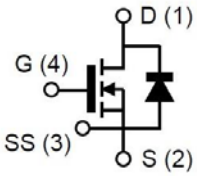
DAC018N120ZZ3

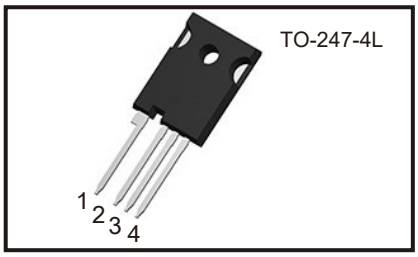
Silicon Carbide Enhancement Mode MOSFET

V_{DSS}	1200V
$I_{D(@25℃)}$	125A
$R_{DS(ON)\ typ.}$	18mΩ

Features

- High blocking voltage with low Rds(on)
- High frequency operation with low Capacitance
- Simple to drive with -4V/+15V gate
- Robust body diode with low Qrr
- 100% Avalanche Tested





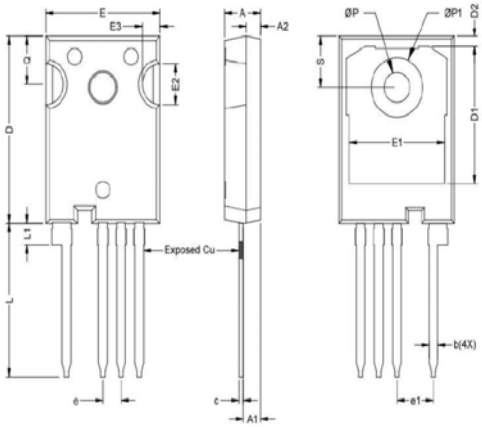
Benefits

- Superior robustness and system reliability
- Higher system efficiency
- Easier paralleling without thermal runaway
- Capable of high temperature application
- Faster and more efficient switching

Applications

- EV motor drives
- EV/HEV charging station
- Energy storage and Battery charging
- High voltage DC-DC converters
- Solar / Wind Inverters
- UPS and PFC

Package Dimensions



Absolute Maximum Ratings

(Tc = 25℃ unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage	V_{GS}=0V I_D=100μA	V_{DS}	1200	V
Gate-Source Voltage (dynamic)	AC (f>1 Hz, duty cycle<1%, pulse width<200ns)	V_{GS}	-8/+19	V
Gate-Source Voltage (static)		$V_{GS(op)}$	-4/+15	V
Drain Current-Continuous	V_{GS}=18V@ T_C=25°C V_{GS}=18V@ T_C=100°C	I_D	125 90	A
Pulse Drain Current		$I_{D,pulse}$	250	A
Power Dissipation		P_D	577	W
Storage Temperature Range		T_{STG}	-55 to +175	°C
Operating Junction Temperature Range		T_J	-55 to +175	°C
Soldering Temperature		T_L	260	°C
Avalanche Capability, single pulse *	V_{DD}=100V V_{GS}=10V L=2mH	I_{AV}	46	A
Avalanche Capability, single pulse**	V_{DD}=100V V_{GS}=10V L=2mH	E_{AV}	2300	mJ

* 100% tested in 60% rating
** 100% tested in 36% rating

DIM	MILLIMETERS		
	MIN	TYP.	MAX
A	4.82	5.02	5.22
A1	2.21	2.41	2.61
A2	1.8	2	2.2
b	0.95	1.2	1.45
b1	1.95	2.2	2.45
b2	2.95	3.2	3.45
c	0.35	0.6	0.85
D	22.34	22.54	22.74
D1	16.3	16.55	16.8
D2	0.99	1.19	1.39
E	15.74	15.94	16.14
E1	13.01	13.26	13.51
E2	4.71	4.91	5.11
E3	2.26	2.46	2.66
e	2.54BSC.		
e1	5.08BSC.		
L	18.23	18.48	18.73
L1	2.35	2.60	2.85
P	3.41	3.61	3.81
P1	6.94	7.19	7.44
Q	5.59	5.79	5.99
S	5.97	6.17	6.37

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
OFF Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V，I_D =0.1mA		1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =1200V V_{GS} =0V	T_J =25℃	-	0.5	100	μA
			T_J =175℃	-	5	200	
Gate-Source Leakage Current	I_{GSS}	V_{GS} =15V，V_{DS} =0V		-	5	100	nA
		V_{GS} =-4V，V_{DS} =0V		-100	-5	-	
ON Characteristics							
Gate Threshold Voltage ***	$V_{GS(th)}$	V_{DS} = V_{GS}，I_D =20mA	T_J =25℃	2.2	3.0	4.2	V
			T_J =175℃	-	2.2	-	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} =15V，I_D =50A	T_J =25℃	-	18	24	mΩ
			T_J =175℃	-	32	-	
Transconductance	g_{fs}	V_{DS} =20V，I_D =50A	T_J =25℃	-	43	-	S
			T_J =175℃	-	41	-	
Internal Gate Resistance	$R_{G(int.)}$	f =1MHz，I_D =0A		-	1.2	-	Ω
Dynamic Characteristics							
Input Capacitance	C_{iss}	V_{DS} =1000V V_{GS} =0V f =100kHz V_{AC} =25mV		-	4800	-	pF
Output Capacitance	C_{oss}			-	168	-	
Reverse Transfer Capacitance	C_{rss}			-	16	-	
Coss Stored Energy	E_{oss}			-	100	-	μJ
Turn-On Switching Energy	E_{on}	V_{DS} =800V，V_{GS} =-4/+15V I_D =50A，$R_{G(ext)}$ =2.0Ω L=200μH		-	590	-	μJ
Turn-Off Switching Energy	E_{off}			-	130	-	
Switching Characteristics							
Turn-On Delay Time	$t_{d(on)}$	V_{DS} =800V，V_{GS} =-4/+15V I_D =50A，$R_{G(ext)}$ =2.0Ω L=200μH		-	20	-	ns
Rise Time	t_r			-	28	-	
Turn-Off Delay Time	$t_{d(off)}$			-	43	-	
Fall Time	t_f			-	13	-	
Total Gate Charge	Q_g	V_{DS} =800V V_{GS} =-4/+15V I_D =50A		-	210	-	nC
Gate to Source Charge	Q_{gs}			-	56	-	
Gate to Drain Charge	Q_{gd}			-	85	-	
Body Diode Characteristics							
Inverse Diode Forward Voltage	V_{SD}	V_{GS}=-4V，I_{SD}=40A	T_J =25℃	-	4.4	-	V
Inverse Diode Forward Voltage			T_J =175℃	-	3.9	-	V
Continuous Diode Forward Current	I_S	V_{GS}=-4V，T_J =25°C		-	100	-	A
Reverse Recovery Time	T_{rr}	I_{SD}=50A，V_{GS}=-4V V_R=800V，$R_{G(ext)}$ =10Ω dif/dt=1750A/μs L=200μH		-	25	-	ns
Reverse Recovery Charge	Q_{rr}			-	450	-	nC
Peak Reverse Recovery Current	I_{rrm}			-	33	-	A
Thermal Resistance							
Thermal Resistance, Junction-to-Case	$R\theta_{JC}$			-	0.26	0.32	°C/W

*** Turn-off with -4V gate bias is highly recommended

Typical Performance

Fig 1. Output Characteristics, T_J = -40°C

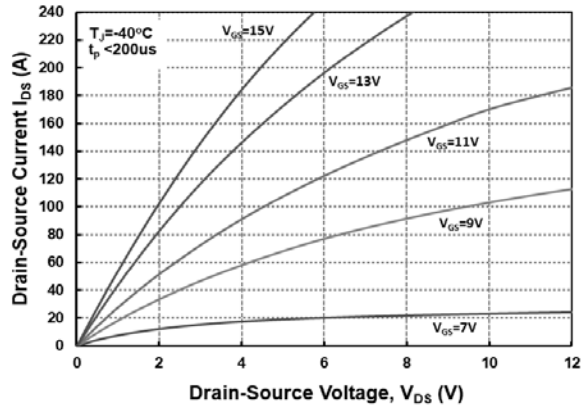


Fig 2. Output Characteristics, T_J = 25°C

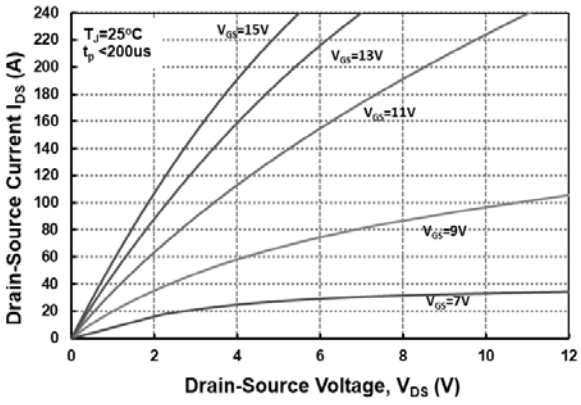


Fig 3. Output Characteristics, T_J = 175°C

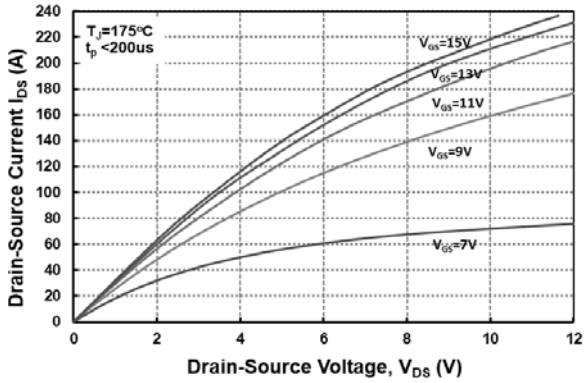


Fig 4. Normalized On-Resistance vs. Temperature

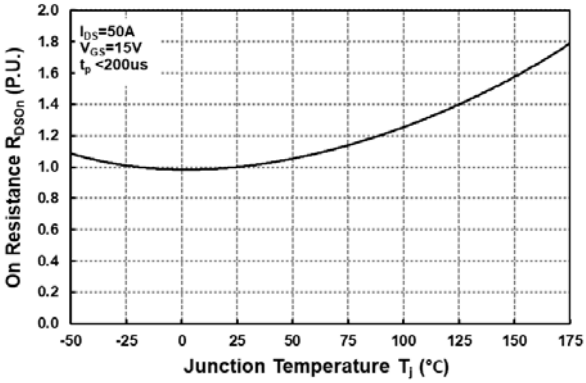


Fig 5. On-Resistance vs. Drain Current for Various Temperatures

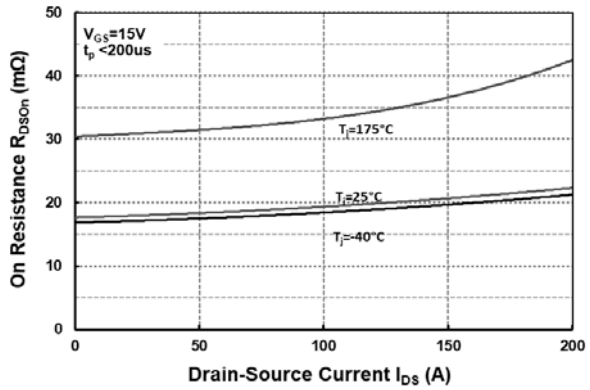
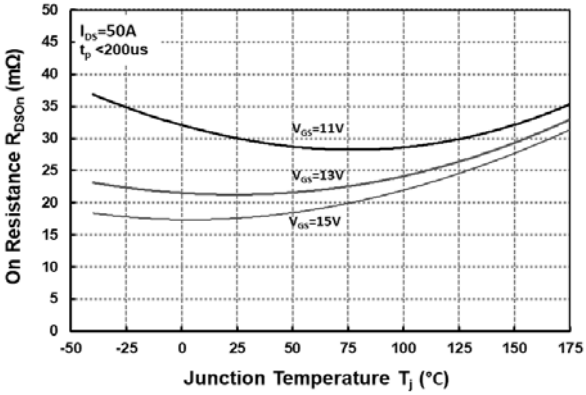


Fig 6. On-Resistance vs. Temperature for Various Gate Voltage



Typical Performance

Fig 7. Transfer Characteristic for Various Junction Temperatures

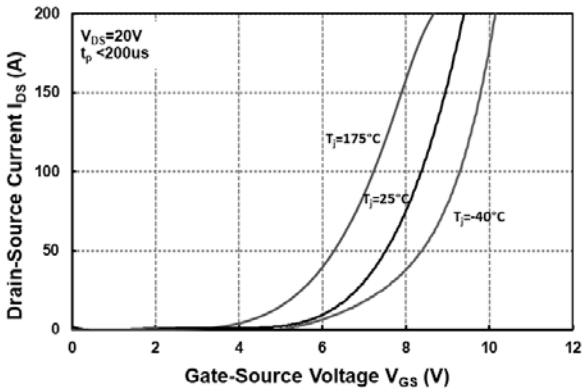


Fig 8.Body Diode Characteristics @ -40°C

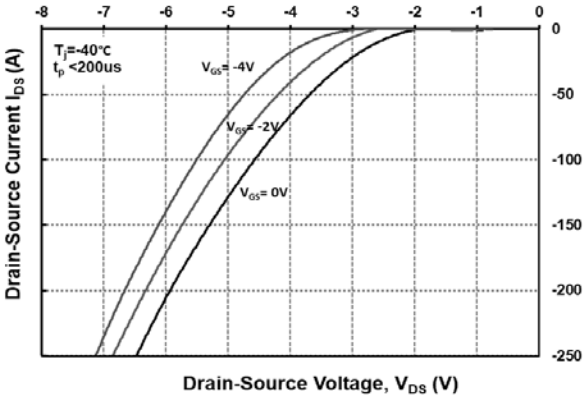


Fig 9. Body Diode Characteristics @ 25°C

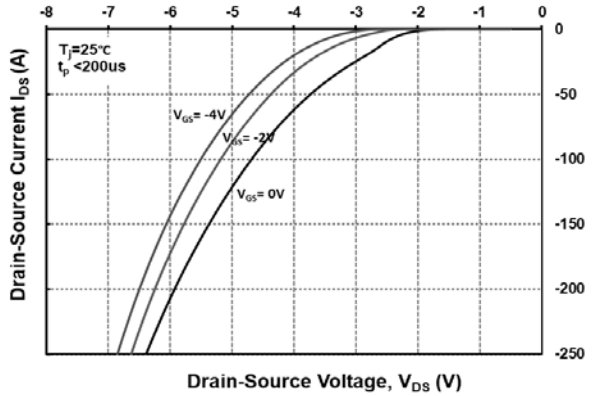


Fig 10. Body Diode Characteristics @ 175°C

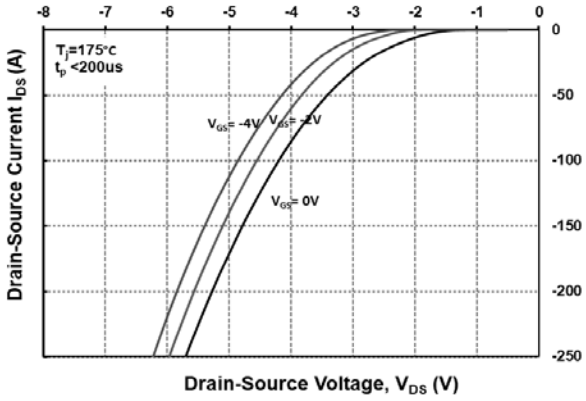


Fig 11. Threshold Voltage vs. Temperature

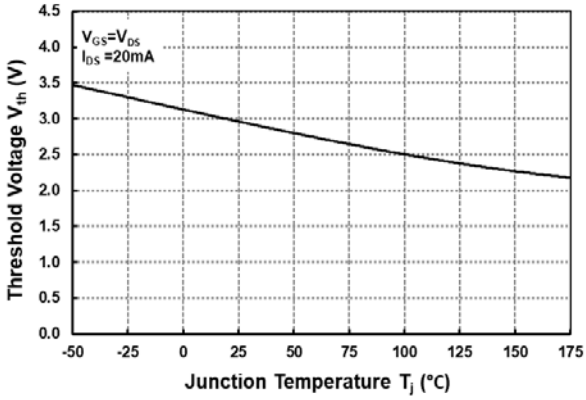
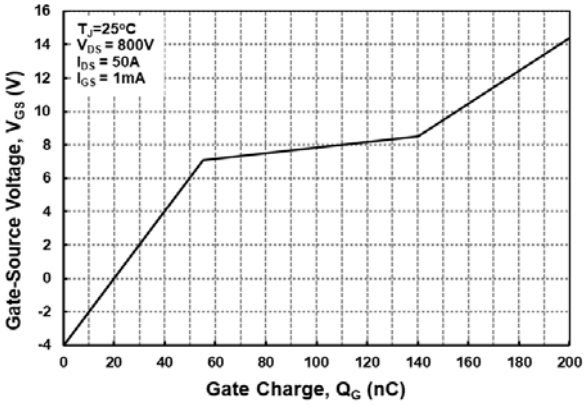


Fig 12. Gate Charge Characteristics



Typical Performance

Fig 13. 3rd Quadrant Characteristics @ -40°C

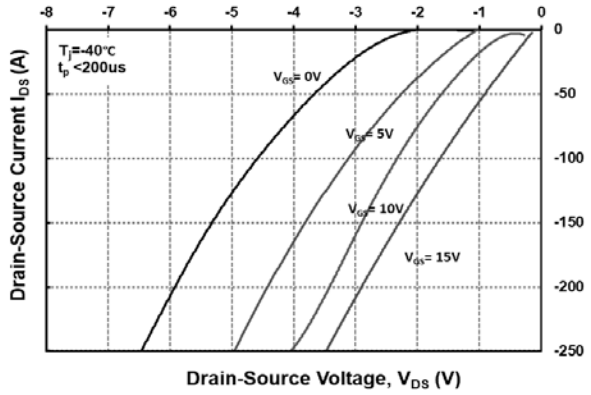


Fig 14. 3rd Quadrant Characteristics @ 25°C

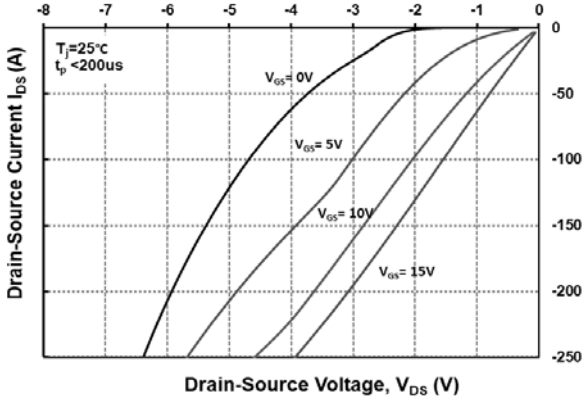


Fig 15. 3rd Quadrant Characteristics @ 175°C

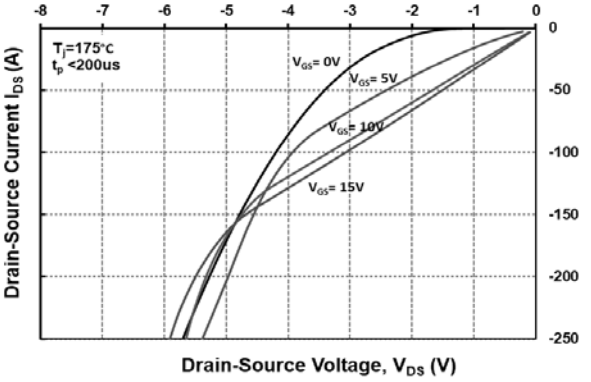


Fig 16. Output Capacitor Stored Energy

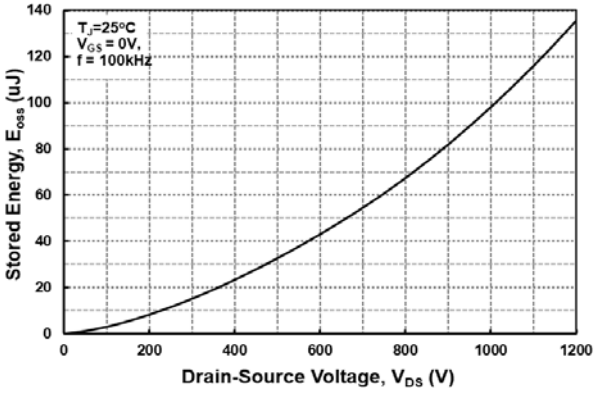


Fig 17. Capacitances vs. Drain-Source Voltage (0-200V)

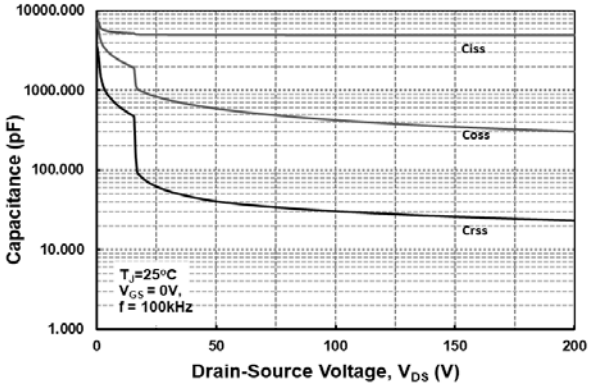
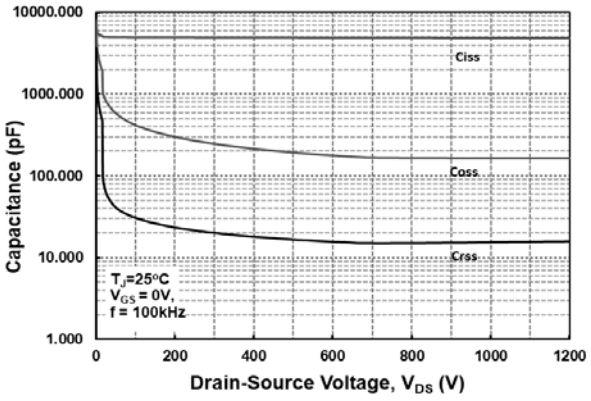


Fig 18. Capacitances vs. Drain-Source Voltage (0-1200V)



Typical Performance

Fig 19. Continuous Drain Current Derating vs. Case Temperature

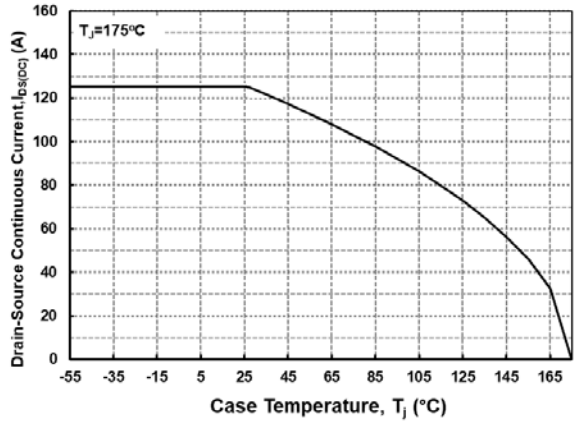


Fig 20. Maximum Power Dissipation Derating vs. Case Temperature

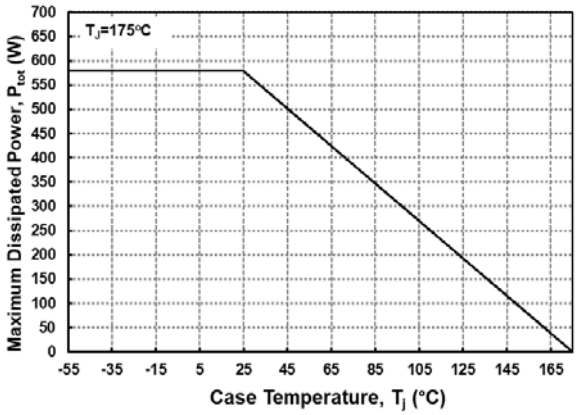


Fig 21. Transient Thermal Impedance (Junction – Case)

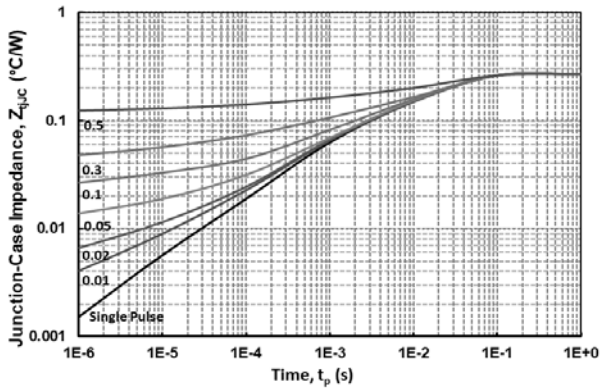


Fig 22. Safe Operating Area

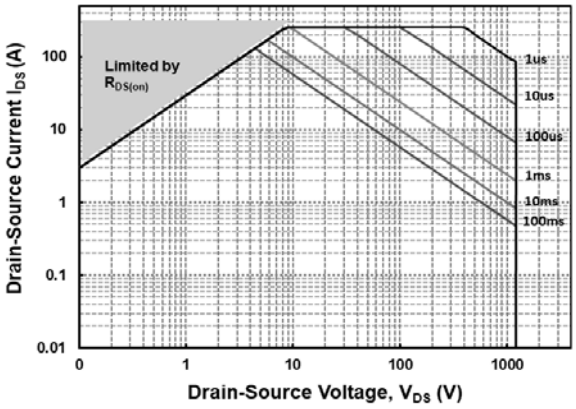


Fig 23. Clamped Inductive Switching Energy vs Drain Current (V_{DD} = 800V)

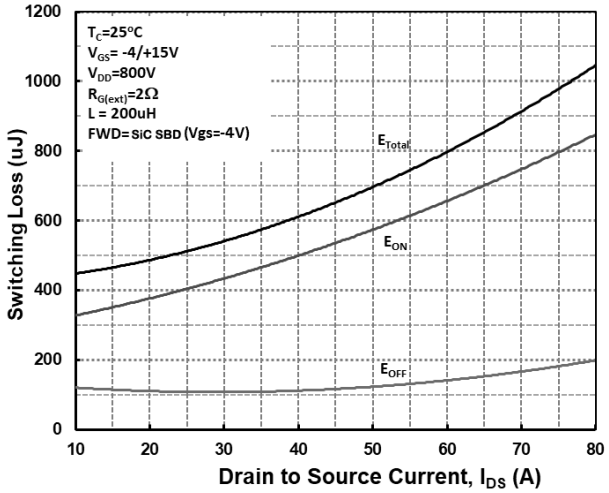
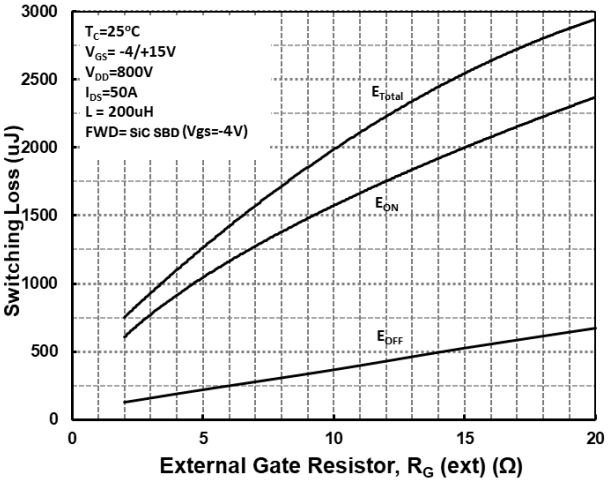


Fig 24. Clamped Inductive Switching Energy vs External Gate Resistor $R_{G(ext)}$



Typical Performance

Fig 25. Switching Times vs Drain Current (V_{DD} = 800V)

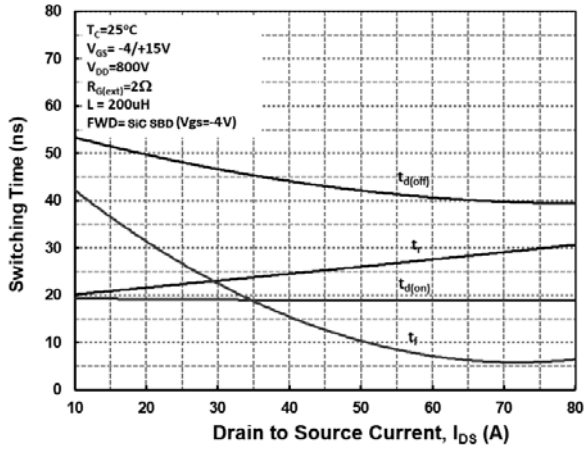
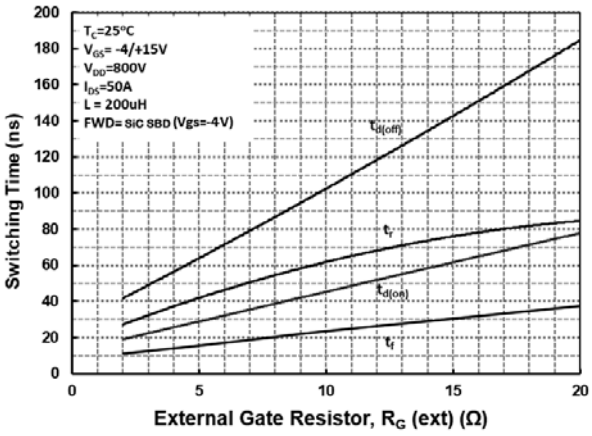


Fig 26. Switching Times vs External Gate Resistor $R_{G(ext)}$



Disclaimer

DACO Semiconductor reserves the right to make modifications, enhancements, improvements, corrections, or other changes to this document and any product described herein without prior notice.For the most up-to-date version, please visit our website.

DACO Semiconductor makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does DACO Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any liability, including without limitation special, consequential or incidental damages.

Purchasers are responsible for its products and applications using DACO Semiconductor products, including compliance with all laws, regulations, and safety requirements or standards, regardless of any support or application information provided by DACO Semiconductor. “Typical” parameters that may be provided in DACO Semiconductor datasheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typical” must be validated for each customer application by the customer’s technical experts.

DACO Semiconductor products are not designed, authorized, or warranted to be suitable for use in life support, life-critical or safety-critical systems, or equipment, nor in applications where failure or malfunction of DACO Semiconductor’s product can reasonably be expected to result in personal injury, death or severe property or environmental damage. DACO Semiconductor accepts no liability for the inclusion and/or use of DACO Semiconductor’s products in such equipment or applications and therefore such inclusion and/or use is at the customer’s own risk.

Purchasers who buy or use DACO Semiconductor products for any unintended or unauthorized applications are required to indemnify and absolve DACO Semiconductor, its suppliers, and distributors from any claims, costs, damages, expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that DACO Semiconductor was negligent regarding the design or manufacture of the part.

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 by any information storage and retrieval system, or otherwise, without the prior written permission of DACO Semiconductor Co., Ltd.