

SMPS MOSFET

**IRFR3708
IRFU3708**

HEXFET® Power MOSFET

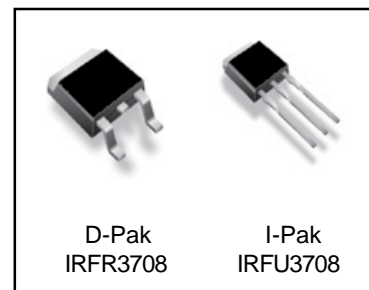
Applications

- High Frequency DC-DC Isolated Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power

V_{DSS}	R_{DS(on)} max	I_D
30V	12.5mΩ	61A^④

Benefits

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



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V _{DS}	Drain-Source Voltage	30	V
V _{GS}	Gate-to-Source Voltage	± 12	V
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V	61 ^④	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	51 ^④	
I _{DM}	Pulsed Drain Current ^①	244	
P _D @ T _A = 25°C	Maximum Power Dissipation ^③	87	W
P _D @ T _A = 70°C	Maximum Power Dissipation ^③	61	W
	Linear Derating Factor	0.58	W/°C
T _J , T _{STG}	Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	1.73	°C/W
R _{θJA}	Junction-to-Ambient (PCB mount)*	—	50	
R _{θJA}	Junction-to-Ambient	—	110	

IRFR/U3708

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.028	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	8.5	12.5	mΩ	V _{GS} = 10V, I _D = 15A ③
		—	10.0	14.0		V _{GS} = 4.5V, I _D = 12A ③
		—	15.0	30.0		V _{GS} = 2.8V, I _D = 7.5A ③
V _{GS(th)}	Gate Threshold Voltage	0.6	—	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 24V, V _{GS} = 0V
		—	—	100		V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 12V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -12V

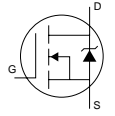
Dynamic @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	49	—	—	S	V _{DS} = 15V, I _D = 50A
Q _g	Total Gate Charge	—	24	—	nC	I _D = 24.8A
Q _{gs}	Gate-to-Source Charge	—	6.7	—		V _{DS} = 15V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	5.8	—		V _{GS} = 4.5V ③
Q _{oss}	Output Gate Charge	—	14	21		V _{GS} = 0V, I _D = 24.8A, V _{DS} = 15V
t _{d(on)}	Turn-On Delay Time	—	7.2	—	ns	V _{DD} = 15V
t _r	Rise Time	—	50	—		I _D = 24.8A
t _{d(off)}	Turn-Off Delay Time	—	17.6	—		R _G = 0.6Ω
t _f	Fall Time	—	3.7	—		V _{GS} = 4.5V ③
C _{iss}	Input Capacitance	—	2417	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	707	—		V _{DS} = 15V
C _{rss}	Reverse Transfer Capacitance	—	52	—		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	213	mJ
I _{AR}	Avalanche Current①	—	62	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	61④	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	244		
V _{SD}	Diode Forward Voltage	—	0.88	1.3	V	T _J = 25°C, I _S = 31A, V _{GS} = 0V ③
		—	0.80	—		T _J = 125°C, I _S = 31A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	41	62	ns	T _J = 25°C, I _F = 31A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	64	96	nC	di/dt = 100A/μs ③
t _{rr}	Reverse Recovery Time	—	43	65	ns	T _J = 125°C, I _F = 31A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	70	105	nC	di/dt = 100A/μs ③

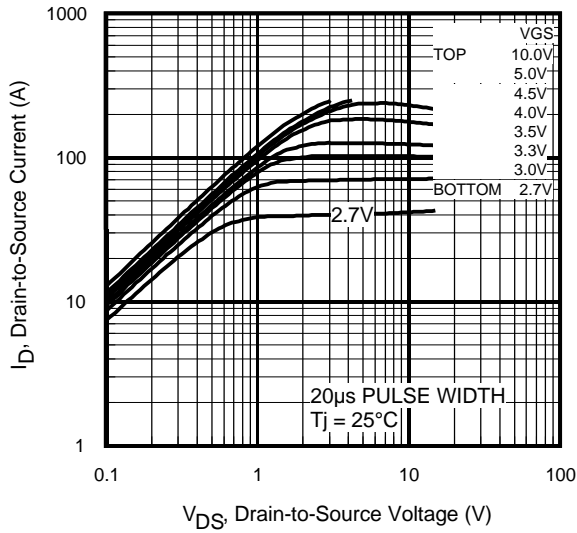


Fig 1. Typical Output Characteristics

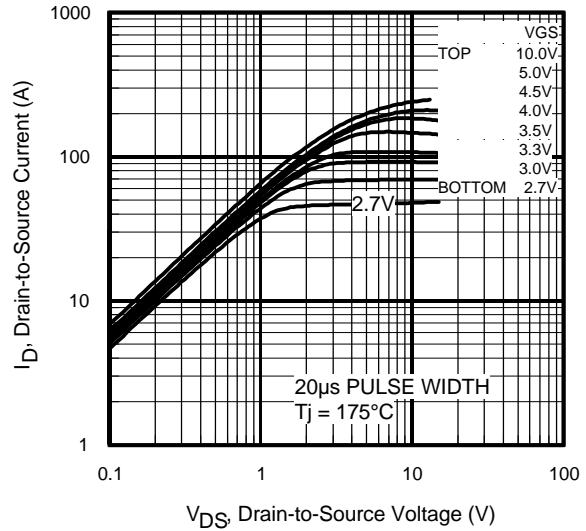


Fig 2. Typical Output Characteristics

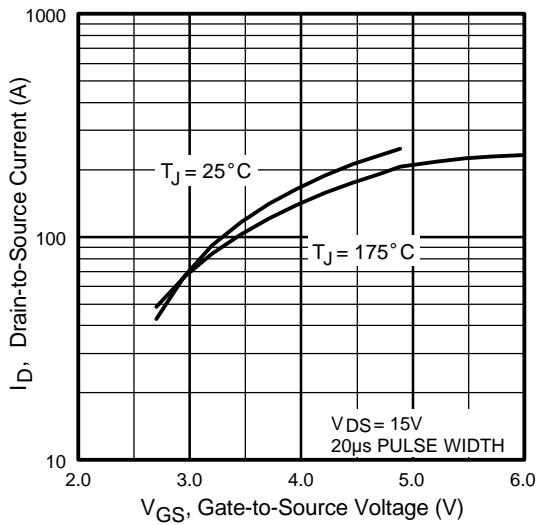


Fig 3. Typical Transfer Characteristics

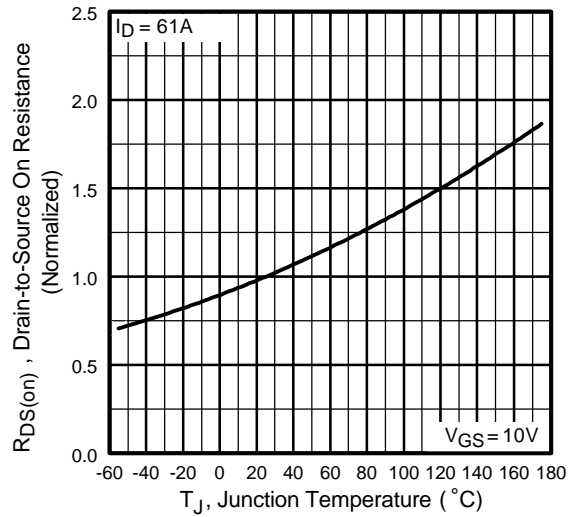


Fig 4. Normalized On-Resistance Vs. Temperature

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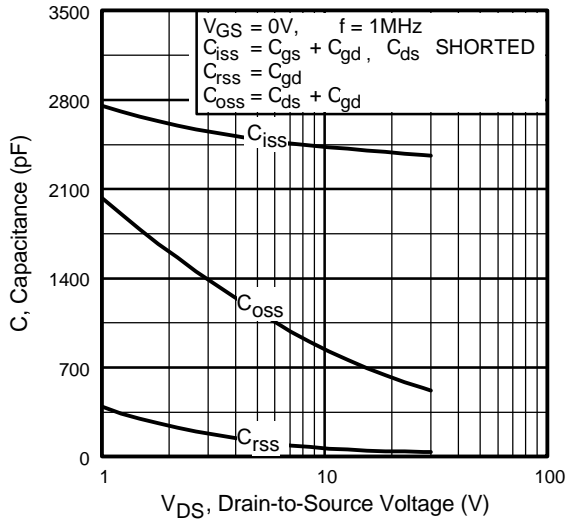


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

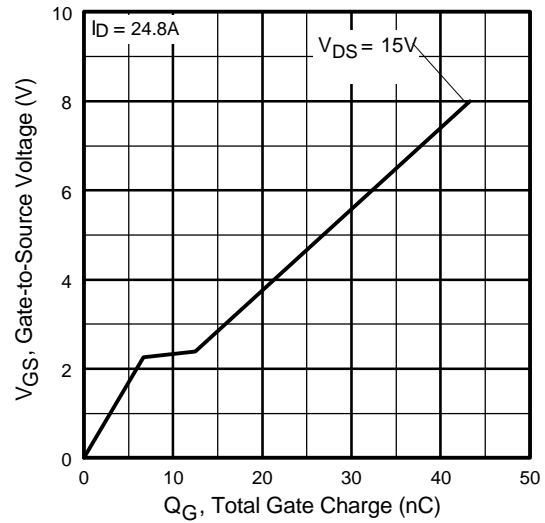


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

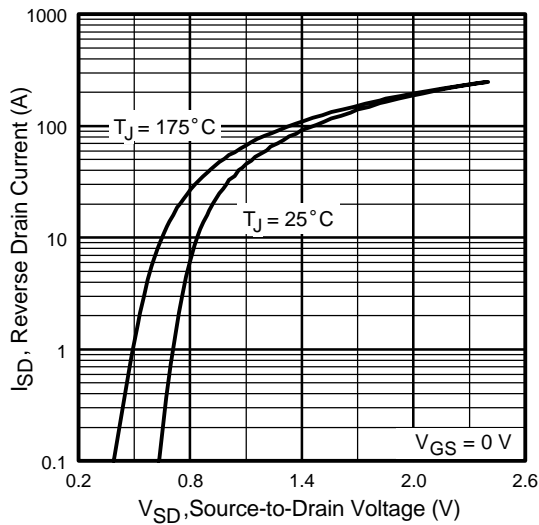


Fig 7. Typical Source-Drain Diode Forward Voltage

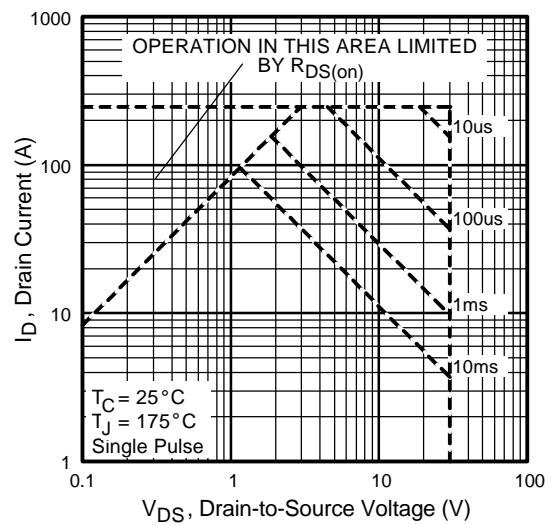


Fig 8. Maximum Safe Operating Area



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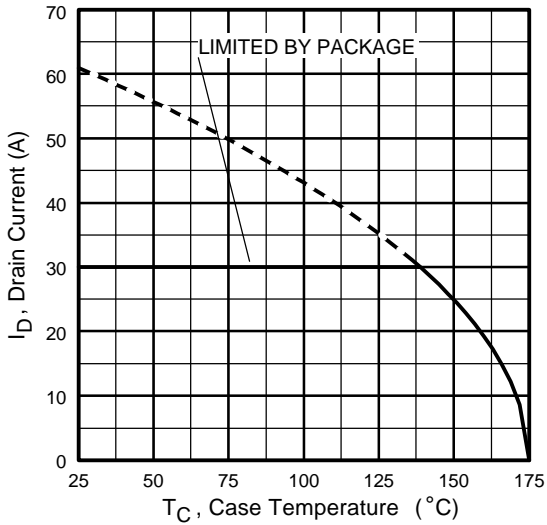


Fig 9. Maximum Drain Current Vs. Case Temperature

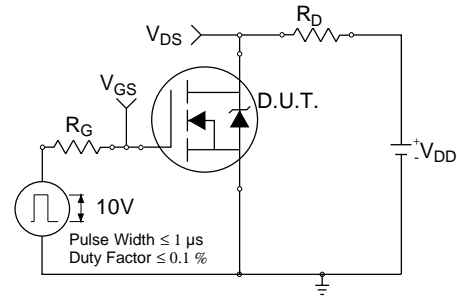


Fig 10a. Switching Time Test Circuit

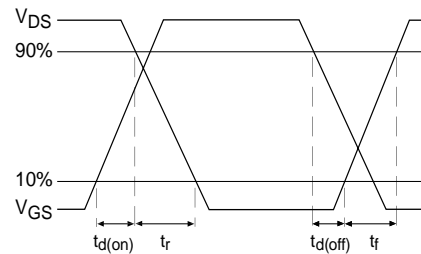


Fig 10b. Switching Time Waveforms

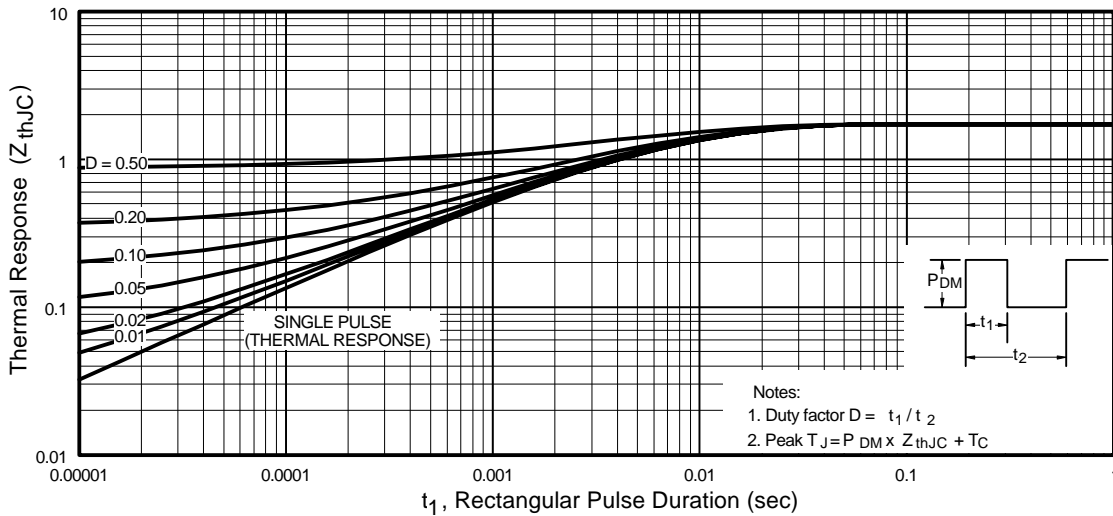


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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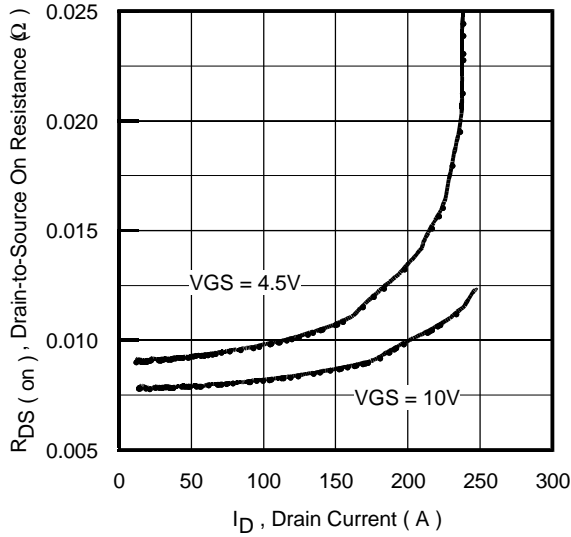


Fig 12. On-Resistance Vs. Drain Current

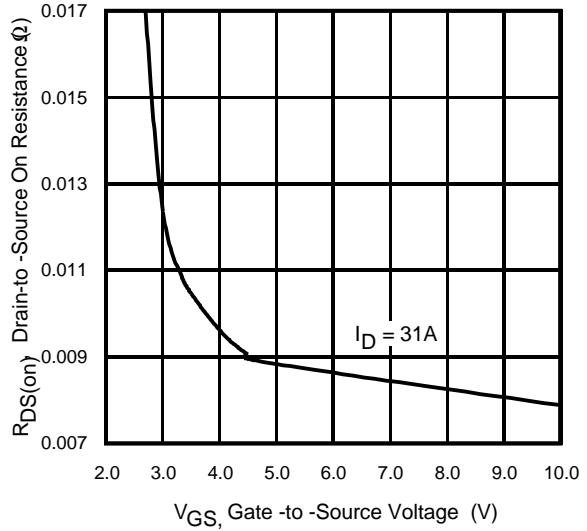


Fig 13. On-Resistance Vs. Gate Voltage

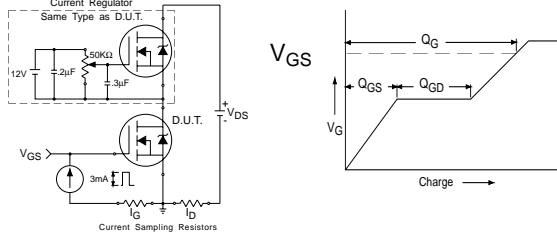


Fig 14a&b. Gate Charge Test Circuit and Waveform

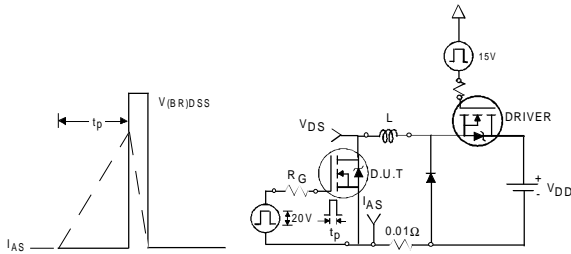


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

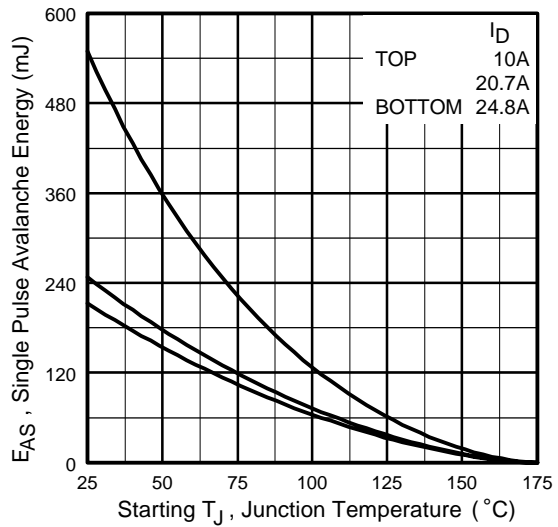
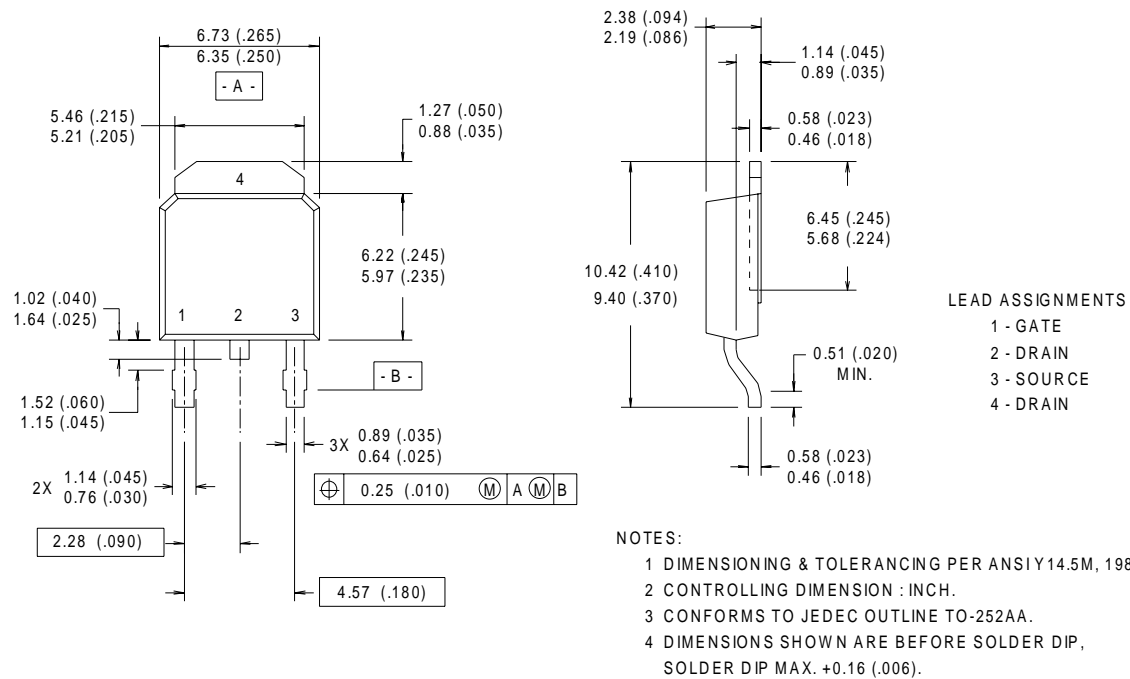


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

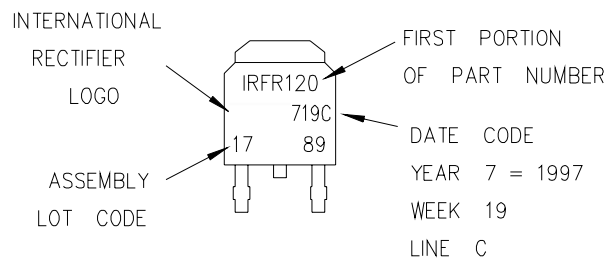
D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



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

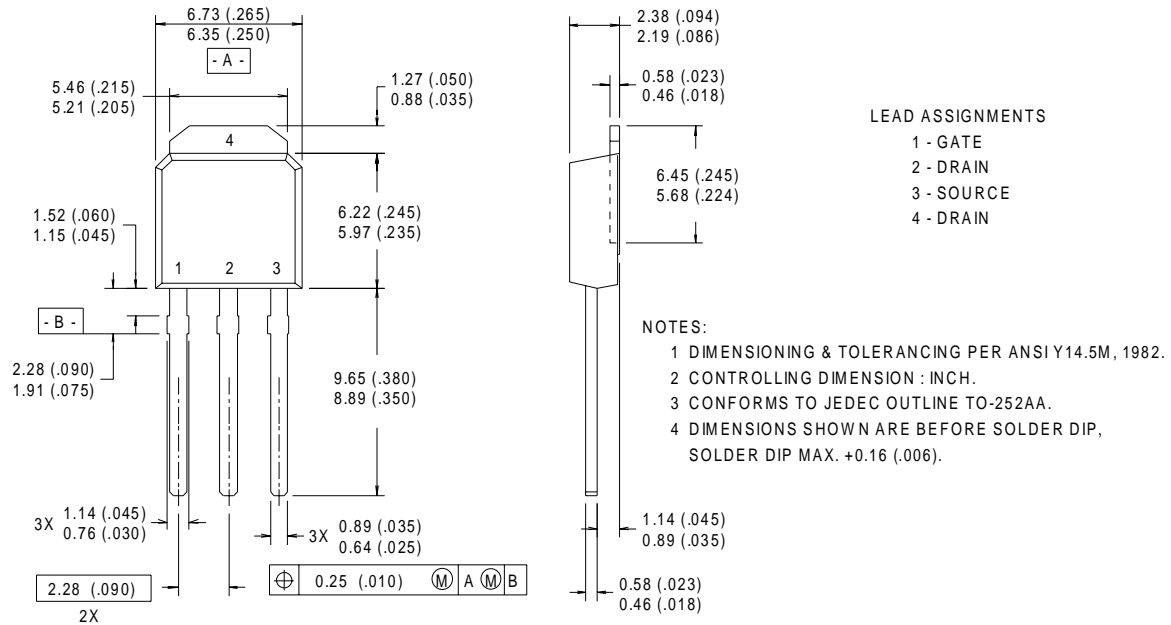
EXAMPLE: THIS IS AN IRFR120
 LOT CODE 1789
 ASSEMBLED ON WW 19, 1997
 IN THE ASSEMBLY LINE "C"



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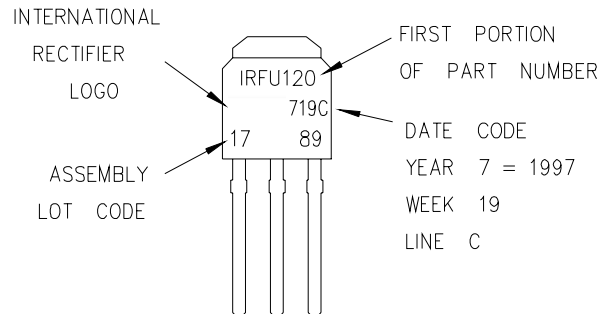
I-Pak (TO-251AA) Package Outline

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"



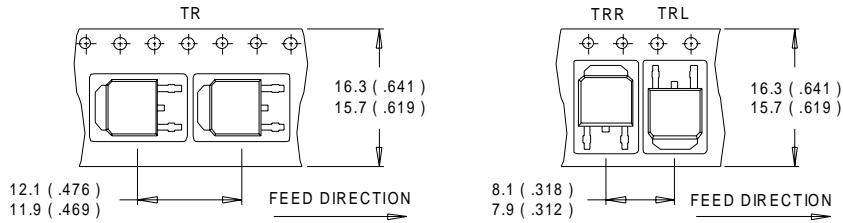


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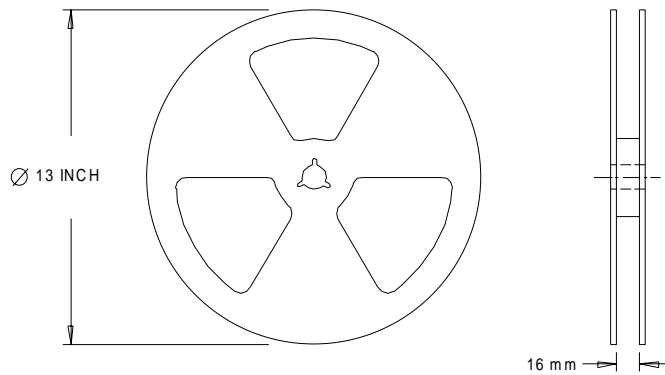
D-Pak (TO-252AA) Tape & Reel Information

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 $T_J = 25^\circ\text{C}$, $L = 0.7 \text{ mH}$
 $R_G = 25\Omega$, $I_{AS} = 24.8 \text{ A}$.
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A.