

**IRFR2407
IRFU2407**

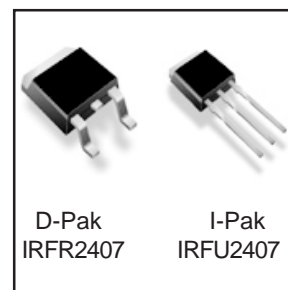
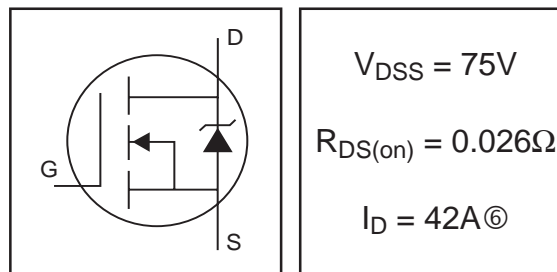
HEXFET® Power MOSFET

- Surface Mount (IRFR2407)
- Straight Lead (IRFU2407)
- Advanced Process Technology
- Dynamic dv/dt Rating
- Fast Switching
- Fully Avalanche Rated

Description

Seventh Generation HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely 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 a wide variety of applications.

The D-Pak is designed for surface mounting using vapor phase, infrared, or wave soldering techniques. The straight lead version (IRFU series) is for through-hole mounting applications. Power dissipation levels up to 1.5 watts are possible in typical surface mount applications.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	42 [ⓐ]	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	29 [ⓐ]	
I_{DM}	Pulsed Drain Current [ⓑ]	170	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation	110	W
	Linear Derating Factor	0.71	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy [Ⓒ]	130	mJ
I_{AR}	Avalanche Current [ⓑ]	25	A
E_{AR}	Repetitive Avalanche Energy [ⓑ]	11	mJ
dv/dt	Peak Diode Recovery dv/dt [Ⓒ]	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.4	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)*	—	50	
$R_{\theta JA}$	Junction-to-Ambient	—	110	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	75	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS/ΔT_J}	Breakdown Voltage Temp. Coefficient	—	0.078	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	0.0218	0.026	Ω	V _{GS} = 10V, I _D = 25A ④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = 10V, I _D = 250μA
g _{fs}	Forward Transconductance	27	—	—	S	V _{DS} = 25V, I _D = 25A
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 75V, V _{GS} = 0V
		—	—	250		V _{DS} = 60V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -20V
Q _g	Total Gate Charge	—	74	110	nC	I _D = 25A
Q _{gs}	Gate-to-Source Charge	—	13	19		V _{DS} = 60V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	22	34		V _{GS} = 10V④
t _{d(on)}	Turn-On Delay Time	—	16	—	ns	V _{DD} = 38V
t _r	Rise Time	—	90	—		I _D = 25A
t _{d(off)}	Turn-Off Delay Time	—	65	—		R _G = 6.8Ω
t _f	Fall Time	—	66	—		V _{GS} = 10V ④
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	—	2400	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	340	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	77	—		f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance	—	15700	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance	—	220	—		V _{GS} = 0V, V _{DS} = 60V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance ⑤	—	220	—		V _{GS} = 0V, V _{DS} = 0V to 60V

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	42⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	170		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 25A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	100	150	ns	T _J = 25°C, I _F = 25A
Q _{rr}	Reverse Recovery Charge	—	400	600	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.
- ② Starting T_J = 25°C, L = 0.42mH
R_G = 25Ω, I_{AS} = 25A.
- ③ I_{SD} ≤ 25A, di/dt ≤ 290A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 175°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ C_{oss eff.} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}
- ⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A

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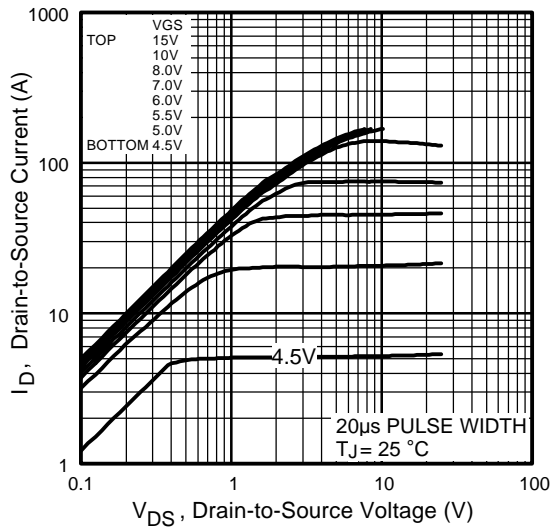


Fig 1. Typical Output Characteristics

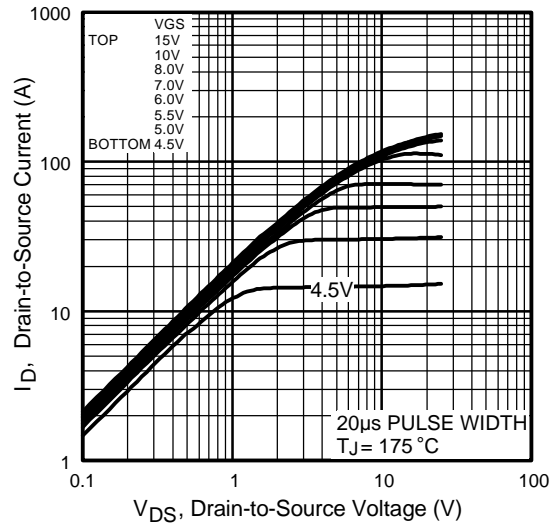


Fig 2. Typical Output Characteristics

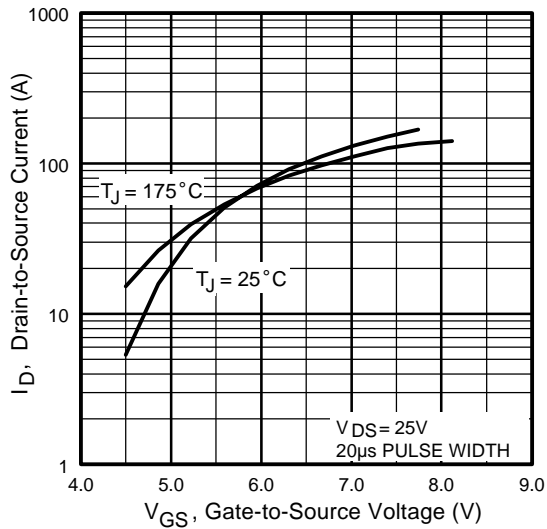


Fig 3. Typical Transfer Characteristics

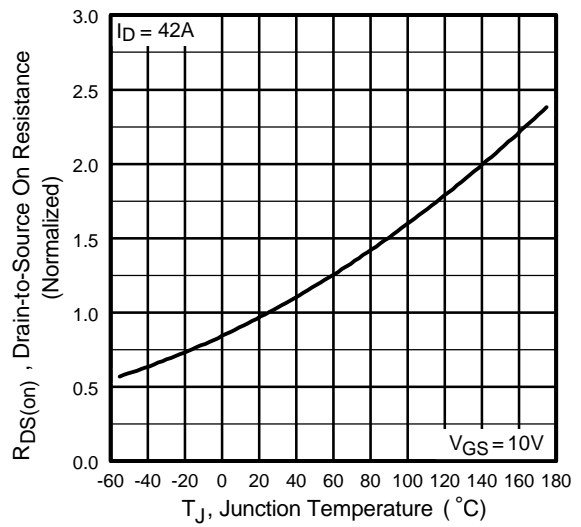


Fig 4. Normalized On-Resistance Vs. Temperature

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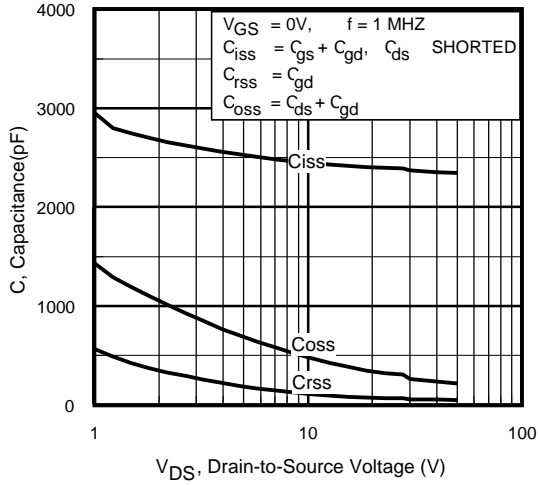


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

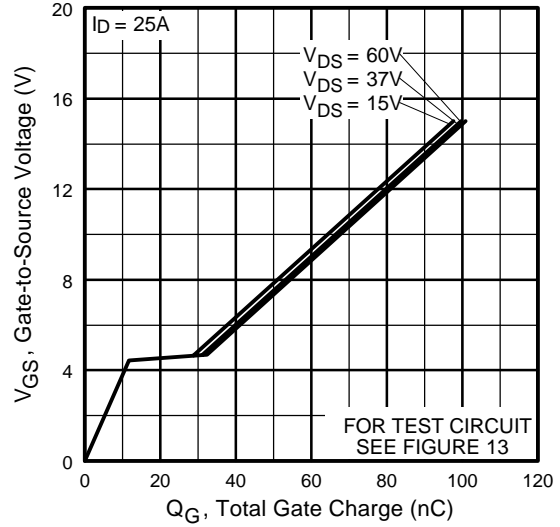


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

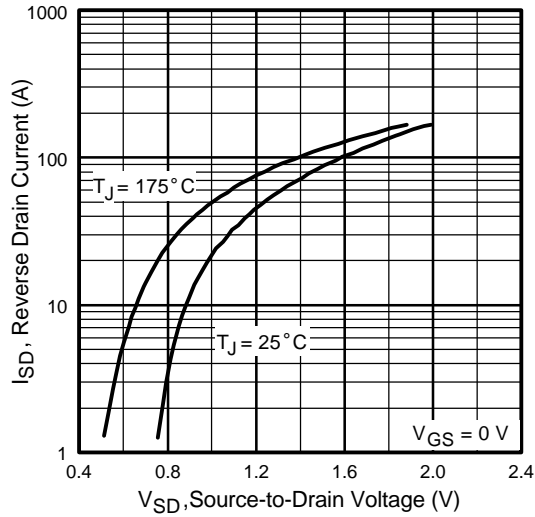


Fig 7. Typical Source-Drain Diode Forward Voltage

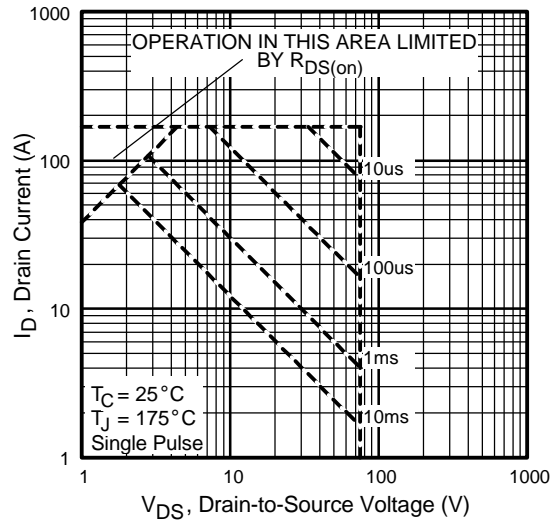


Fig 8. Maximum Safe Operating Area



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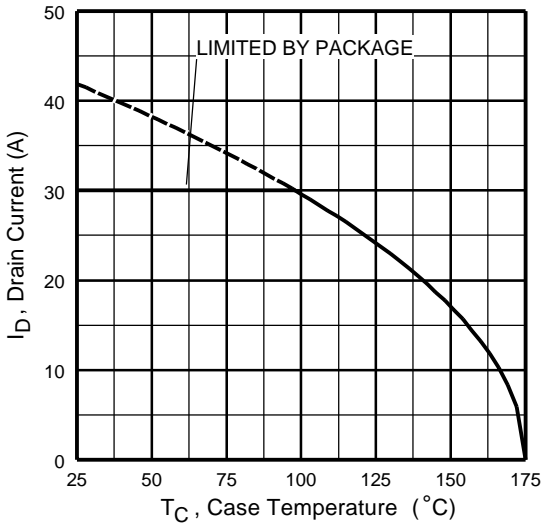


Fig 9. Maximum Drain Current Vs. Case Temperature

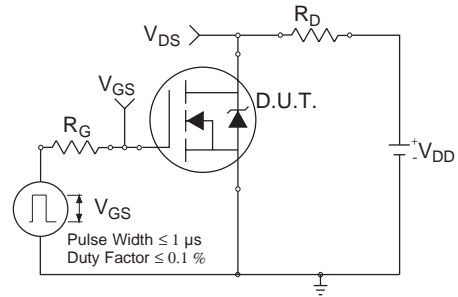


Fig 10a. Switching Time Test Circuit

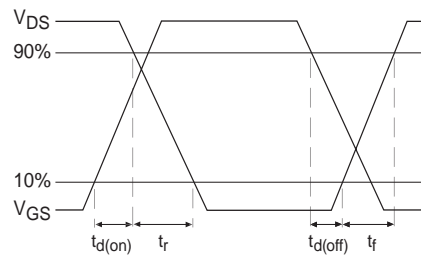


Fig 10b. Switching Time Waveforms

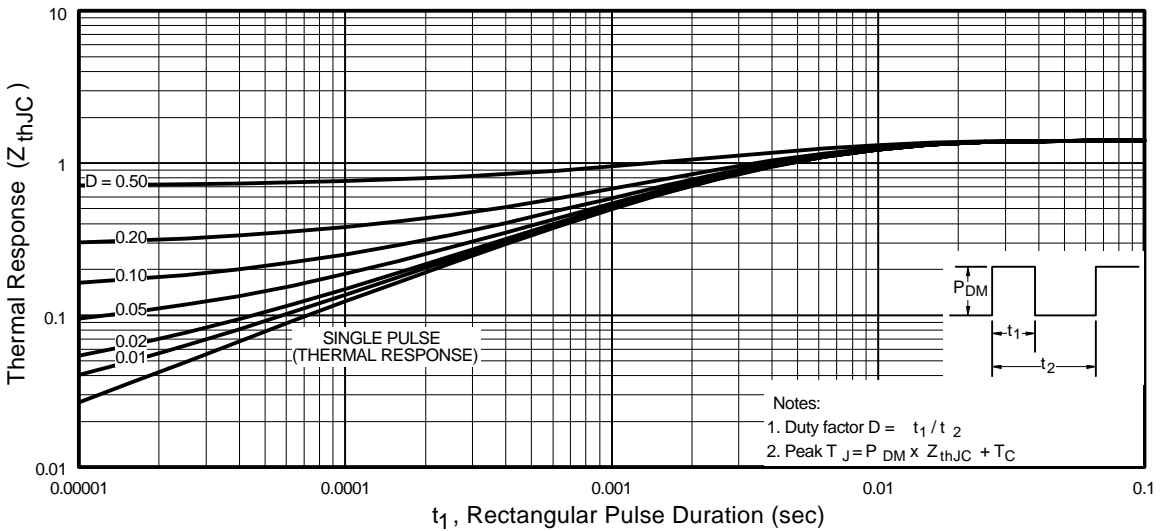


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Fig 12a. Unclamped Inductive Test Circuit



Fig 12b. Unclamped Inductive Waveforms

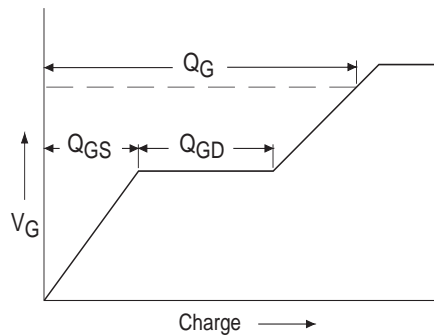


Fig 13a. Basic Gate Charge Waveform

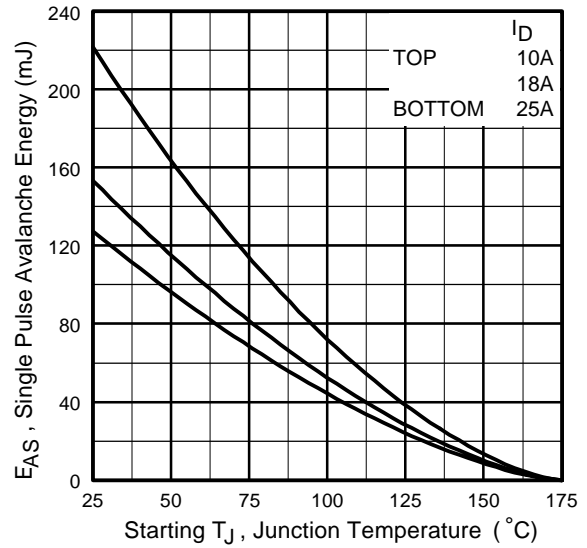
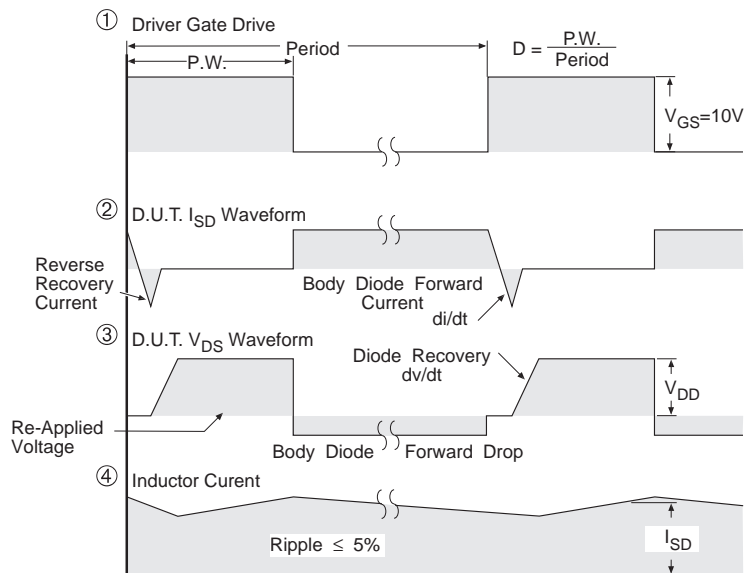


Fig 12c. Maximum Avalanche Energy Vs. Drain Current



Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



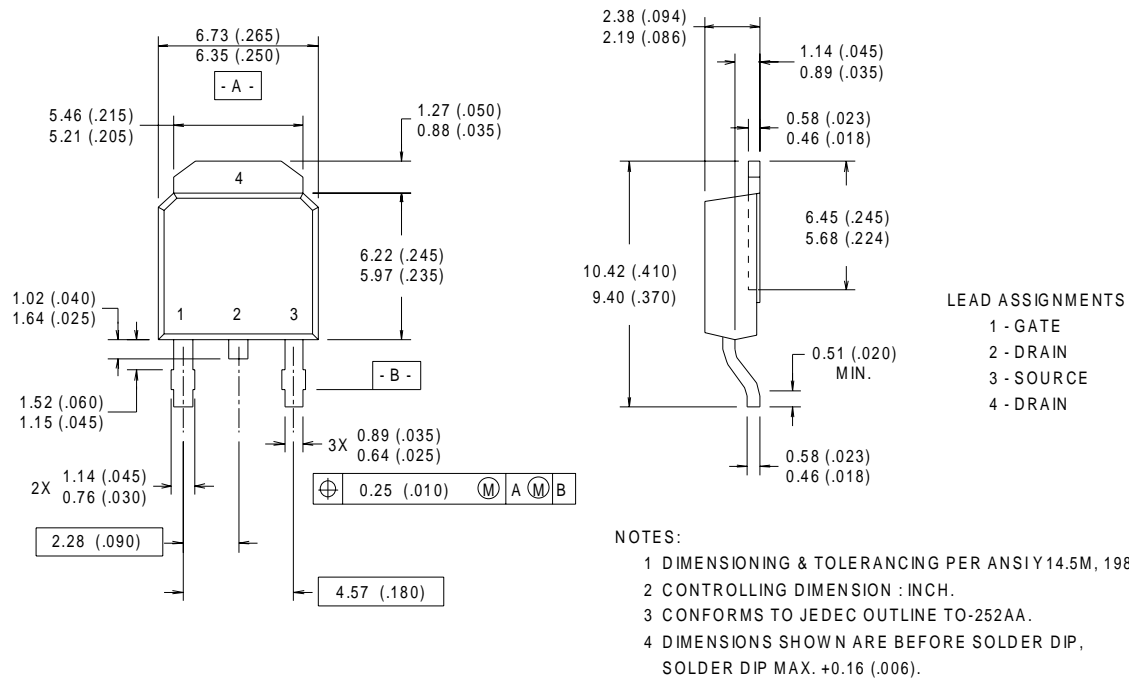
* $V_{GS} = 5V$ for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

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D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



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

THIS IS AN IRFR120
 LOT CODE 1789
 N WW 19, 1997
 IN THE ASSEMBLY LINE "C"

INTERNATIONAL
 RECTIFIER
 LOGO
 ASSEMBLY

OF PART NUMBER
 DATE CODE
 WEEK 19

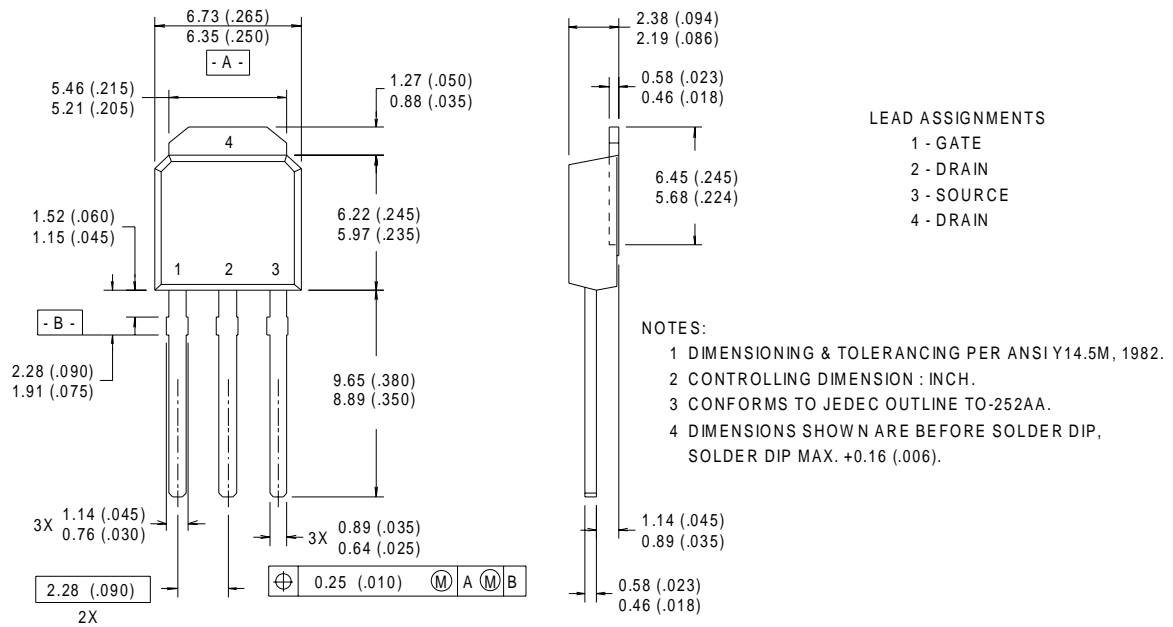


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I-Pak (TO-251AA) Package Outline

Dimensions are shown in millimeters (inches)



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

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

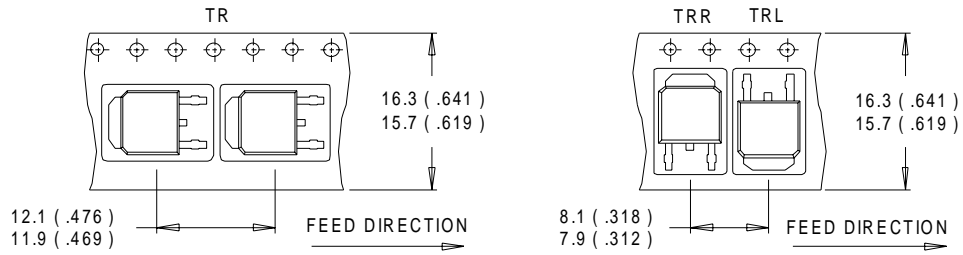
INTERNATIONAL
 RECTIFIER
 LO
 ASSEMBLY

OF PART NUMBER
 DATE CODE
 YEAR 7 = 1997
 WEEK 19
 LINE

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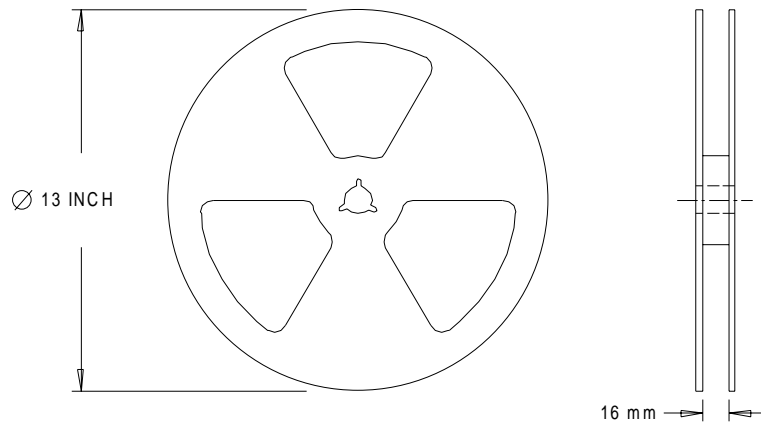
D-Pak (TO-252AA) Tape & Reel Information

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.