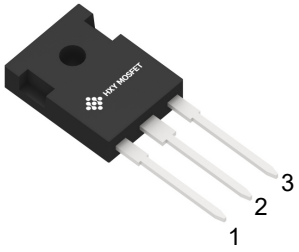
IPW65R029CFD7XKSA1

SiC Power MOSFET N-Channel Enhancement Mode

Features

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant



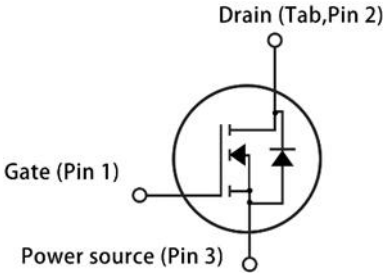
TO-247

Benefits

- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink reguirements

Applications

- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



Ordering Part Number	Package	Brand
IPW65R029CFD7XKSA1	TO-247	HXY MOSFET

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

Symbol	Parameter	Test conditions	Value	Unit	Note
V_{DSmax}	Drain-Source Voltage	V_{GS} = 0V, I_D = 100μA	650	V	
V_{GSmax}	Gate-Source voltage	AC (f > 1 Hz)	-10/+25	V	
V_{GSop}	Recommend Gate-Source Voltage	Static	-4/+18	V	
I_D	Continuous Drain current	V_{GS} = 18V, T_C = 25°C	99	A	Fig. 14
		V_{GS} = 18V, T_C = 100°C	70		
$I_{D,pulse}$	Pulsed Drain Current	Pulse with t_p limited by T_{jmax}	157	A	
P_D	Power Dissipation	T_C = 25°C, Tj = 175°C	333	W	Fig.16
T_j	Operating junction temperature		-55~175	°C	
T_{stg}	Storage temperature		-55~175	°C	
	TO-247 miunting torque	M3 Screw	0.7	Nm	

Thermal Characteristics

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{th(jc)}$	Thermal resistance from Junction to Case		0.45		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		40		K/W	

Electrical Characteristics (T_C = 25˚C unless other wise specified)

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown voltage	V_{GS} = 0V, I_D = 100μA	650			V	
$V_{GS(th)}$	Gate Threshold voltage	V_{GS} = $V_{DS,}$ I_D =16mA		3.0		V	Fig. 9
		V_{GS} = $V_{DS,}$ I_D =16mA, T_j=175°C		2.0			
I_{GSS}	Gate-Source Leakage current	V_{GS} =18V , V_{DS} = 0V			250	nA	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =650V, V_{GS} = 0V, T_j = 25°C		1	50	μA	
$R_{DS(on)}$	Drain-Source On-state Resistance	V_{GS} = 18V, I_D =40A		26	38	mΩ	Fig. 3, 4 , 5
		V_{GS} = 18V, I_D =40A,T_j = 175°C		35			
g_{fs}	Transconductance	V_{DS} = 18V, I_D =40A		27		S	Fig. 6
		V_{DS} = 18V, I_D =40A,T_j = 175°C		25			

Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
Q_{GS}	Gate to Source Charge	V_{DS} = 400V I_D =40A V_{GS} =-4V/18V		29		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			35			
Q_G	Total Gate Charge			74.5			

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 600V f =1 MHz V_{AC} = 25mV		2543		pF	Fig. 13
C_{oss}	Output Capacitance			173		pF	
C_{rss}	Reverse Transfer Capacitance			8		pF	
$R_{G(int)}$	Internal Gate Resistance	f=1 MHz, V_{AC} = 25mV		1.2		Ω	

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	V_{GS} = -4V, I_{SD} = 20A		4.3		V	Fig. 7,8
		V_{GS} = -4V, I_{SD} = 20A, T_j = 175°C		3.7			
I_S	Continuous Diode Forward Current	V_{GS} = -4V, T_C = 25°C		66		A	
$I_{S,\ pulse}$	Diode pulse Current	V_{GS} = -4V, pulse width t_p limited by T_{jmax}		157		A	
t_{rr}	Reverse Recovery Time	V_{GS} = -4V, I_{SD} = 40 A, V_R = 400V dif/dt = 3600A/us		14		nS	
Q_{rr}	Reverse Recovery Charge			263		nC	
I_{rrm}	Peak Reverse Recovery Current			20		A	

Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 400V, V_{GS} = -4/+18V I_D= 40 A, $R_{G(iext)}$ = 5Ω L = 294μH		2		nS	Fig.21
t_r	Rise Time			30		nS	
$t_{d(off)}$	Turn-Off Delay Time			25		nS	
t_f	Fall Time			9		nS	
E_{on}	Turn-On Energy			162		μJ	Fig.19
E_{off}	Turn-Off Energy			160		μJ	
E_{tot}	Total switching energy			322		μJ	

Typical Performance

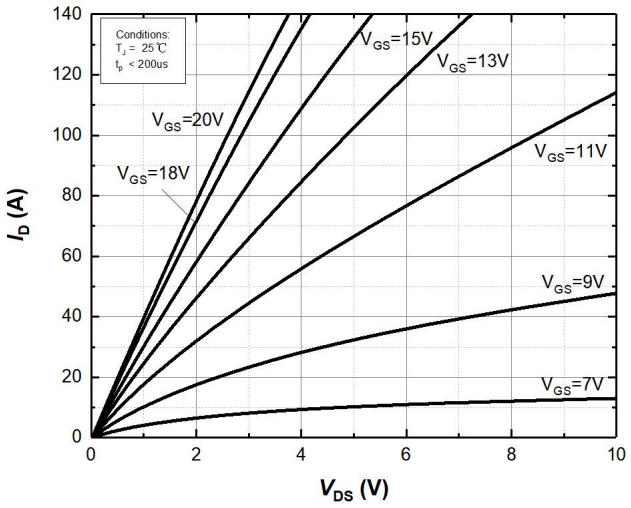


Figure 1. Output characteristics at Tj=25°C

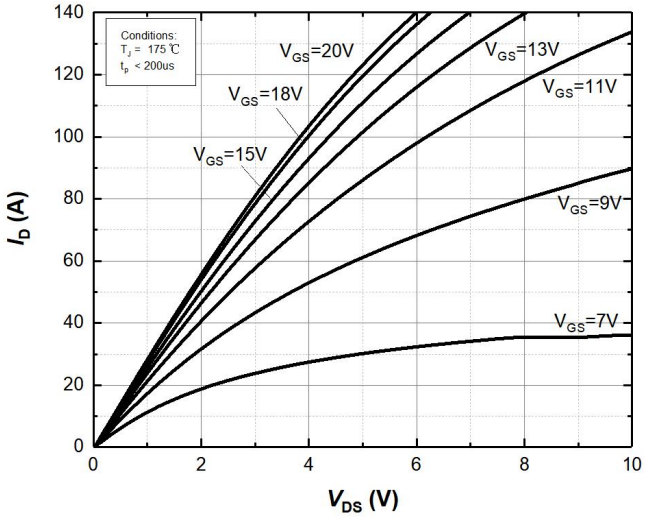


Figure 2. Output characteristics at Tj=175°C

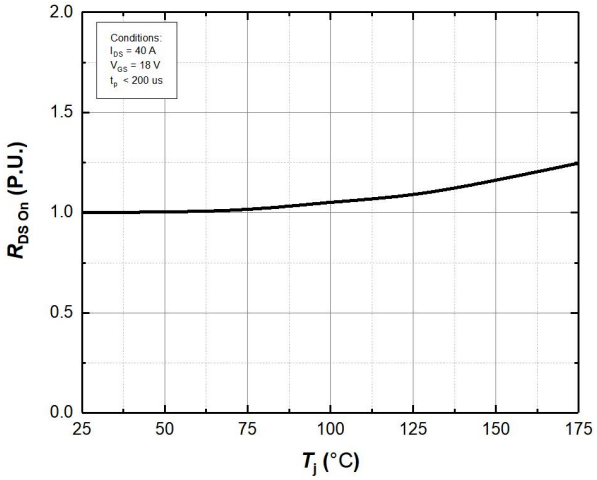


Figure 3. Normalized On-Resistance vs. Temperature

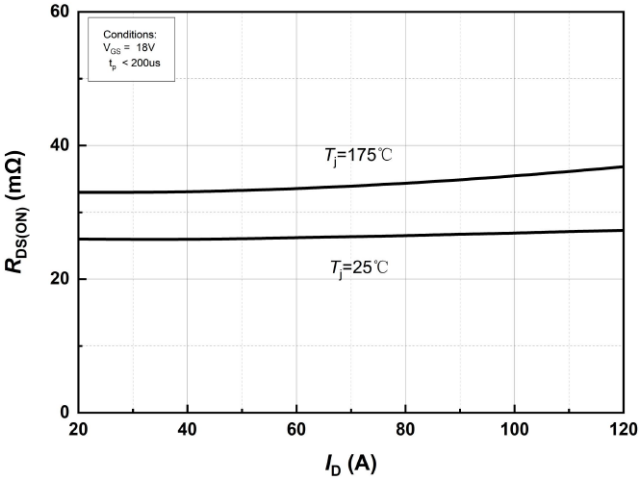


Figure 4. On-Resistance vs. Drain current for Various Temperature

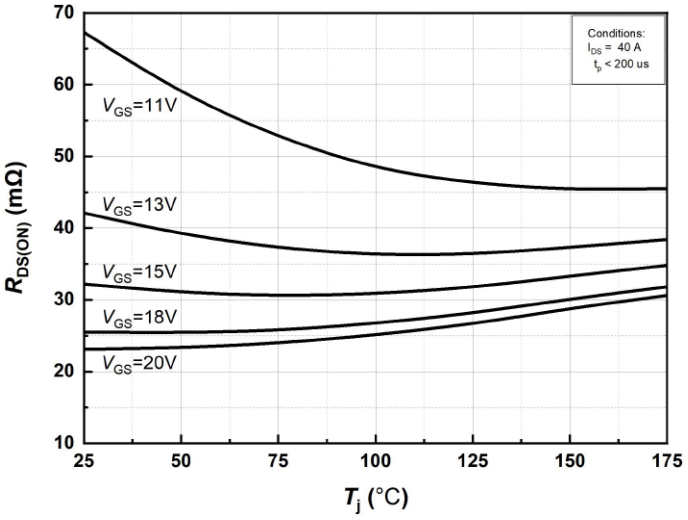


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

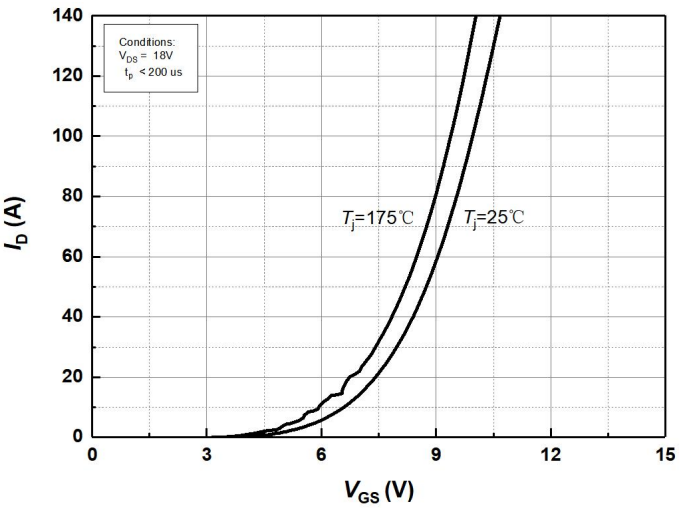


Figure 6. Transfer Characteristics for Various Junction Temperatures

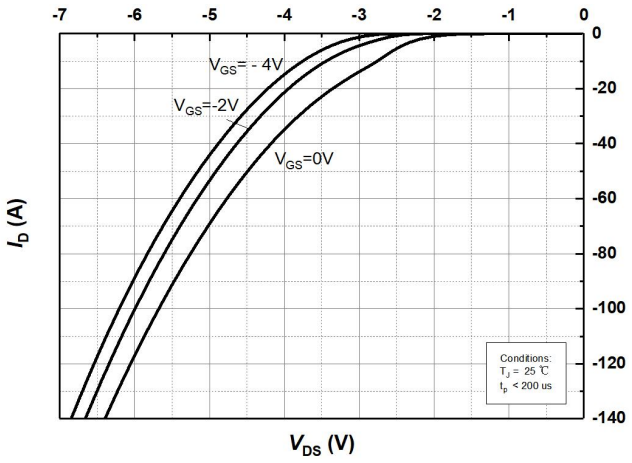


Figure 7. Body Diode Characteristics at Tj=25°C

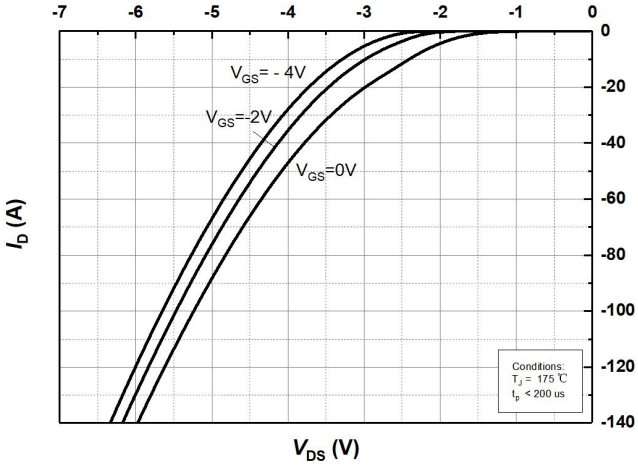


Figure 8. Body Diode Characteristics at Tj=175°C

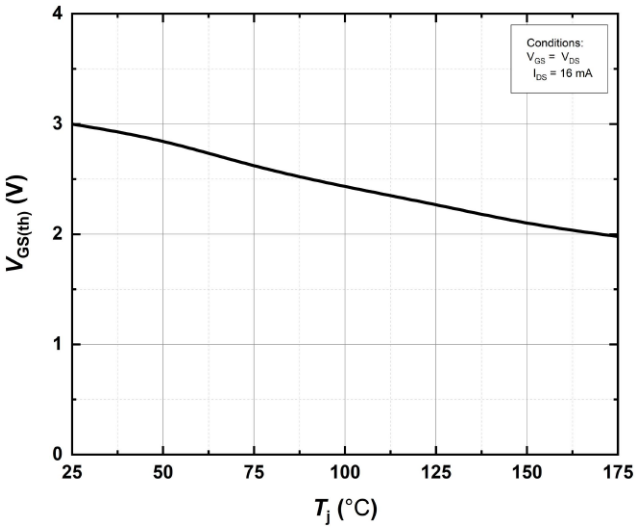


Figure 9. Threshold Voltage vs. Temperature

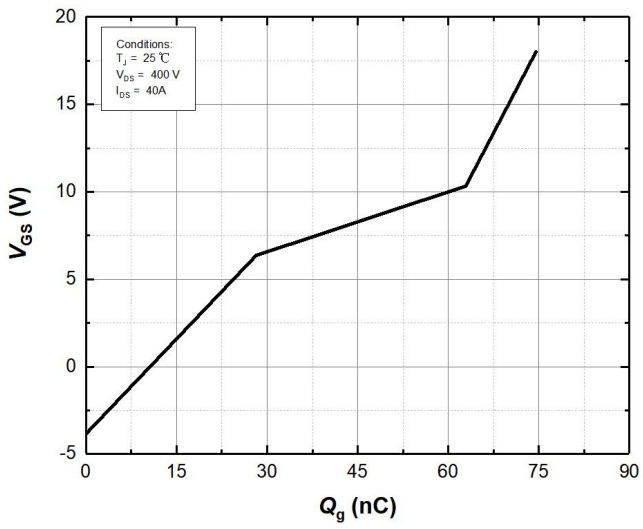


Figure 10 Gate Charge Characteristics

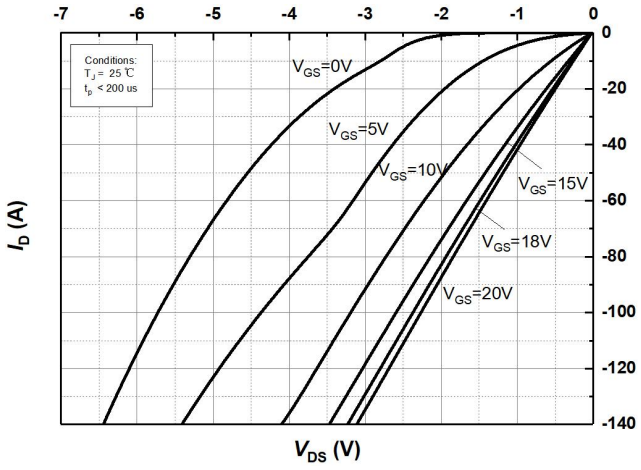


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

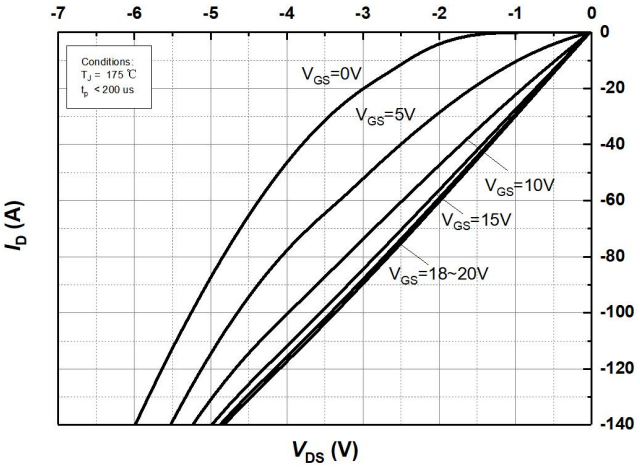


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

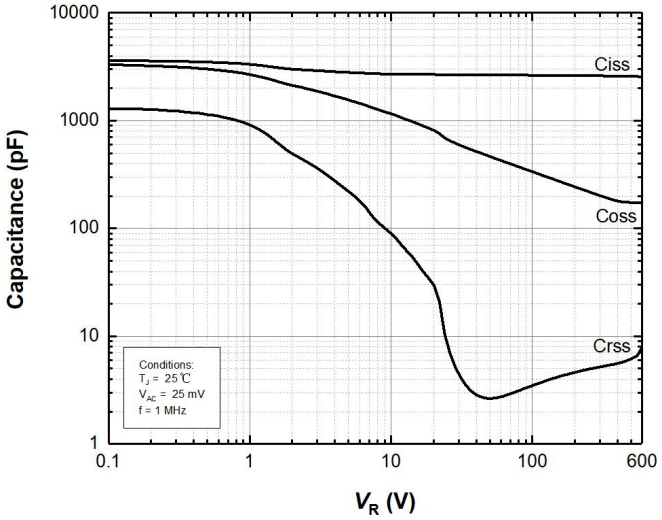


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

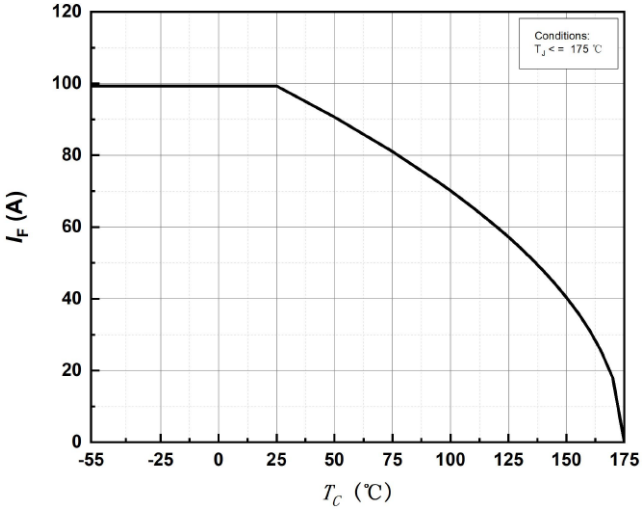


Figure 14. Continuous Drain Current Derating vs Case Temperature

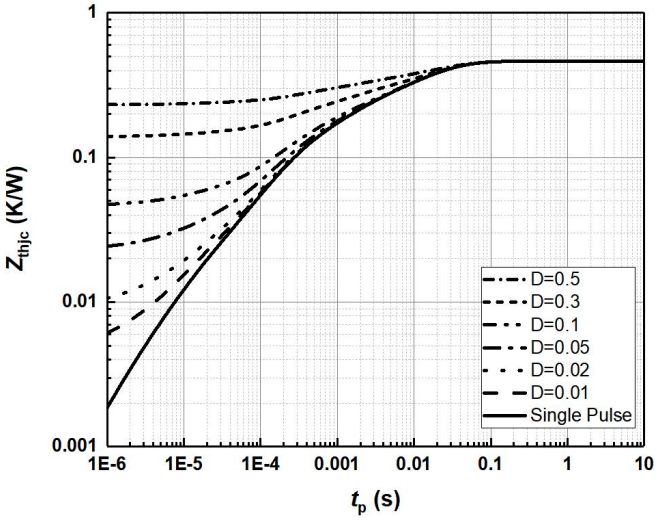


Figure 15.Transient Thermal Impedance (Junction – Case)

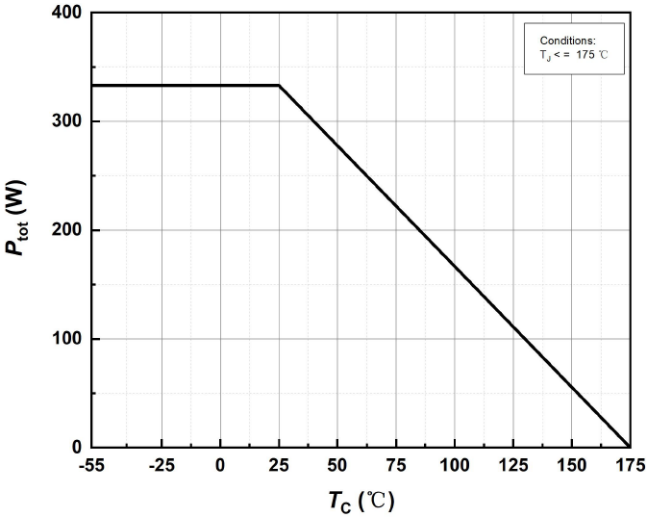


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

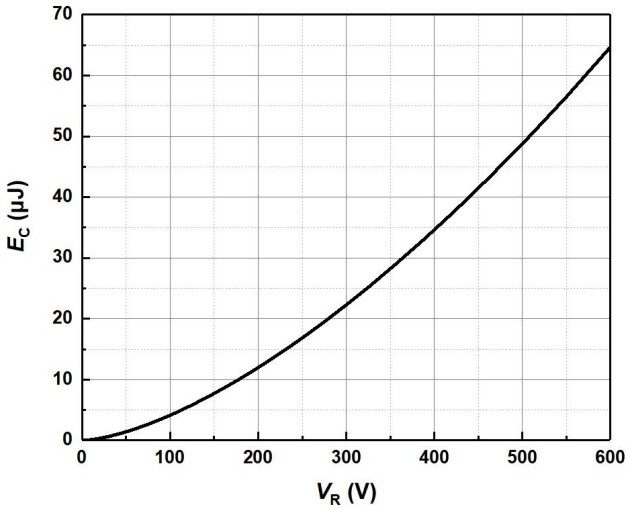


Figure 17. Output Capacitor Stored Energy

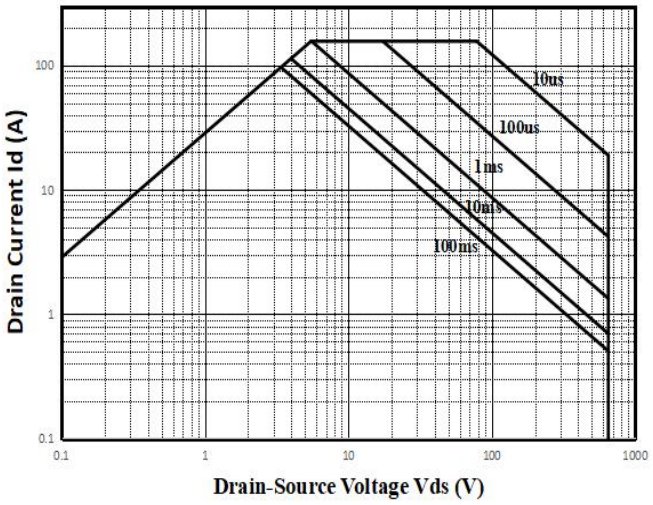


Figure 18. Safe Operating Area

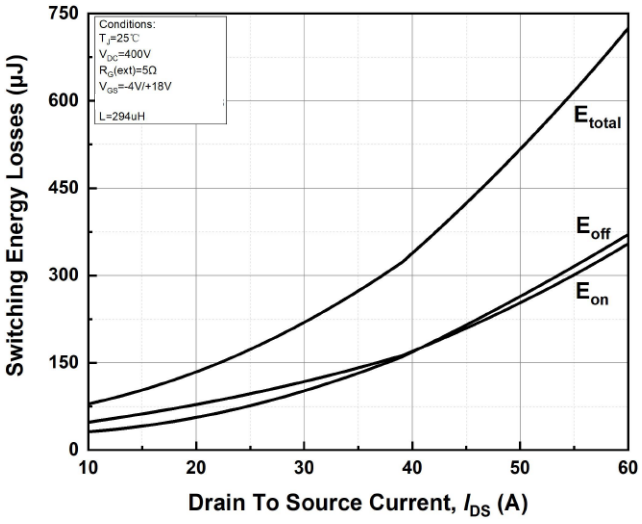


Figure 19. Clamped Inductive Switching Energy vs. Drain Current(V_{DD} = 400V)

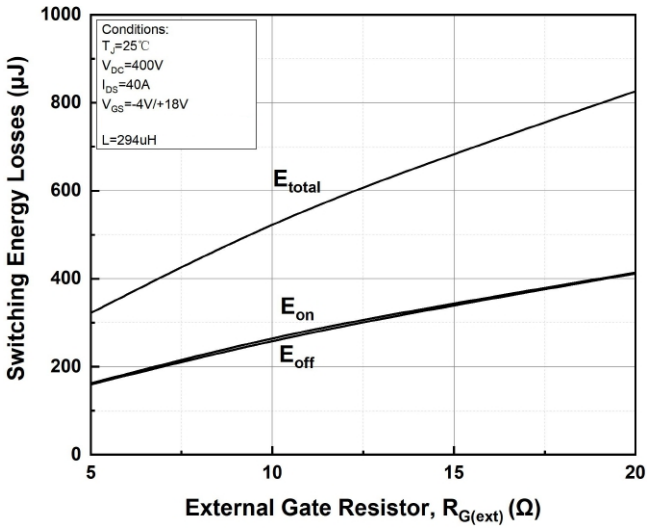


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

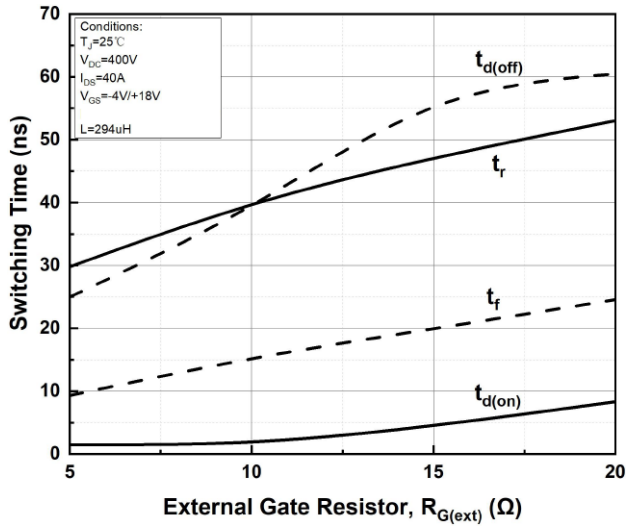
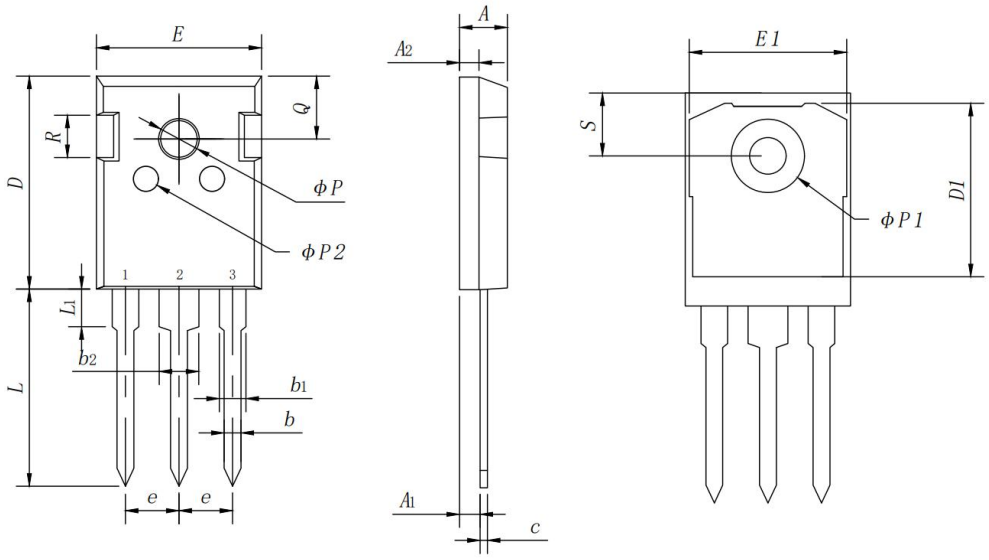


Figure 21. Switching Times vs. $R_{G(ext)}$

Package Dimensions

Package TO-247



SYMBOLS	DIMENSION IN MM		
	MIN	NOM	MAX
A	4.70	5.00	5.30
A_1	2.24	2.41	2.58
A_2	1.80	2.00	2.20
b	1.00	1.20	1.40
b_1	1.60	2.10	2.60
b_2	2.60	3.10	3.60
c	0.40	0.60	0.80
D	20.0	21.00	22.0
D1	15.24	16.24	17.24
E	15.50	15.75	16.01
E1	13.77	14.02	14.27
e	5.20	5.44	5.72
L	19.70	19.95	20.20
L_1	3.85	4.15	4.45
ΦP	3.55	3.60	3.65
Φp1	7.14	7.19	7.24
Φp2	2.35	2.40	2.45
Q	5.89	6.15	6.40
R	4.30	4.60	4.90
S	6.04	6.17	6.30

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:

HSD15C.TCT PESDNC2XD5VBL HLY323BC1524L HSEN3611D3 PJSD24CW_R1 RLSD32A121V TPSMB28A-VR HACPDQC5V0-HF HAZ4007-01H HRCLAMP3371ZCTFT HSEN2411D3 LM393DR-HXY ESD5LM5.0C-HXY PESDSC2FD5VU PJEC5V0M1FN2 60N06 AQ15C-01FTG HCEZ36V,L3F HESDSLC3V3D3B PESDNC2XD5VBF HPTVSUC3D5VB HSG3D15B3.3MA PESDLC2FD3V3BH AZ4007-01H HESD36VD3B AZ4836-01L BV05C-H ESD5L5.0C-HXY HSTS521050B331 TPSMB100CA-VR