

Applications

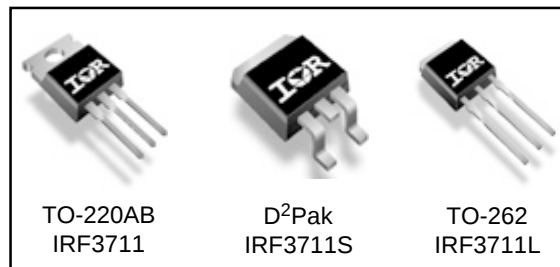
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Server Processor Power Synchronous FET
- Optimized for Synchronous Buck Converters Including Capacitive Induced Turn-on Immunity

Benefits

- Ultra-Low Gate Impedance
- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Fully Characterized Avalanche Voltage and Current

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	I_D
20V	6.0m Ω	110A ^⑥



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	110 ^⑥	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	69	
I_{DM}	Pulsed Drain Current ^①	440	
P_D @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation	120	W
P_D @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation ^⑤	3.1	W
	Linear Derating Factor	0.96	W/ $^\circ\text{C}$
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	$^\circ\text{C}$

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.04	$^\circ\text{C/W}$
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface ^④	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient ^④	—	62	
$R_{\theta JA}$	Junction-to-Ambient (PCB mount) ^⑤	—	40	

Notes ^① through ^⑥ are on page 11

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.022	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	4.7	6.0	$m\Omega$	$V_{GS} = 10V, I_D = 15A$ ③
		—	6.2	8.5		$V_{GS} = 4.5V, I_D = 12A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 16V, V_{GS} = 0V$
		—	—	100		$V_{DS} = 16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -16V$

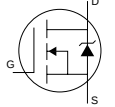
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

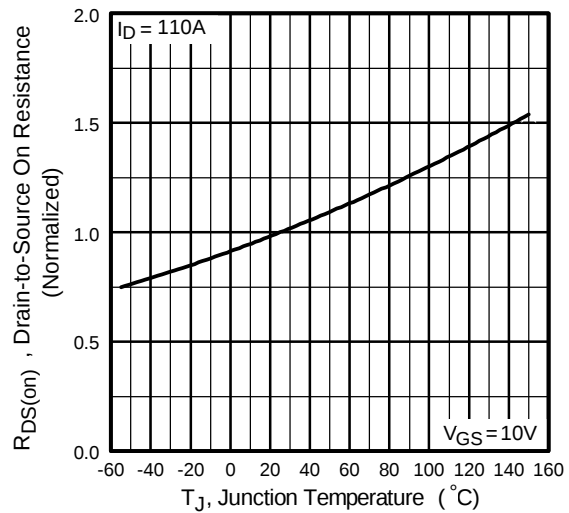
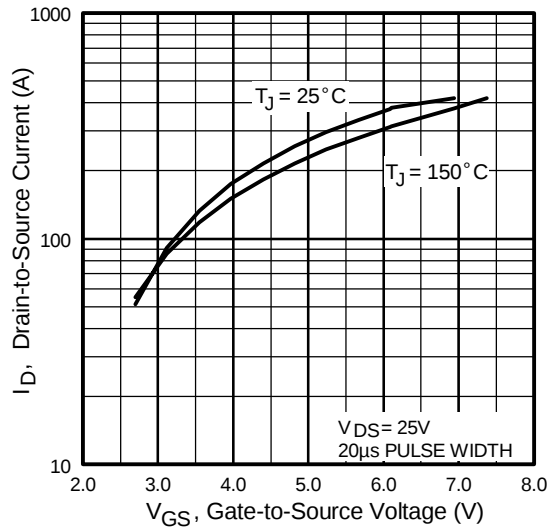
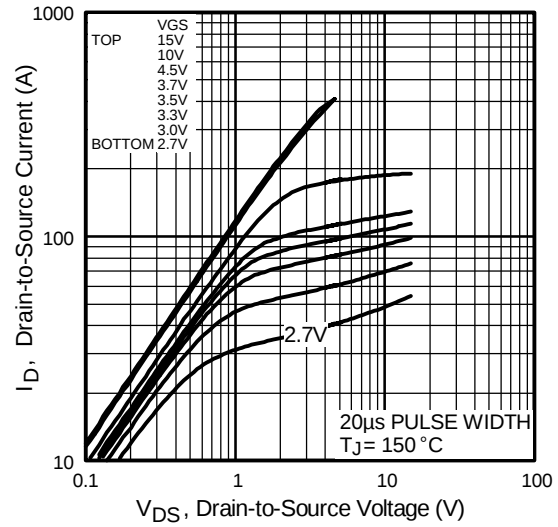
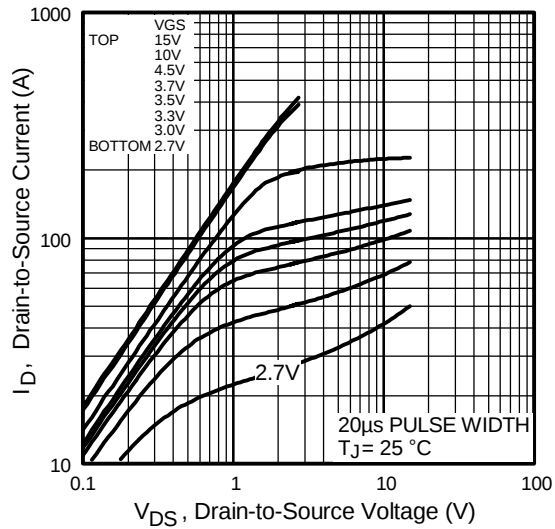
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	53	—	—	S	$V_{DS} = 16V, I_D = 30A$
Q_g	Total Gate Charge	—	29	44	nC	$I_D = 15A$
Q_{gs}	Gate-to-Source Charge	—	7.3	—		$V_{DS} = 10V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	8.9	—		$V_{GS} = 4.5V$
Q_{oss}	Output Gate Charge	—	33	—		$V_{GS} = 0V, V_{DS} = 10V$
$t_{d(on)}$	Turn-On Delay Time	—	12	—	ns	$V_{DD} = 10V$
t_r	Rise Time	—	220	—		$I_D = 30A$
$t_{d(off)}$	Turn-Off Delay Time	—	17	—		$R_G = 1.8\Omega$
t_f	Fall Time	—	12	—		$V_{GS} = 4.5V$ ③
C_{iss}	Input Capacitance	—	2980	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	1770	—		$V_{DS} = 10V$
C_{rss}	Reverse Transfer Capacitance	—	280	—		$f = 1.0MHz$

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	460	mJ
I_{AR}	Avalanche Current①	—	30	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	440		
V_{SD}	Diode Forward Voltage	—	0.88	1.3	V	$T_J = 25^\circ\text{C}, I_S = 30A, V_{GS} = 0V$ ③
		—	0.82	—		$T_J = 125^\circ\text{C}, I_S = 30A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	50	75	ns	$T_J = 25^\circ\text{C}, I_F = 16A, V_R = 10V$
Q_{rr}	Reverse Recovery Charge	—	61	92	nC	$di/dt = 100A/\mu s$ ③
t_{rr}	Reverse Recovery Time	—	48	72	ns	$T_J = 125^\circ\text{C}, I_F = 16A, V_R = 10V$
Q_{rr}	Reverse Recovery Charge	—	65	98	nC	$di/dt = 100A/\mu s$ ③



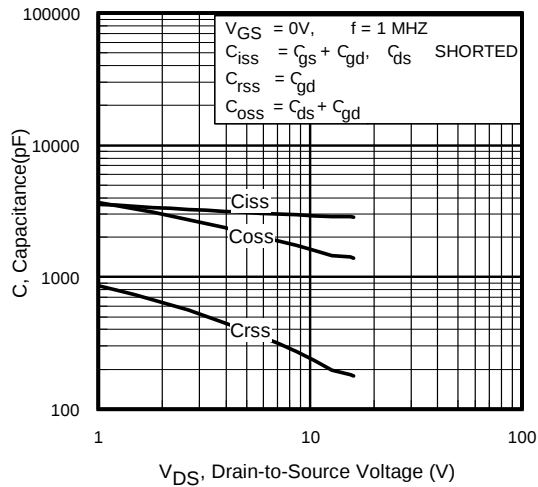


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

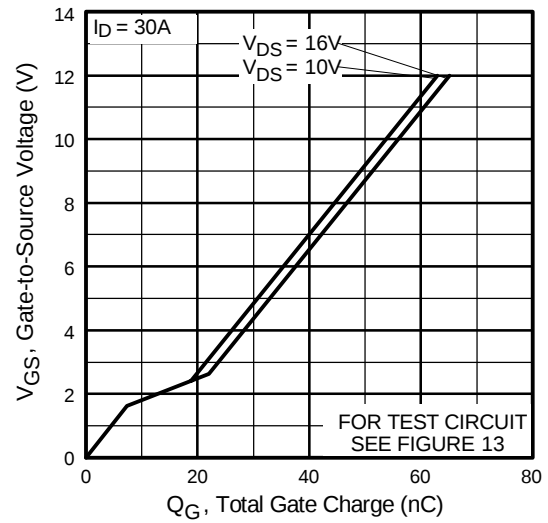


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

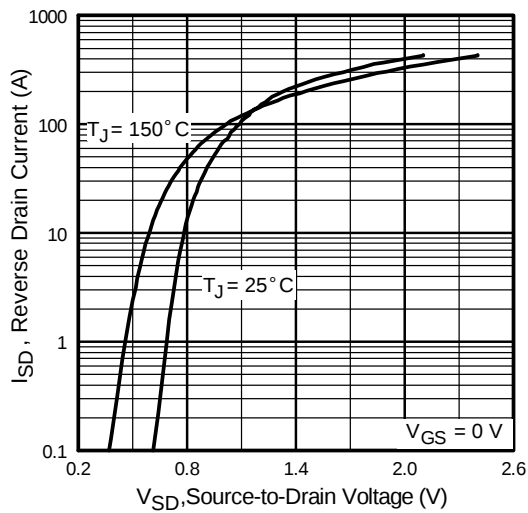


Fig 7. Typical Source-Drain Diode Forward Voltage

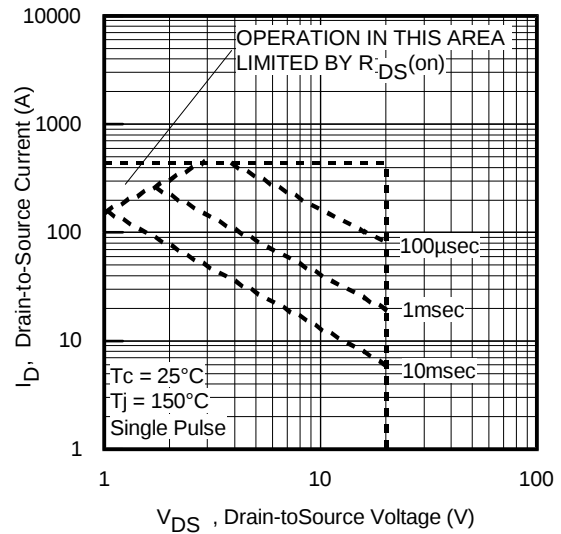


Fig 8. Maximum Safe Operating Area

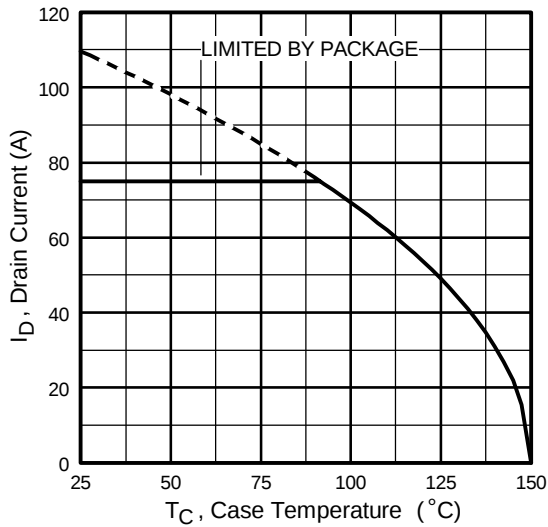


Fig 9. Maximum Drain Current Vs. Case Temperature

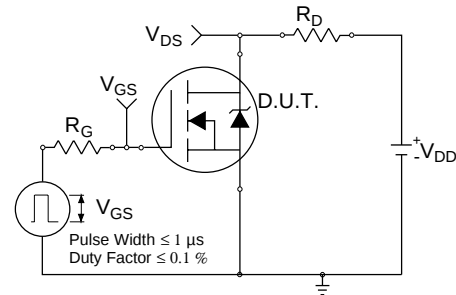


Fig 10a. Switching Time Test Circuit

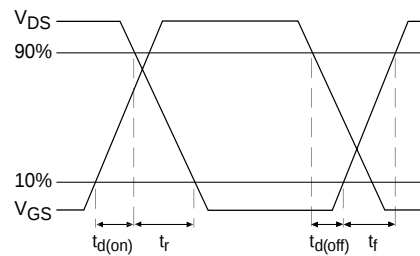


Fig 10b. Switching Time Waveforms

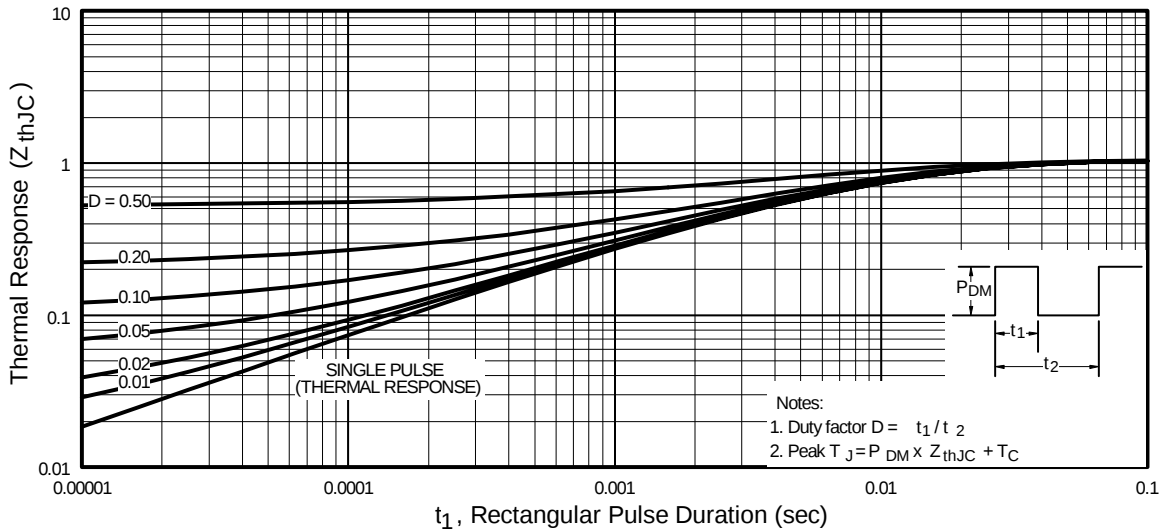


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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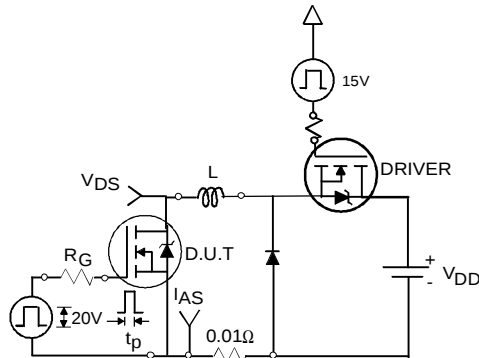


Fig 12a. Unclamped Inductive Test Circuit

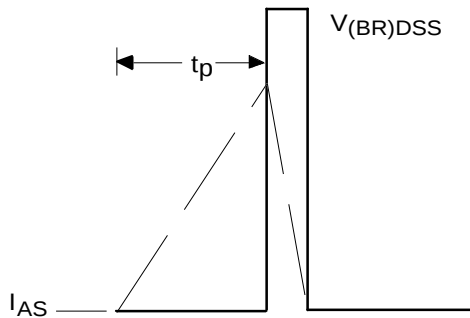


Fig 12b. Unclamped Inductive Waveforms

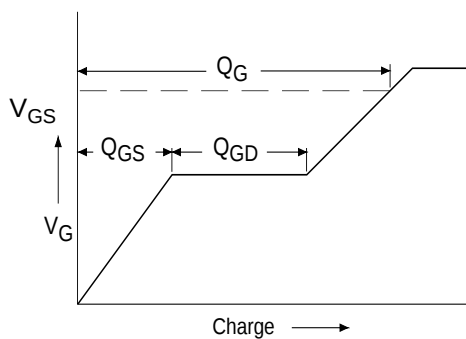


Fig 13a. Basic Gate Charge Waveform

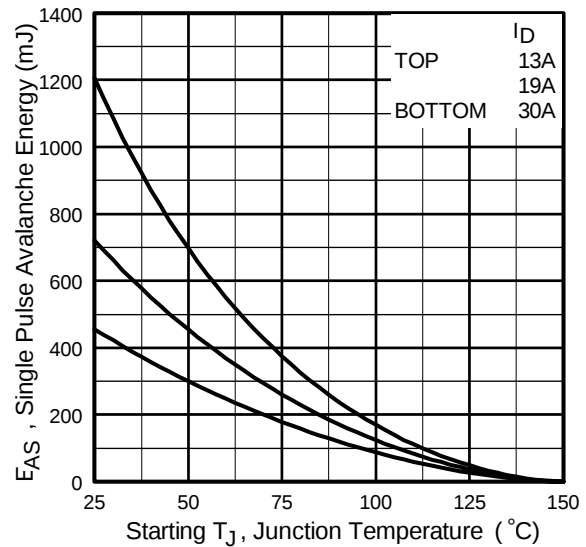


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

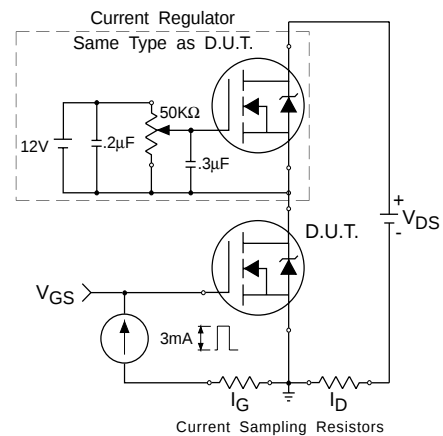
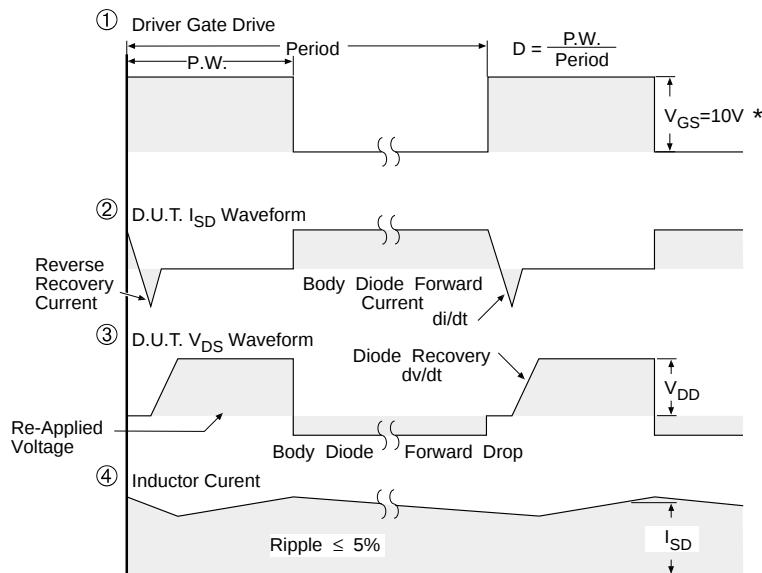
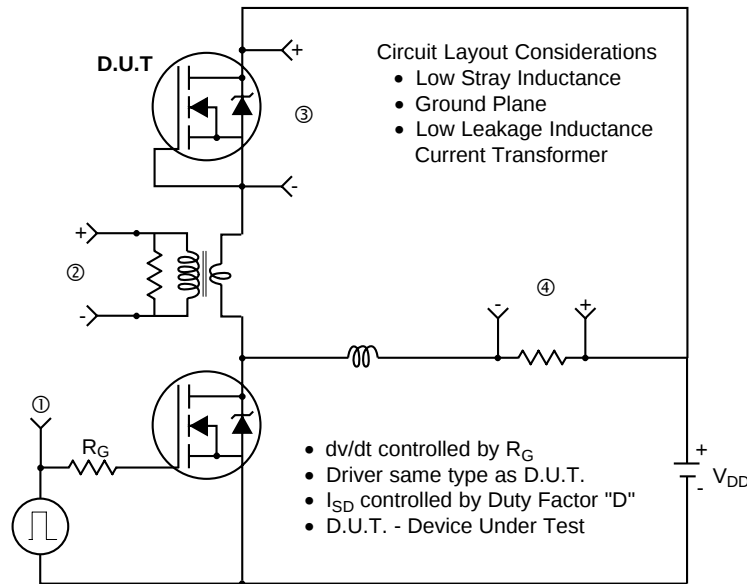


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

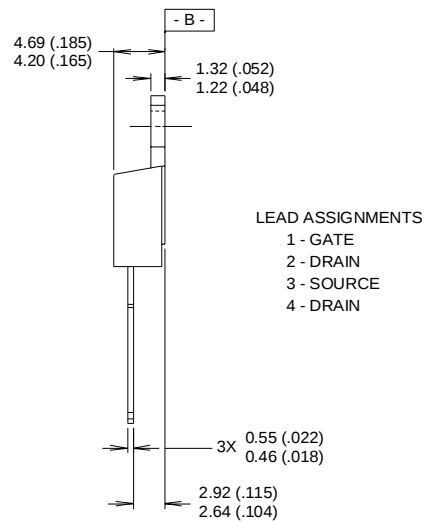


* $V_{GS} = 5V$ for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

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Dimensions are shown in millimeters (inches)



3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

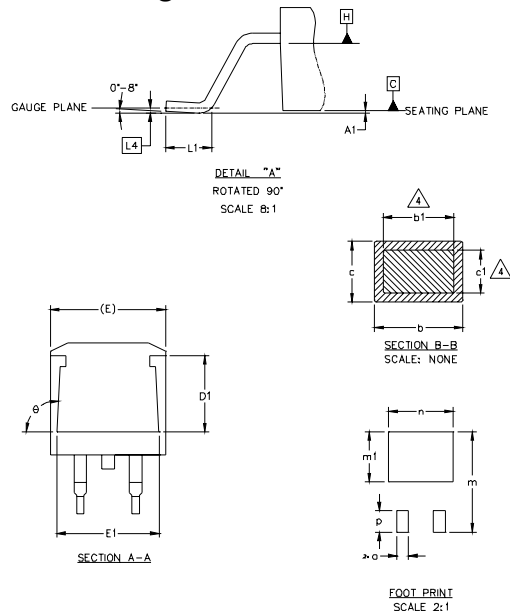
Diagram of an IRF1010 MOSFET package with labels:

- INTERNATIONAL RECTIFIER LOGO
- PART NUMBER
- DATE CODE
- YEAR 7 = 1997
- WEEK 19
- LINE C
- ASSEMBLY LOT CODE

International
Rectifier

D²Pak Package Outline

IRF3711/3711S/3711L



DIODES

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

* PART DEPENDENT.

DATE	04-14-93
BY	JH
CHKD	
APP	
DO NOT SCALE DRAWING	
THIS DRAWING AND SPECIFICATIONS ARE THE PROPERTY OF INTERNATIONAL RECTIFIER, ARE ISSUED IN STRICT CONFIDENCE, AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF PRODUCTS WITHOUT PERMISSION FROM INTERNATIONAL RECTIFIER.	
SCALE: 4:1	SHEET 3 OF 3
REV 10	

DIODES

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

* PART DEPENDENT.

DATE	04-14-93
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SCALE: 4:1	SHEET 3 OF 3
REV 10	

L2	1.27	1.65	.065
L3	1.27	1.78	.070
L4	0.25 BSC	.010 BSC	
m	17.78	.700	
m1	8.89	.350	
n	11.43	.450	
o	2.08	.082	
p	3.81	.150	
theta	90°	93°	90° 93°

10-01-1311	PER EC	10/25/01	FC	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).	DWN	JH	DATE	04-14-93	OUTLINE OF A TO-263AB (D2PAK)
9-01-1272	PER EC	10/15/01	FC	TOLERANCES ARE: FRACTIONAL DECIMALS ANGLES FINISH	OKD				International Rectifier
8-01-0446	PER EC	03/26/01	FC	±1/64 .xx ±.010 ±1/2° .xxx ±.005	APP				Tijuana, B.C. Mexico
7-01-0216	PER EC	02/15/01	FC	PER ANSI 14.5M, 1982	DO NOT SCALE DRAWING				DWG NO. 115-0088
6-00-1065	PER EC	06/15/00	FC	THIS DRAWING AND SPECIFICATIONS ARE THE PROPERTY OF INTERNATIONAL RECTIFIER, ARE ISSUED IN STRICT CONFIDENCE, AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF PRODUCTS WITHOUT PERMISSION FROM INTERNATIONAL RECTIFIER.					SCALE: 4:1
5-98-0194	PER EC	01/21/98	LV						SHEET 3 OF 3
EC		REVISION	BY						REV 10

COMMENTS

REMARKS

TOLERANCING PER ASME Y14.5M-1994

SHOWN IN MILLIMETERS [INCHES].

DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.

DO NOT APPLY TO BASE METAL ONLY.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.

DATE

COLLECTOR

3.- EMITTER

DIODES

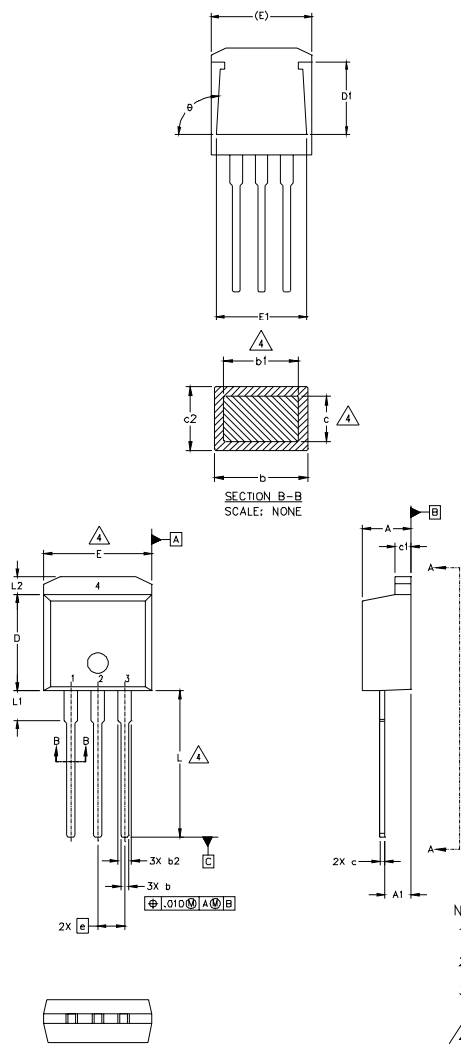
- 1.- ANODE *
- 2.- CATHODE
- 3.- ANODE

* PART DEPENDENT.

IRF3711/3711S/3711L

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IR Rectifier

TO-262 Package Outline



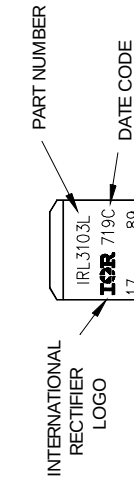
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	4
A1	2.03	2.92	.080	.115	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	
b2	1.14	1.40	.045	.055	4
c	0.38	0.63	.015	.025	
c1	1.14	1.40	.045	.055	3
c2	0.43	.063	.017	.029	
D	8.51	9.65	.335	.380	
D1	5.33		.210		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
L	13.46	14.09	.530	.555	
L1	3.56	3.71	.140	.146	
L2		1.65		.065	

LEAD ASSIGNMENTS

HEXFET

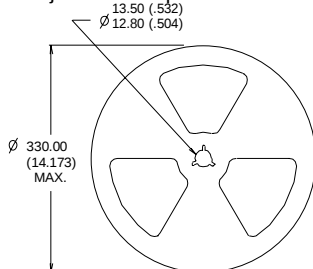
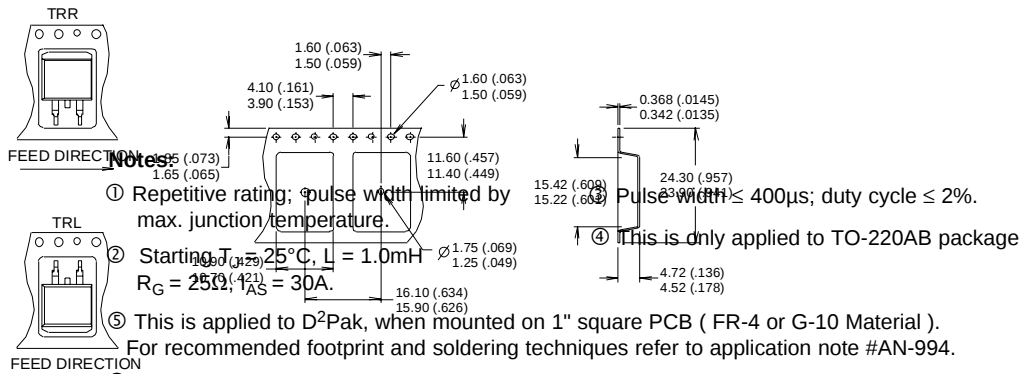
- 1. - GATE
- 2. - DRAIN
- 3. - SOURCE
- 4. - DRAIN

TO-262 Part Marking Information



EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"

D²Pak Tape & Reel Information



Data and specifications subject to change without notice.
This product has been designed and qualified for the industrial market.
Qualification Standards can be found on IR's Web site.

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IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105

TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information. 11/01

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

www.irf.com