International
IOR Rectifier

PD - 94404

SMPS MOSFET

IRLR8203
IRLU8203

HEXFET® Power MOSFET

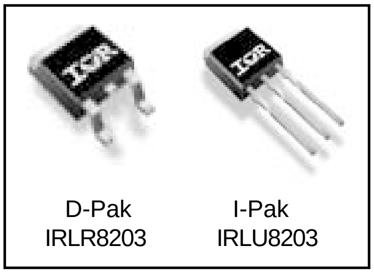
V_{DSS}	$R_{DS(on)}$ max	I_D
30V	**6.8mΩ**	**110A④**

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



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 Current①	120	
P_D @T_C = 25°C	Maximum Power Dissipation③	140	W
P_D @T_C = 100°C	Maximum Power Dissipation③	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

03/12/02

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
$\Delta V_{(BR)DSS}/\Delta T_J$	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

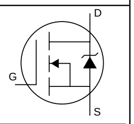
Dynamic @ T_J = 25°C (unless otherwise specified)

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	–––		ƒ = 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

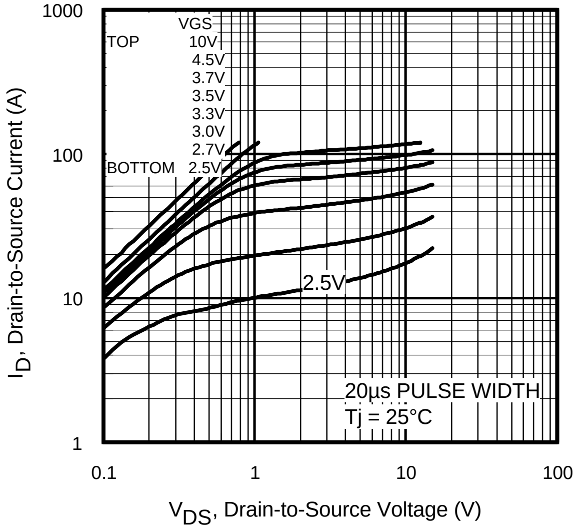


Fig 1. Typical Output Characteristics

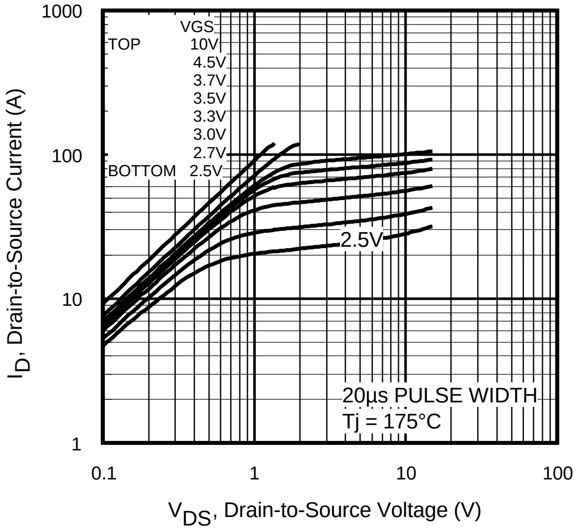


Fig 2. Typical Output Characteristics

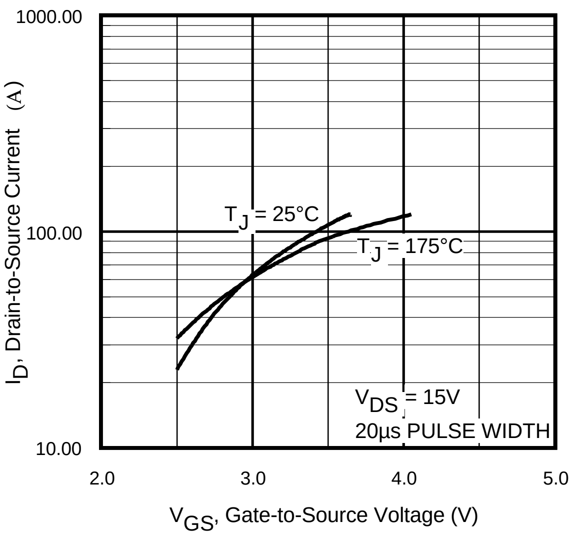


Fig 3. Typical Transfer Characteristics

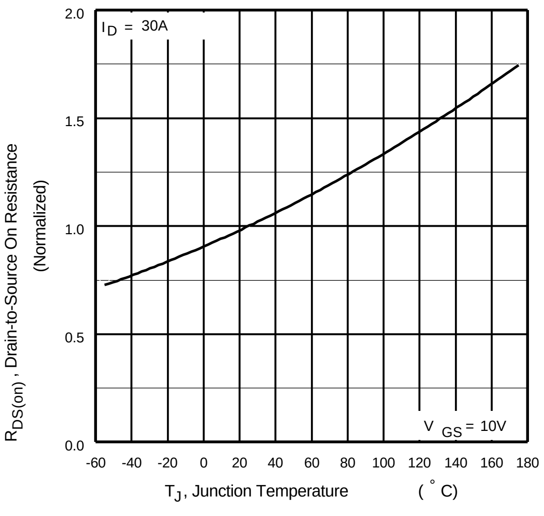


Fig 4. Normalized On-Resistance Vs. Temperature

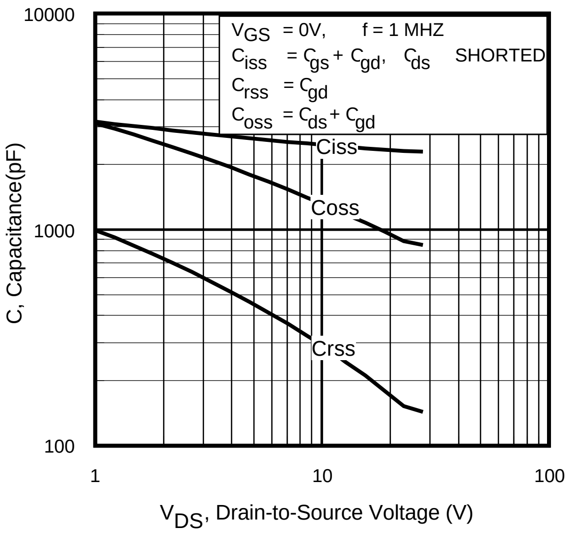


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

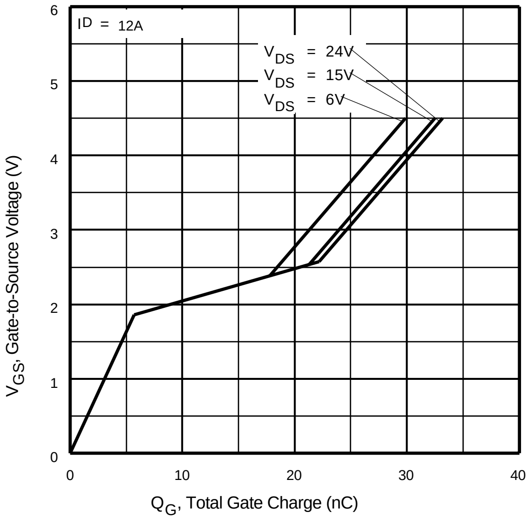


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

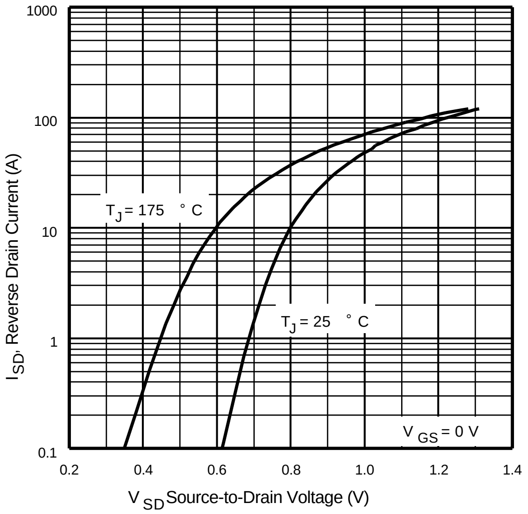


Fig 7. Typical Source-Drain Diode Forward Voltage

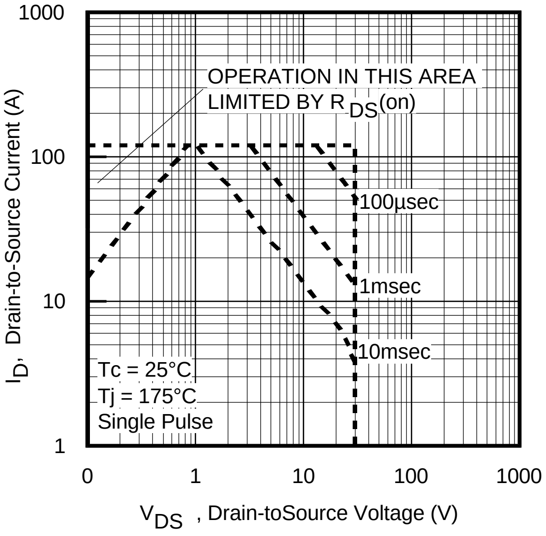


Fig 8. Maximum Safe Operating Area

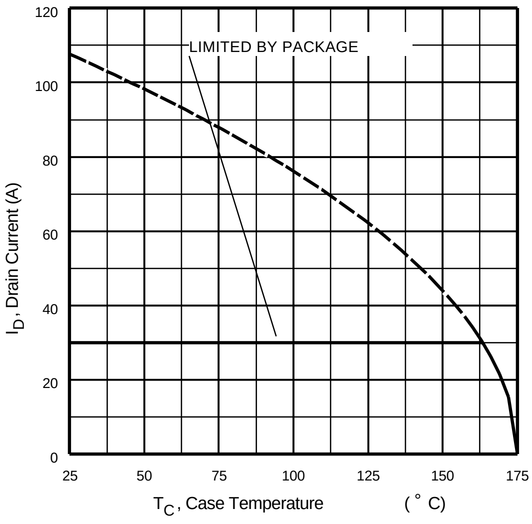


Fig 9. Maximum Drain Current Vs. Case Temperature

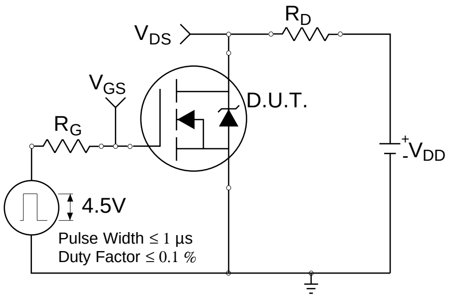


Fig 10a. Switching Time Test Circuit

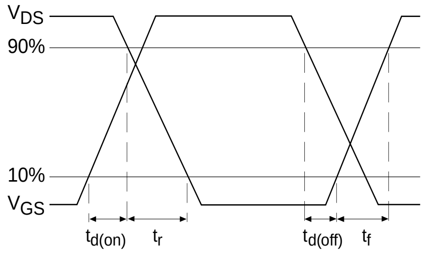


Fig 10b. Switching Time Waveforms

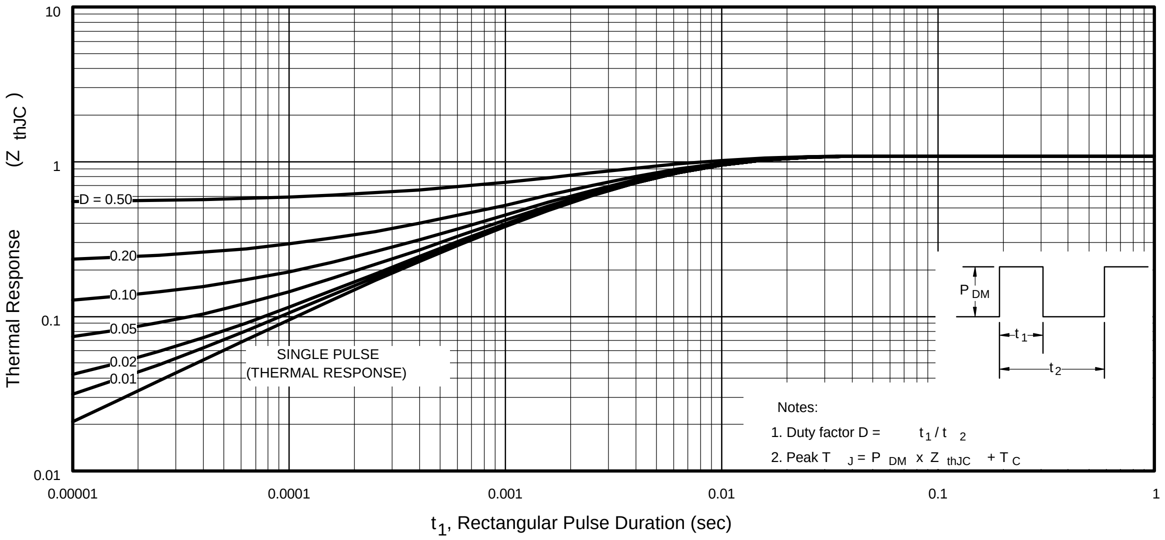


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

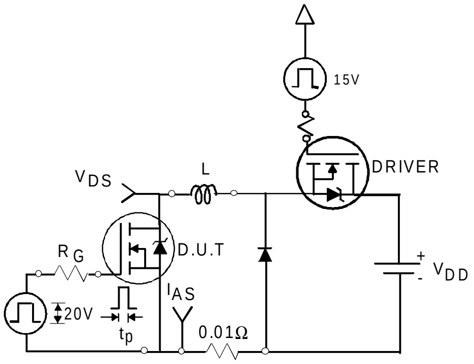


Fig 12a. Unclamped Inductive Test Circuit

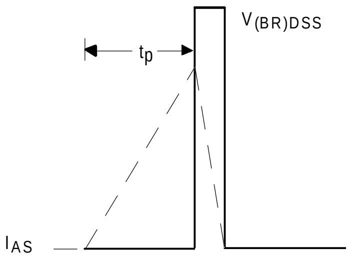


Fig 12b. Unclamped Inductive Waveforms

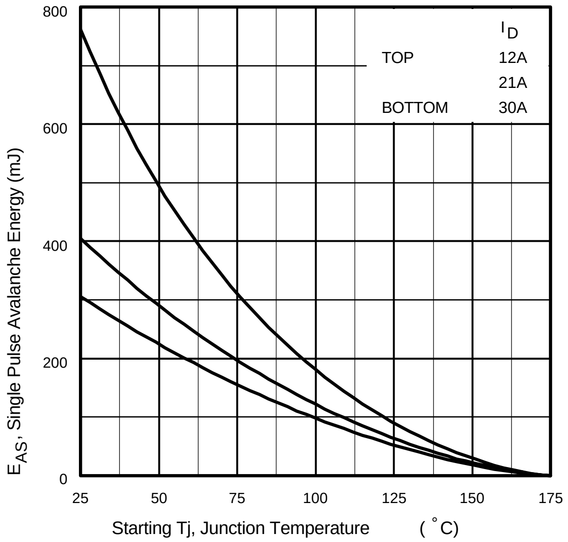


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

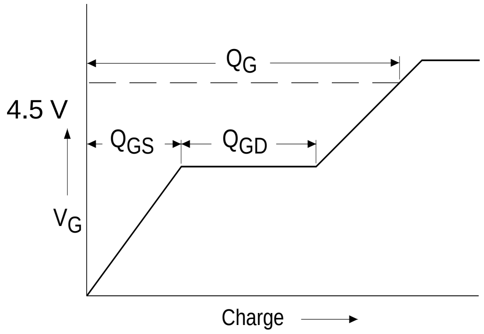


Fig 13a. Basic Gate Charge Waveform

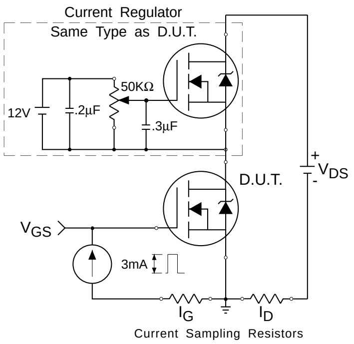
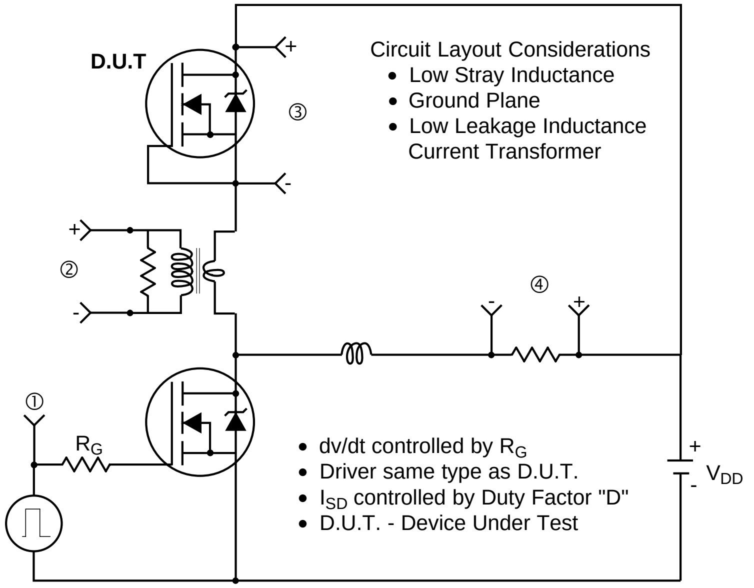


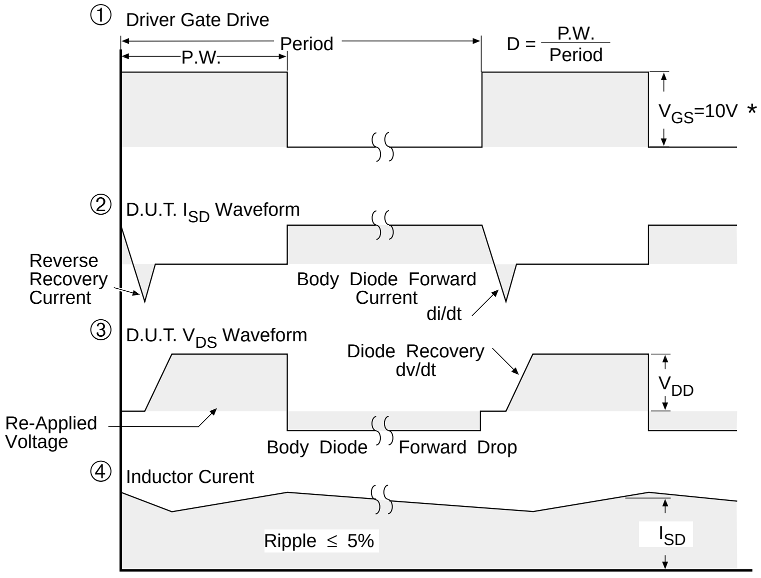
Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



Circuit Layout Considerations
- Low Stray Inductance
- Ground Plane
- Low Leakage Inductance Current Transformer

- dv/dt controlled by R_G
- Driver same type as D.U.T.
- I_{SD} controlled by Duty Factor "D"
- D.U.T. - Device Under Test

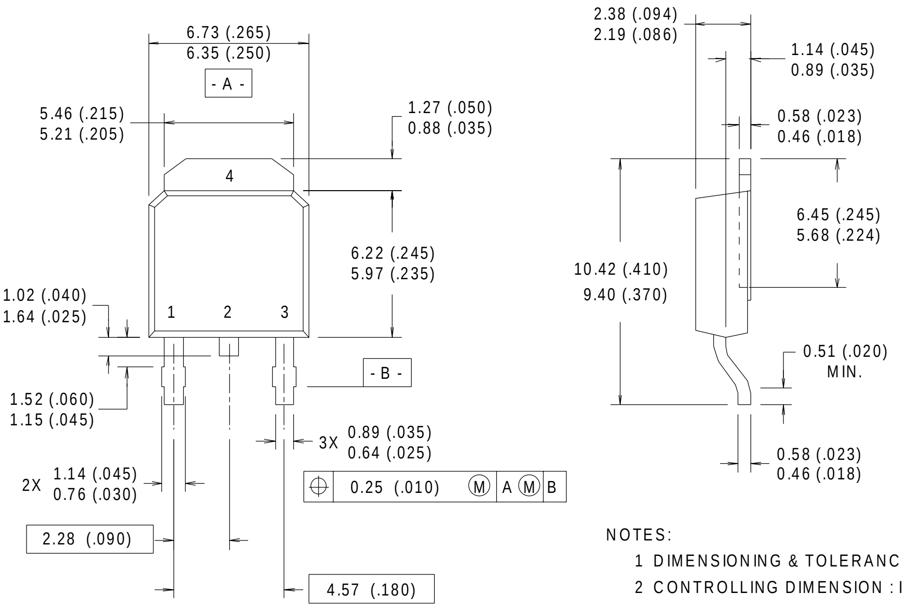


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)

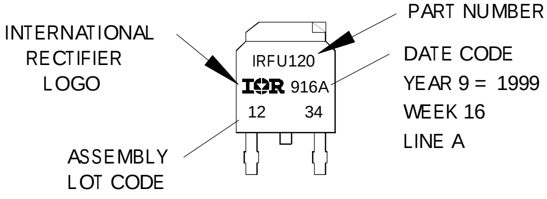


LEAD ASSIGNMENTS
1 - GATE
2 - DRAIN
3 - SOURCE
4 - DRAIN

NOTES:
1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH.
3 CONFORMS TO JEDEC OUTLINE TO-252AA.
4 DIMENSIONS SHOWN ARE BEFORE SOLDER DIP,
SOLDER DIP MAX. +0.16 (.006).

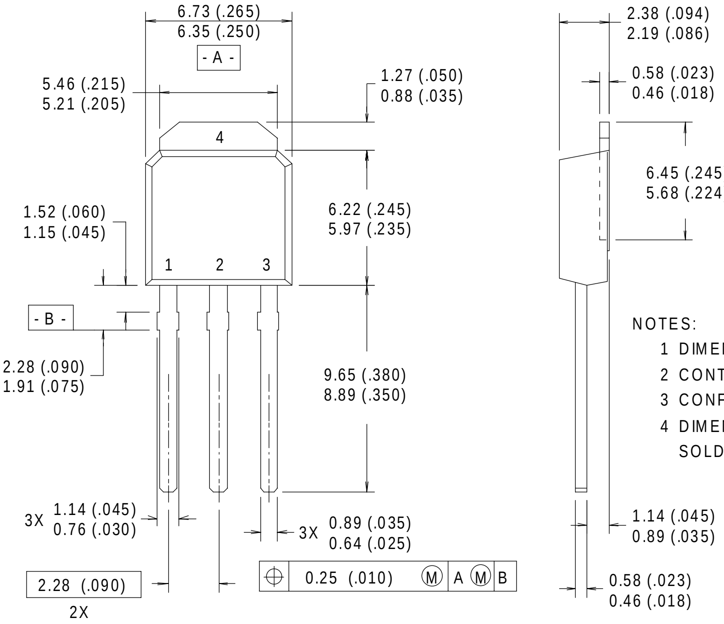
D-Pak (TO-252AA) Part Marking Information

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)

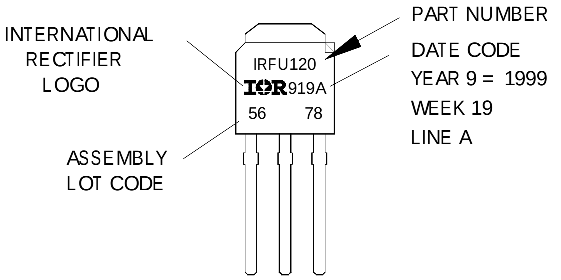


LEAD ASSIGNMENTS
1 - GATE
2 - DRAIN
3 - SOURCE
4 - DRAIN

NOTES:
1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH.
3 CONFORMS TO JEDEC OUTLINE TO-252AA.
4 DIMENSIONS SHOWN ARE BEFORE SOLDER DIP, SOLDER DIP MAX. +0.16 (.006).

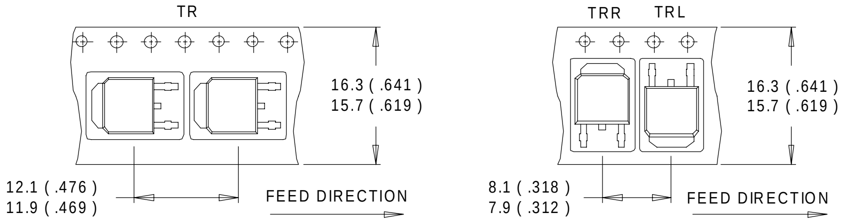
I-Pak (TO-251AA) Part Marking Information

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

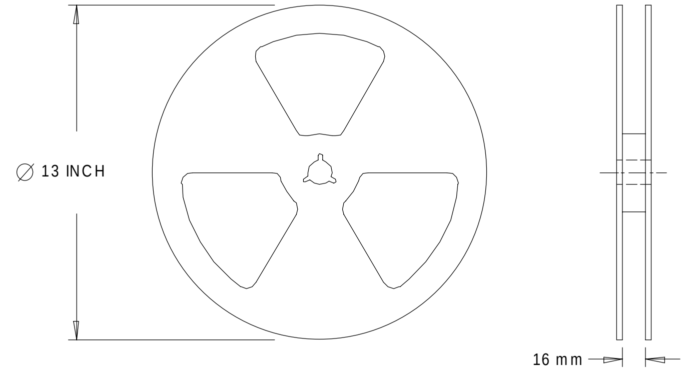


D-Pak (TO-252AA) Tape & Reel Information

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 $T_J = 25°C$, L = 0.68mH $R_G = 25\Omega$, $I_{AS} = 30A$.

③ Pulse width ≤ 400µs; duty cycle ≤ 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.

International
IOR Rectifier

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