

International
IR Rectifier

SMPS MOSFET

PD - 94404
IRLR8203
IRLU8203

HEXFET® Power MOSFET

Applications

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

Benefits

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

V _{DSS}	R _{DS(on)} max	I _D
30V	6.8mΩ	110A ^④



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V _{DS}	Drain-Source Voltage	30	V
V _{GS}	Gate-to-Source Voltage	± 20	V
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	110 ^④	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	76 ^④	
I _{DM}	Pulsed Drain Current ^①	120	
P _D @ T _C = 25°C	Maximum Power Dissipation ^③	140	W
P _D @ T _C = 100°C	Maximum Power Dissipation ^③	69	W
	Linear Derating Factor	0.92	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	—	1.09	°C/W
R _{θJA}	Junction-to-Ambient (PCB mount)*	—	50	
R _{θJA}	Junction-to-Ambient	—	110	

* When mounted on 1" square PCB (FR-4 or G-10 Material).
For recommended footprint and soldering techniques refer to application note #AN-994

Notes ① through ④ are on page 10

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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	—	0.027	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	5.6	6.8	mΩ	V _{GS} = 10V, I _D = 15A ③
		—	7.1	9.0		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} = 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} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -20V

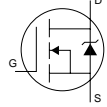
Dynamic @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	35	—	—	S	V _{DS} = 15V, I _D = 12A
Q _g	Total Gate Charge	—	33	50	nC	I _D = 12A
Q _{gs}	Gate-to-Source Charge	—	5.7	8.5		V _{DS} = 24V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	17	25		V _{GS} = 4.5V ③
Q _{oss}	Output Gate Charge	—	23	34		V _{GS} = 0V, V _{DS} = 10V
t _{d(on)}	Turn-On Delay Time	—	15	—	ns	V _{DD} = 15V
t _r	Rise Time	—	99	—		I _D = 12A
t _{d(off)}	Turn-Off Delay Time	—	30	—		R _G = 6.8Ω
t _f	Fall Time	—	69	—		V _{GS} = 4.5V ③
C _{iss}	Input Capacitance	—	2430	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	1200	—		V _{DS} = 15V
C _{rss}	Reverse Transfer Capacitance	—	250	—		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	310	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	—	—	120		
V _{SD}	Diode Forward Voltage	—	0.75	1.3	V	T _J = 25°C, I _S = 12A, V _{GS} = 0V ③
		—	0.65	—		T _J = 125°C, I _S = 12A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	48	72	ns	T _J = 25°C, I _F = 12A, V _R = 15V
Q _{rr}	Reverse Recovery Charge	—	62	92	nC	di/dt = 100A/μs ③
t _{rr}	Reverse Recovery Time	—	49	74	ns	T _J = 125°C, I _F = 12A, V _R = 15V
Q _{rr}	Reverse Recovery Charge	—	67	100	nC	di/dt = 100A/μs ③

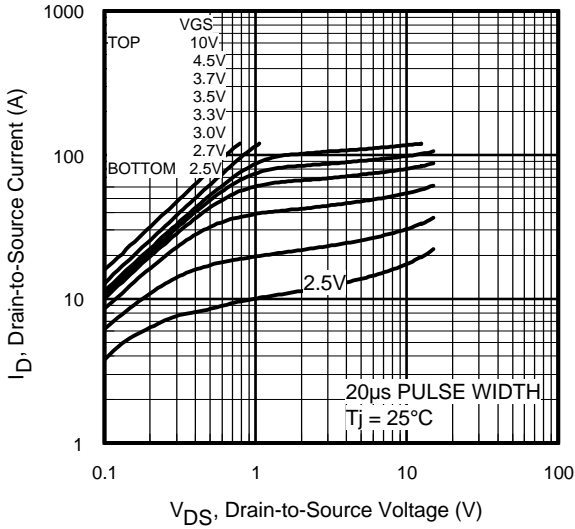


Fig 1. Typical Output Characteristics

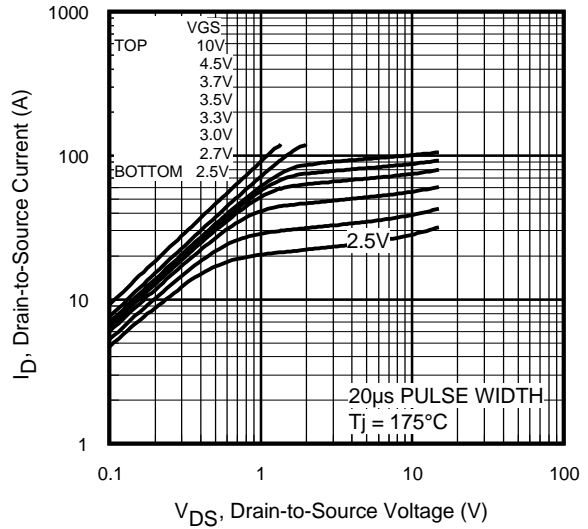


Fig 2. Typical Output Characteristics

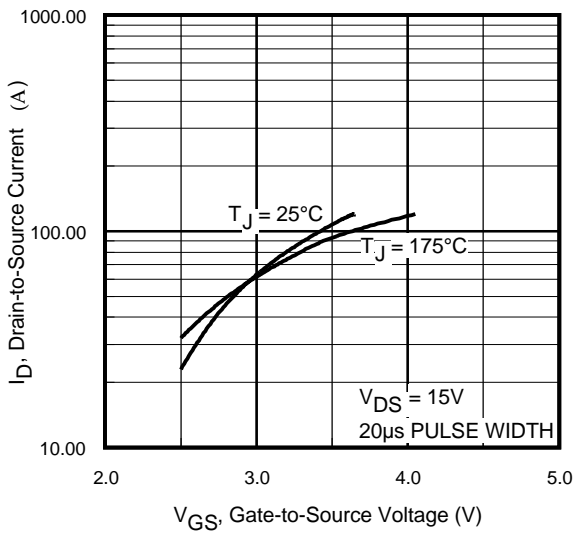


Fig 3. Typical Transfer Characteristics

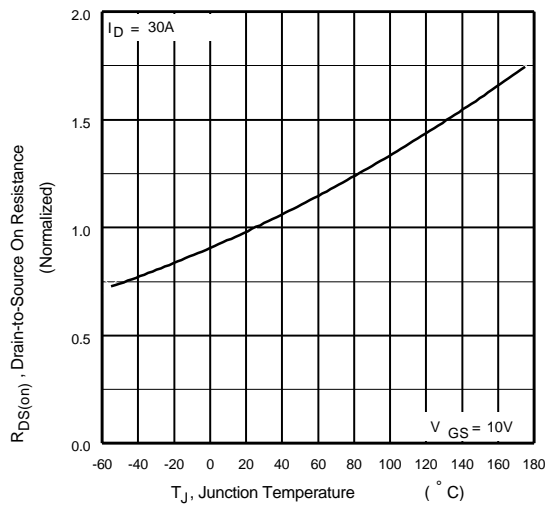


Fig 4. Normalized On-Resistance Vs. Temperature

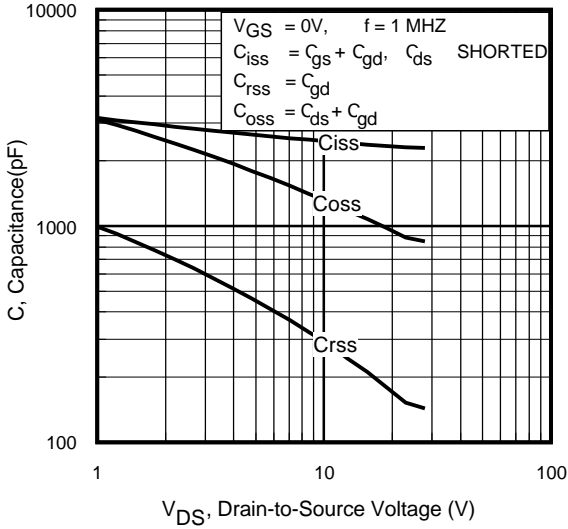


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

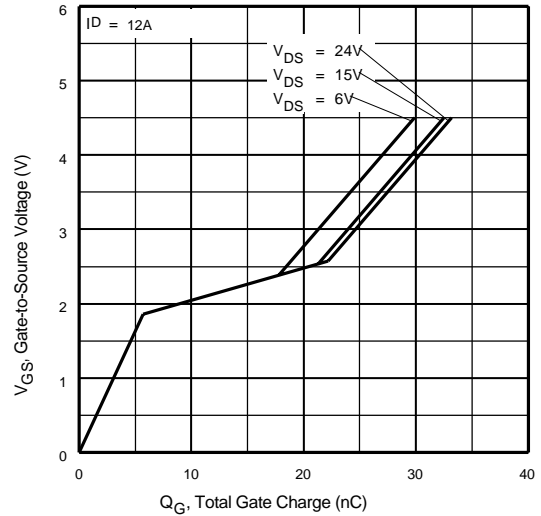


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

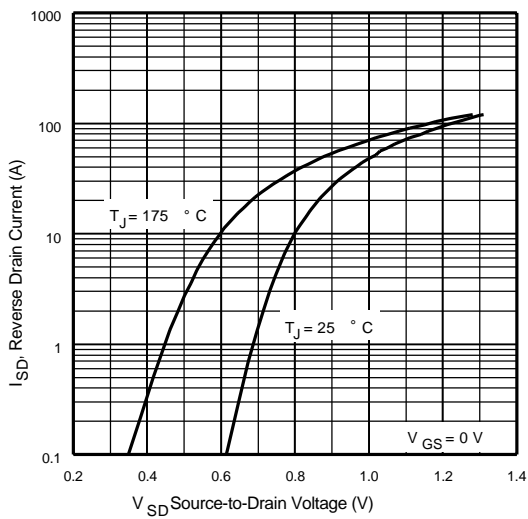


Fig 7. Typical Source-Drain Diode Forward Voltage

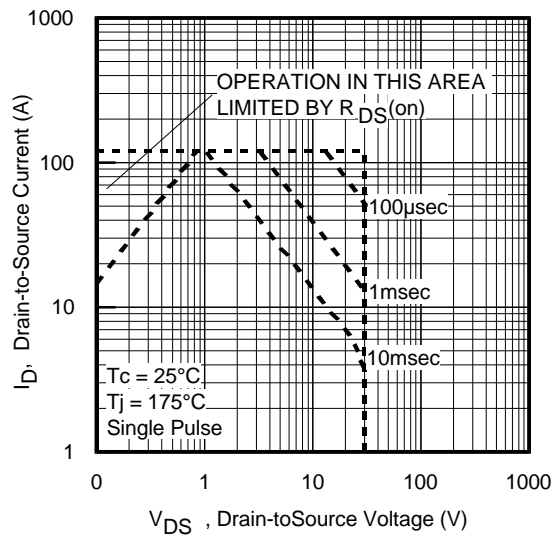


Fig 8. Maximum Safe Operating Area

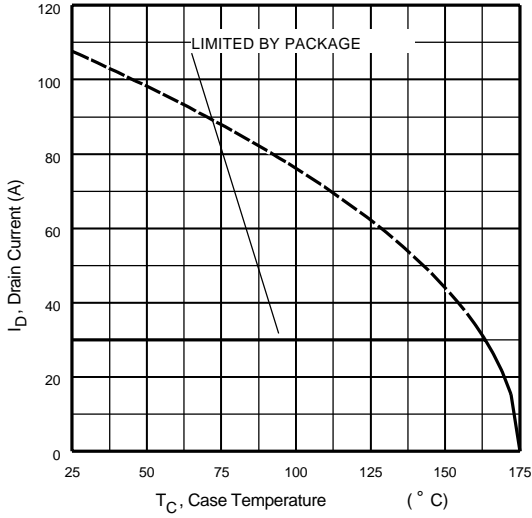


Fig 9. Maximum Drain Current Vs. Case Temperature

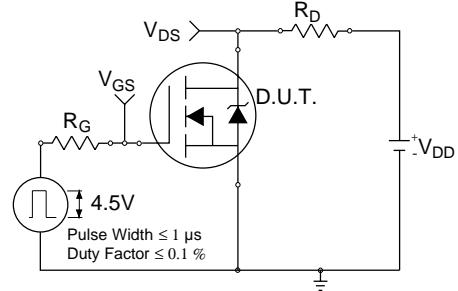


Fig 10a. Switching Time Test Circuit

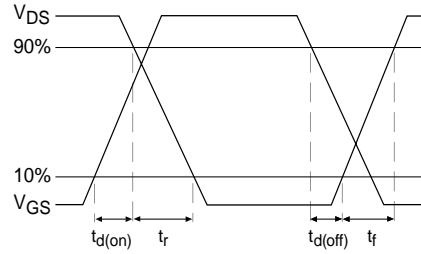


Fig 10b. Switching Time Waveforms

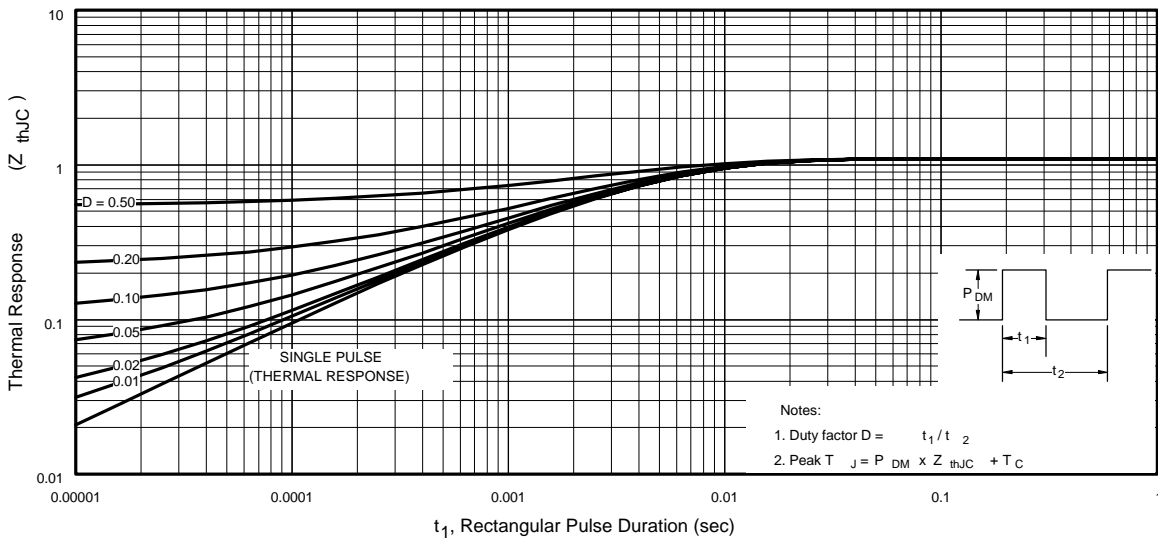


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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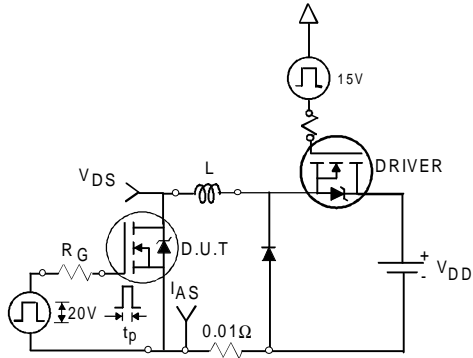


Fig 12a. Unclamped Inductive Test Circuit

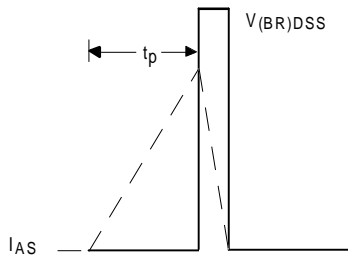


Fig 12b. Unclamped Inductive Waveforms

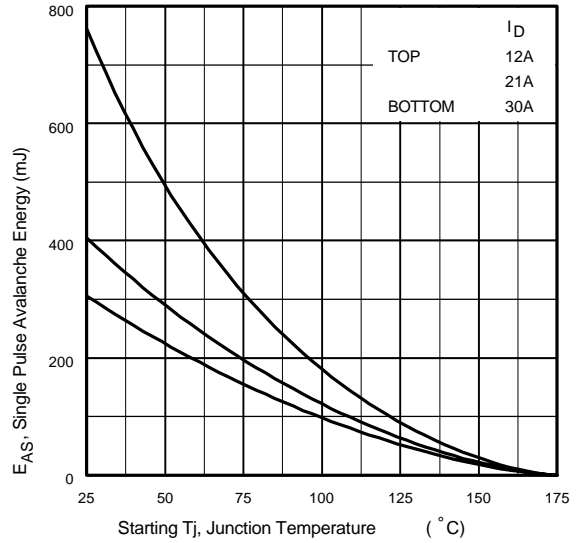


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

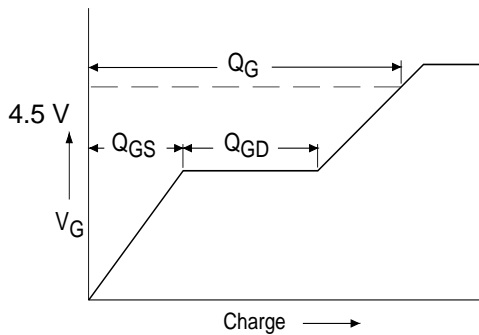


Fig 13a. Basic Gate Charge Waveform

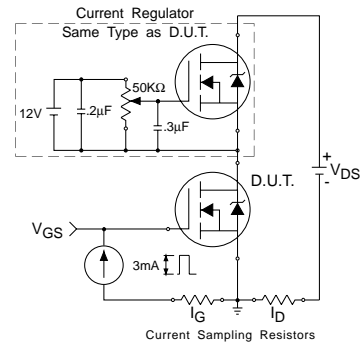
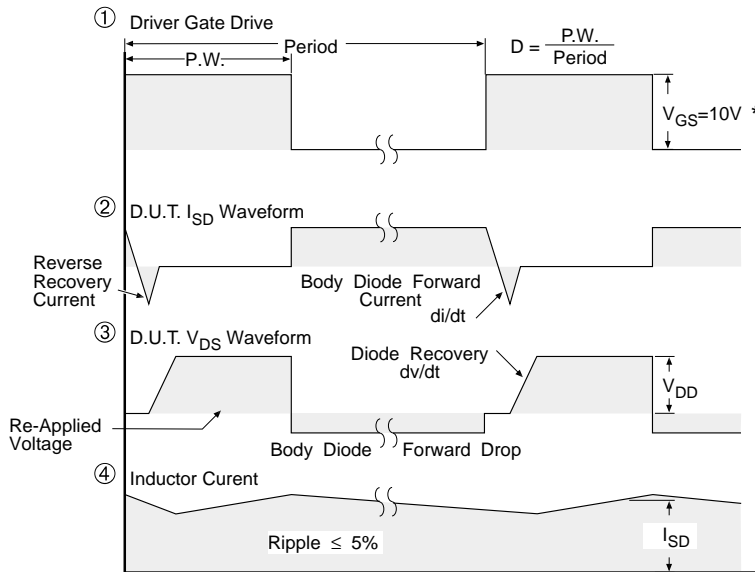
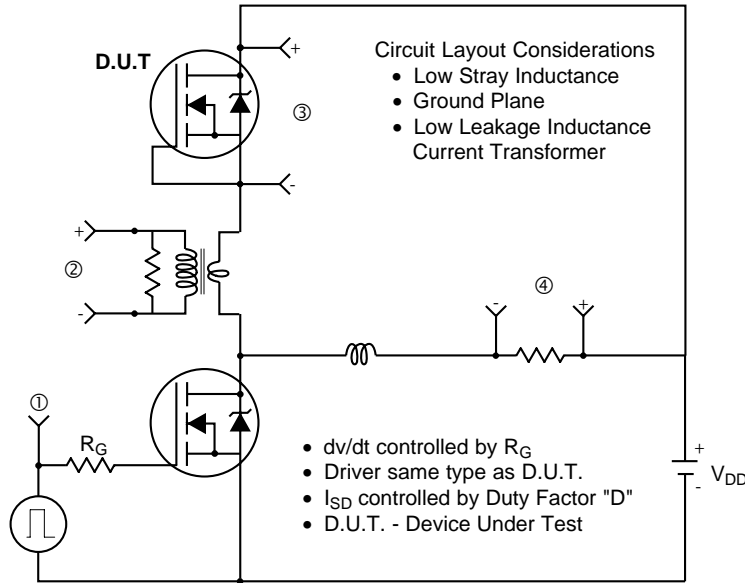


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

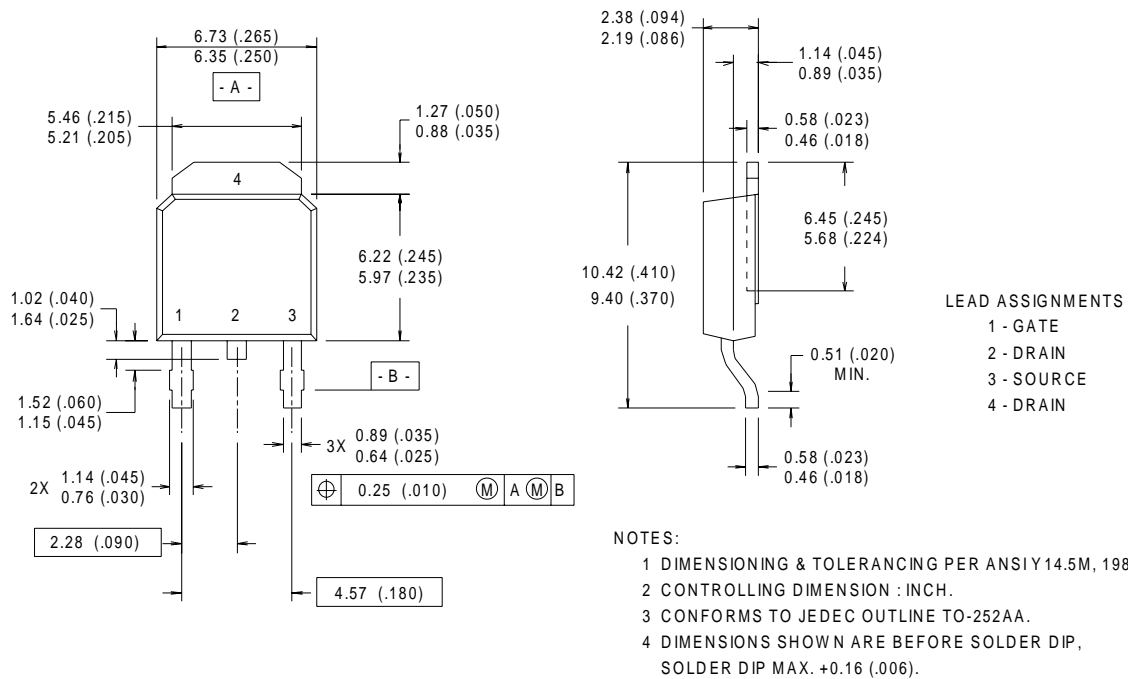
Fig 14. For N-Channel HEXFET® Power MOSFETs

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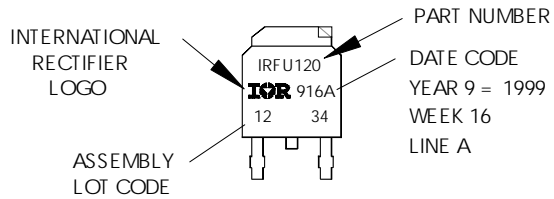
D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



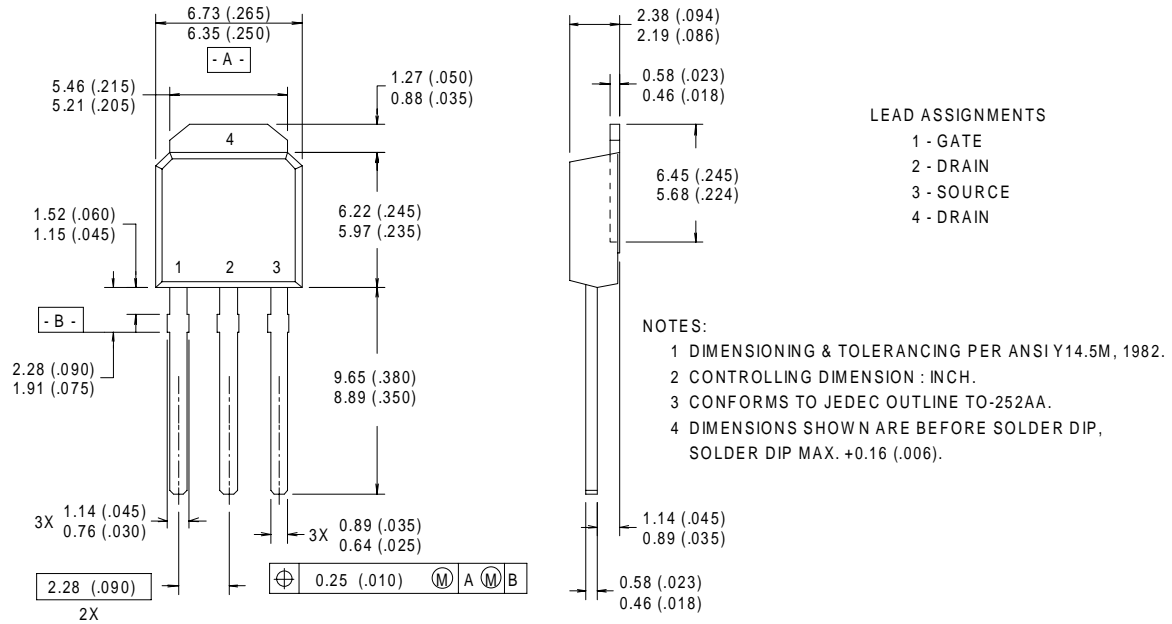
D-Pak (TO-252AA) Part Marking Information

EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 1999
IN THE ASSEMBLY LINE "A"



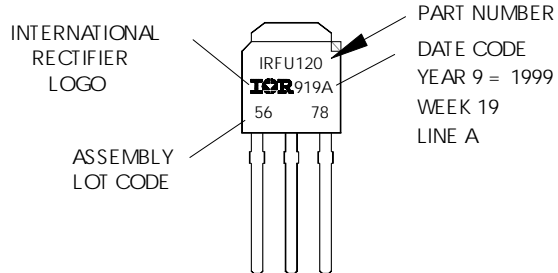
I-Pak (TO-251AA) Package Outline

Dimensions are shown in millimeters (inches)



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

EXAMPLE: THIS IS AN IRFR120
 WITH ASSEMBLY
 LOT CODE 5678
 ASSEMBLED ON VW 19, 1999
 IN THE ASSEMBLY LINE "A"

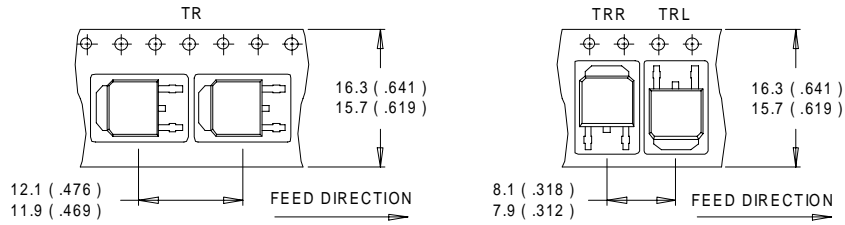


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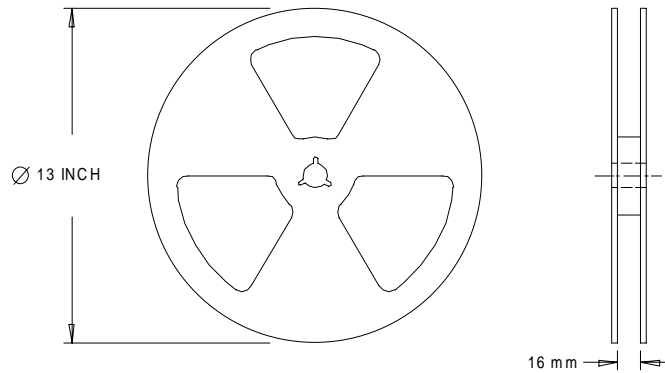
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D-Pak (TO-252AA) Tape & Reel Information

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 $T_J = 25^\circ\text{C}$, $L = 0.68\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 30\text{A}$.
- 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.

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.

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