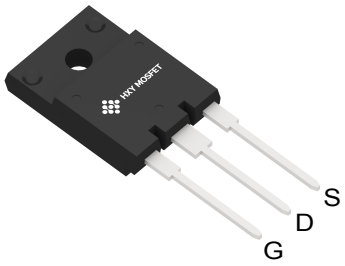
NDUL03N150CG

SiC Power MOSFET N-Channel Enhancement Mode

Features

- Low on-resistance
- Fast switching speed
- Long creepage distance
- Simple to drive
- Pb-free lead plating; RoHS compliant

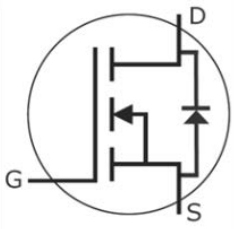


TO-3PF

Applications

- Auxilialy power supplies
- Switch mode power supplies

Ordering Part Number	Package	Brand
NDUL03N150CG	TO-3PF	HXY MOSFET



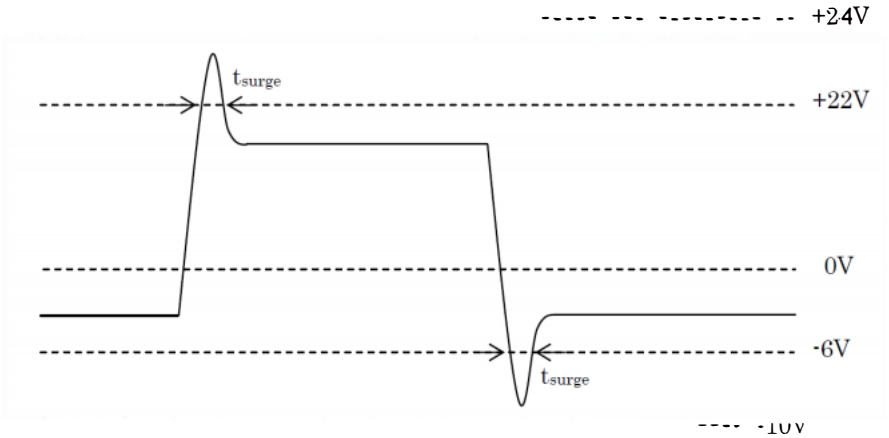
Absolute Maximum Ratings (T_C = 25˚C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	1500	V
Continuous drain current	T_c = 25°C	I_D *1	3.7	A
	T_c = 100°C	I_D *1	2.6	A
Pulsed drain current		$I_{D,pulse}$ *2	9.2	A
Gate - Source voltage (DC)		V_{GSS}	-4 to 20	V
Gate - Source surge voltage (t_{surge}<300nsec)		V_{GSS_surge} *3	-10 to 22	V
Power dissipation (T_c = 25°C)		P_D	35	W
Virtual Junction temperature		T_{vj}	175	°C
Range of storage temperature		T_{stg}	-55 to +175	°C

Electrical Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain-Source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=1mA	1500			V
Zero gate voltage drain current	I_{DSS}	V_{DS}=1500V,V_{GS}=0V Tvj=25°C Tvj=150°C		0.1 0.2	10	μA
Gate-Source leakage current	I_{GSS+}	V_{GS}=+20V,V_{DS}=0V			100	nA
Gate- Source leakage current	I_{GSS-}	V_{GS}=-4V,V_{DS}=0V			-100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, Io=0.41mA	1.8	2.8	4.0	V

⋆1 Limited by maximum T_{vj} and for Max.R_{thJC}
⋆2 PW≤10us, Duty cycle≤ 1%
⋆3 Example of acceptable V_{GS} waveform



*4 Pulsed

Electrical Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Static drain - source on - state resistance	$R_{DS(on)}$ *4	V_{GS} = 18V, I_D = 1.1A				Ω
		T_{vj} = 25°C	-	1.15	1.50	
		T_{vj} = 125°C	-	1.71	-	
Gate input resistance	R_G	f = 1MHz, open drain	-	64	-	Ω
Transconductance	g_{fs} *4	V_{DS} = 10V, I_D = 1.1A	-	0.4	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	184	-	pF
Output capacitance	C_{oss}	V_{DS} = 800V	-	16	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	6	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V V_{DS} = 0V to 800V	-	17	-	pF
Turn - on delay time	$t_{d(on)}$ *4	V_{DD} = 500V, I_D = 1.1A	-	16	-	ns
Rise time	t_r *4	V_{GS} = 18V/0V	-	21	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 455Ω	-	35	-	
Fall time	t_f *4	R_G = 0Ω	-	74	-	
Turn - on switching loss	E_{on} *4	V_{DD} = 800V, I_D=1.1A V_{GS} = 18V/0V R_G = 0Ω, L=2mH *E_{on} includes diode reverse recovery	-	57	-	μJ
Turn - off switching loss	E_{off} *4		-	32	-	

Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}	-	3.32	4.32	K/W

Gate Charge Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *4	V_{DD} = 500V	-	14	-	nC
Gate - Source charge	Q_{gs} *4	I_D = 1A	-	4	-	
Gate - Drain charge	Q_{gd} *4	V_{GS} = 18V	-	5	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} = 500V, I_D = 1A	-	10.5	-	V

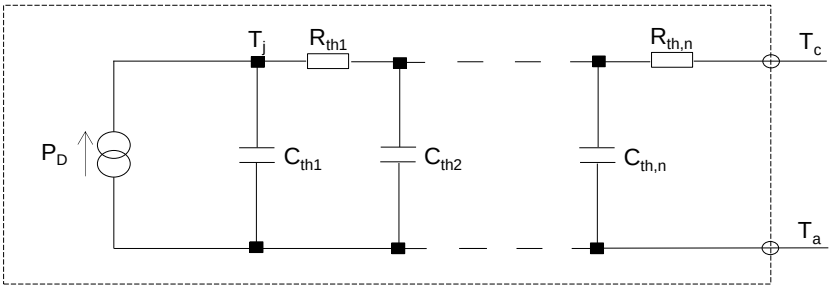
Body diode electrical Characteristics (Source-Drain) (T_C=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	3.7	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	9.2	A
Forward voltage	V_{SD} *4	V_{GS} = 0V, I_S = 1.1A	-	4.3	-	V
Reverse recovery time	t_{rr} *4	I_F = 1.1A, V_R = 800V di/dt = 300A/μs	-	21	-	ns
Reverse recovery charge	Q_{rr} *4		-	13	-	nC
Peak reverse recovery current	I_{rrm} *4		-	1.1	-	A

Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	816m	K/W
R_{th2}	1939m	
R_{th3}	567m	

Symbol	Value	Unit
C_{th1}	127μ	Ws/K
C_{th2}	1.64m	
C_{th3}	64.5m	



Typical Performance

Fig.1 Power Dissipation Derating Curve

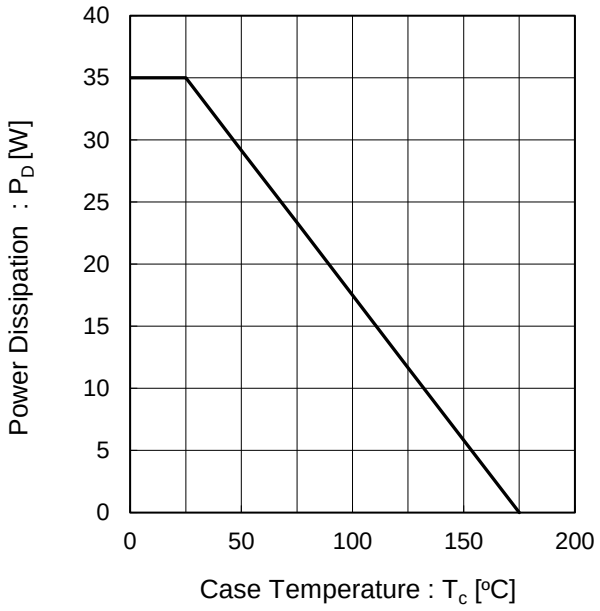


Fig.2 Maximum Safe Operating Area

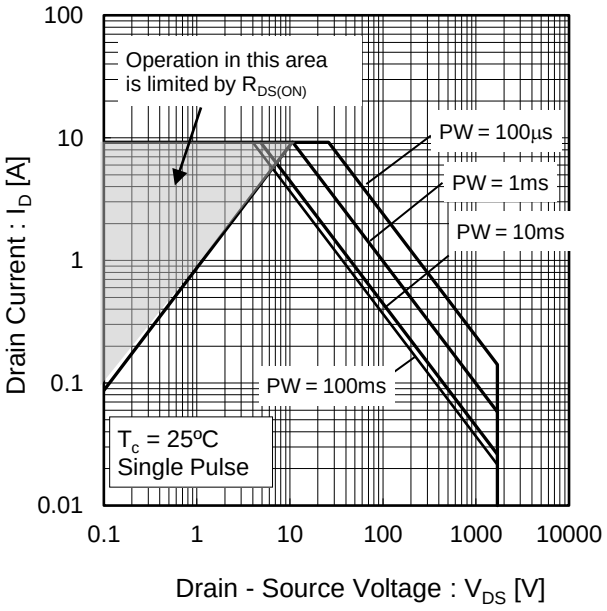
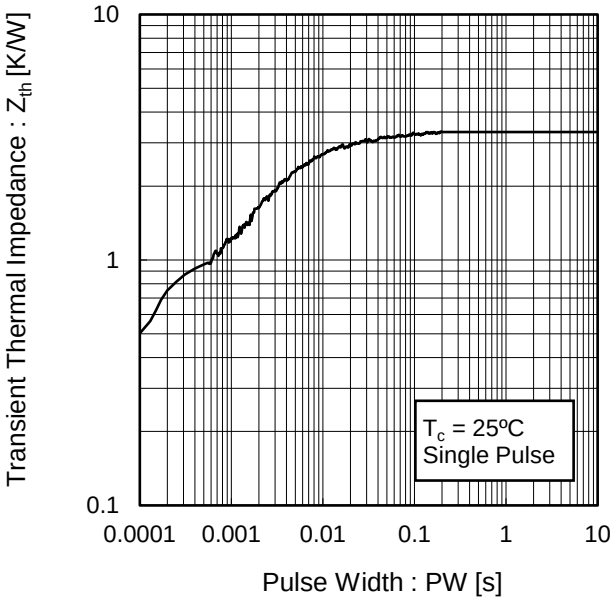


Fig.3 Typical Transient Thermal Impedance vs. Pulse Width



Electrical Characteristic Curves

Fig.4 Typical Output Characteristics(I)

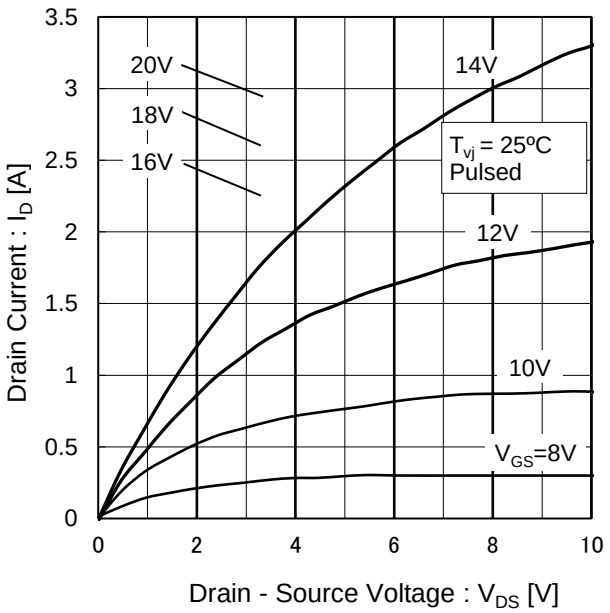


Fig.5 Typical Output Characteristics(II)

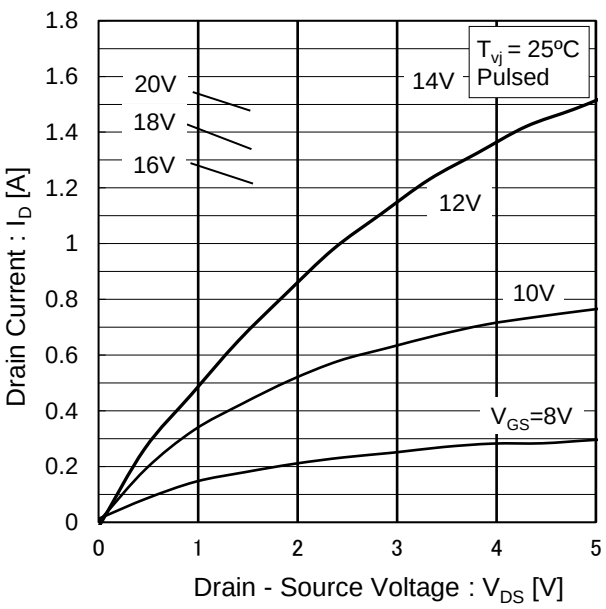


Fig.6 T_{vj} = 150ºC Typical Output Characteristics(I)

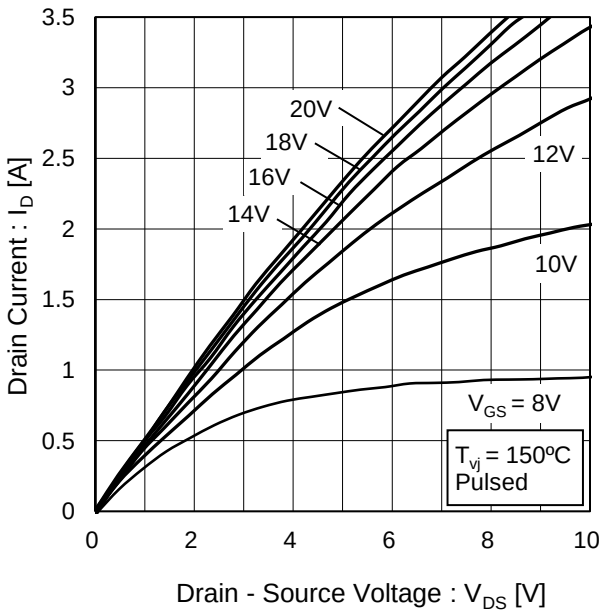


Fig.7 T_{vj} = 150ºC Typical Output Characteristics(II)

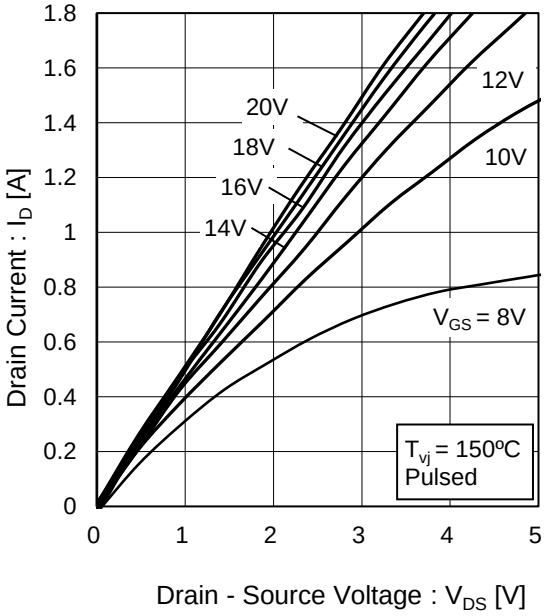


Fig.8 Typical Transfer Characteristics (I)

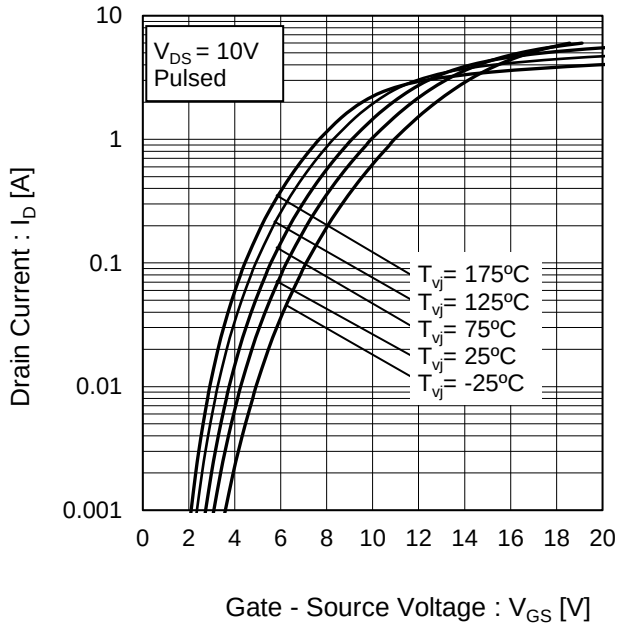


Fig.9 Typical Transfer Characteristics (II)

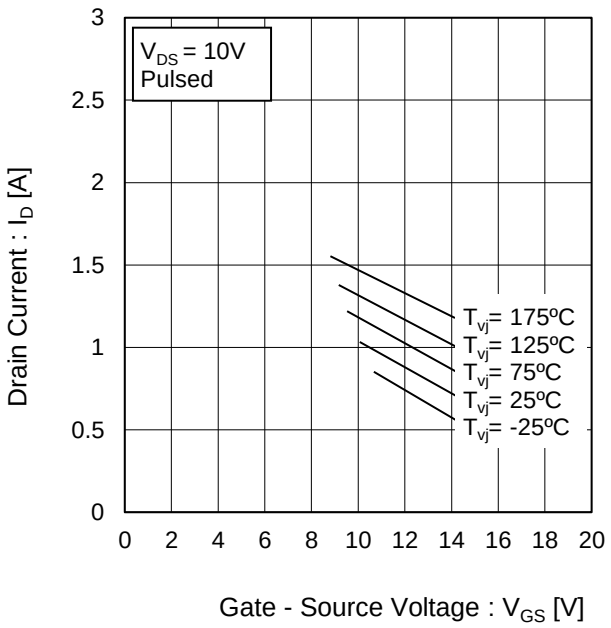


Fig.10 Gate Threshold Voltage
vs. Virtual Junction Temperature

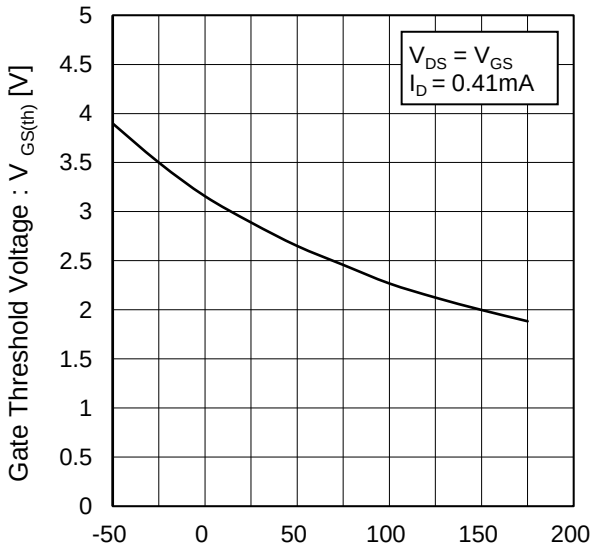


Fig.11 Transconductance
vs. Drain Current

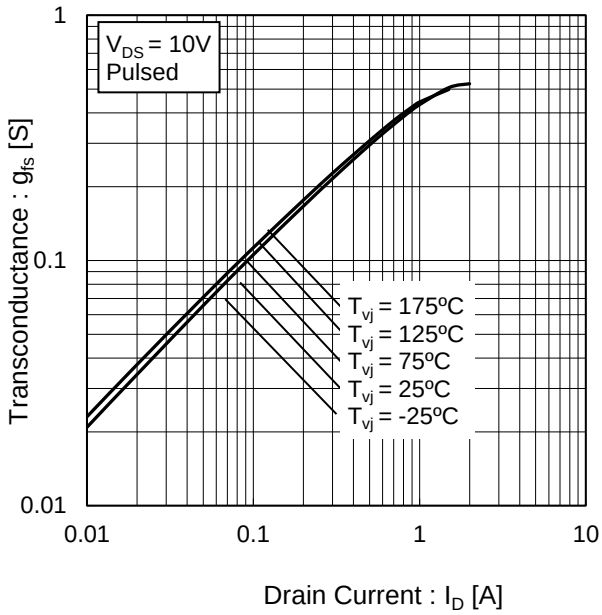


Fig.12 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

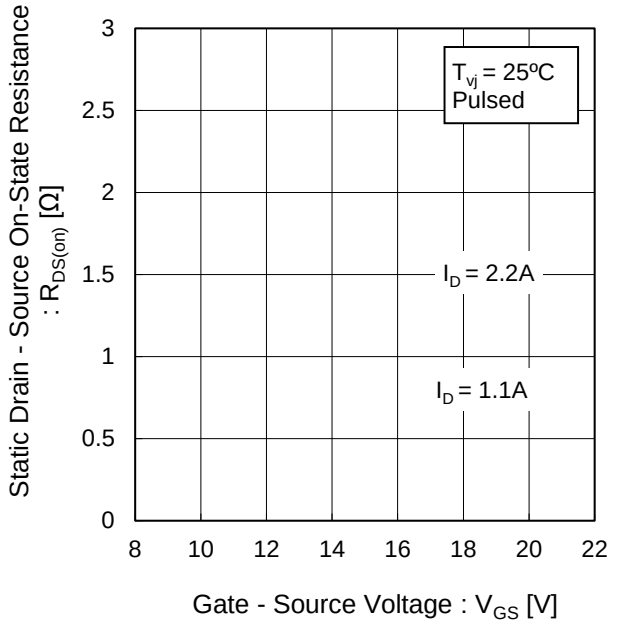


Fig.13 Static Drain - Source On - State Resistance vs. Virtual Junction Temperature

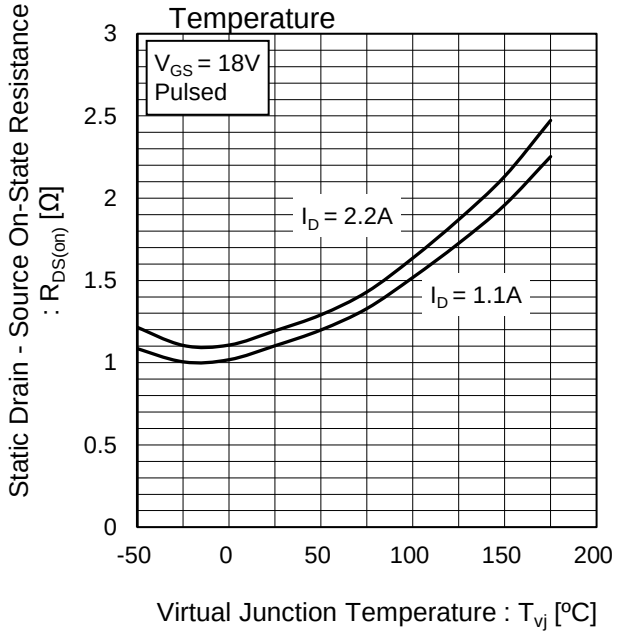


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current

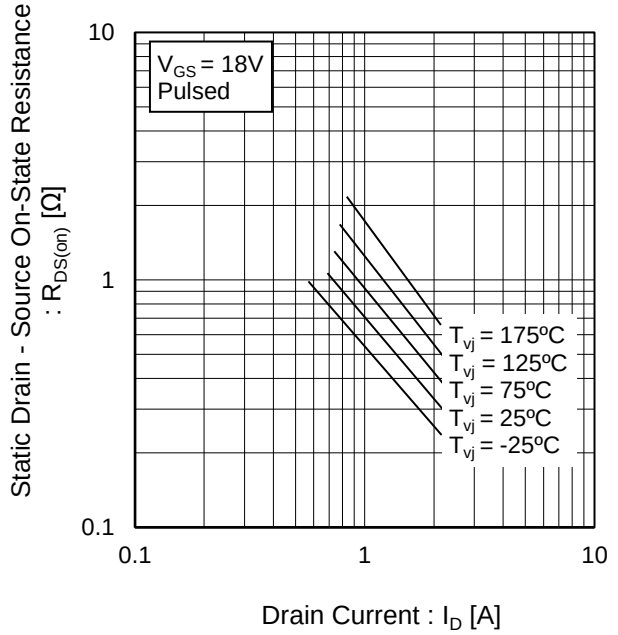


Fig.15 Typical Capacitance vs. Drain - Source Voltage

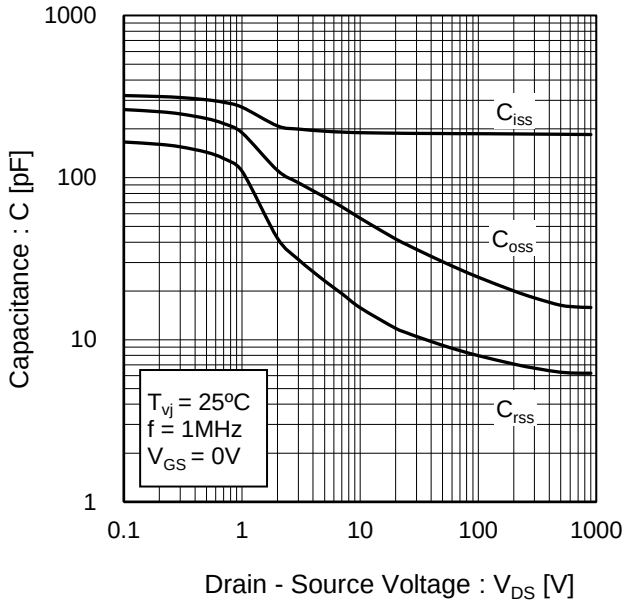


Fig.16 Coss Stored Energy

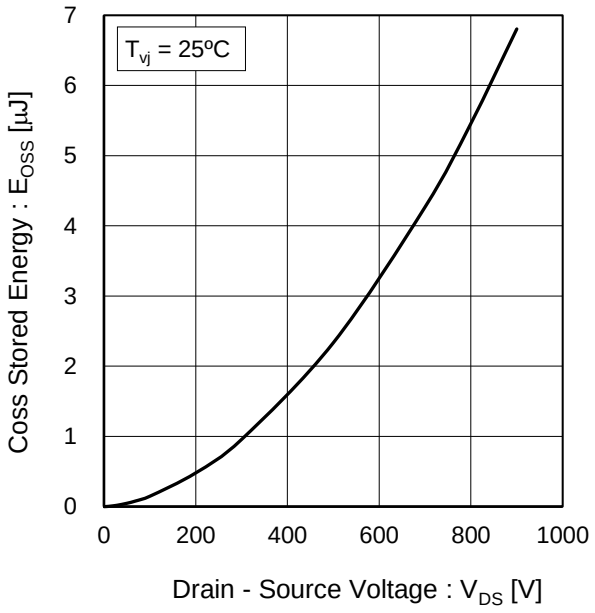


Fig.17 Switching Characteristics

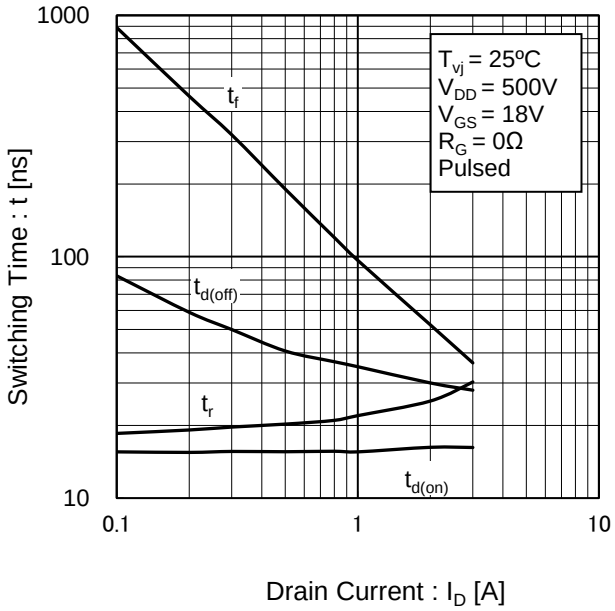


Fig.18 Dynamic Input Characteristics

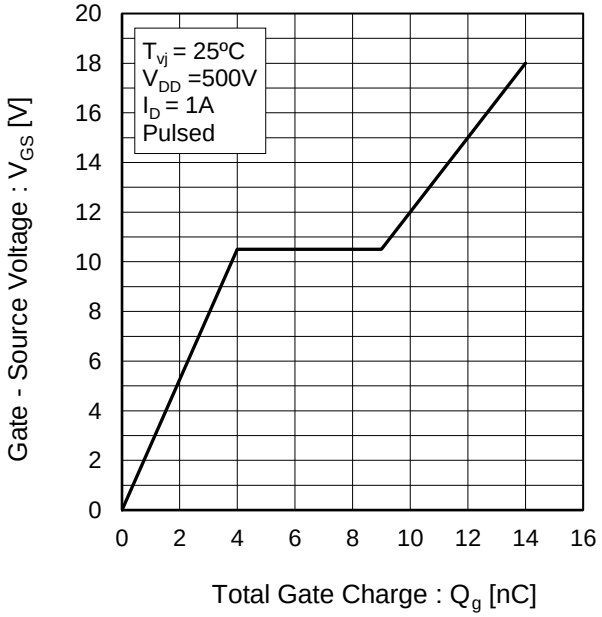


Fig.19 Typical Switching Loss
vs. Drain - Source Voltage

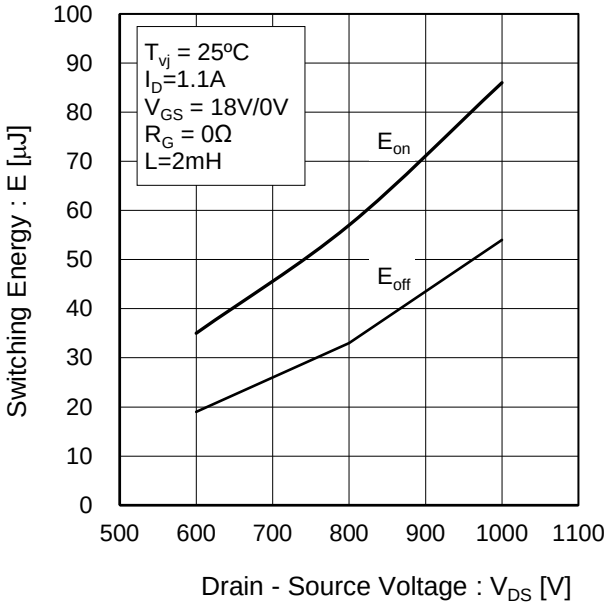


Fig.20 Typical Switching Loss vs. Drain Current

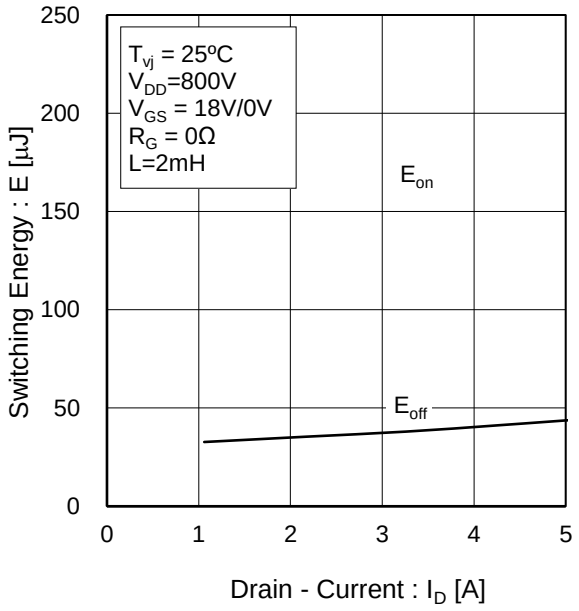


Fig.21 Typical Switching Loss vs. External Gate Resistance

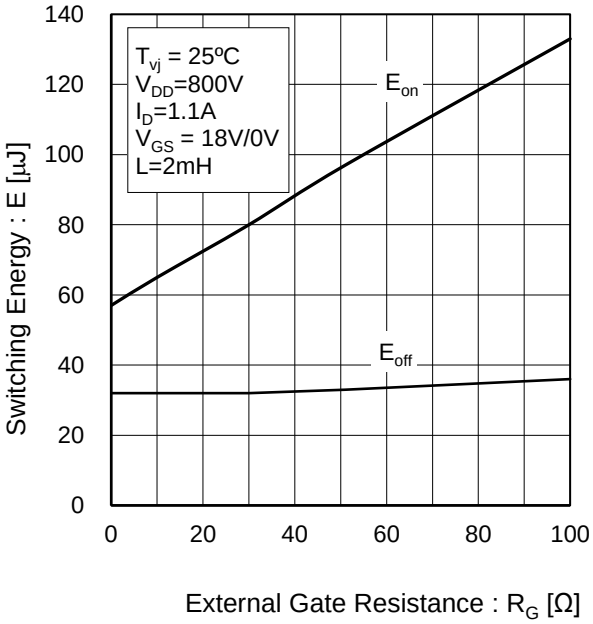


Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

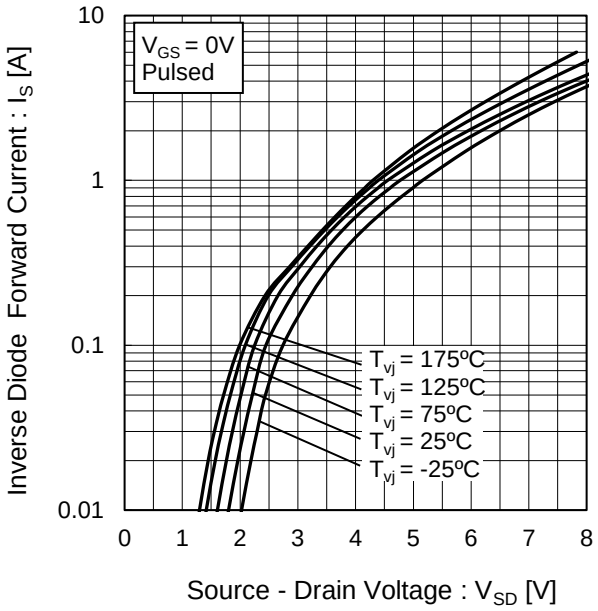
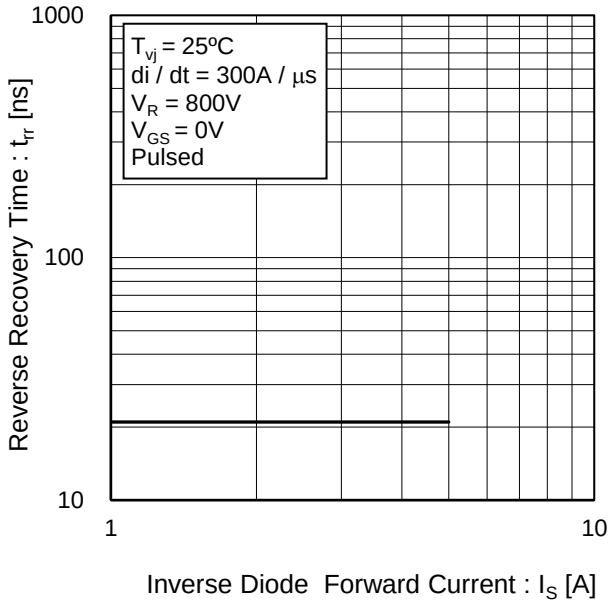


Fig.23 Reverse Recovery Time vs.Inverse Diode Forward Current



Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

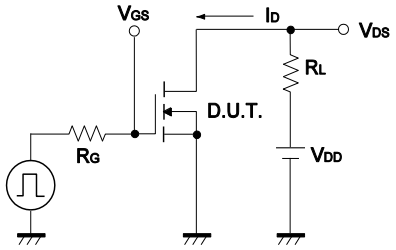


Fig.1-2 Switching Waveforms

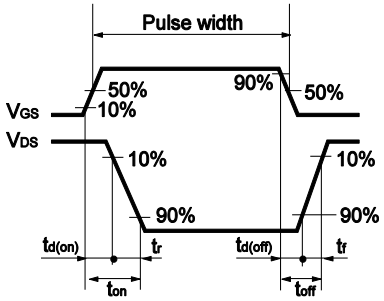


Fig.2-1 Gate Charge Measurement Circuit

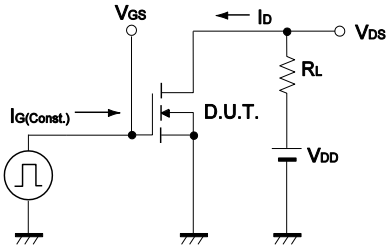


Fig.2-2 Gate Charge Waveform

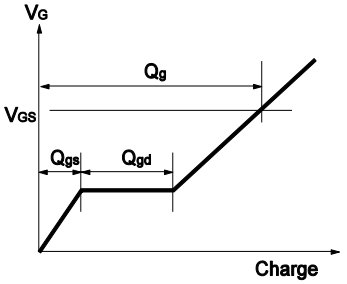


Fig.3-1 Switching Energy Measurement Circuit

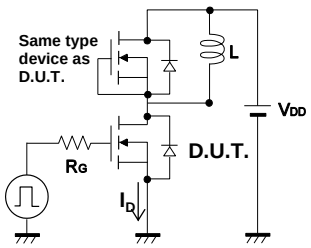


Fig.3-2 Switching Waveforms

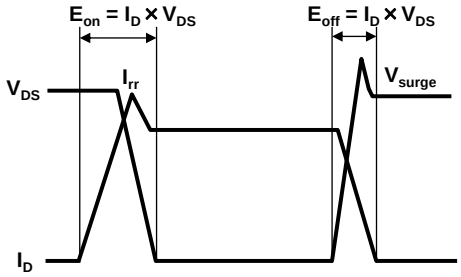


Fig.4-1 Reverse Recovery Time Measurement Circuit

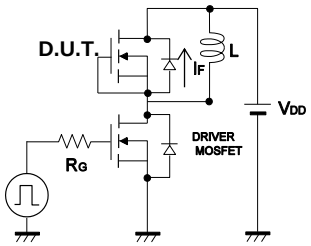
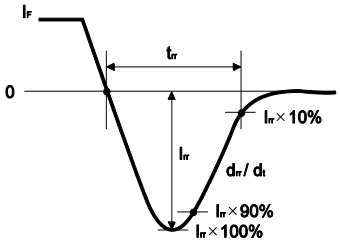
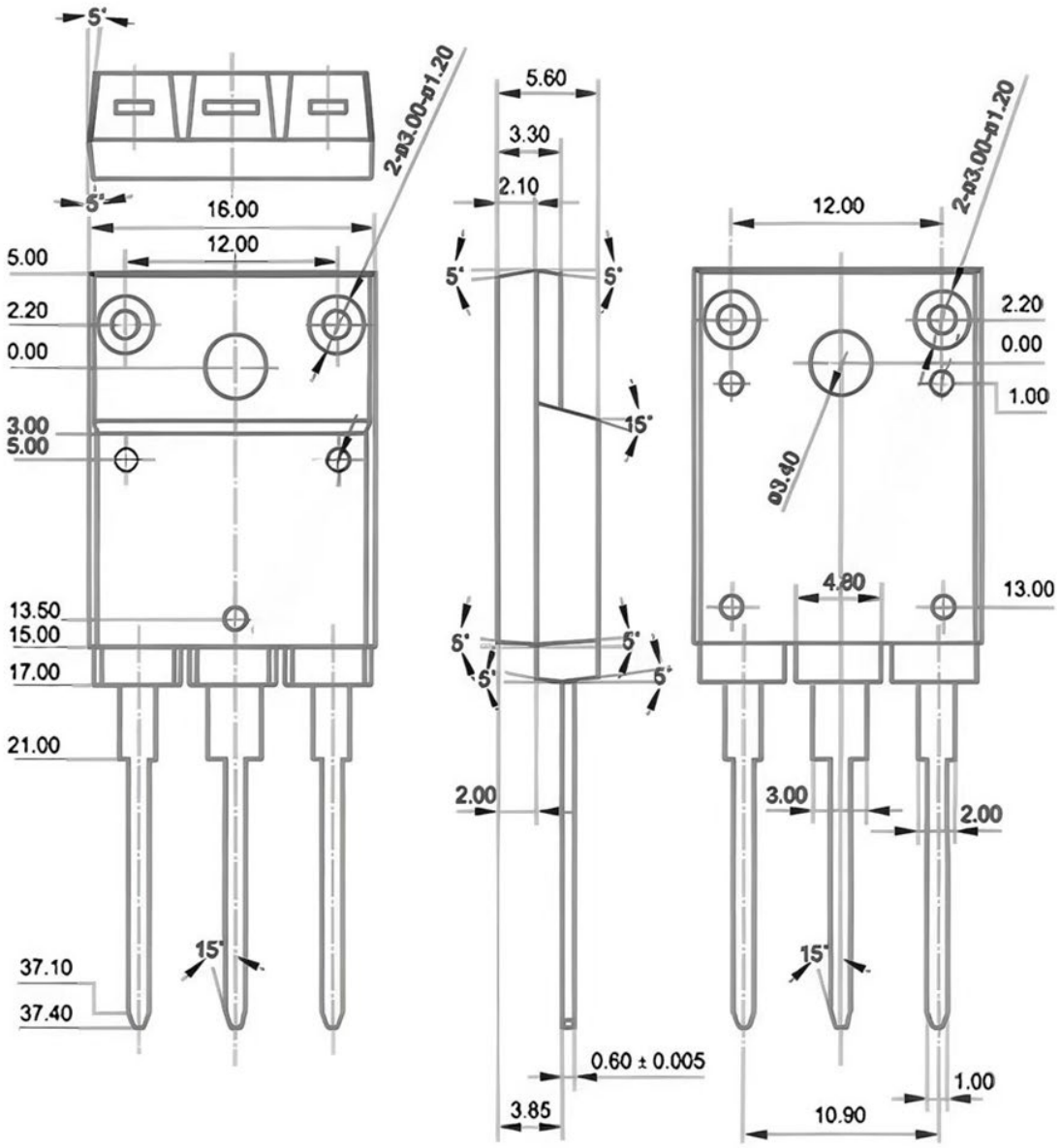


Fig.4-2 Reverse Recovery Waveform



Package Dimensions

Package TO-3PF



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.

Unikeyic Electronics

Global Electronic Components Distributor

Click to view pricing, inventory, delivery, and lifecycle information:

HXY MOSFET:

BZT52C13 HC4D20120A HOPA2340UA MMBT3904T SS10100 IRLML6246PBF P6SMB33CA P6SMB36CA HXY2101EI HAD8542ARZ HMCP602-I/SN P6SMB200A SQJA04EP-T1_BE3 DTC143ZE TPSMB100CA-VR SS5150B HXY2300MI HXY8205ES HC3D10170A HT7540-1 MAX487ESA PESD5V0S1BB BZT52C3V3S HT7150 SS1045 HESDNC5VB1AF-B TPSMB28A-VR SD15C SS510C US2M