

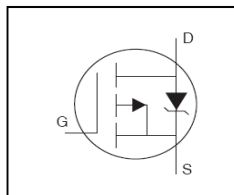


THE DATASHEET OF AUIRF4905



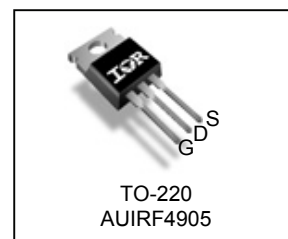
Features

- 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 *



HEXFET® Power MOSFET

V_{DSS}	-55V
$R_{DS(on)}$ max.	0.02Ω
I_D	-74A



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	
AUIRF4905	TO-220	Tube	50	AUIRF4905

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, $V_{GS} @ 10\text{V}$ (Silicon Limited)	-74	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ (Silicon Limited)	-52	
I_{DM}	Pulsed Drain Current ①	-260	
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	930	mJ
I_{AR}	Avalanche Current ①	-38	A
E_{AR}	Repetitive Avalanche Energy ①	20	mJ
dv/dt	Peak Diode Recovery dv/dt③	-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)		
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑦	—	0.75	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	


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

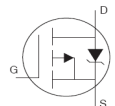
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	-55	—	—	V	V _{GS} = 0V, I _D = -250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	-0.05	—	V/°C	Reference to 25°C, I _D = -1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.02	Ω	V _{GS} = -10V, I _D = -38A ④
V _{GS(th)}	Gate Threshold Voltage	-2.0	—	-4.0	V	V _{DS} = V _{GS} , I _D = -250μA
g _{fs}	Forward Trans conductance	21	—	—	S	V _{DS} = -25V, I _D = -38A
I _{DSS}	Drain-to-Source Leakage Current	—	—	-25	μA	V _{DS} = -55V, V _{GS} = 0V
		—	—	-250		V _{DS} = -44V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	V _{GS} = -20V
	Gate-to-Source Reverse Leakage	—	—	100		V _{GS} = 20V

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

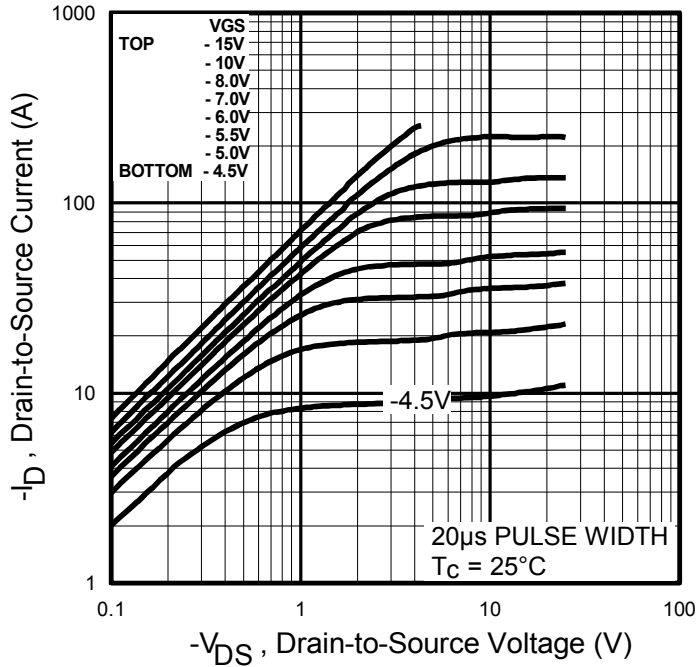
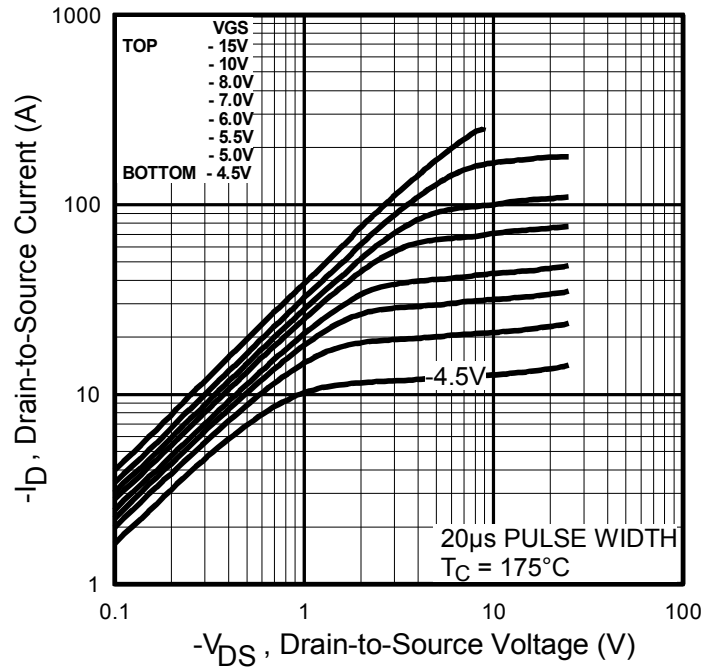
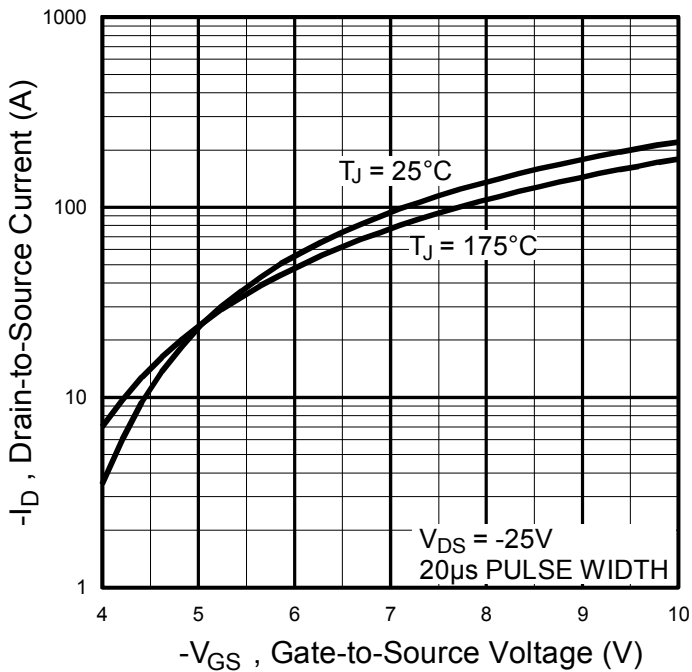
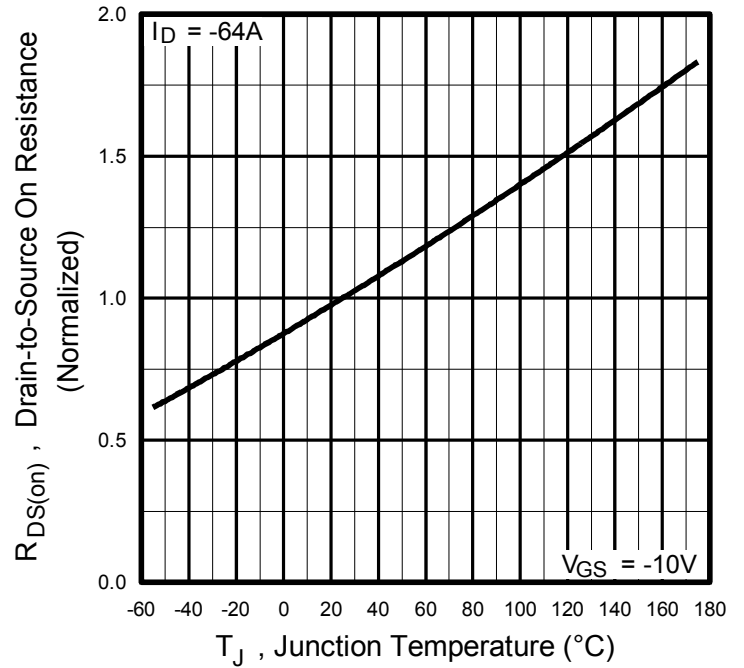
Q _g	Total Gate Charge	—	—	180	nC	I _D = -38A V _{DS} = -44V V _{GS} = -10V, See Fig 6 and 13 ④
Q _{gs}	Gate-to-Source Charge	—	—	32		
Q _{gd}	Gate-to-Drain Charge	—	—	86		
t _{d(on)}	Turn-On Delay Time	—	18	—	ns	V _{DD} = -28V I _D = -38A R _G = 2.5Ω, R _D = 0.72Ω, See Fig. 10 ④
t _r	Rise Time	—	99	—		
t _{d(off)}	Turn-Off Delay Time	—	61	—		
t _f	Fall Time	—	96	—		
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	—	3400	—	pF	V _{GS} = 0V V _{DS} = -25V f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance	—	1400	—		
C _{rss}	Reverse Transfer Capacitance	—	640	—		

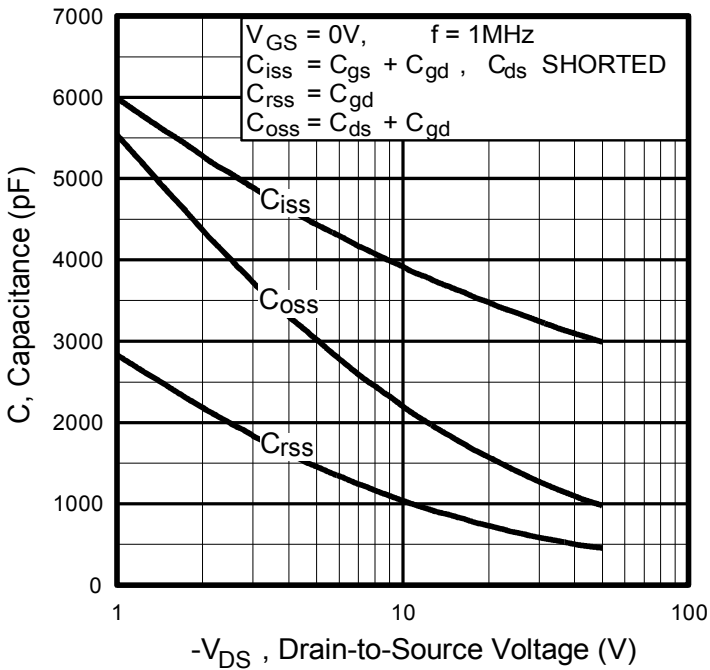
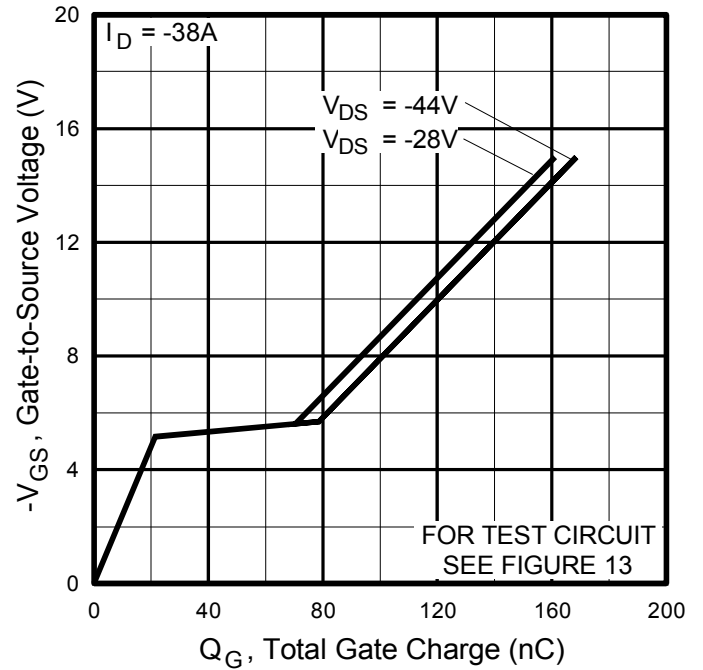
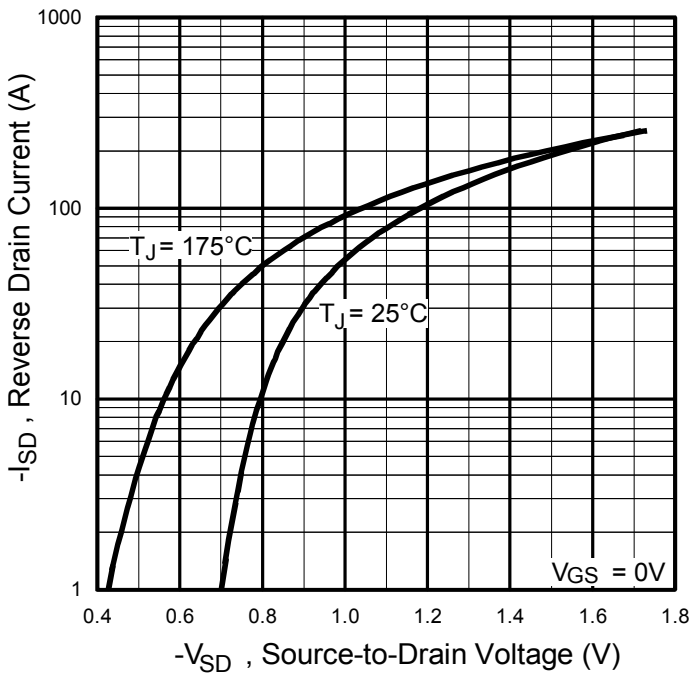
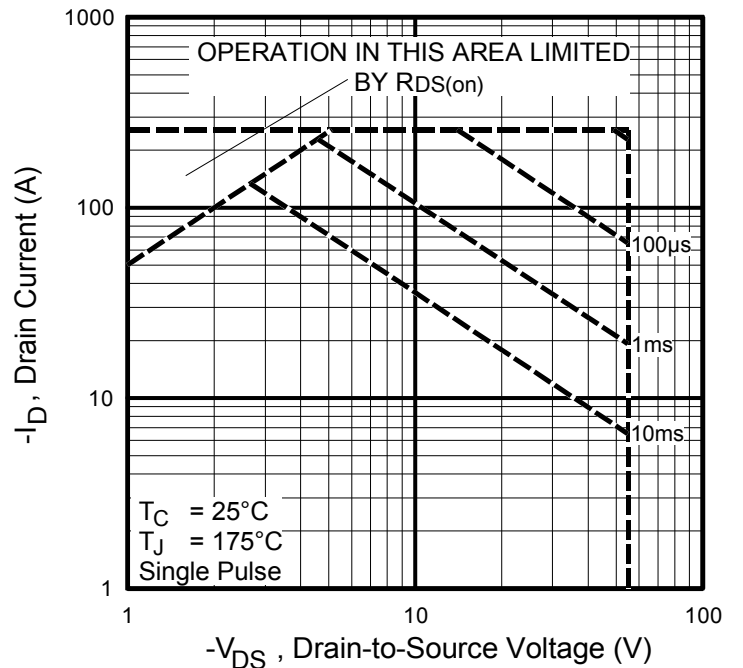
Diode Characteristics

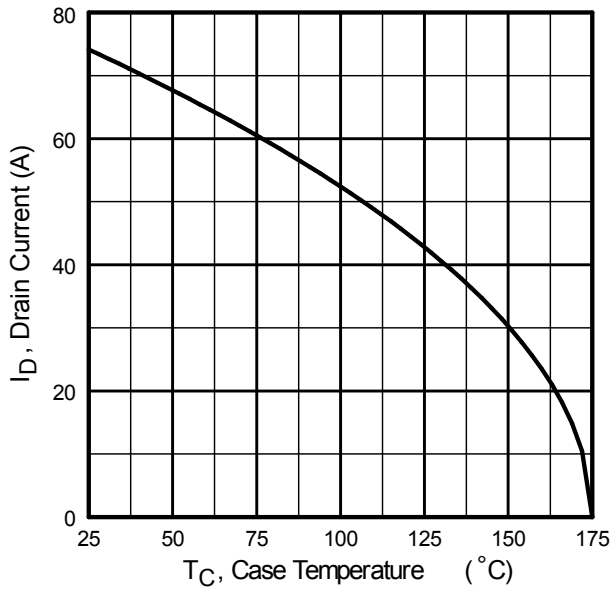
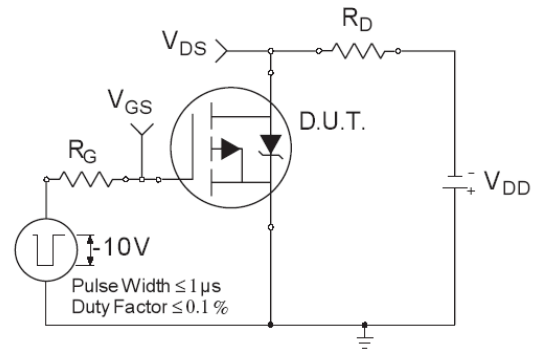
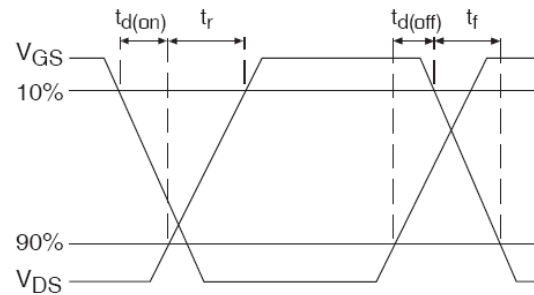
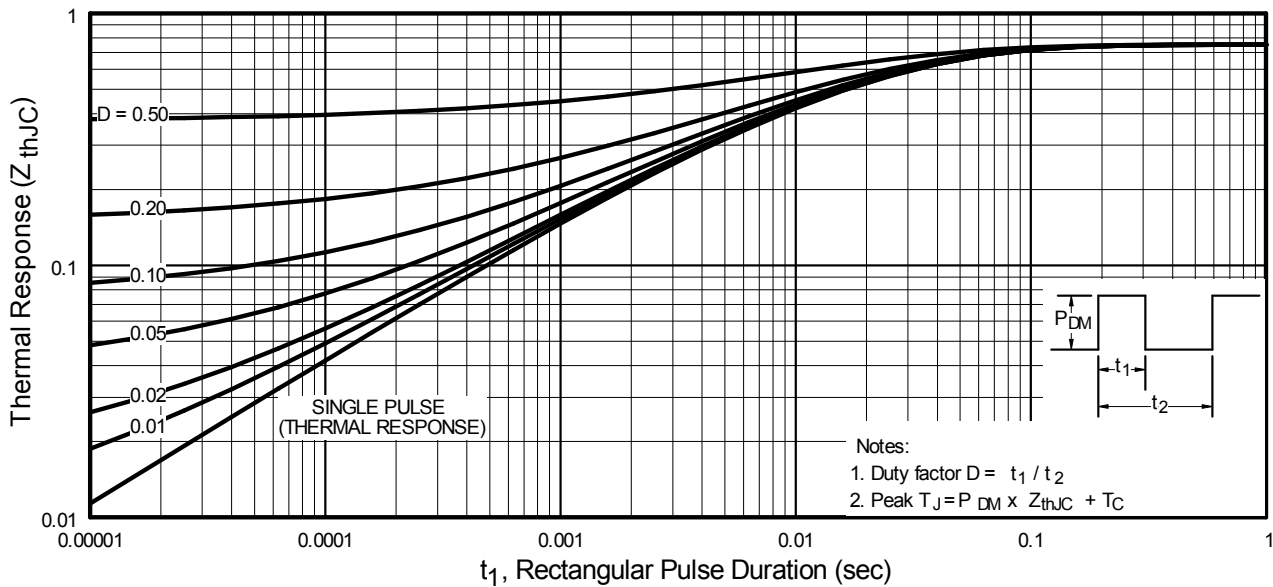
	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	-74	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	-260		
V _{SD}	Diode Forward Voltage	—	—	-1.6	V	T _J = 25°C, I _S = -38A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	89	130	ns	T _J = 25°C, I _F = -38A
Q _{rr}	Reverse Recovery Charge	—	230	350	nC	di/dt = 100A/μs 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 Starting T_J = 25°C, L = 1.3mH, R_G = 25Ω, I_{AS} = -38A. (See Figure 12)
- ③ I_{SD} ≤ -38A, di/dt ≤ -270A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 175°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.


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.

Fig 10a. Switching Time Test Circuit

Fig 10b. Switching Time Waveforms

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

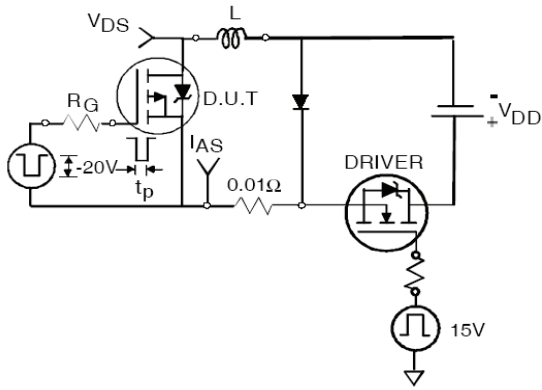


Fig 12a. Unclamped Inductive Test Circuit

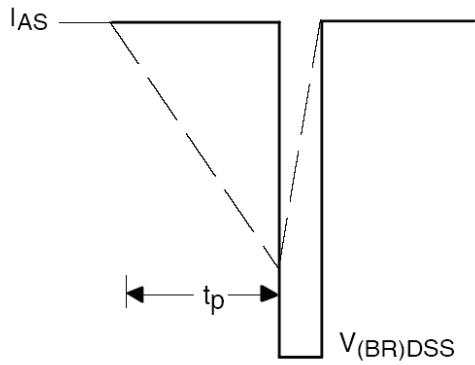


Fig 12b. Unclamped Inductive Waveforms

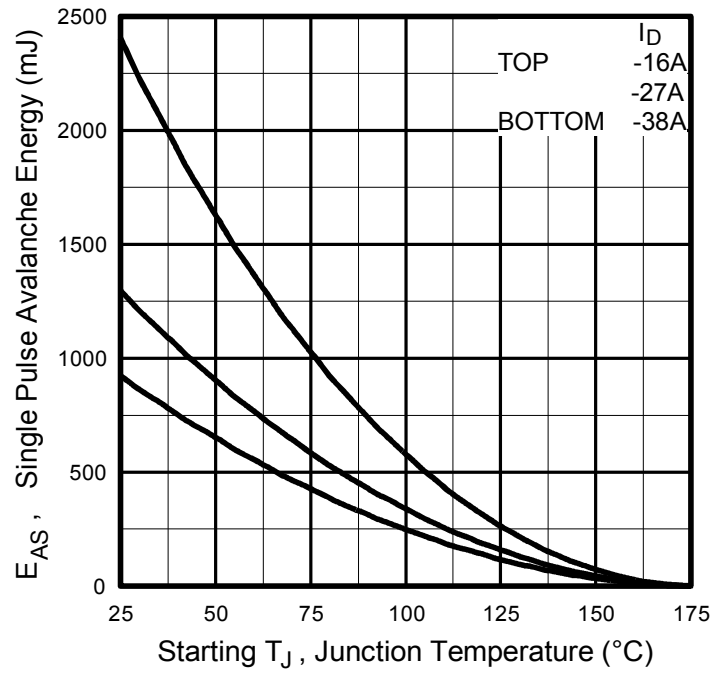


Fig 12c. Maximum Avalanche Energy vs. Drain Current

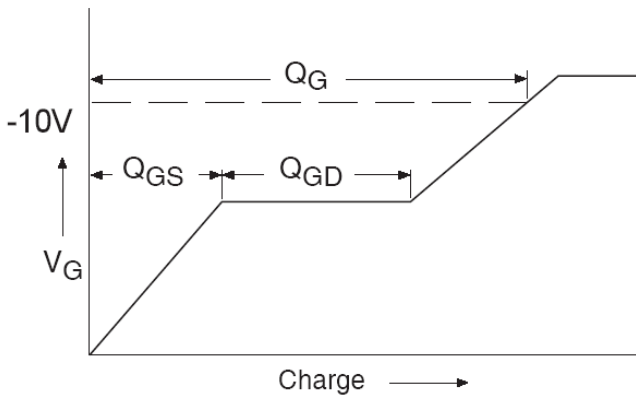


Fig 13a. Gate Charge Waveform

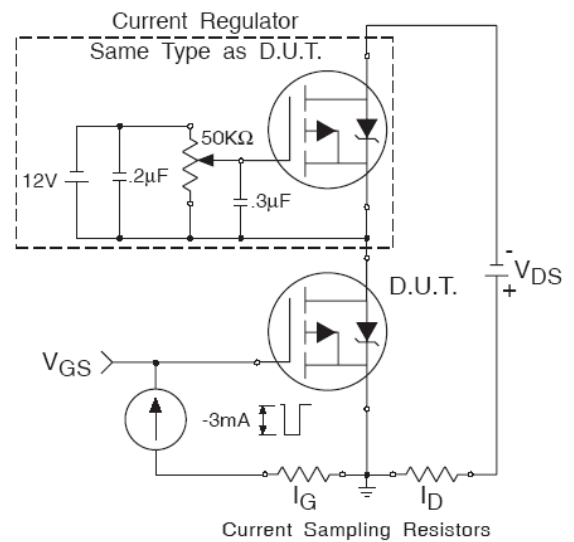
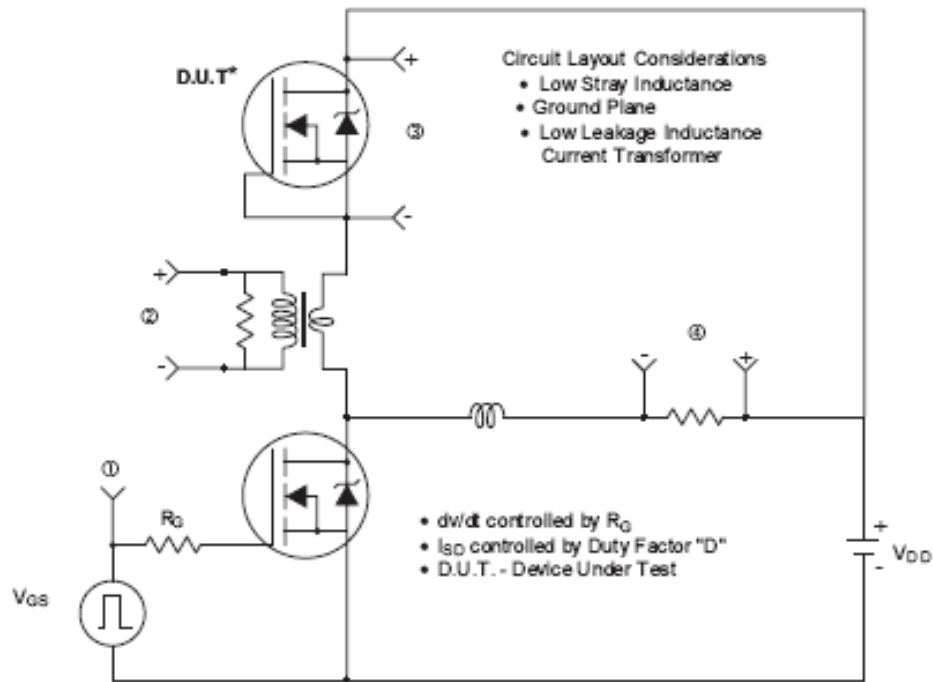
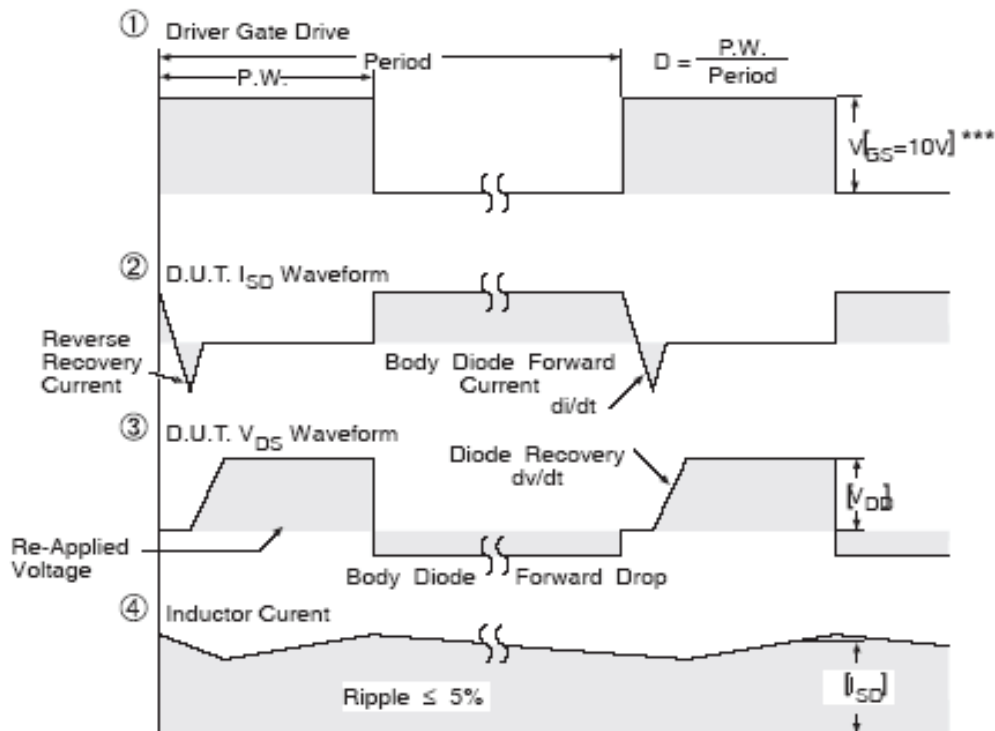


Fig 13b. Gate Charge Test Circuit

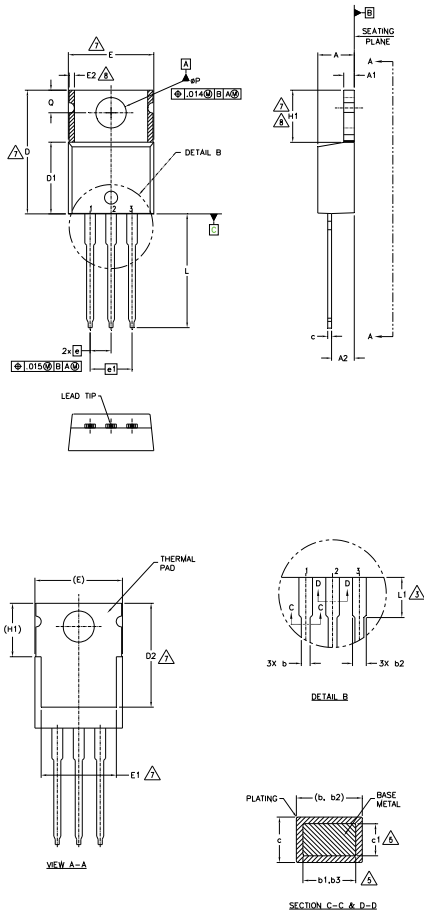


* Reverse Polarity of D.U.T for P-Channel



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

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

TO-220AB Package Outline (Dimensions are shown in millimeters (inches))

NOTES:

- 1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.- DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 5.- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
- 6.- CONTROLLING DIMENSION : INCHES.
- 7.- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
- 8.- DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- 9.- OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	1.14	1.40	.045	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	-	0.76	-	.030	8
e	2.54 BSC		.100 BSC		
e1	5.08 BSC		.200 BSC		
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	3.56	4.06	.140	.160	3
phi P	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	

LEAD ASSIGNMENTS
HEXFET

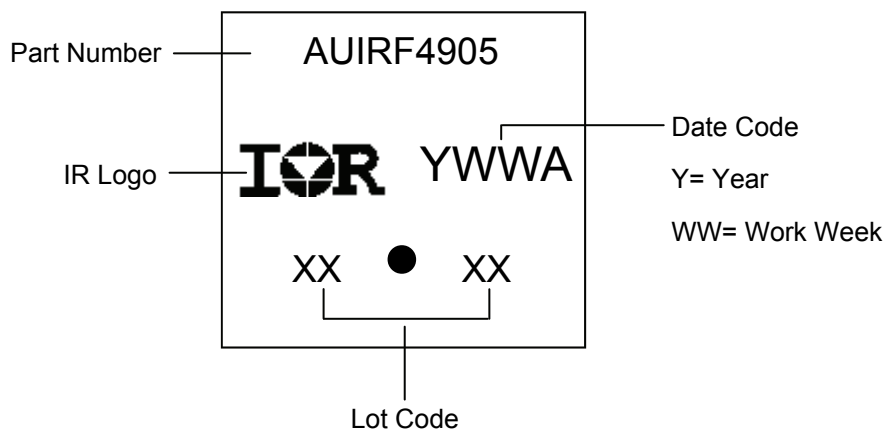
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE

IGBTs, CoPACK

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

DIODES

- 1.- ANODE
- 2.- CATHODE
- 3.- ANODE

TO-220 Part Marking Information


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		3L-TO-220	N/A
ESD	Machine Model	Class M4 (+/- 425V) [†] AEC-Q101-002	
	Human Body Model	Class H2 (+/- 4000V) [†] AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 1125V) [†] AEC-Q101-005	
RoHS Compliant		Yes	

† Highest passing voltage.

Revision History

Date	Comments
09/20/2017	<ul style="list-style-type: none"> Updated datasheet with corporate template Corrected typo error on package outline and part marking on page 8.

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