

SMPS MOSFET

IRFR3711
IRFU3711

Applications

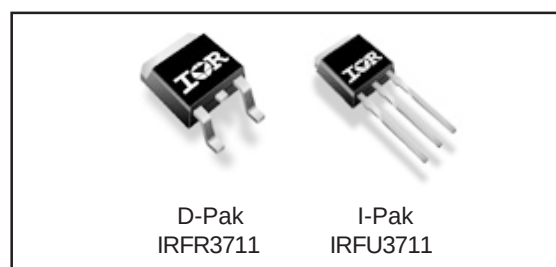
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Server Processor Power Synchronous FET
- Optimized for Synchronous Buck Converters Including Capacitive Induced Turn-on Immunity

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	6.5m Ω	110A ^④



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 ^④	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	69 ^④	
I_{DM}	Pulsed Drain Current ^①	440	
P_D @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation ^⑤	2.5	W
P_D @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation	120	W
	Linear Derating Factor	0.96	mW/ $^\circ\text{C}$
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	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient (PCB mount) ^⑤	—	50	
$R_{\theta JA}$	Junction-to-Ambient	—	110	

Notes ^① through ^④ are on page 10

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°C , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	5.2	6.5	$m\Omega$	$V_{GS} = 10V, I_D = 15A$ ③
		—	6.7	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		$V_{GS} = -16V$

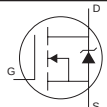
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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	—		$V_{GS} = 4.5V$ ③
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)	—	—	110④	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

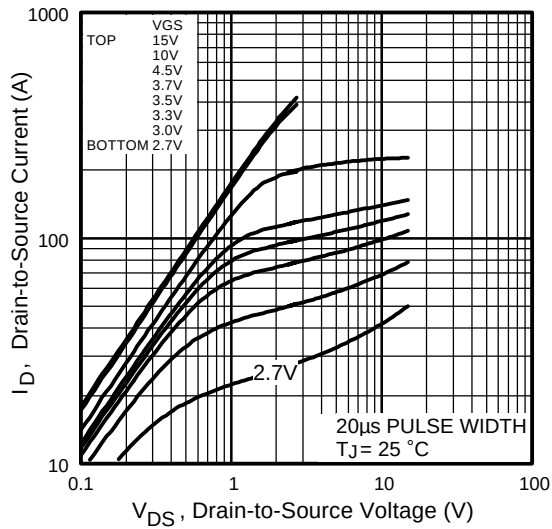


Fig 1. Typical Output Characteristics

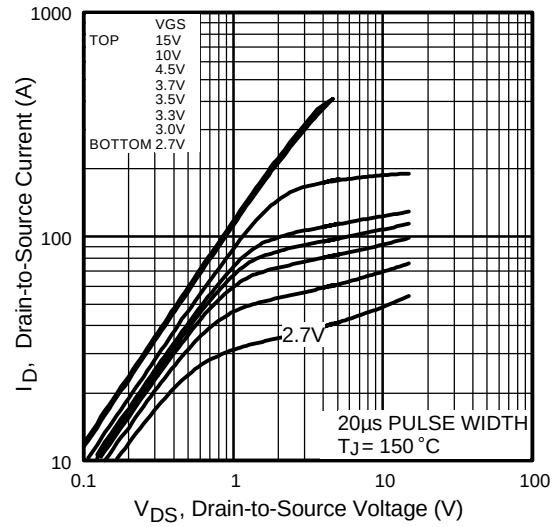


Fig 2. Typical Output Characteristics

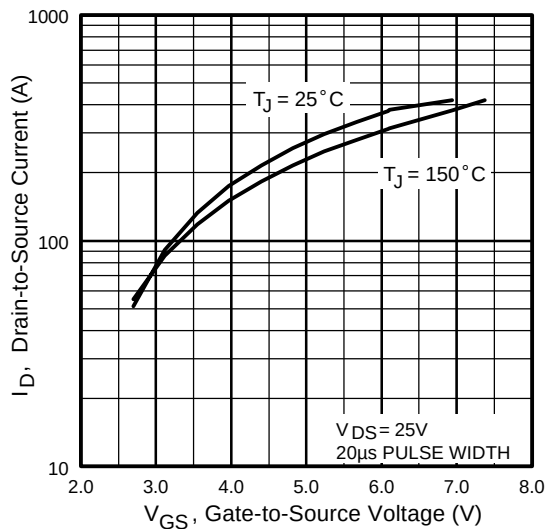


Fig 3. Typical Transfer Characteristics

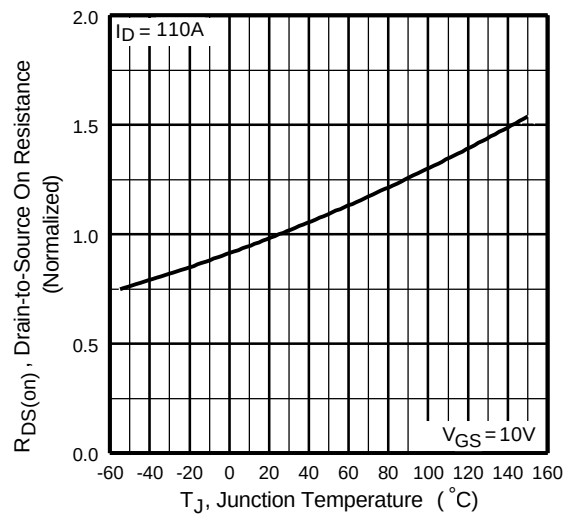
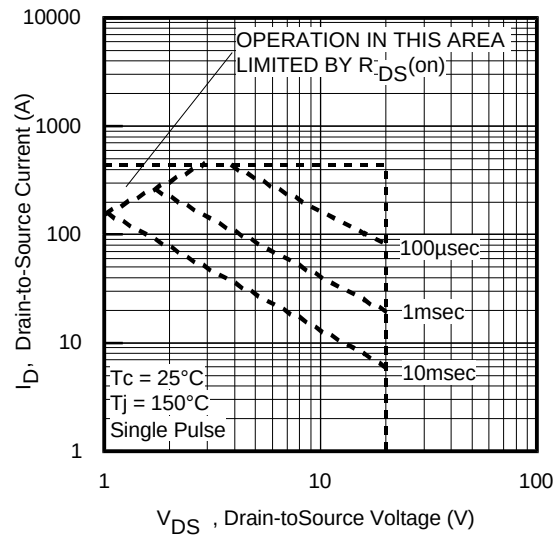
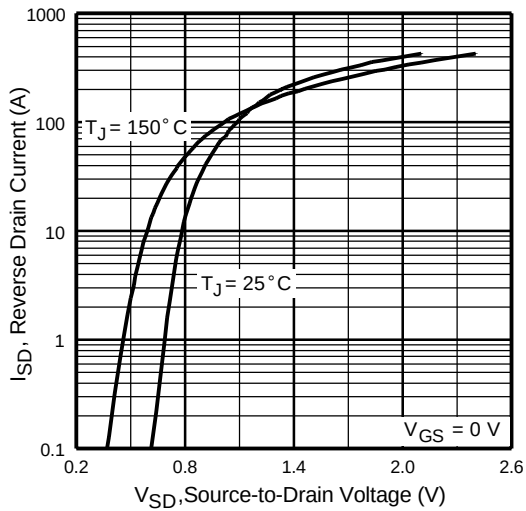
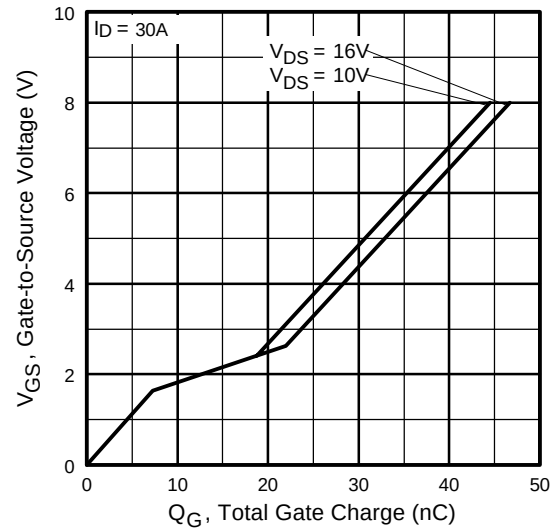
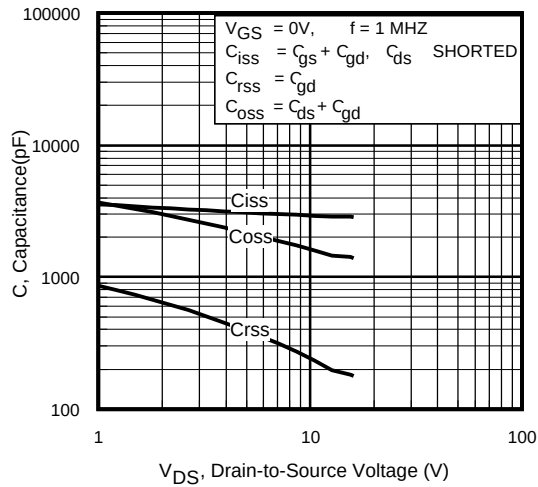


Fig 4. Normalized On-Resistance Vs. Temperature



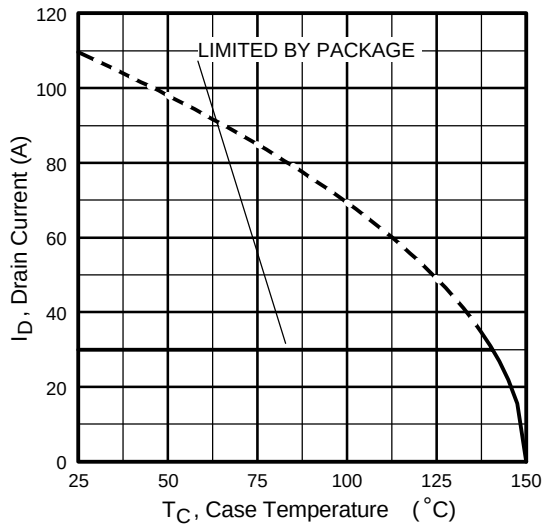


Fig 9. Maximum Drain Current Vs. Case Temperature

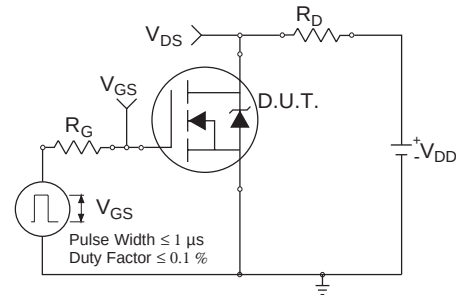


Fig 10a. Switching Time Test Circuit

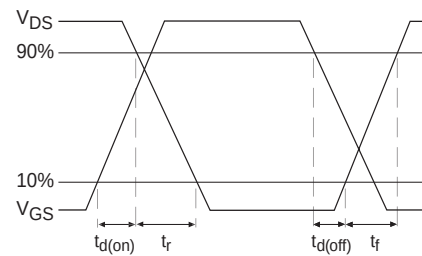


Fig 10b. Switching Time Waveforms

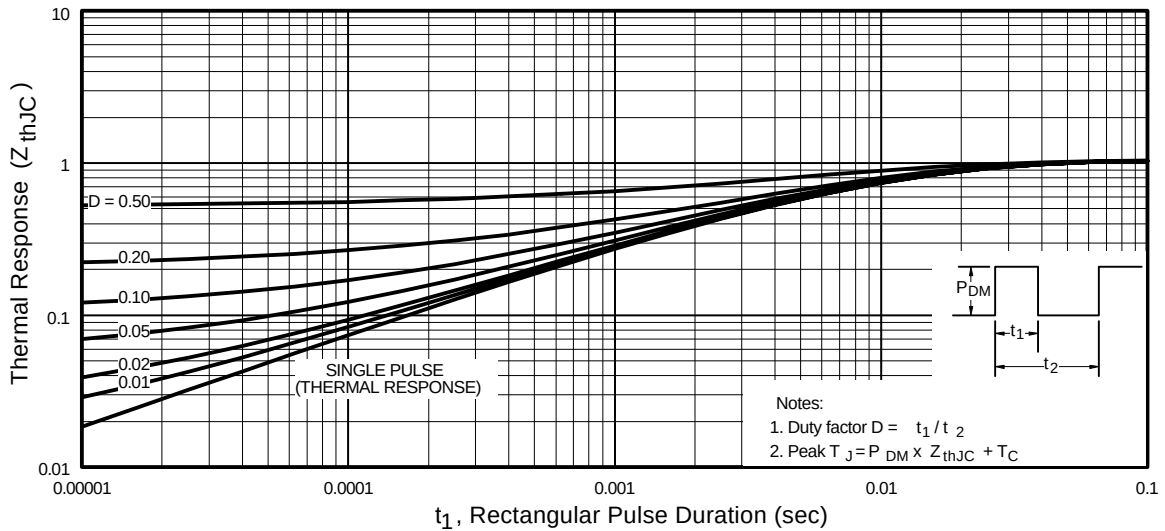


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

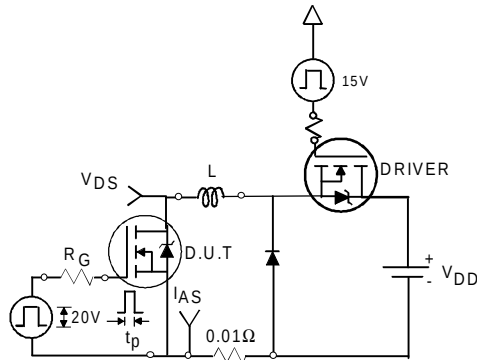


Fig 12a. Unclamped Inductive Test Circuit

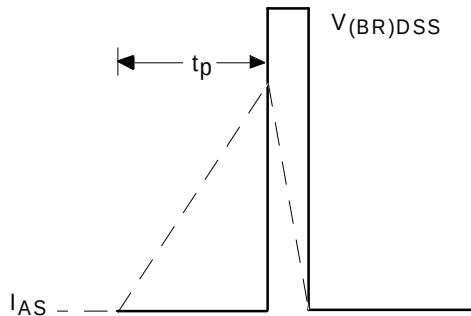


Fig 12b. Unclamped Inductive Waveforms

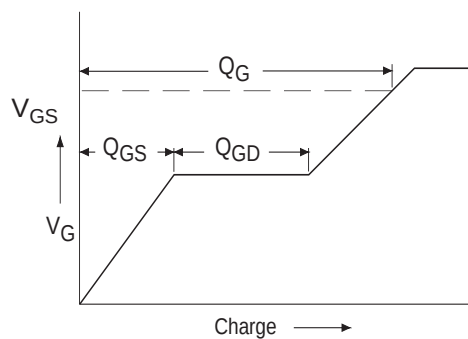


Fig 13a. Basic Gate Charge Waveform

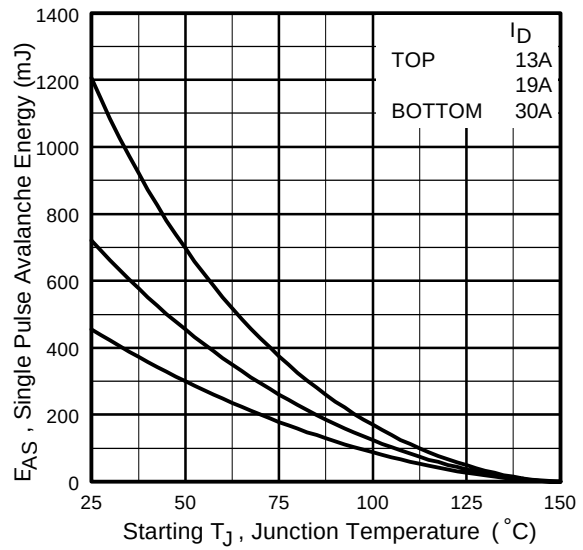


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

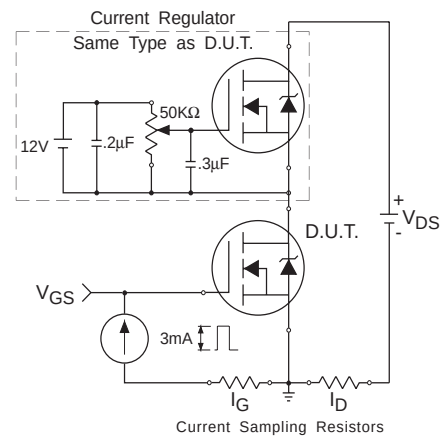
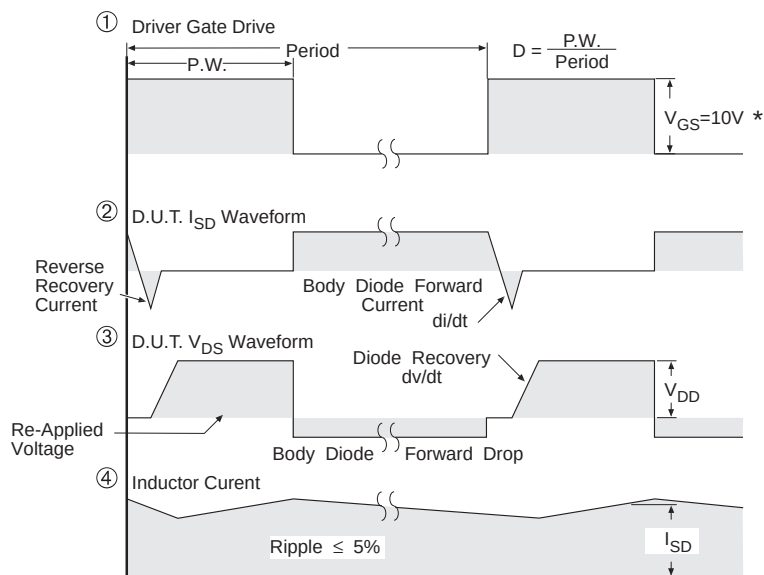
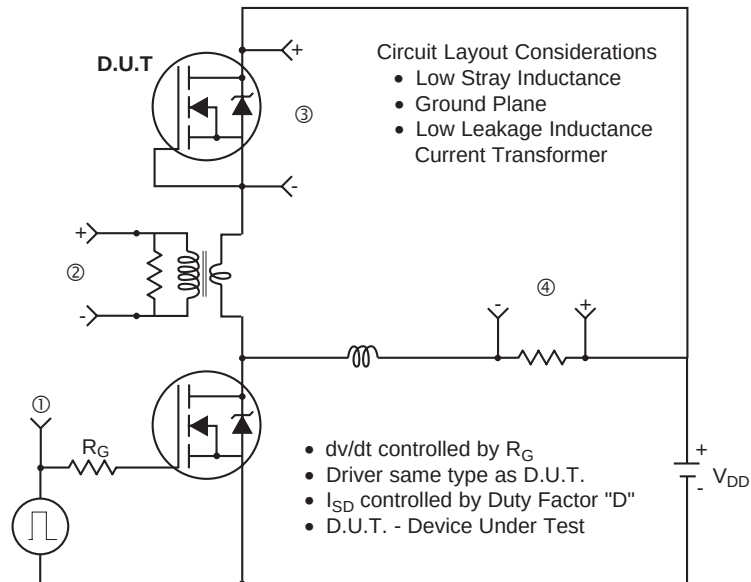


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

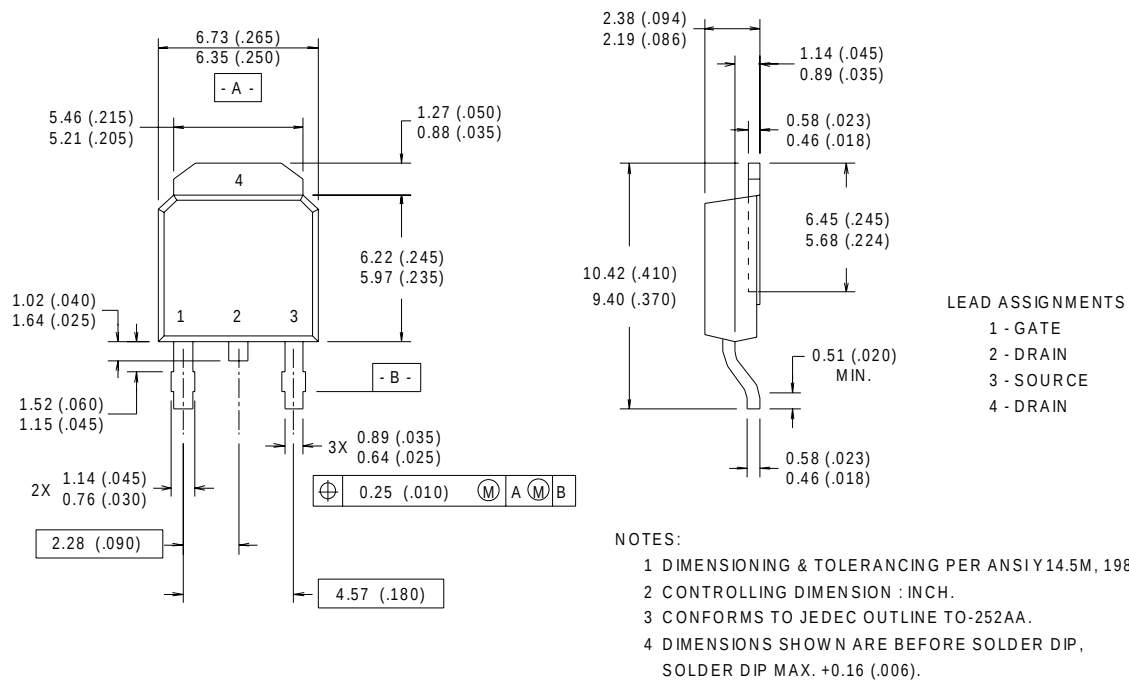
Fig 14. For N-Channel HEXFET® Power MOSFETs

IRFR/U3711

International
IR Rectifier

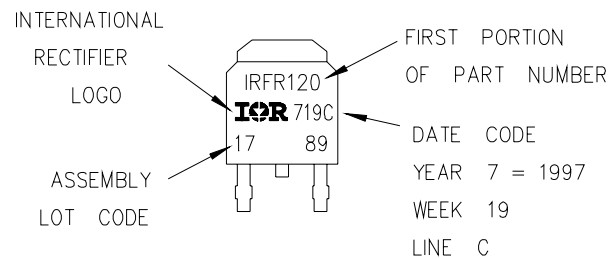
D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



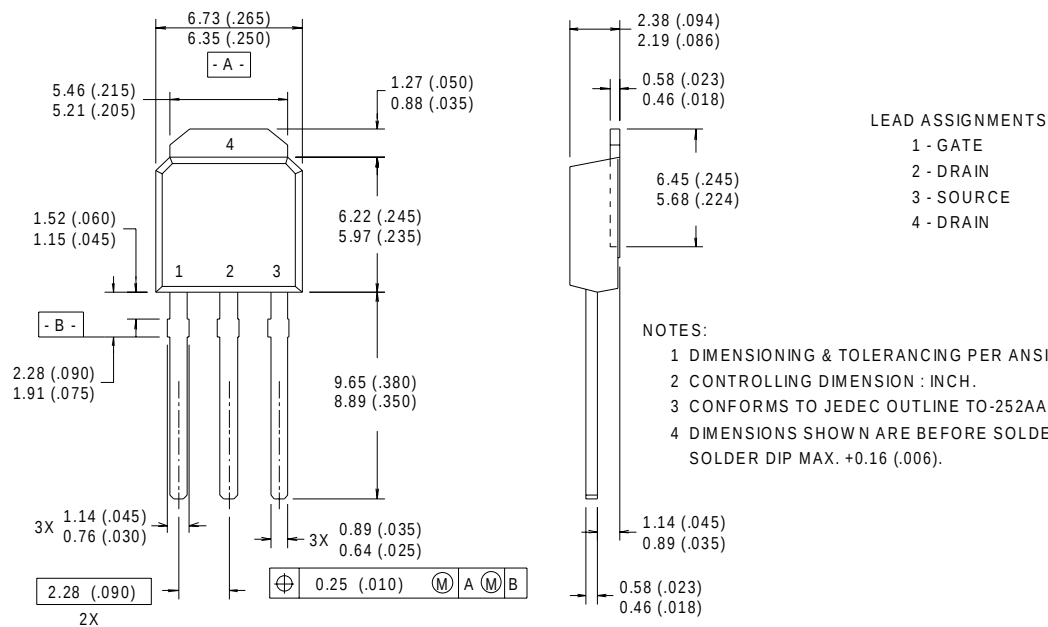
D-Pak (TO-252AA) Part Marking Information

EXAMPLE: THIS IS AN IRFR120
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"



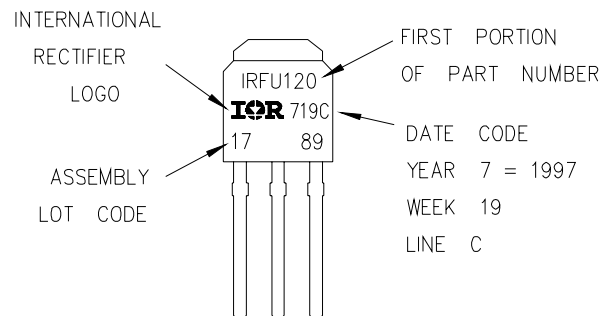
I-Pak (TO-251AA) Package Outline

Dimensions are shown in millimeters (inches)



I-Pak (TO-251AA) Part Marking Information

EXAMPLE: THIS IS AN IRFU120
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"

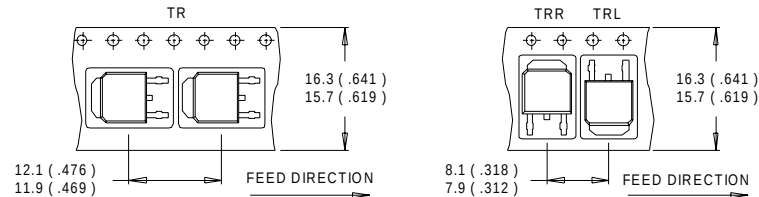


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International
IR Rectifier

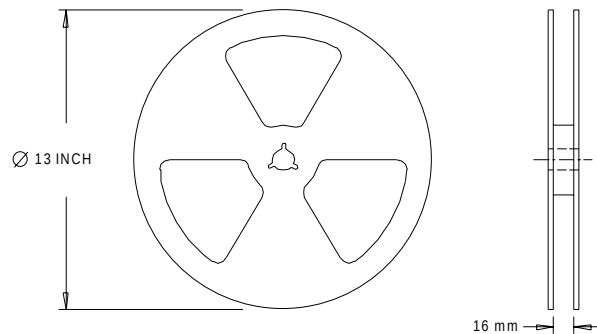
D-Pak (TO-252AA) Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES :

1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :

1. OUTLINE CONFORMS TO EIA-481.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 1.0\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 30\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A.
- 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

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

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