

Applications

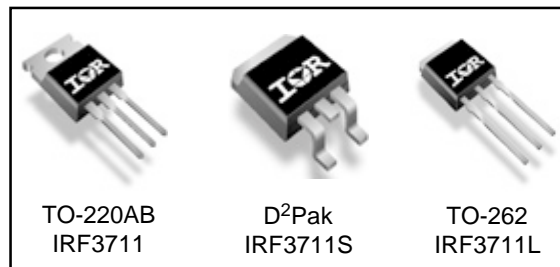
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Server Processor Power Synchronous FET
- Optimized for Synchronous Buck Converters Including Capacitive Induced Turn-on Immunity

Benefits

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

HEXFET® Power MOSFET

V _{DSS}	R _{DS(on)} max	I _D
20V	6.0mΩ	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°C	Continuous Drain Current, V _{GS} @ 10V	110 ^⑥	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	69	
I _{DM}	Pulsed Drain Current ^①	440	
P _D @ T _C = 25°C	Maximum Power Dissipation	120	W
P _D @ T _A = 25°C	Maximum Power Dissipation ^⑤	3.1	W
	Linear Derating Factor	0.96	W/°C
T _J , T _{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	1.04	°C/W
R _{θCS}	Case-to-Sink, Flat, Greased Surface ^④	0.50	—	
R _{θJA}	Junction-to-Ambient ^④	—	62	
R _{θJA}	Junction-to-Ambient (PCB mount) ^⑤	—	40	

Notes ^① through ^⑥ are on page 11

www.irf.com

1

11/15/01

IRF3711/3711S/3711L

International
IR RectifierStatic @ $T_J = 25^\circ\text{C}$ (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 $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	4.7	6.0	m Ω	$V_{GS} = 10V, I_D = 15A$ 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		$V_{GS} = -16V$

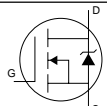
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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	—		$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	1770	—	pF	$V_{DS} = 10V$
C_{rss}	Reverse Transfer Capacitance	—	280	—		$f = 1.0\text{MHz}$

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

IRF3711/3711S/3711L

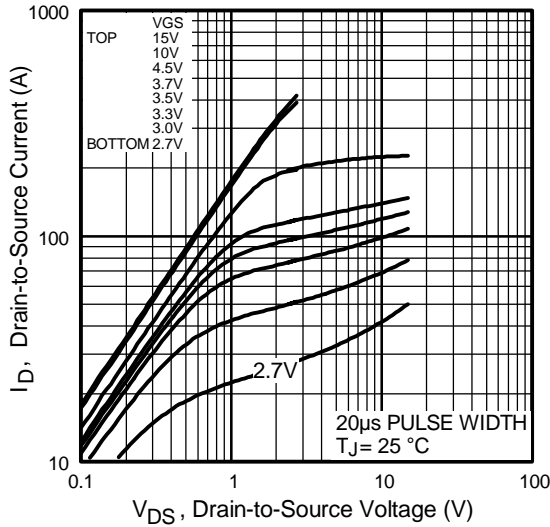


Fig 1. Typical Output Characteristics

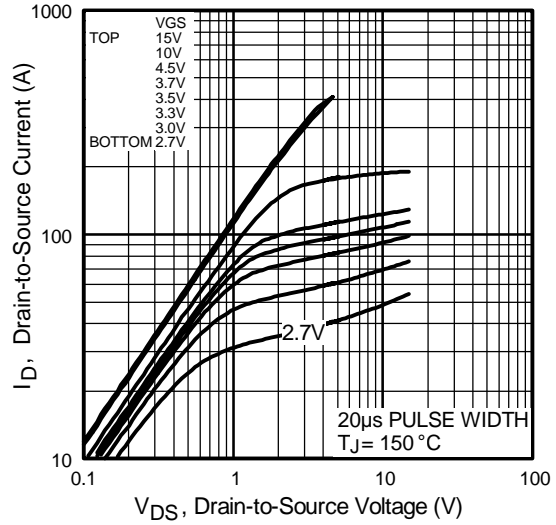


Fig 2. Typical Output Characteristics

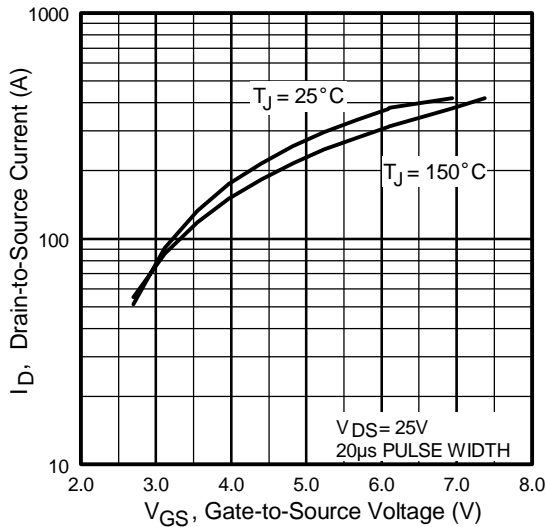


Fig 3. Typical Transfer Characteristics

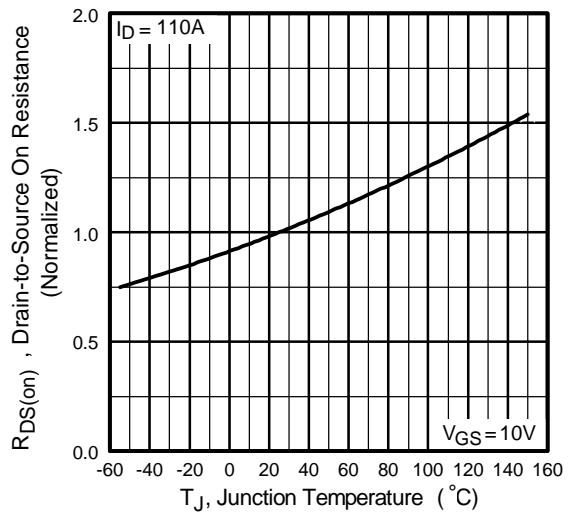


Fig 4. Normalized On-Resistance Vs. Temperature

IRF3711/3711S/3711L

International
IR Rectifier

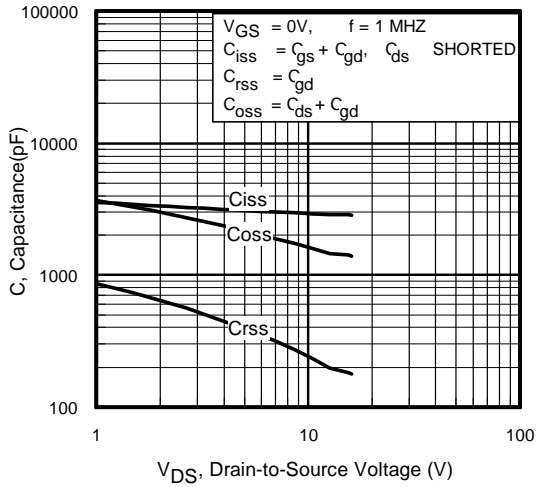


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

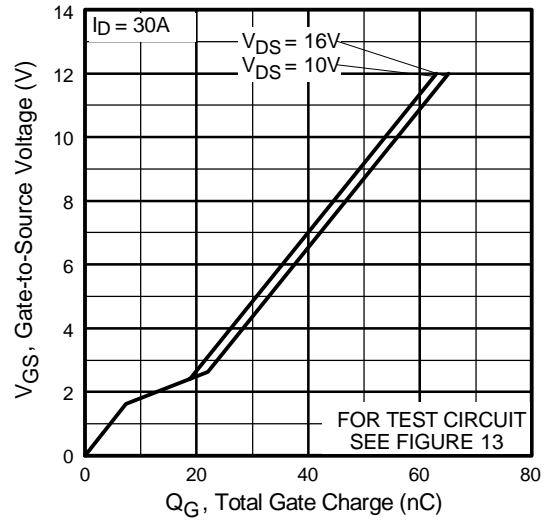


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

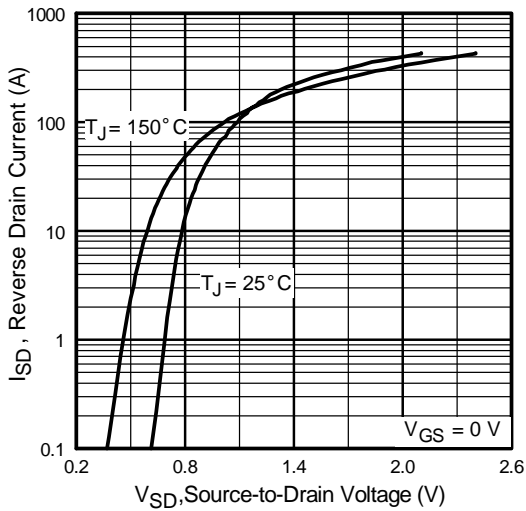


Fig 7. Typical Source-Drain Diode Forward Voltage

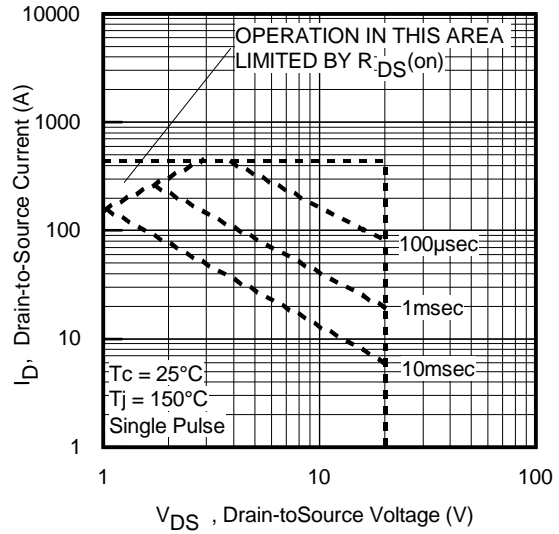


Fig 8. Maximum Safe Operating Area

IRF3711/3711S/3711L

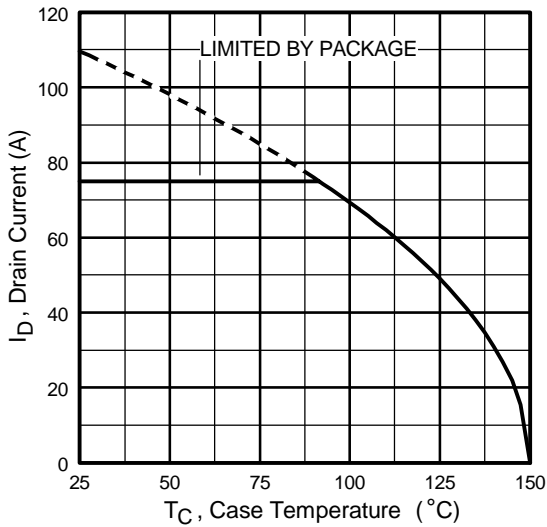


Fig 9. Maximum Drain Current Vs. Case Temperature

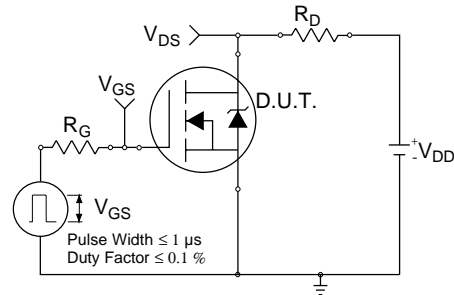


Fig 10a. Switching Time Test Circuit

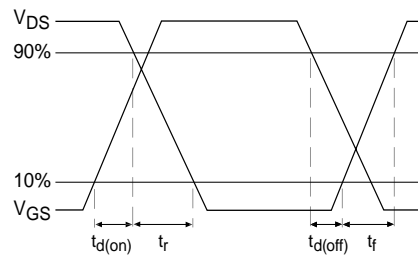


Fig 10b. Switching Time Waveforms

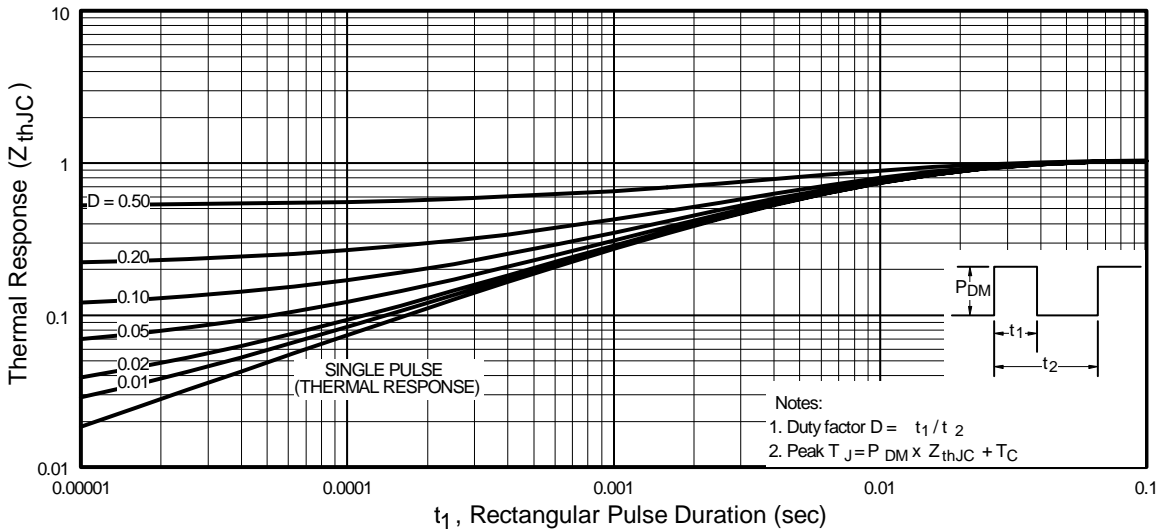


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

IRF3711/3711S/3711L

International
IR Rectifier

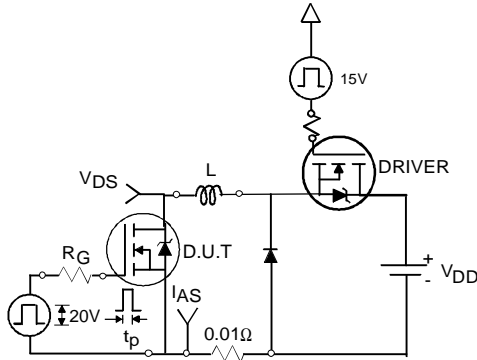


Fig 12a. Unclamped Inductive Test Circuit

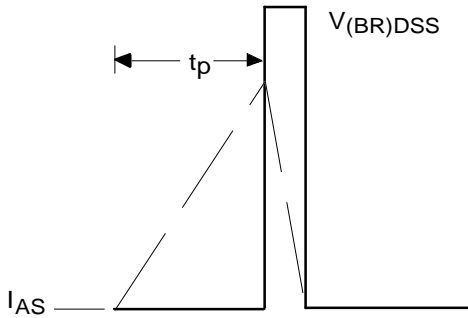


Fig 12b. Unclamped Inductive Waveforms

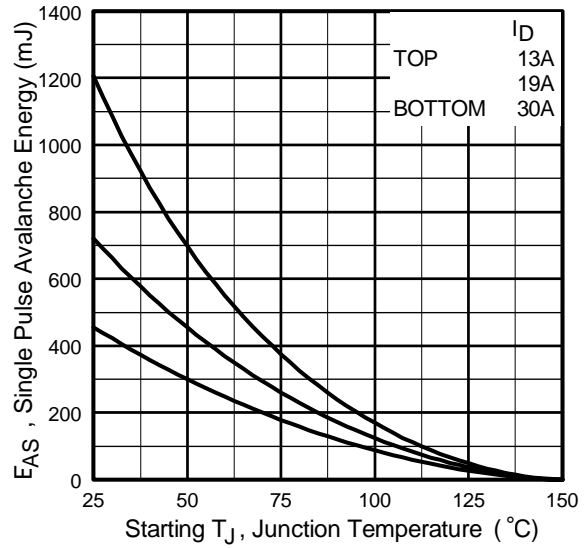


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

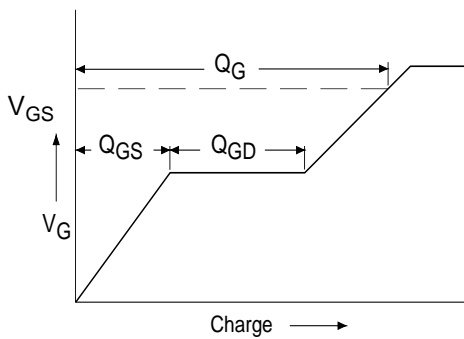


Fig 13a. Basic Gate Charge Waveform

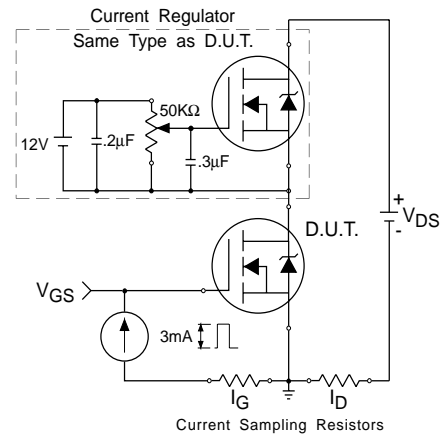
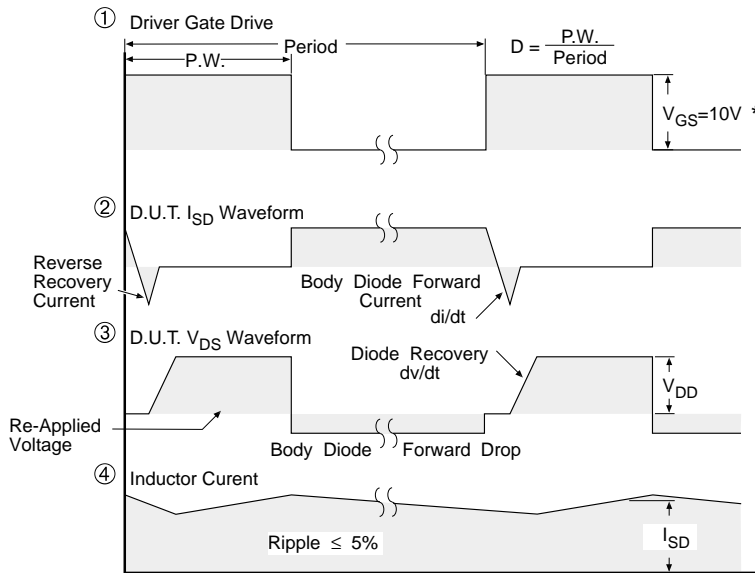
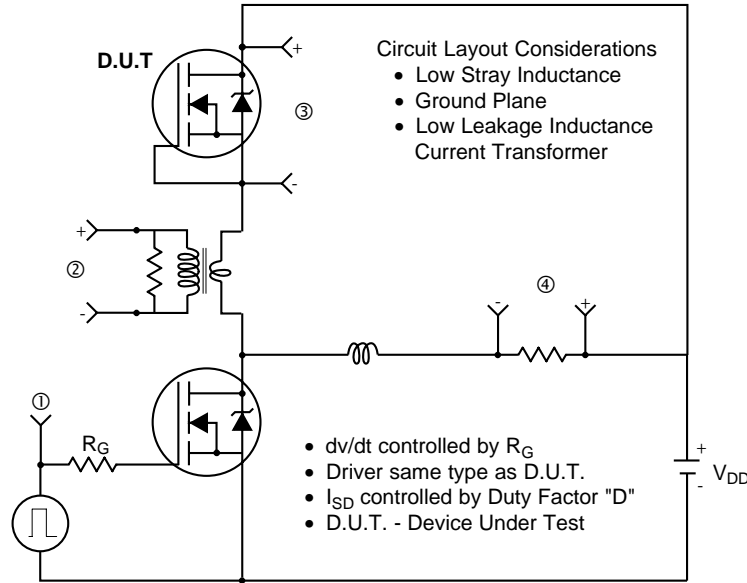


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

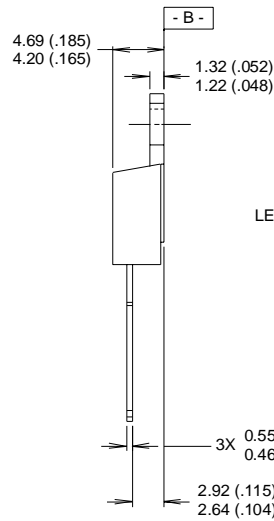
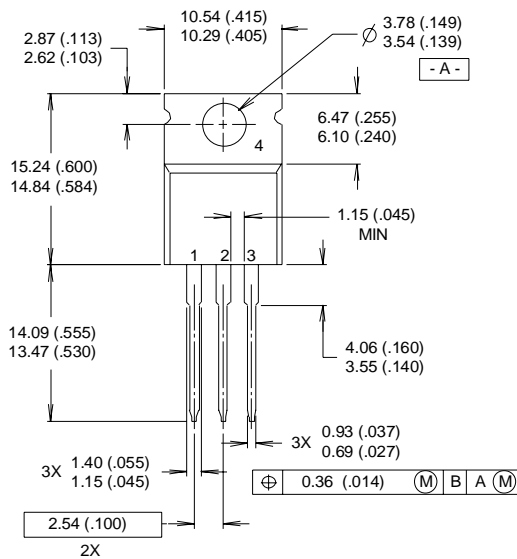
Fig 14. For N-Channel HEXFET® Power MOSFETs

IRF3711/3711S/3711L



TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



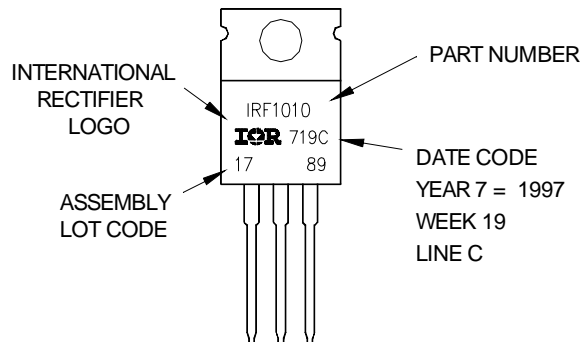
- LEAD ASSIGNMENTS**
- 1 - GATE
 - 2 - DRAIN
 - 3 - SOURCE
 - 4 - DRAIN

NOTES:

- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
- 2 CONTROLLING DIMENSION : INCH
- 3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
- 4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

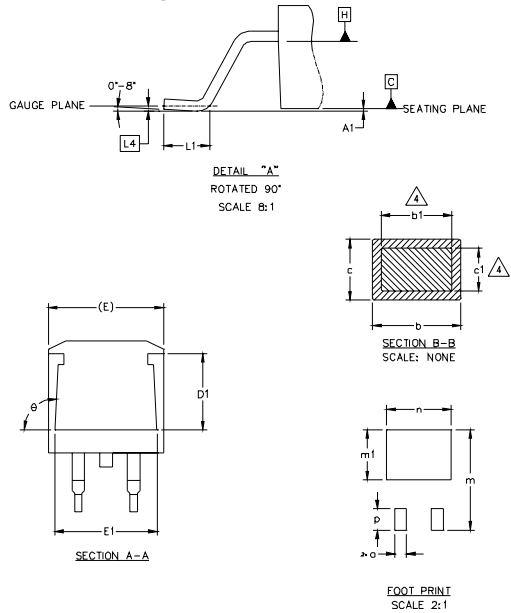
TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
 LOT CODE 1789
 ASSEMBLED ON WW 19, 1997
 IN THE ASSEMBLY LINE "C"



International Rectifier D²Pak Package Outline

IRF3711/3711S/3711L



DIODES

1.- ANODE *

2.- CATHODE

3.- ANODE

* PART DEPENDENT.

DATE	24-14-93
DESCRIPTION	OUTLINE OF A TO-263AB (D2PAK)
DESIGNED BY	International Rectifier
DRWING BY	Tijuana, B.C. Mexico
DATE	115-0088
SCALE	4:1 SHEET 3 OF 3 REV 10

DIODES

1.- ANODE *

2.- CATHODE

3.- ANODE

* PART DEPENDENT.

DATE	24-14-93
DESCRIPTION	OUTLINE OF A TO-263AB (D2PAK)
DESIGNED BY	International Rectifier
DRWING BY	Tijuana, B.C. Mexico
DATE	115-0088
SCALE	4:1 SHEET 3 OF 3 REV 10

L2	1.27	1.65	.065	
L3	1.27	1.78	.050	.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	
θ	90°	93°	90°	93°

COMMENTS

UNIT

TOLERANCING PER ASME Y14.5M-1994
SHOWN IN MILLIMETERS [INCHES].

DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"]
DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.

D c1 APPLY TO BASE METAL ONLY.

UNITS: INCH.

DATE

COLLECTOR

EMITTER

DIODES

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

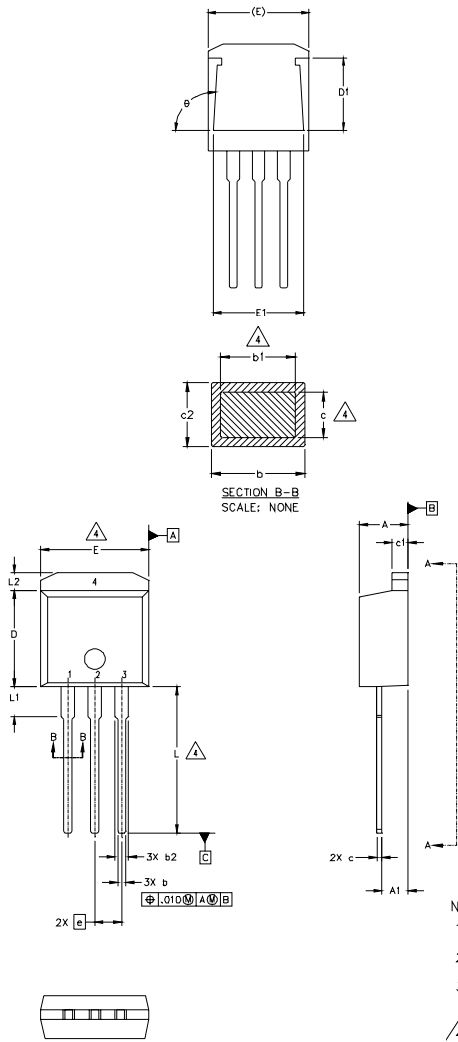
* PART DEPENDENT.

10	01-1311	PER EC	10/25/01	FC	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES (MILLIMETERS). TOLERANCES ARE: FRAC. DECIMALS ANGLES FINISH ±1/64 .xx ±.010 ±1/2° 63 .xxx ±.005 PER ANSI 14.5M, 1982.	DWN	JH	DATE	04-14-93	OUTLINE OF A TO-263AB (D2PAK)
9	01-1272	PER EC	10/15/01	FC		CKD				
8	01-0446	PER EC	03/26/01	FC		APP				
7	01-0216	PER EC	02/15/01	FC		DO NOT SCALE DRAWING				
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.				
5	98-0194	PER EC	01/21/98	LV					International Rectifier	
	EC		REVISION	BY					DWG NO.	115-0088
									SCALE:	4:1 SHEET 3 OF 3 REV 10

IRF3711/3711S/3711L

International
IR Rectifier

TO-262 Package Outline



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	2.92	.080	.115	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.40	.045	.055	
c	0.38	0.63	.015	.025	4
c1	1.14	1.40	.045	.055	
c2	0.43	.063	.017	.029	
D	8.51	9.65	.335	.380	3
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

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. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
5. CONTROLLING DIMENSION: INCH.

TO-262 Part Marking Information

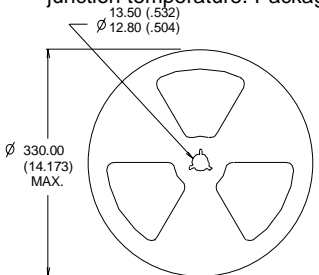
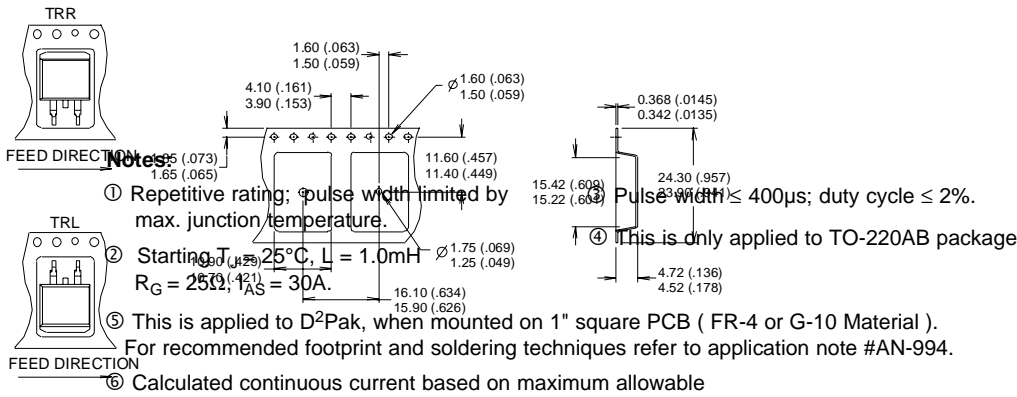


EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"

International
IR Rectifier

IRF3711/3711S/3711L

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.

International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
 TAC Fax: (310) 252-7903

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

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

www.irf.com