International
IOR Rectifier

PD - 94492

IRLR7811W

SMPS MOSFET

HEXFET® Power MOSFET

Applications

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

Benefits

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

V_{DSS}	$R_{DS(on)}$ max	Q_g
30V	**10.5mΩ**	**19nC**

D-Pak

Absolute Maximum Ratings

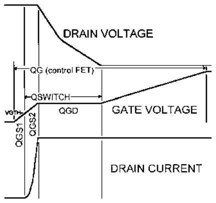
	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	64④	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	45④	
I_{DM}	Pulsed Drain Current ①	260	
P_D @T_C = 25°C	Power Dissipation	71	
P_D @T_A = 100°C	Power Dissipation*	1.5	W
	Linear Derating Factor	0.48	W/°C
V_{GS}	Gate-to-Source Voltage	± 12	V
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	–––	2.1	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)*	–––	50	
$R_{\theta JA}$	Junction-to-Ambient	–––	110	

Notes ① through ④ are on page 9

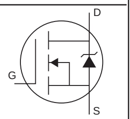
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	——	——	V	V_{GS} = 0V, I_D = 250µA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	27	——	mV/°C	Reference to 25°C, I_D = 1mA ⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	6.5	10	mΩ	V_{GS} = 10V, I_D = 15A ④
		——	7.5	12		V_{GS} = 4.5V, I_D = 12A
$V_{GS(th)}$	Gate Threshold Voltage	——	1.5	2.5	V	V_{DS} = V_{GS}, I_D = 250µA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	——	-5.0	——	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	——	——	30	µA	V_{DS} = 24V, V_{GS} = 0V
		——	——	150		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -12V
g_{fs}	Forward Transconductance	58	——	——	S	V_{DS} = 15V, I_D = 12A
Q_g	Total Gate Charge Control Fet	——	21	31	nC	
Q_{gs1}	Pre-Vth Gate-Source Charge	——	5.0	——	nC	V_{DS} = 20V V_{GS} = 4.5V I_D = 12A
Q_{gs2}	Post-Vth Gate-Source Charge	——	1.7	——		
Q_{gd}	Gate-to-Drain Charge	——	6.6	——		
Q_{godr}	Gate Charge Overdrive	——	5.5	——		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	——	8.3	——		
Q_g	Total Gate Charge Sync Fet	——	17			
Q_{oss}	Output Charge	——	10	——		V_{DS} = 16V, V_{GS} = 0V
R_g	Gate Resistance	——	1.6	——		
$t_{d(on)}$	Turn-On Delay Time	——	18	——	ns	V_{DD} = 16V, V_{GS} = 4.5V④ I_D = 12A Clamped Inductive Load
t_r	Rise Time	——	4.8	——		
$t_{d(off)}$	Turn-Off Delay Time	——	11	——		
t_f	Fall Time	——	23	——		
C_{iss}	Input Capacitance	——	2260	——	pF	V_{GS} = 0V V_{DS} = 15V f = 1.0MHz
C_{oss}	Output Capacitance	——	420	——		
C_{rss}	Reverse Transfer Capacitance	——	180	——		

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	140	mJ
I_{AR}	Avalanche Current①	——	12	A
E_{AR}	Repetitive Avalanche Energy①	——	7.1	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	64④	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	260		
V_{SD}	Diode Forward Voltage	——	——	1.2	V	T_J = 25°C, I_S = 12A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	30	45	ns	T_J = 25°C, I_F =12A di/dt = 100A/µs ④
Q_{rr}	Reverse RecoveryCharge	——	27	41	nC	
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

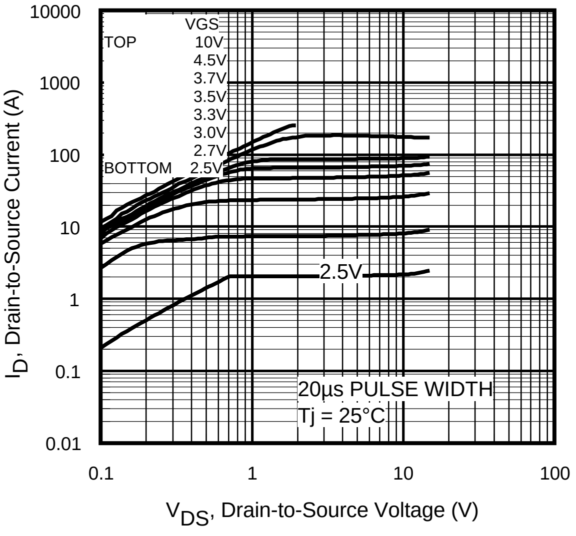


Fig 1. Typical Output Characteristics

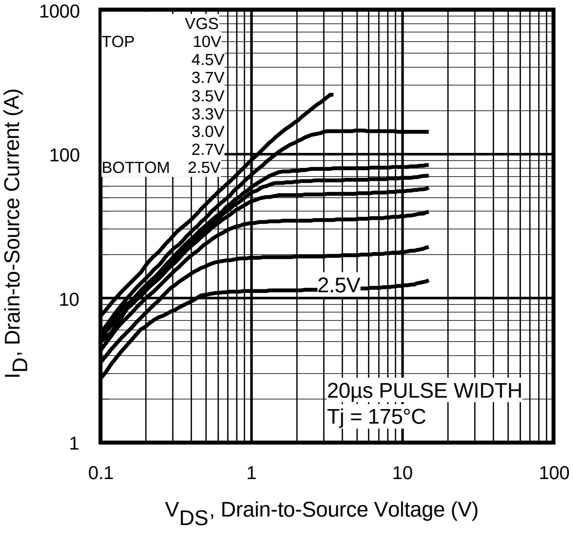


Fig 2. Typical Output Characteristics

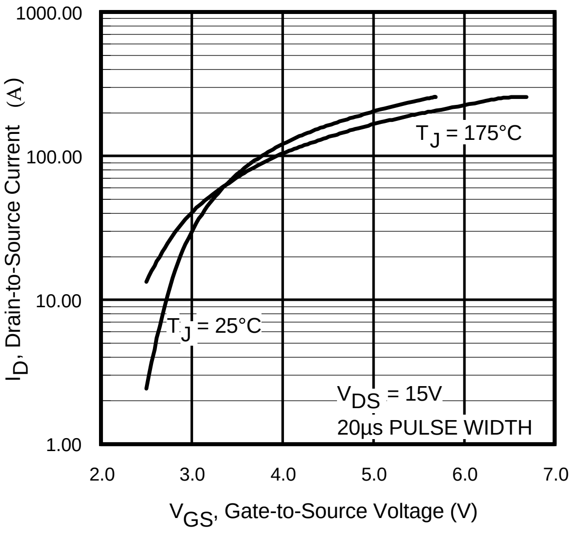


Fig 3. Typical Transfer Characteristics

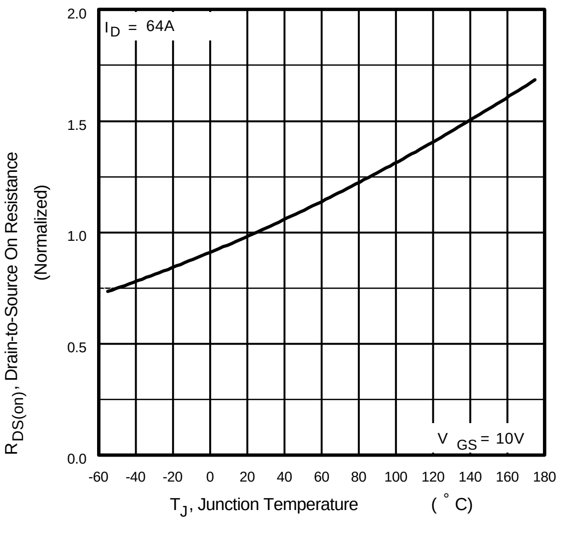


Fig 4. Normalized On-Resistance
Vs. Temperature

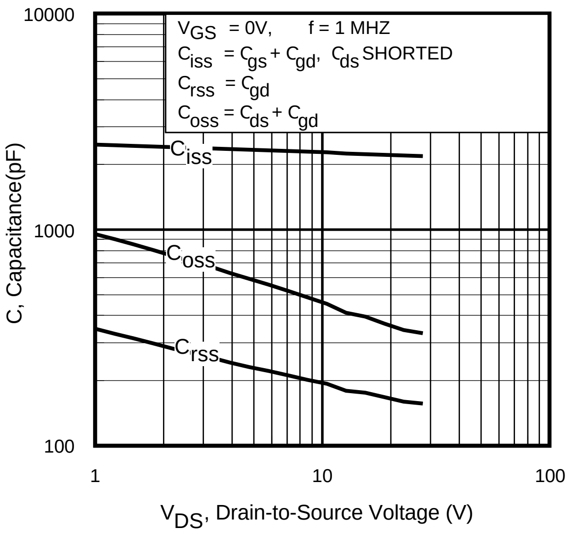


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

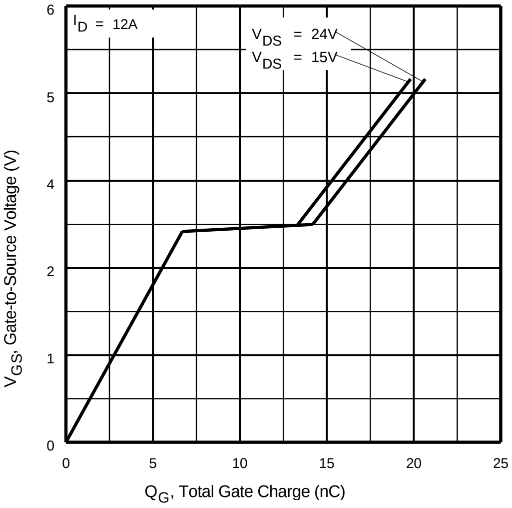


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

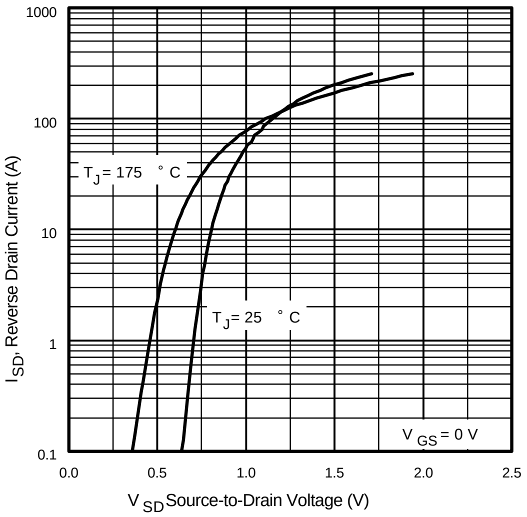


Fig 7. Typical Source-Drain Diode Forward Voltage

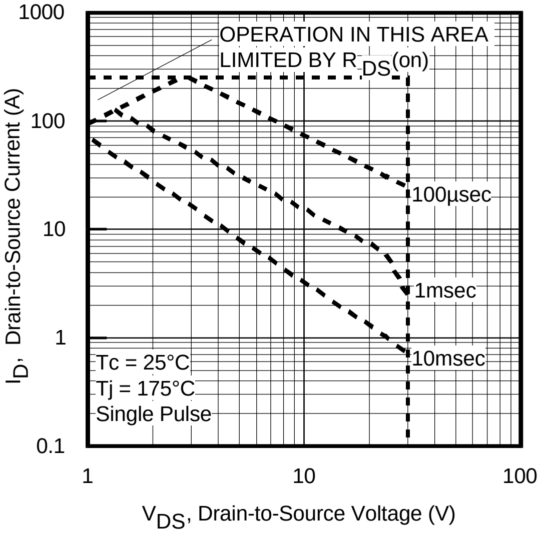


Fig 8. Maximum Safe Operating Area

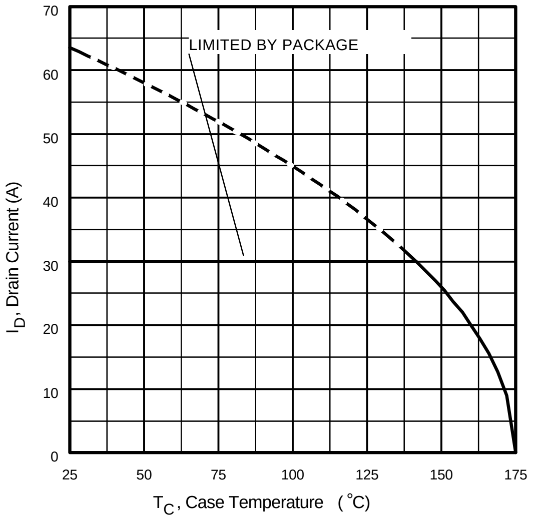


Fig 9. Maximum Drain Current Vs. Case Temperature

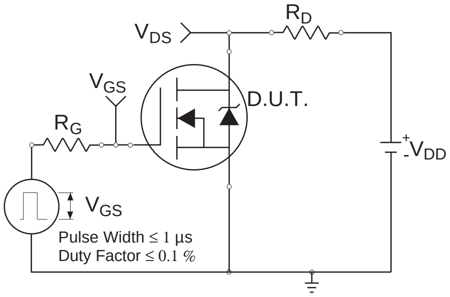


Fig 10a. Switching Time Test Circuit

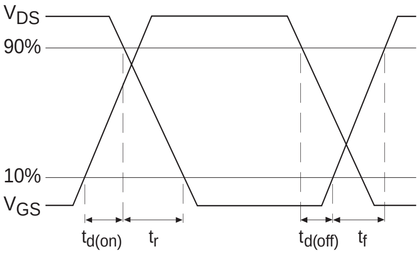


Fig 10b. Switching Time Waveforms

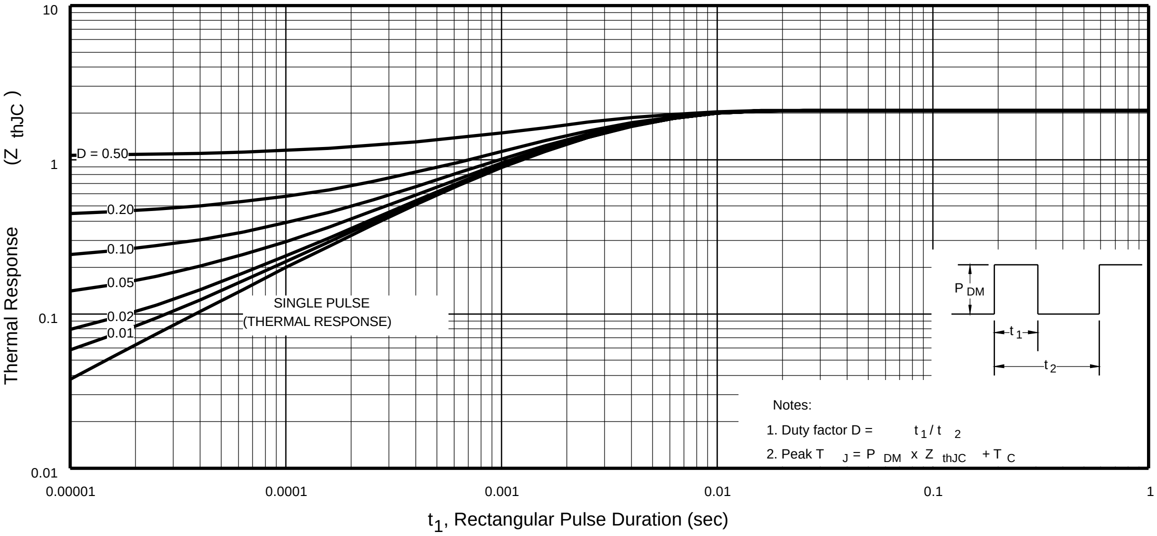


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

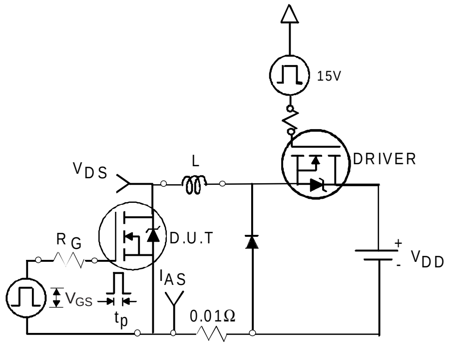


Fig 12a. Unclamped Inductive Test Circuit

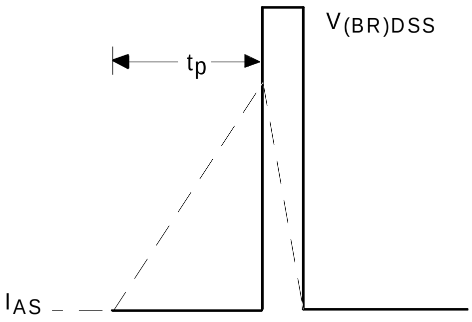


Fig 12b. Unclamped Inductive Waveforms

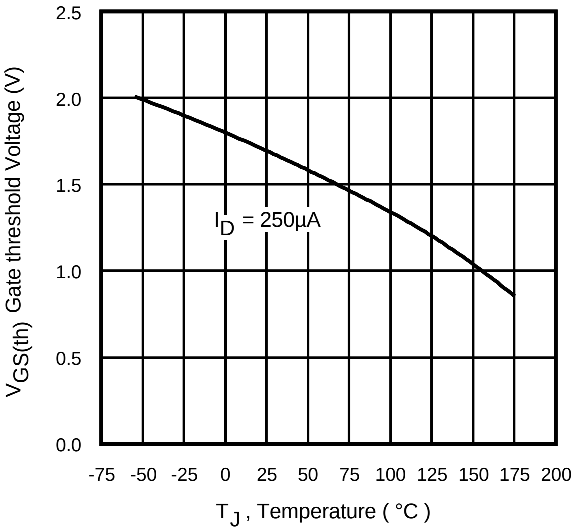


Fig 13. Threshold Voltage Vs. Temperature

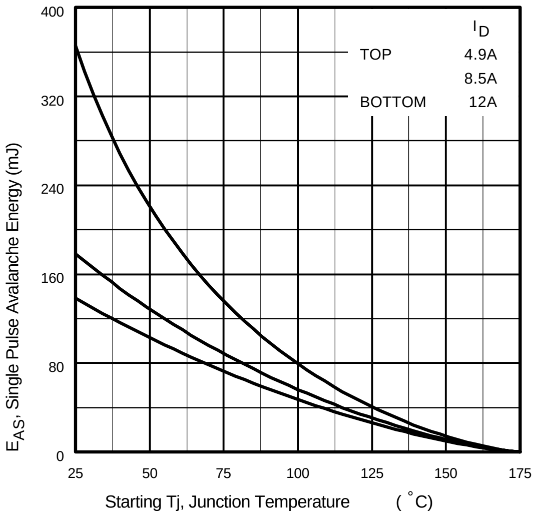


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

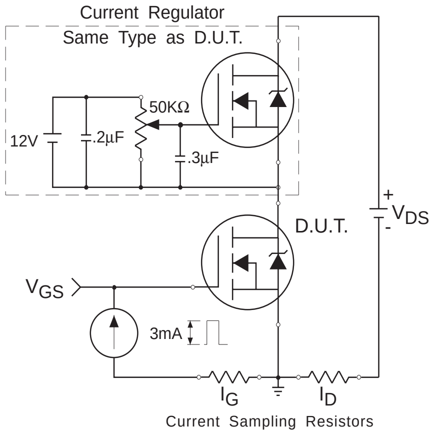
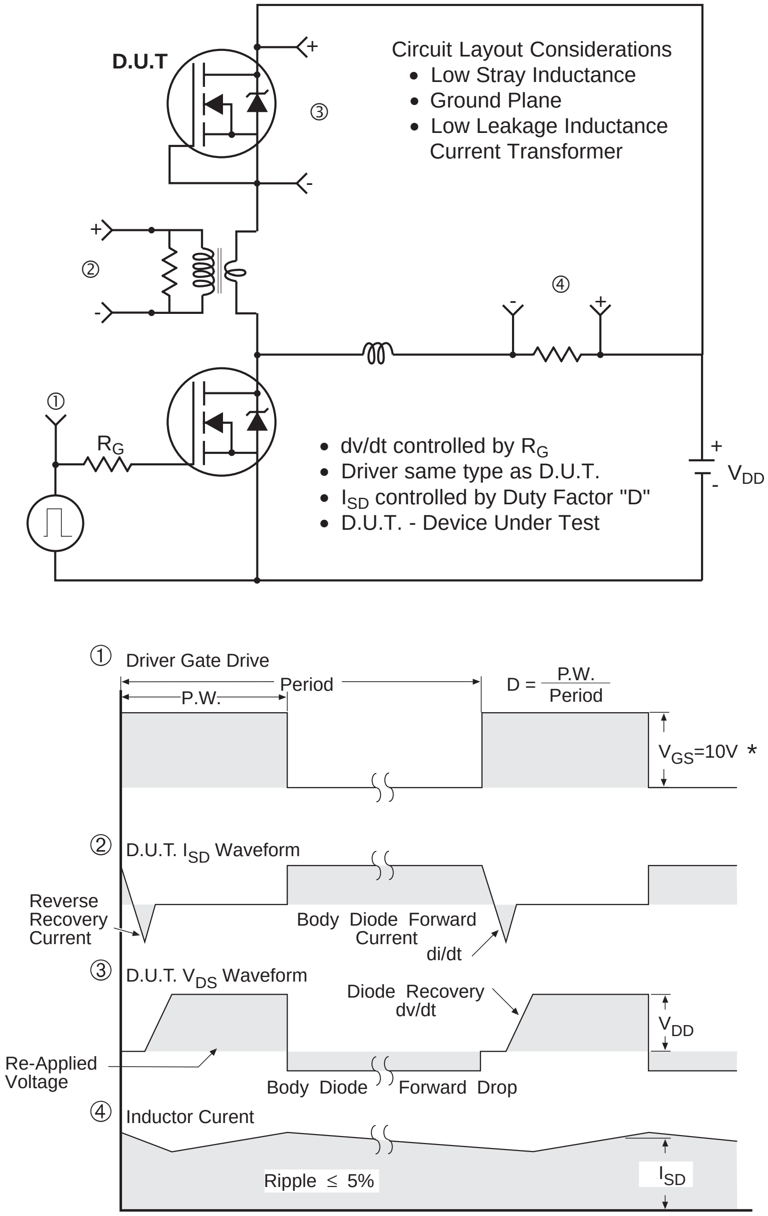


Fig 14. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

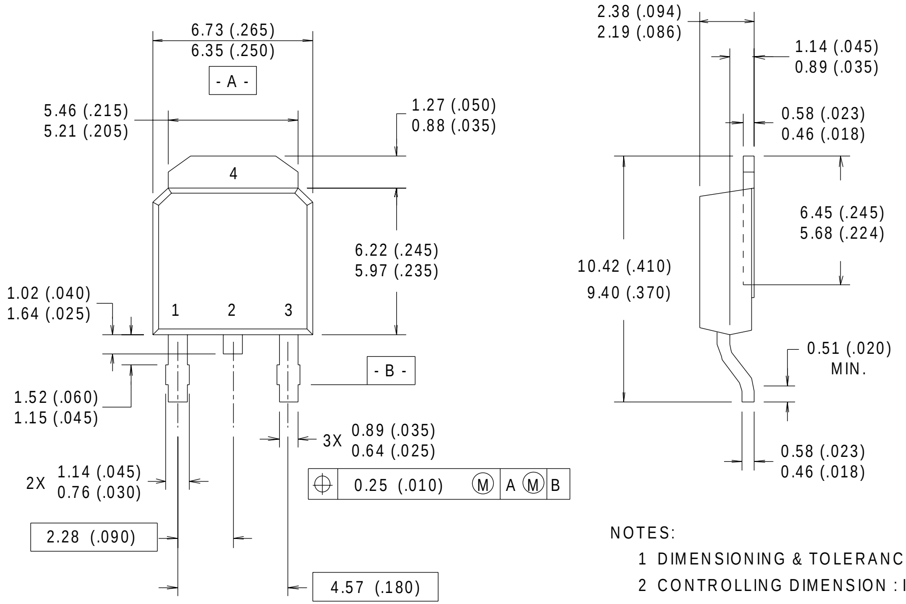


* V_{GS} = 5V for Logic Level Devices

Fig 15. For N-Channel HEXFET® Power MOSFETs

TO-252AA (D-Pak) Package Outline

Dimensions are shown in millimeters (inches)



LEAD ASSIGNMENTS

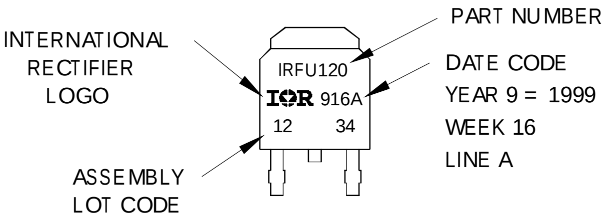
1 - GATE
2 - DRAIN
3 - SOURCE
4 - DRAIN

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).

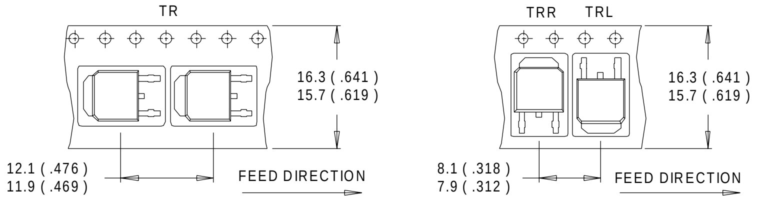
TO-252AA (D-Pak) Part Marking Information

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

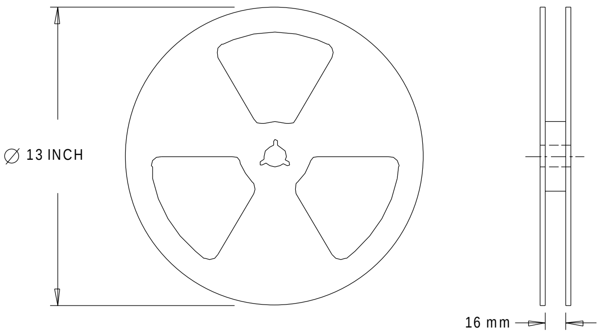


D-Pak (TO-252AA) Tape & Reel Information

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 = 1.9mH
$R_G = 25\Omega$, $I_{AS} = 12A$.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A.

* 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 Consumer market.
Qualification Standards can be found on IR's Web site.

International
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