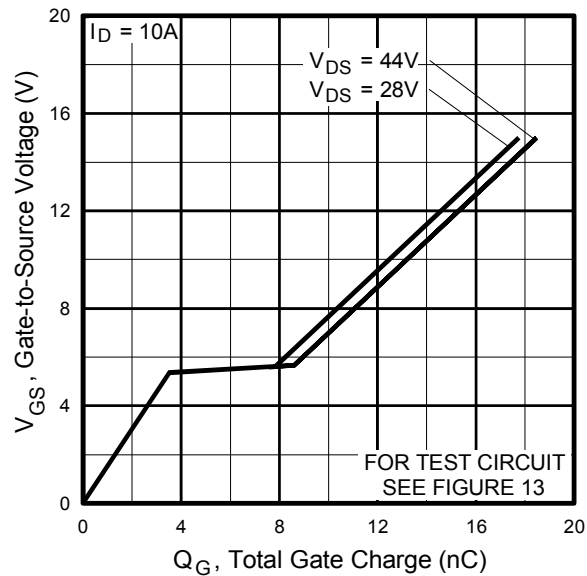
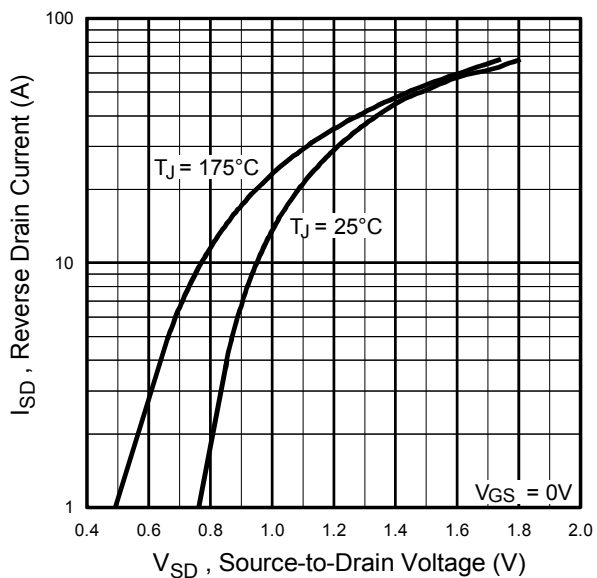
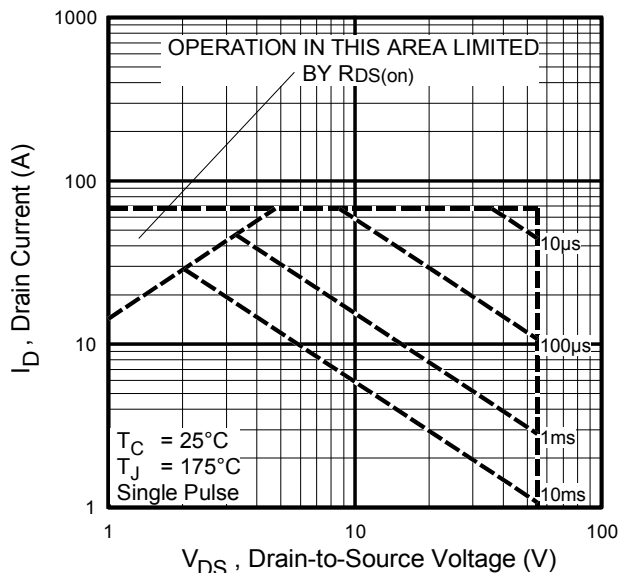
**Diode Characteristics**

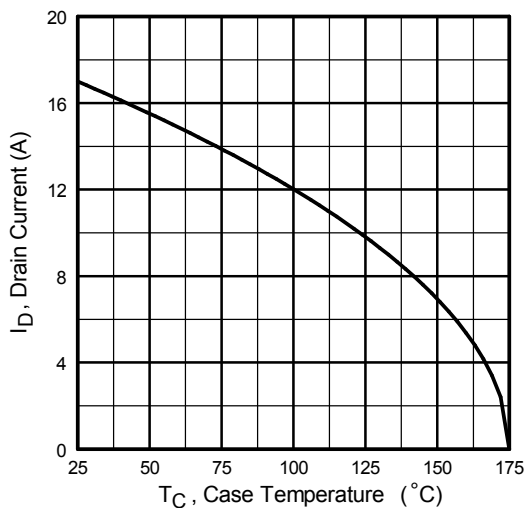
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	68		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 10A, V <sub>GS</sub> = 0V ④
t <sub>rr</sub>	Reverse Recovery Time	—	56	83	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 10A
Q <sub>rr</sub>	Reverse Recovery Charge	—	120	180	nC	di/dt = 100A/μs ④
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> )				

**Notes:**

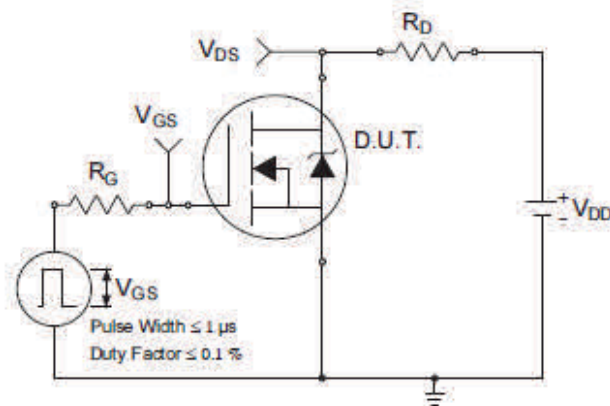
- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig.11)
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 1.0mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 10A, V<sub>GS</sub> = 10V. (See fig.12)
- ③ I<sub>SD</sub> ≤ 10A, di/dt ≤ 280A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 175°C.
- ④ Pulse width ≤ 400μs; duty cycle ≤ 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. 1** Typical Output Characteristics

**Fig. 2** Typical Output Characteristics

**Fig. 3** Typical Transfer Characteristics

**Fig. 4** Normalized On-Resistance vs. Temperature

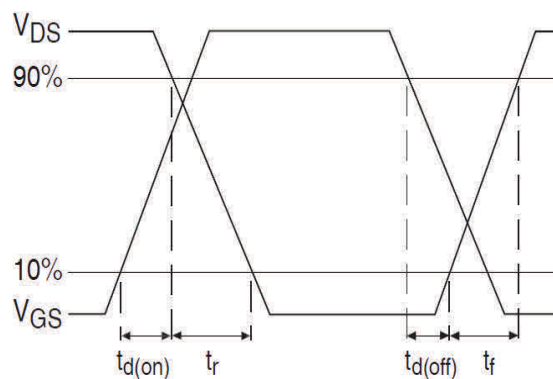

**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

**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



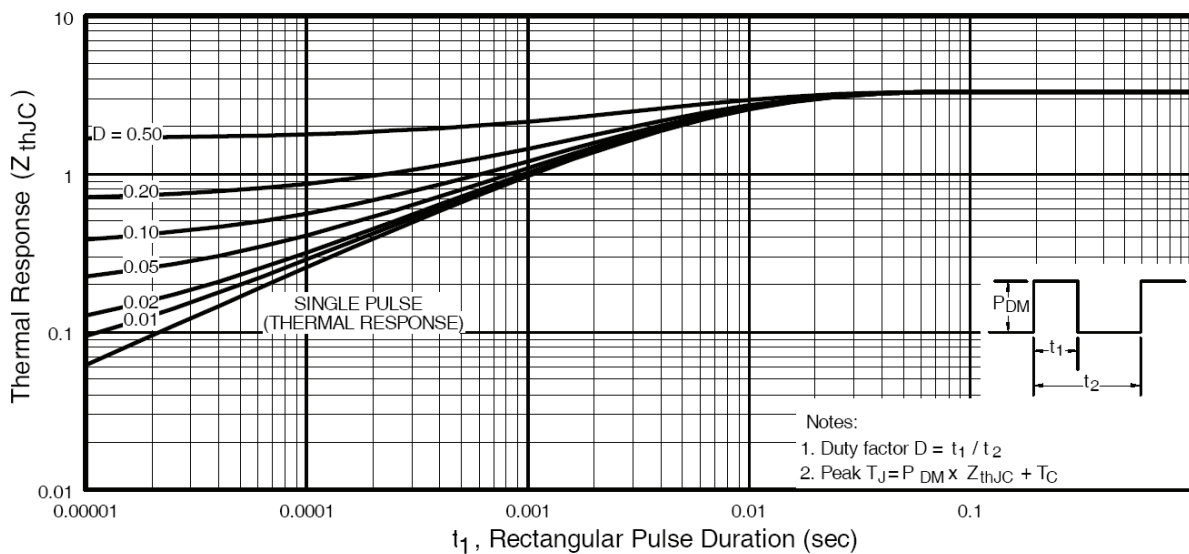
**Fig 9.** Maximum Drain Current vs. Case Temperature



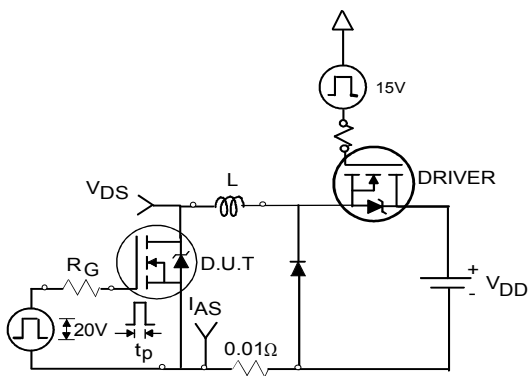
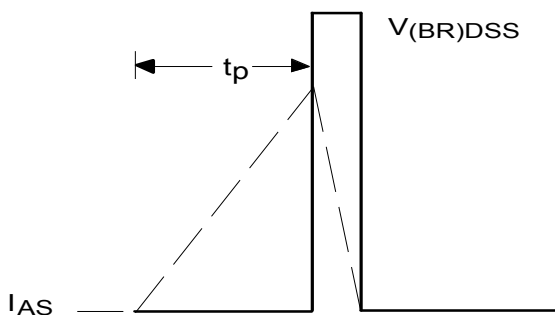
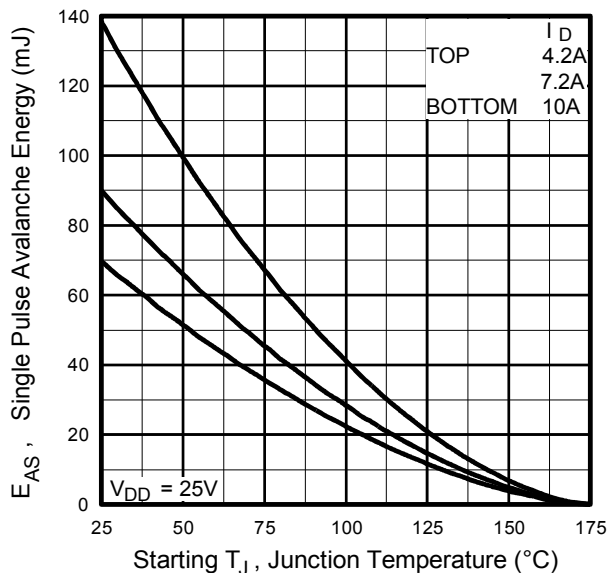
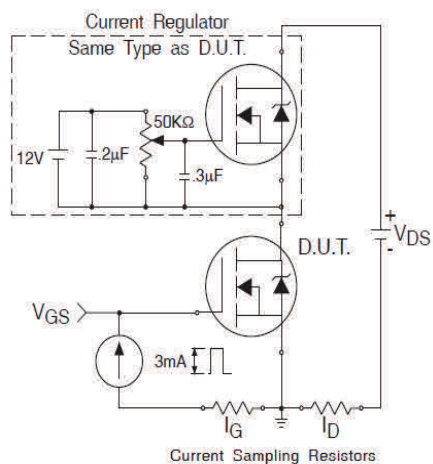
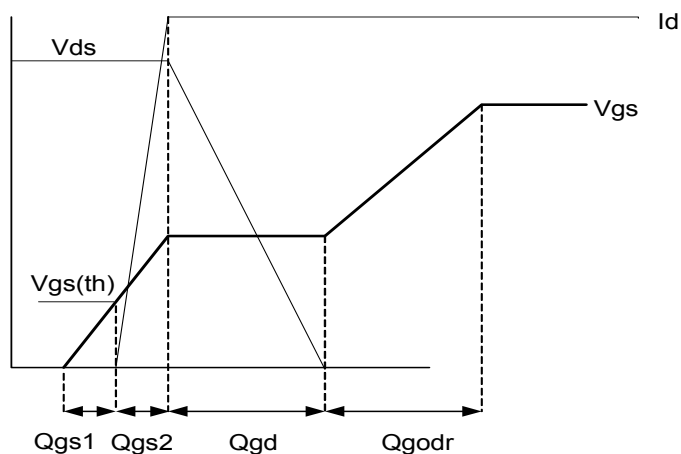
**Fig 10a.** Switching Time Test Circuit

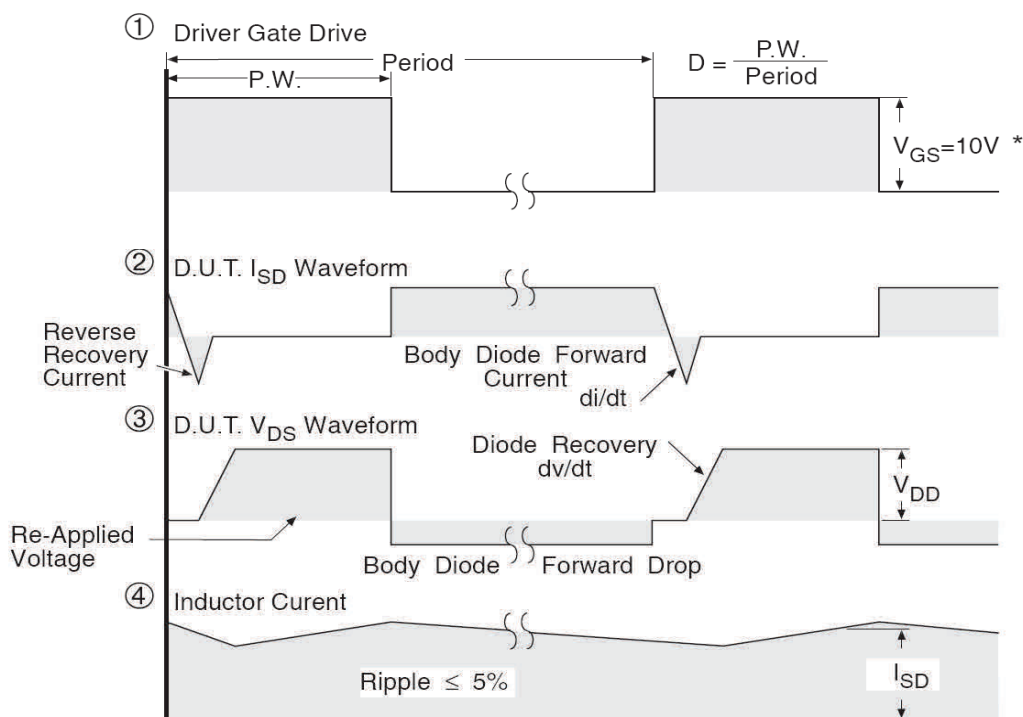
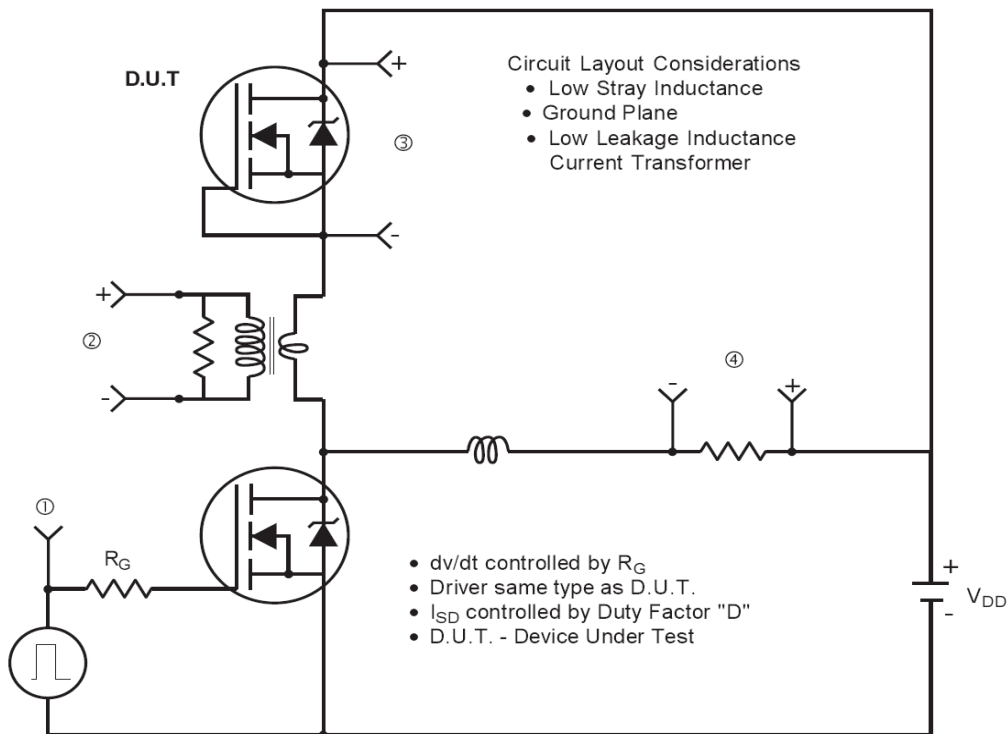


**Fig 10b.** Switching Time Waveforms



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


**Fig 12a. Unclamped Inductive Test Circuit**

**Fig 12b. Unclamped Inductive Waveforms**

**Fig 12c. Maximum Avalanche Energy vs. Drain Current**

**Fig 13a. Gate Charge Test Circuit**

**Fig 13b. Gate Charge Waveform**

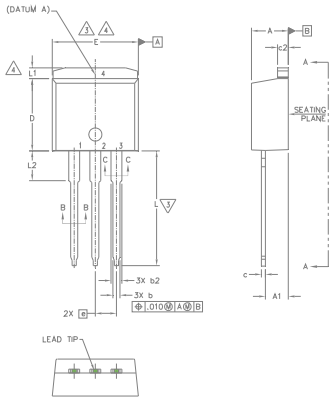
**Peak Diode Recovery dv/dt Test Circuit**


\*  $V_{GS} = 5V$  for Logic Level Devices

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





**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**

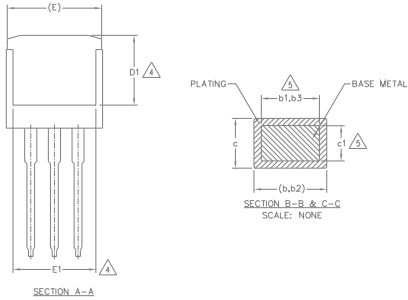
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

**HEXFET**

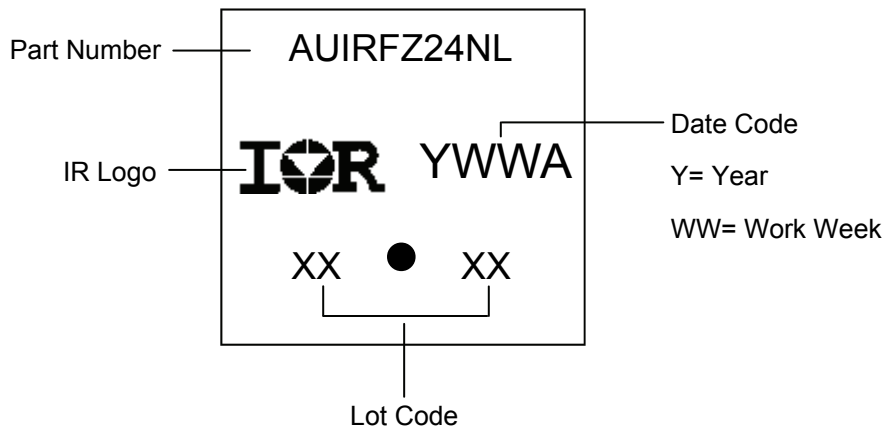
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

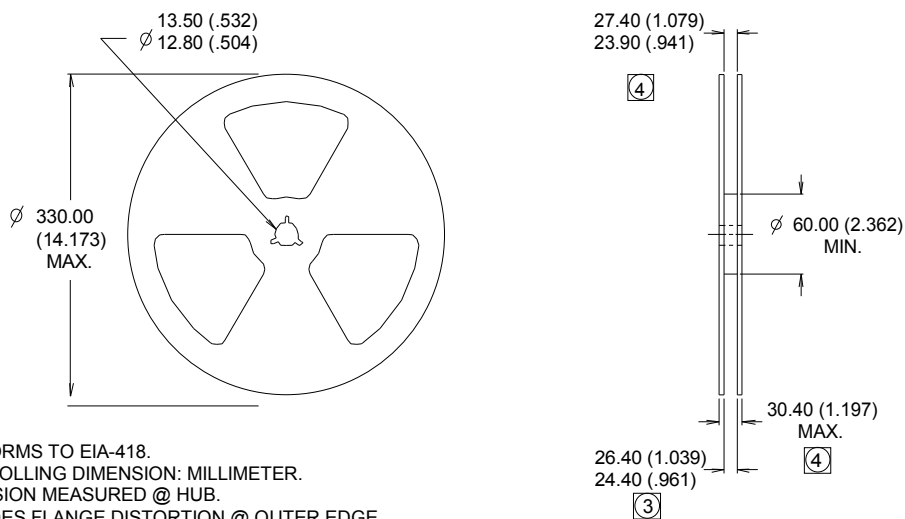
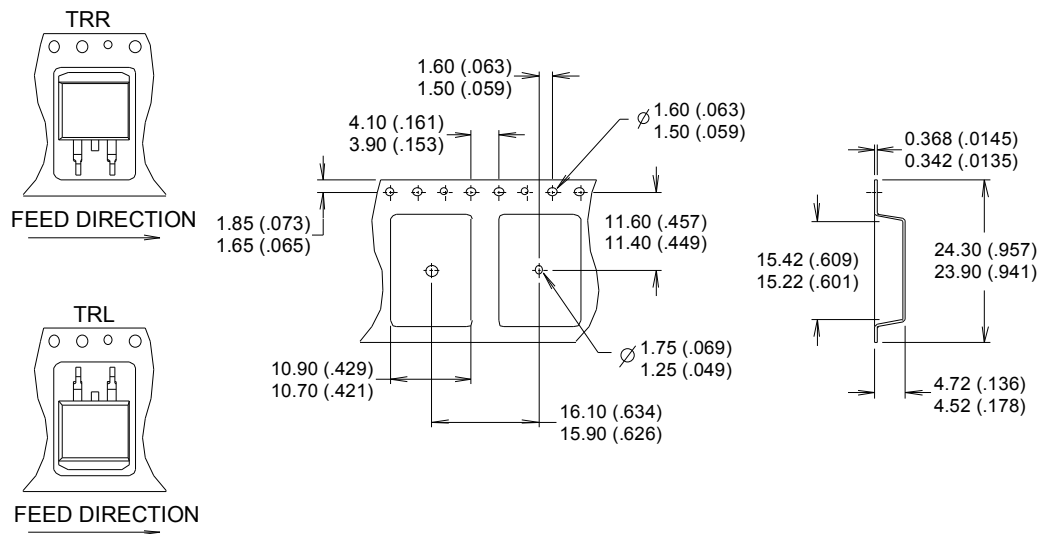
**DIODES**

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



SYMBOL	DIMENSIONS				NOTES
	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	4
L2	3.56	3.71	.140	.146	

**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**

<b>Qualification Level</b>		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.	
<b>Moisture Sensitivity Level</b>		D <sup>2</sup> -Pak	MSL1
		TO-262	
<b>ESD</b>	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	
<b>RoHS Compliant</b>		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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