



Description

The IRFZ44NSTRLPBF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

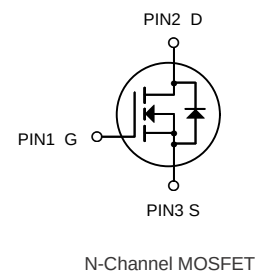
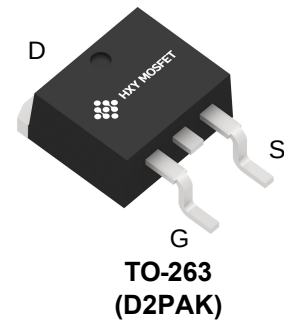
$V_{DS} = 55V$ $I_D = 49A$

$R_{DS(ON)} < 13m\Omega @ V_{GS}=10V$

Application

Switching application

Power Management for Inverter Systems.



Package Marking and Ordering Information

Product ID	Pack	Brand	Units/Tube
IRFZ44NSTRLPBF	TO-263(D2PAK)	HXY MOSFET	50

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

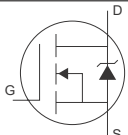
Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage	55	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current-Continuous	49	A
$I_D (100^\circ C)$	Drain Current-Continuous($T_C=100^\circ C$)	35	A
I_{DM}	Pulsed Drain Current	160	A
P_D	Maximum Power Dissipation	94	W
E_{AR}	Repetitive Avalanche Energy	9.4	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	$^\circ C$
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case ^(Note 2)	1.5	$^\circ C/W$



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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	55			V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient		0.058		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance		10	13	mΩ	V _{GS} = 10V, I _D = 25A
V _{GS(th)}	Gate Threshold Voltage	2.0		4.0	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	19			S	V _{DS} = 25V, I _D = 25A
I _{DSS}	Drain-to-Source Leakage Current			25	μA	V _{DS} = 55V, V _{GS} = 0V
				250		V _{DS} = 44V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage			100	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage			-100		V _{GS} = -20V
Q _g	Total Gate Charge			63		I _D = 25A
Q _{gs}	Gate-to-Source Charge			14	nC	V _{DS} = 44V
Q _{gd}	Gate-to-Drain ("Miller") Charge			23		V _{GS} = 10V, See Fig. 6 and 13
t _{d(on)}	Turn-On Delay Time		12			V _{DD} = 28V
t _r	Rise Time		60			I _D = 25A
t _{d(off)}	Turn-Off Delay Time		44		ns	R _G = 12Ω
t _f	Fall Time		45			V _{GS} = 10V, See Fig. 10
L _S	Internal Source Inductance		7.5		nH	Between lead, and center of die contact
C _{iss}	Input Capacitance		1470			V _{GS} = 0V
C _{oss}	Output Capacitance		360			V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance		88		pF	f = 1.0MHz, See Fig. 5
E _{AS}	Single Pulse Avalanche Energy		530	150	mJ	I _{AS} = 25A, L = 0.47mH

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)			49	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode)			160		
V _{SD}	Diode Forward Voltage			1.3	V	T _J = 25°C, I _S = 25A, V _{GS} = 0V
t _{rr}	Reverse Recovery Time		63	95	ns	T _J = 25°C, I _F = 25A
Q _{rr}	Reverse Recovery Charge		170	260	nC	di/dt = 100A/μs
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. (See fig. 11)
- ② Starting T_J = 25°C, L = 0.48mH
R_G = 25Ω, I_{AS} = 25A. (See Figure 12)
- ③ I_{SD} ≤ 25A, di/dt ≤ 230A/μs, V_{DD} ≤ V_{(BR)DSS},
T_J ≤ 175°C
- ④ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑤ This is a typical value at device destruction and represents operation outside rated limits.
- ⑥ This is a calculated value limited to T_J = 175°C.

** When mounted on 1" square PCB (FR-4 or G-10 Material).

For recommended footprint and soldering techniques refer to application note #AN-994.



Typical Characteristics

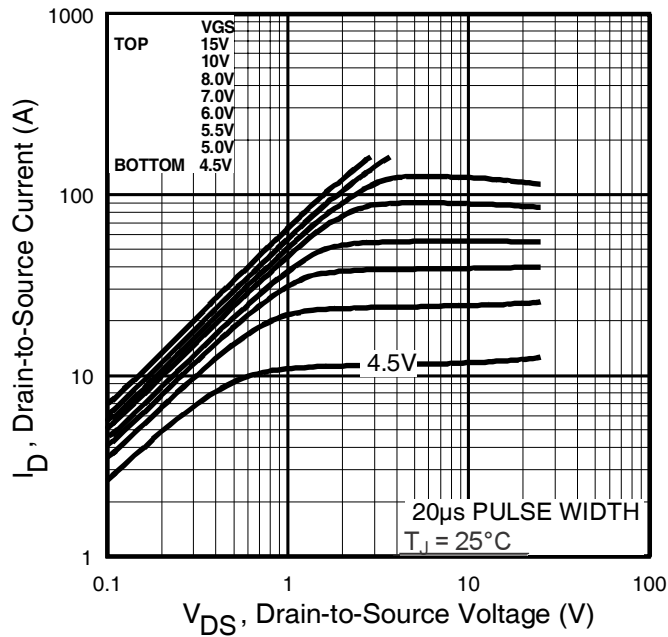


Fig 1. Typical Output Characteristics

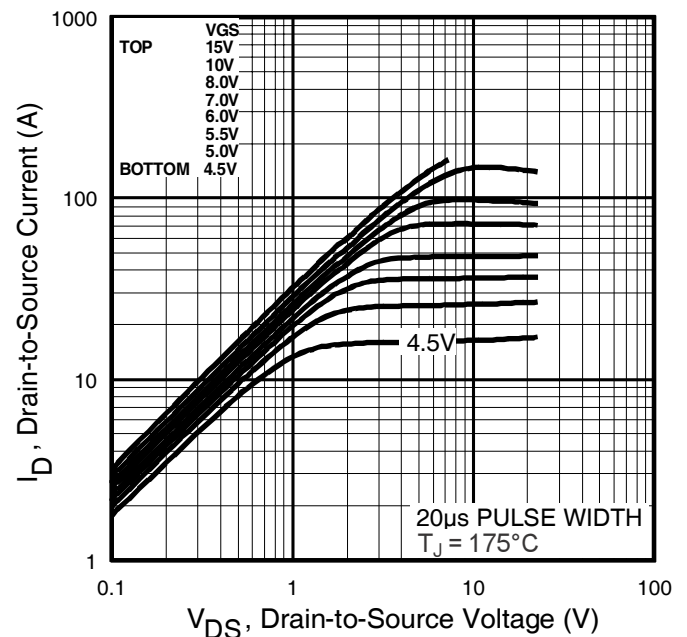


Fig 2. Typical Output Characteristics

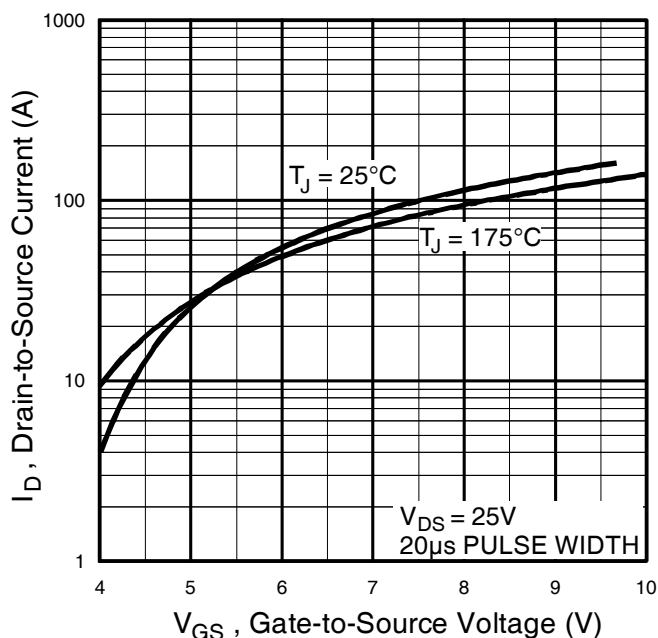


Fig 3. Typical Transfer Characteristics

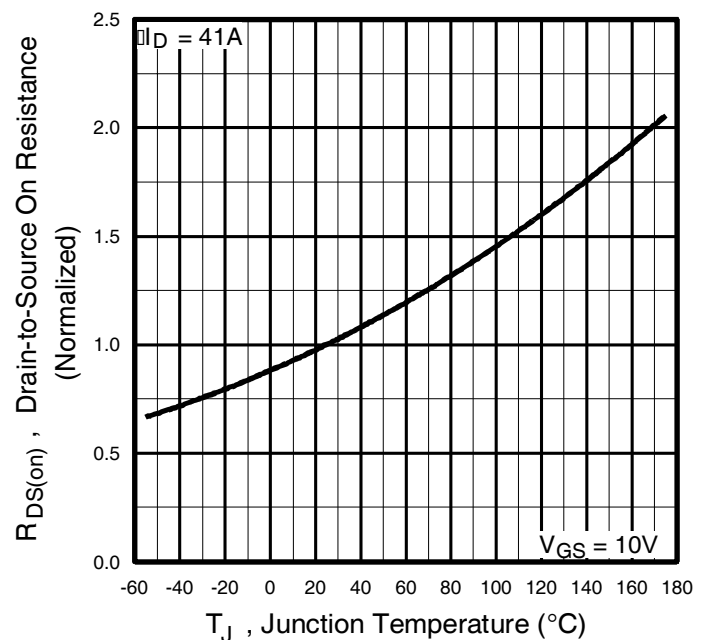


Fig 4. Normalized On-Resistance
Vs. Temperature

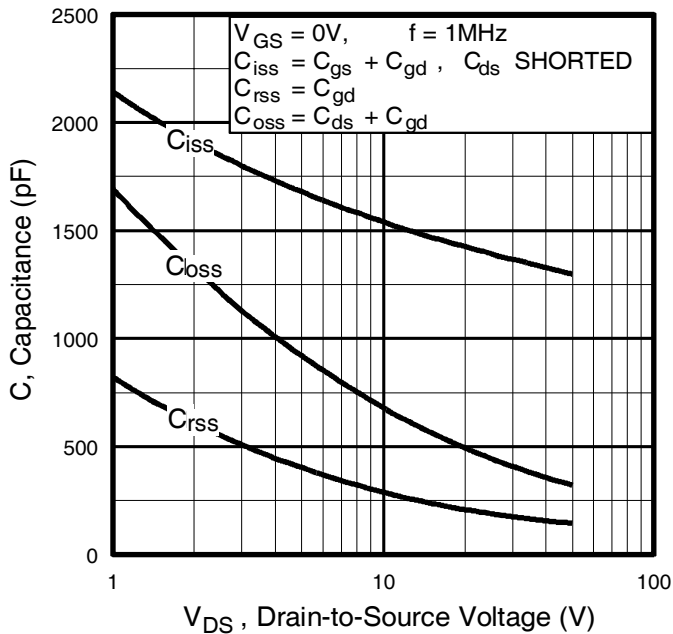


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

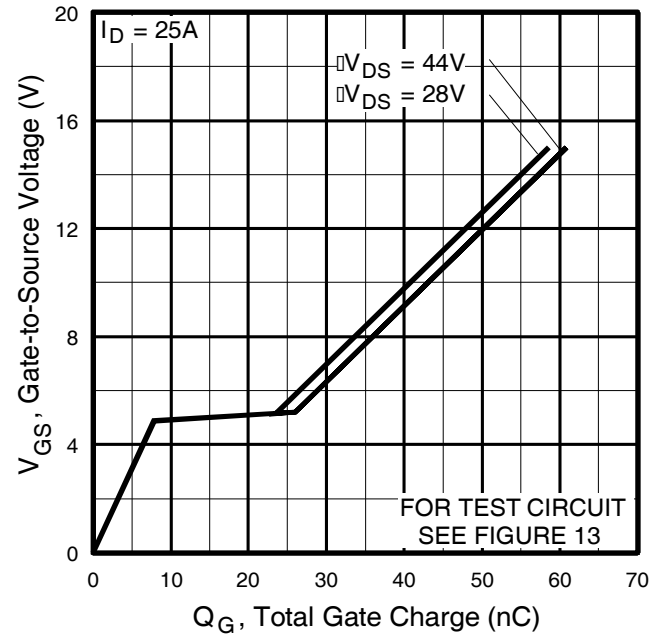


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

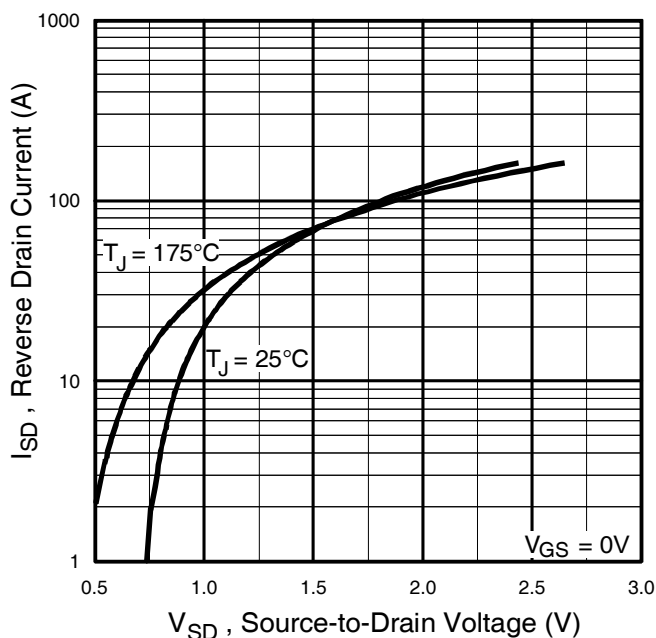


Fig 7. Typical Source-Drain Diode Forward Voltage

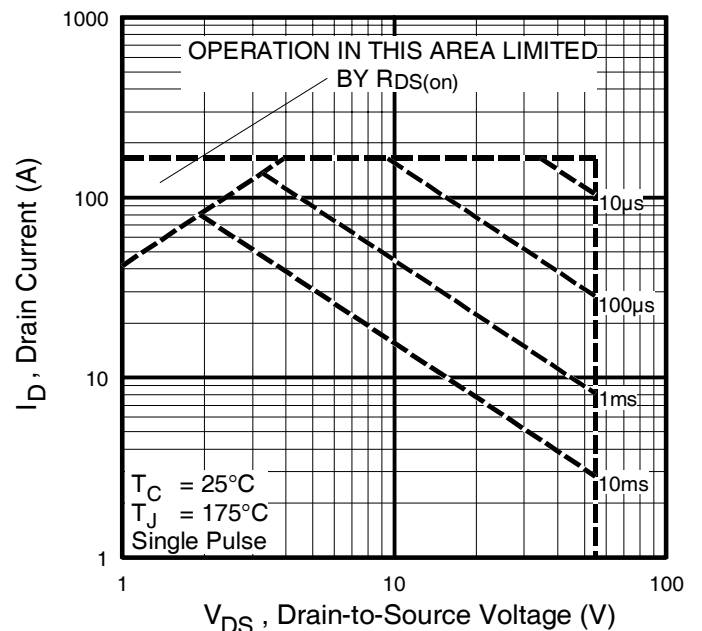


Fig 8. Maximum Safe Operating Area

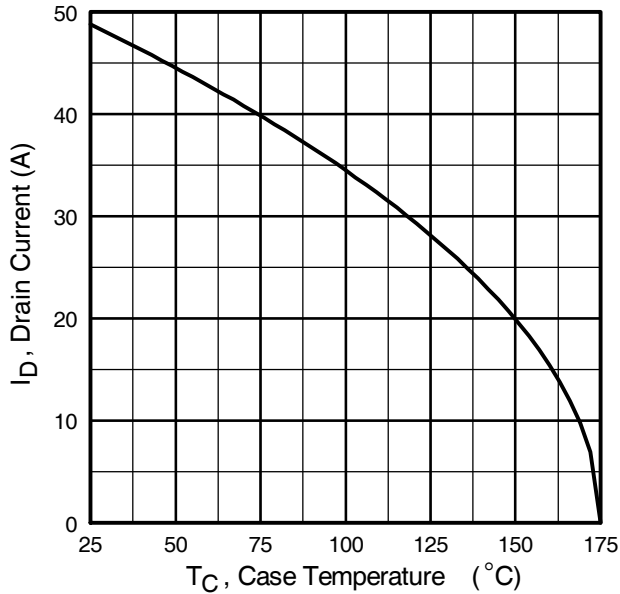


Fig 9. Maximum Drain Current Vs. Case Temperature

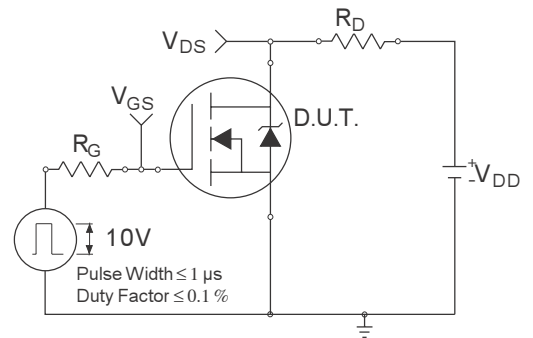


Fig 10a. Switching Time Test Circuit

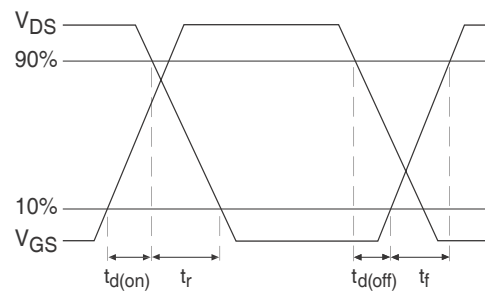


Fig 10b. Switching Time Waveforms

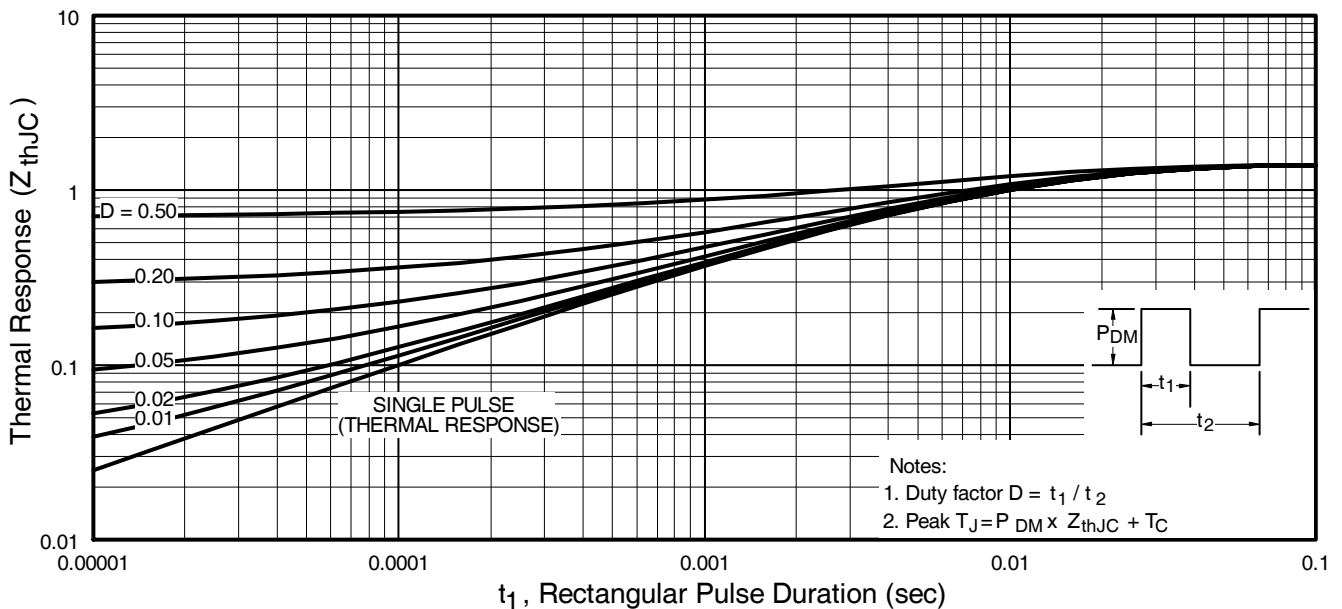


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

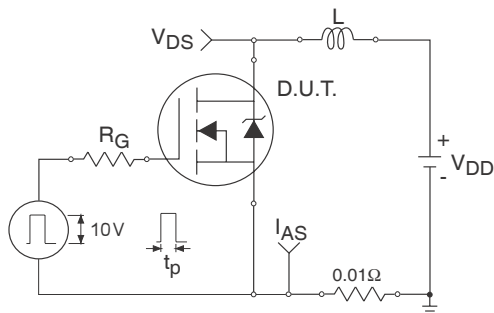


Fig 12a. Unclamped Inductive Test Circuit

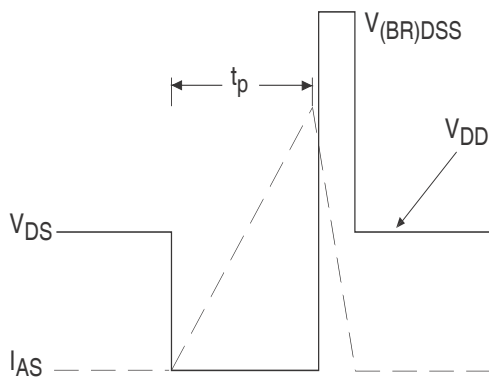


Fig 12b. Unclamped Inductive Waveforms

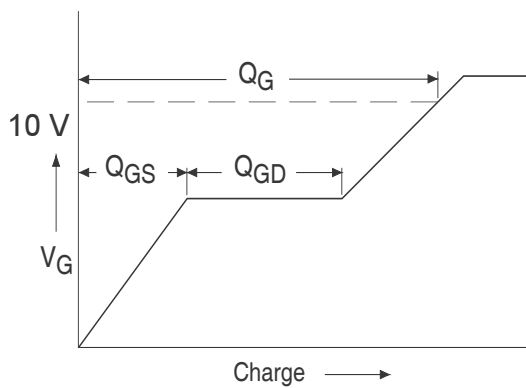


Fig 13a. Basic Gate Charge Waveform

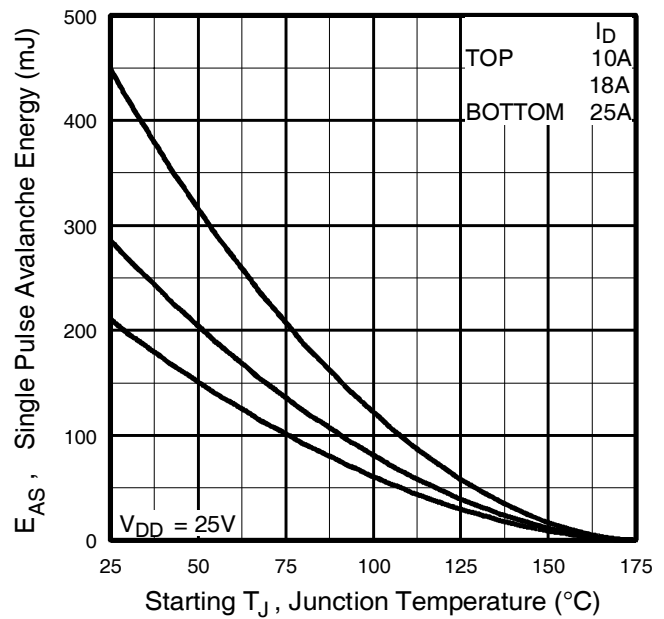


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

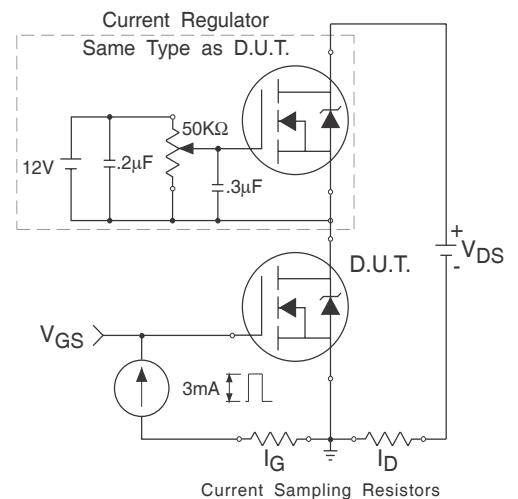
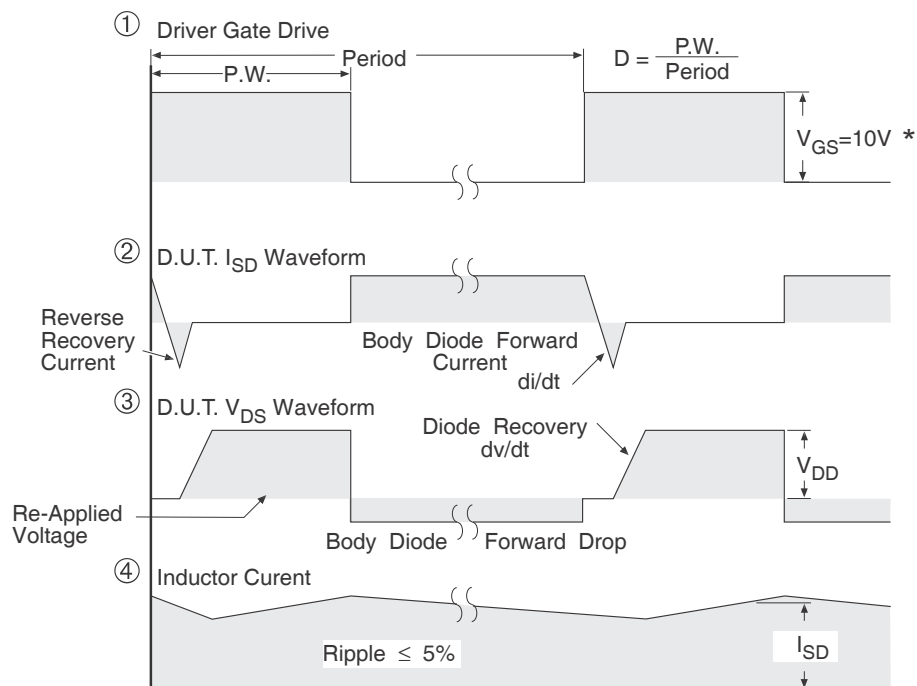
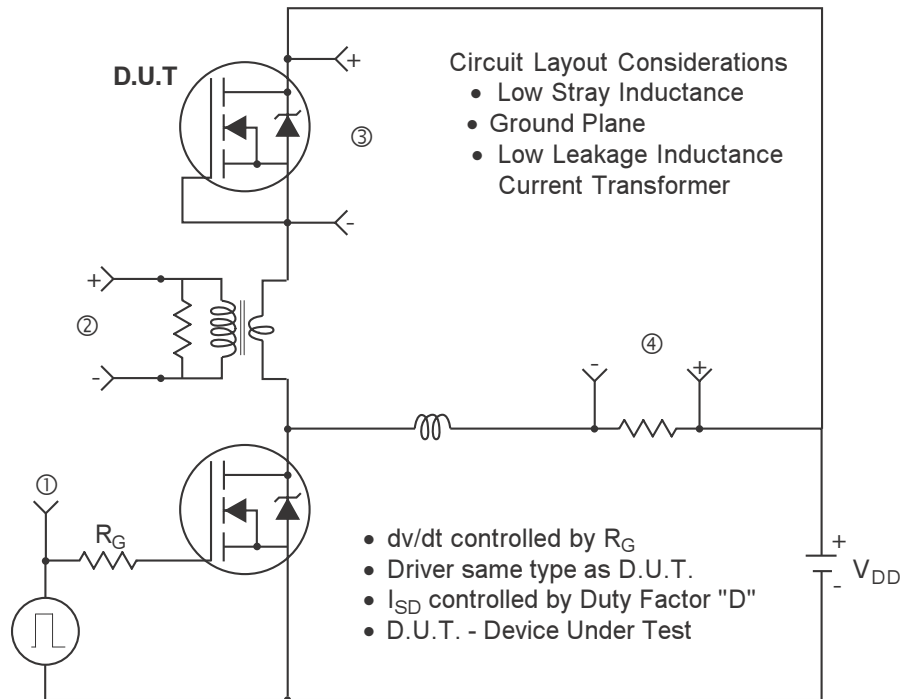


Fig 13b. Gate Charge Test Circuit

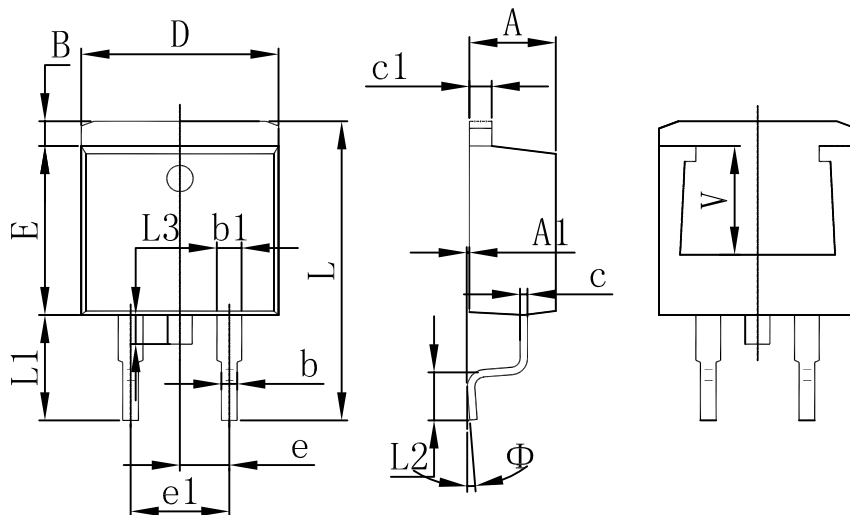


* $V_{GS} = 5V$ for Logic Level Devices

Fig 14. For N-Channel HEXFETS



TO-263(D2PAK)Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	



Attention

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.