International
IOR Rectifier

SMPS MOSFET

IRF3711
IRF3711S
IRF3711L

HEXFET® Power MOSFET

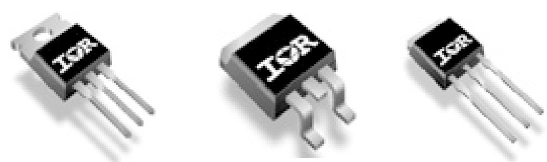
V_{DSS}	$R_{DS(on)}$ max	I_D
20V	**6.0mΩ**	**110A**⑥

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



TO-220AB IRF3711 | D^2Pak IRF3711S | TO-262 IRF3711L

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	110⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	69	
I_{DM}	Pulsed Drain Current①	440	
P_D @T_C = 25°C	Maximum Power Dissipation	120	W
P_D @T_A = 25°C	Maximum Power Dissipation⑤	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
$R_{\theta JC}$	Junction-to-Case	—	1.04	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface ④	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient④	—	62	
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)⑤	—	40	

Notes ① through ⑥ are on page 11

11/15/01

Static @ T_J = 25°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 = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.022	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	4.7	6.0	mΩ	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 = 250µA
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°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 16V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -16V

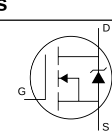
Dynamic @ T_J = 25°C (unless otherwise specified)

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 = 1.8Ω
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°C, I_S = 30A, V_{GS} = 0V ③
		——	0.82	——		T_J = 125°C, I_S = 30A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	50	75	ns	T_J = 25°C, I_F = 16A, V_R=10V
Q_{rr}	Reverse Recovery Charge	——	61	92	nC	di/dt = 100A/µs ③
t_{rr}	Reverse Recovery Time	——	48	72	ns	T_J = 125°C, I_F = 16A, V_R=10V
Q_{rr}	Reverse Recovery Charge	——	65	98	nC	di/dt = 100A/µs ③

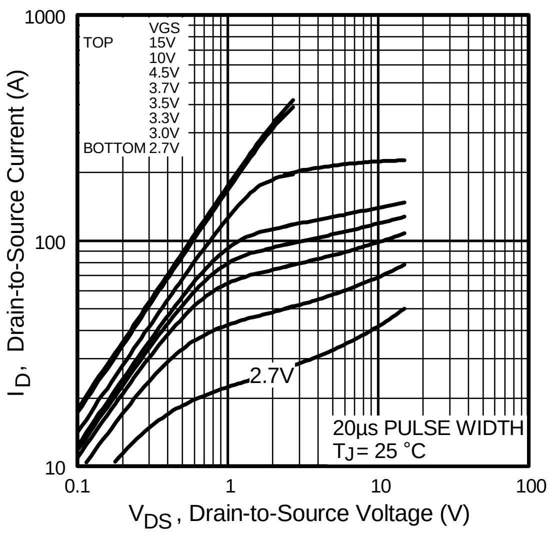


Fig 1. Typical Output Characteristics

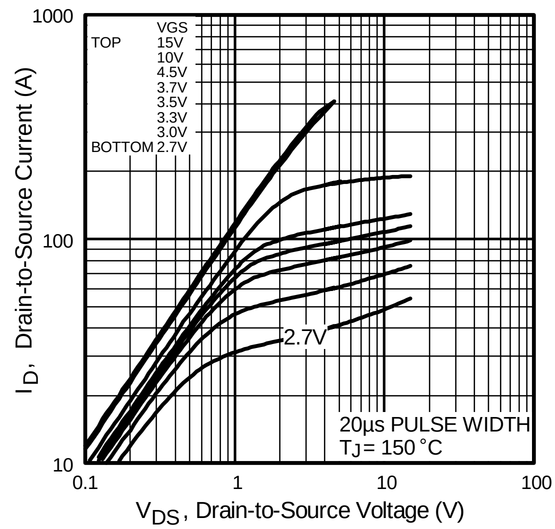


Fig 2. Typical Output Characteristics

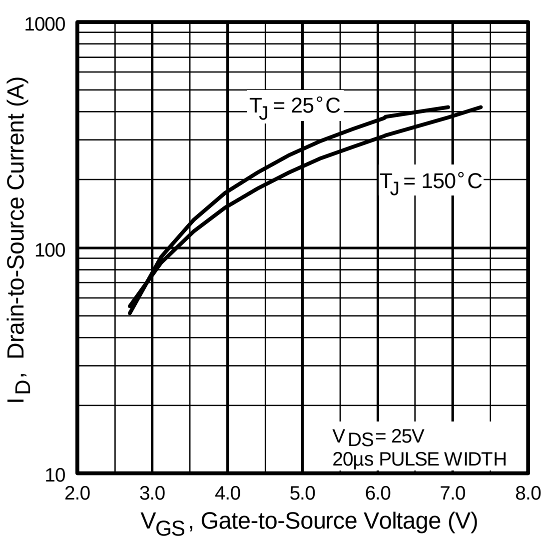


Fig 3. Typical Transfer Characteristics

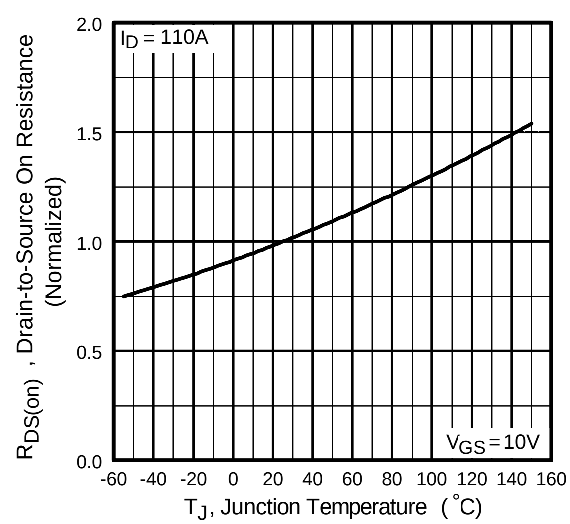


Fig 4. Normalized On-Resistance Vs. Temperature

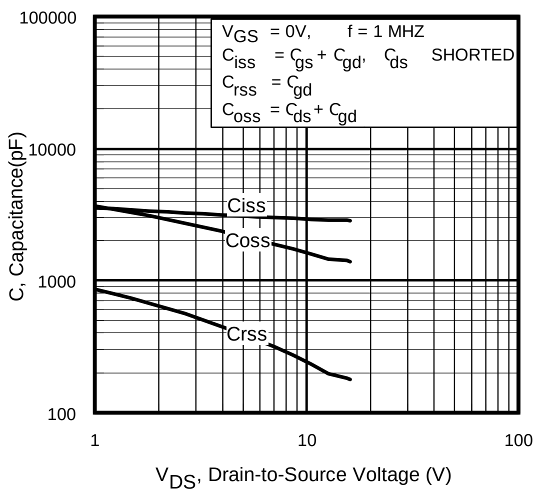


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

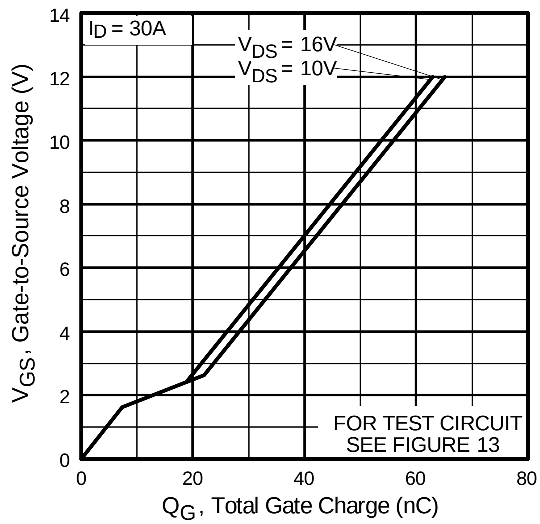


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

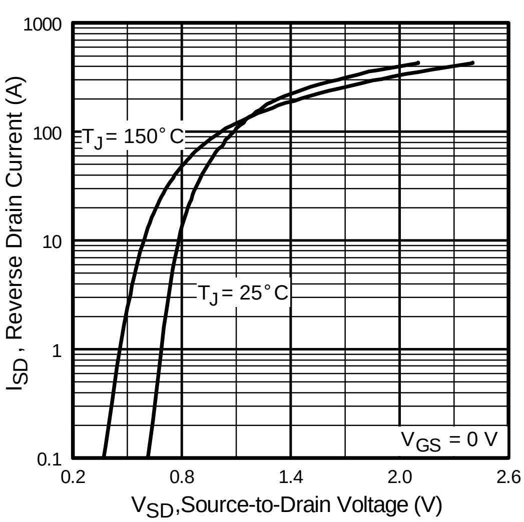


Fig 7. Typical Source-Drain Diode Forward Voltage

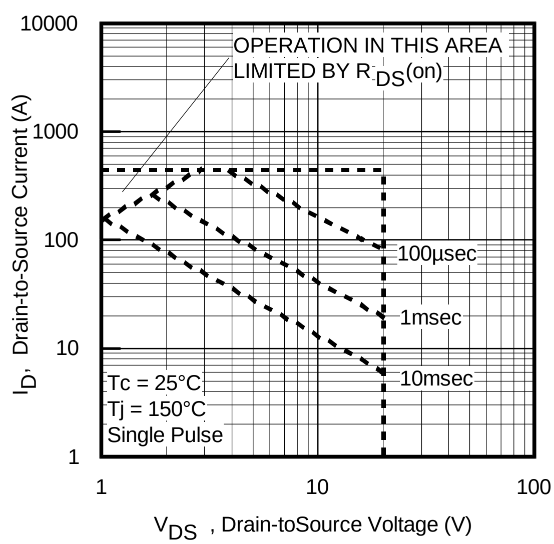


Fig 8. Maximum Safe Operating Area

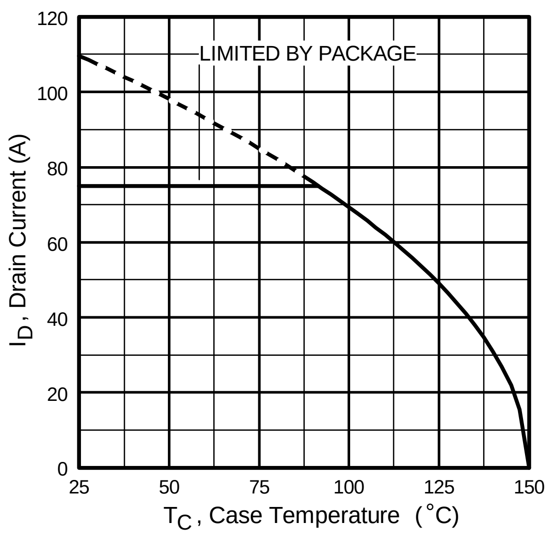


Fig 9. Maximum Drain Current Vs. Case Temperature

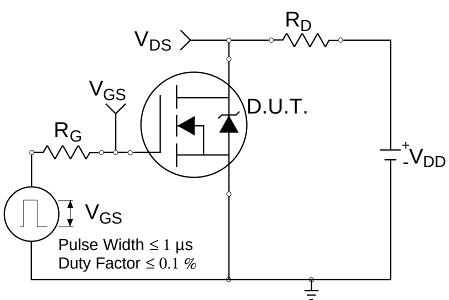


Fig 10a. Switching Time Test Circuit

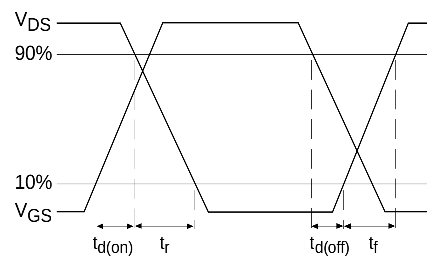


Fig 10b. Switching Time Waveforms

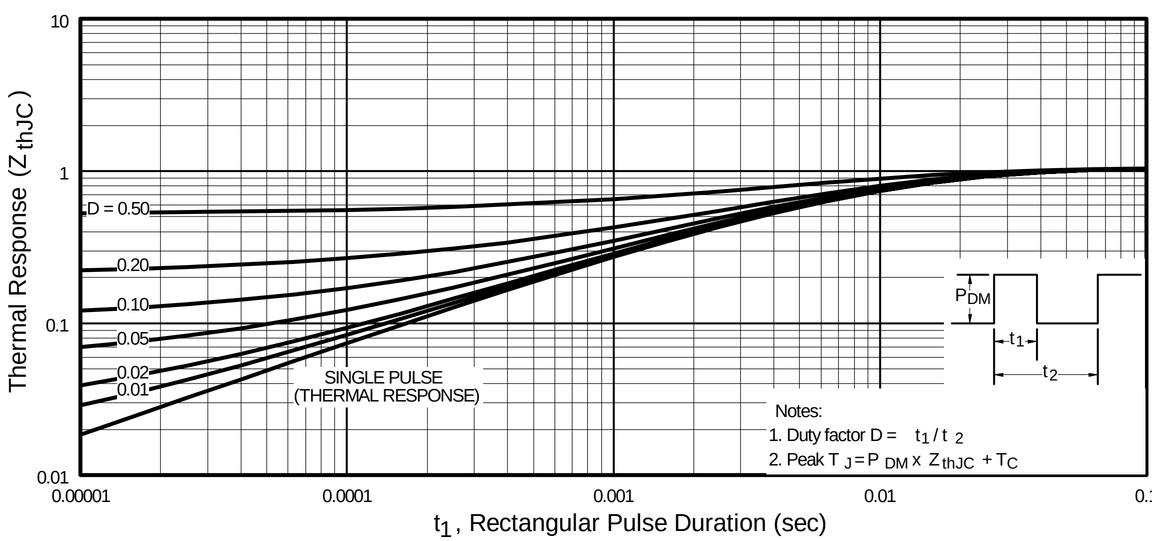


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

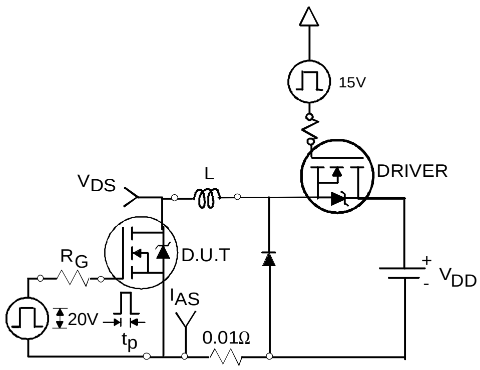


Fig 12a. Unclamped Inductive Test Circuit

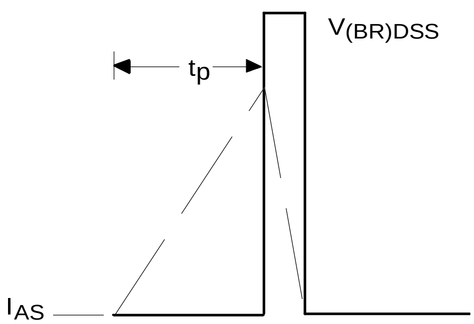


Fig 12b. Unclamped Inductive Waveforms

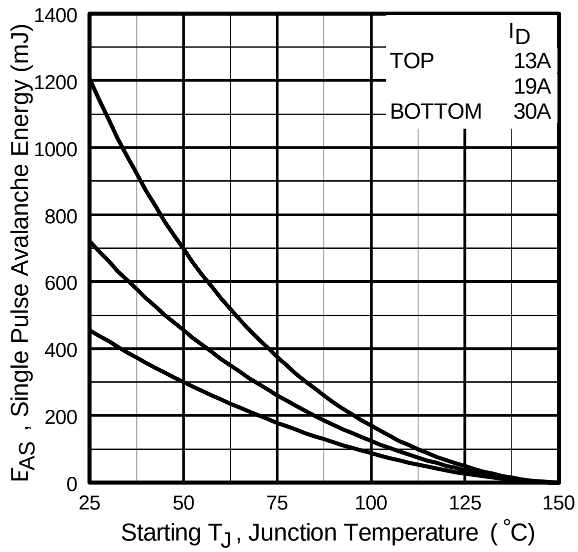


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

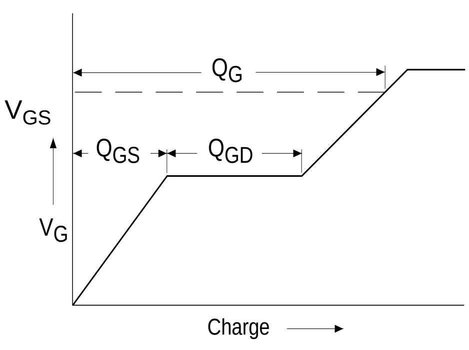


Fig 13a. Basic Gate Charge Waveform

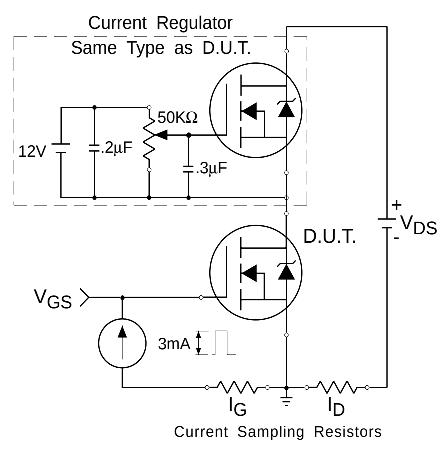
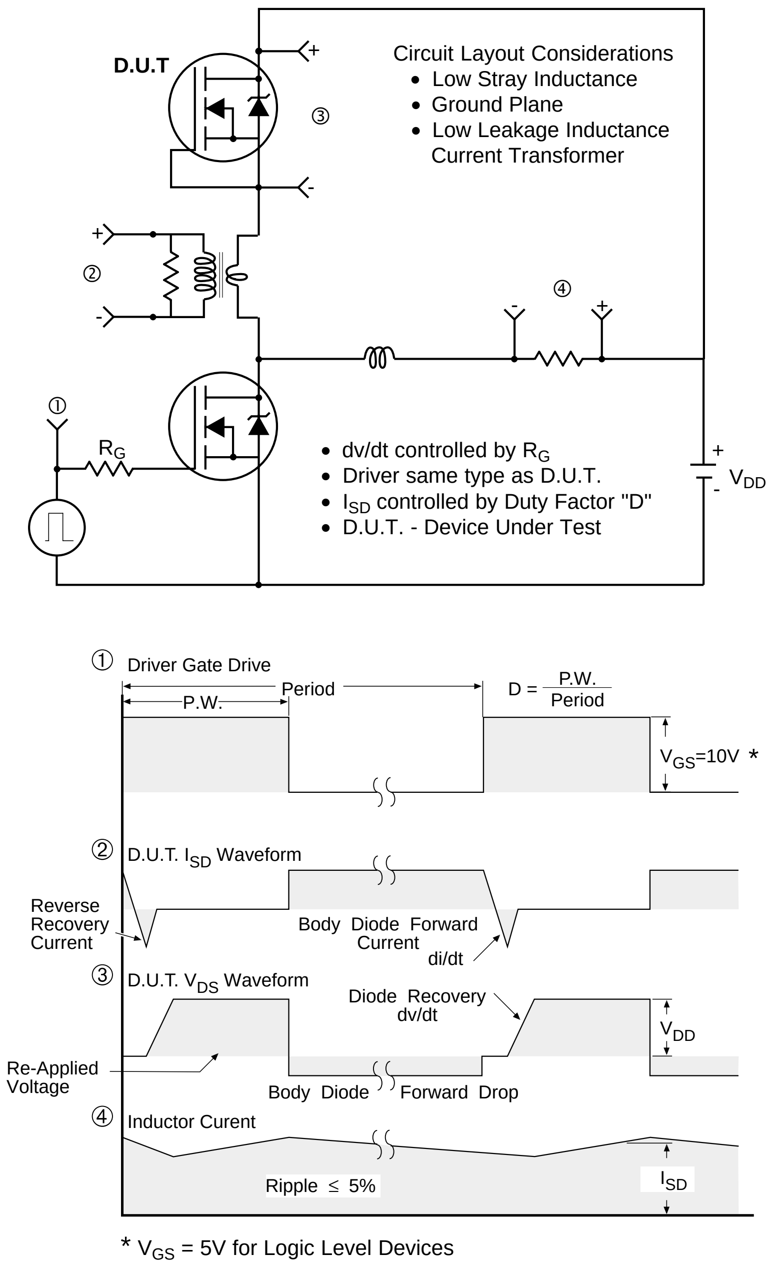


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

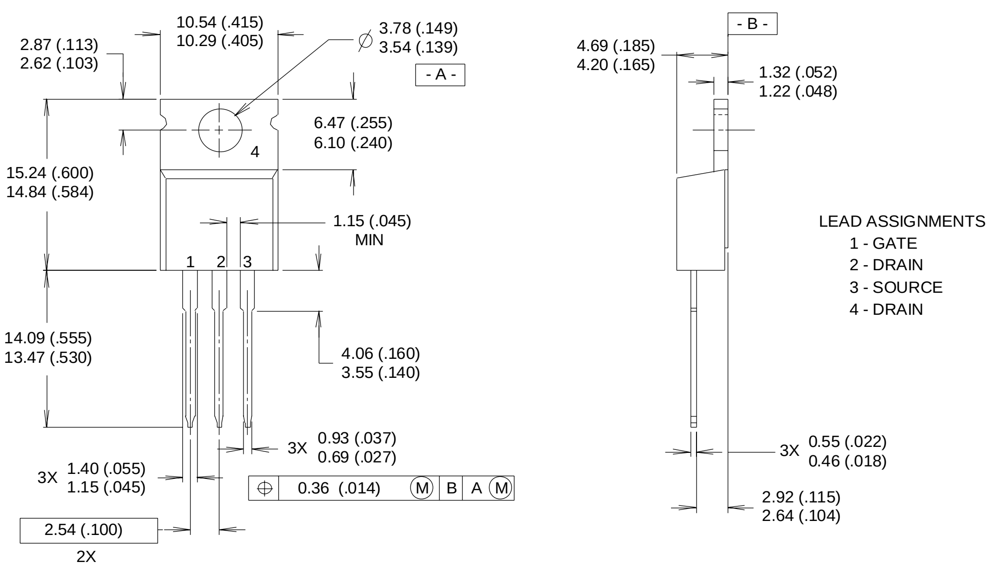


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.

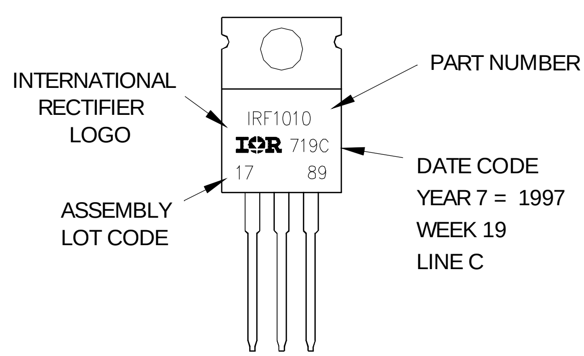
2 CONTROLLING DIMENSION : INCH

3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.

4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

TO-220AB Part Marking Information

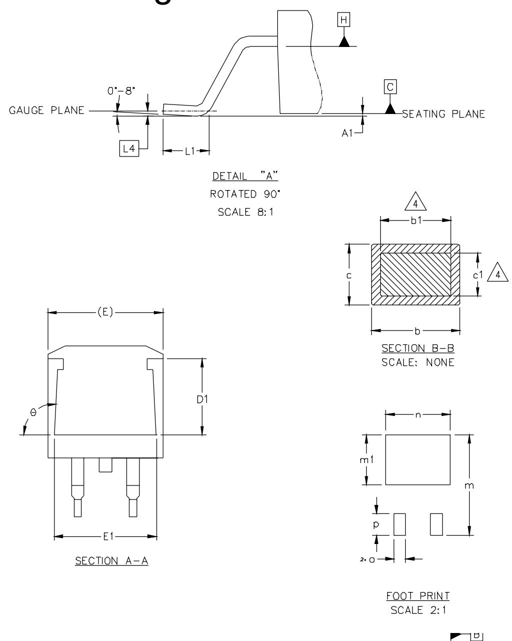
EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"



International
IOR Rectifier

IRF3711/3711S/3711L

D²Pak Package Outline



DIODES

1.– ANODE *
2.– CATHODE
3.– ANODE

* PART DEPENDENT.

OUTLINE OF A TO–263AB (D2PAK)
International Rectifier
IOR Tijuana, B.C. Mexico
DWG NO. 115–0088
SCALE: 4:1 SHEET 3 OF 3 REV 10

DIODES

1.– ANODE *
2.– CATHODE
3.– ANODE

* PART DEPENDENT.

JH DATE 04-14-93 OUTLINE OF A TO–263AB (D2PAK)
International Rectifier
IOR Tijuana, B.C. Mexico
DWG NO. 115–0088
SCALE: 4:1 SHEET 3 OF 3 REV 10

GNMENTS

FET

) 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.

ENSION: INCH.
GATE
COLLECTOR
3.– EMITTER

L2		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°

DIODES

1.– ANODE *
2.– CATHODE
3.– ANODE

* PART DEPENDENT.

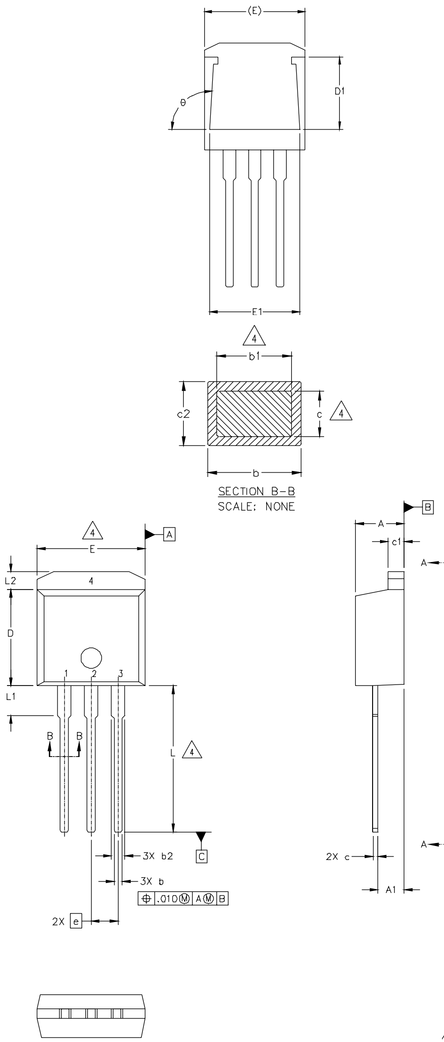
10	01–1311	PER EC	10/25/01	FC
9	01–1272	PER EC	10/15/01	FC
8	01–0446	PER EC	03/26/01	FC
7	01–0216	PER EC	02/15/01	FC
6	00–1065	PER EC	06/15/00	FC
5	98–0194	PER EC	01/21/98	LV
	EC	REVISION		BY

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES (MILIMETERS).
TOLERANCES ARE:
FRAC. ±1/64 DECIMALS .XX ±.010 .XXX ±.005 ANGLES ±1/2° FINISH 63
PER ANSI 14.5M, 1982

DWN JH DATE 04-14-93
CKD
APP
DO NOT SCALE DRAWING

OUTLINE OF A TO–263AB (D2PAK)
International Rectifier
IOR Tijuana, B.C. Mexico
DWG NO. 115–0088
SCALE: 4:1 SHEET 3 OF 3 REV 10

TO-262 Package Outline



SYMBOL	DIMENSIONS MILLIMETERS MIN.	MILLIMETERS MAX.	INCHES MIN.	INCHES MAX.	NOTES
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

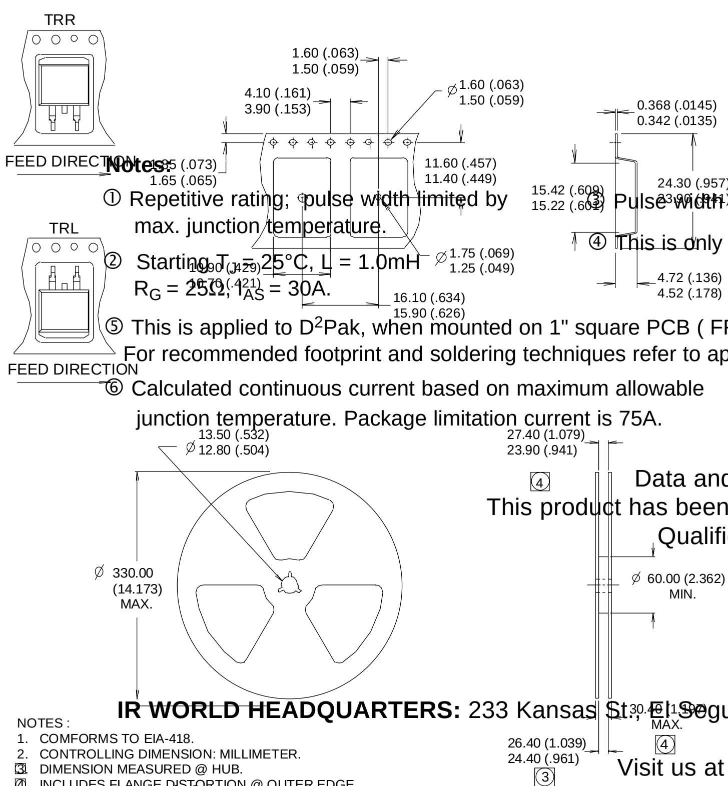
1.– GATE
2.– DRAIN
3.– SOURCE
4.– DRAIN

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 [.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

D^2Pak Tape & Reel Information



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 1.0mH R_G = 25Ω, I_{AS} = 30A.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ This is only applied to TO-220AB package

⑤ This is applied to D^2Pak, when mounted on 1" square PCB (FR-4 or G-10 Material).
For recommended footprint and soldering techniques refer to application note #AN-994.

⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

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
IOR 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