DAC014N120Z5

Silicon Carbide Enhancement Mode MOSFET

Features

- High blocking voltage
- High frequency operation
- · Low on-resistance
- · Fast intrinsic diode with low reverse recovery
- 100% Avalanche tested

Benefits

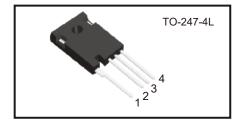
- · Higher system efficiency
- High temperature application
- · Hard switching & higher reliability
- Parallel device convenience without thermal runaway
- Easy to drive

Applications

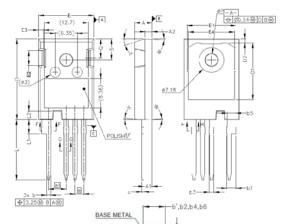
- Motor Drives
- Solar Inverters
- AC/DC converters
- DC/DC converters
- Uninterruptible power supplies

G (4) SS (3)





Package Dimensions



SECTION "F-F", "G-G" AND "H-H" SCALE: NONE

PLATING

н								
ļ	SYMBOL	MILLIMETERS		OVALDOL	MILLIMETERS			
		MIN	MAX	SYMBOL	MIN	MAX		
	Α	4.83	5.21	Е	15.75	16.13		
١	A1	2.29	2.54	E1	13.10	14.15		
l	A2	1.91	2.16	E2	3.68	5.10		
	b'	1.07	1.28	E3	1.00	1.90		
	b	1.07	1.33	E4	12.38	13.43		
l	b1	2.39	2.94	е	2.54 BSC			
Ì	b2	2.39	2.84	e1	5.08 BSC			
l	b3	1.07	1.60	N	4			
ļ	b4	1.07	1.50	L	17.31	17.82		
	b5	2.39	2.69	L1	3.97	4.37		
J	b6	2.39	2.64	L2	2.35	2.65		
l	c'	0.55	0.65	øΡ	3.51	3.65		
l	С	0.55	0.68	Q	5.49	6.00		
1	D	23.30	23.60	S	6.04	6.30		
١	D1	16.25	17.65	T	17.5°	REF.		
	D2	0.95	1.25	W	3.5 °	3.5 ° REF.		
				X	4°	REF.		

Absolute Maximum Ratings

(Tc = 25°C unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage V _{ls} =0V l _D =100μA	V _{DS}	1200	V
Gate - Source Voltage (dynamic) T _{surge} <100ns	V _{GS(max.)}	-8/+19	V
Gate - Source Voltage (static)	V _{GS(op)}	-4/+15	v
Drain Current-Continuous Ves =15V,Tc=25°C Ves =15V,Tc=100°C	I _D	135 95	Α
Pulse Drain Current	I _{D,pulse}	400	A
Total Power Dissipation	P _D	600	w
Storage Temperature Range	T _{STG}	-55 to +175	°C
Operating Junction Temperature Range	TJ	-55 to +175	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



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

OFF Characteristics Drain-Source Breakdown Voltage BV _{oss} V _{os} =0V · I ₀ =0.1mA 1200 . . V Zero Gate Voltage Drain Current I _{loss} V _{os} =0V · V _{os} =1200V - 1 50 μA Gate-Source Leakage Current I _{loss} V _{os} =15V · V _{os} =0V - 1 200 nA ON Characteristics Gate Threshold Voltage V _{os} (los) V _{os} =15V · V _{os} =0A - 14 18 mΩ Drain-Source On-State Resistance R _{Os(los)} V _{os} =15V · I _o =80A - 68 - S Dynamic Characteristics Input Capacitance C _{oss} V _{os} =20V · I _o =80A - 68 - S Quiput Capacitance C _{oss} V _{os} =20V · I _o =80A - 68 - S Pythamic Characteristics Input Capacitance C _{oss} V _{os} =1000V - 260 - pF Reverse Transfer Capacitance C _{css} V _{os} =4000V - 260 - pF	Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit	
Vos = 0.0								
Cate-Source Leakage Current I _{GSS} V _{GS} =15V·V _{GS} =0V - 1 200 nA	Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V , I _D =0.1mA	1200	-	-	٧	
ON Characteristics Vos(th) Vos = Vos · I₀ = 27mA 2.0 2.5 3.8 V Drain-Source On-State Resistance Ros(on) Vos = 15V · I₀ = 80A - 14 18 mΩ Transconductance grs V₁s = 20V · I₀ = 80A - 68 - S Dynamic Characteristics Uput Capacitance C₀ss V₀s = 100V · I₀ = 80A - 68 - S Post Stored Energy E₀s V₀s = 100V · V₀s = 1000V V₀s = 00V · V₀s = 1000V V₀s = 00V · V₀s = 00V V₀s = 00	Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} =0V , V _{DS} =1200V	-	1	50	μA	
Gate Threshold Voltage V _{OS} (th) V _{DS} = V _{OS} · I _D = 27mA 2.0 2.5 3.8 V Drain-Source On-State Resistance R _{OS} (m) V _{OS} = 15V · I _D = 80A - 14 18 mΩ Transconductance g₁ V₁S = 20V · I _D = 80A - 68 - S Dynamic Characteristics Input Capacitance C₁SS V₀S = 1000V - 6300 - PF Reverse Transfer Capacitance C₁SS V₀S = 00V - 16 - PF Reverse Transfer Capacitance C₁SS V₀S = 800V · V₀S = 4V/+15V - 16 - PF Reverse Transfer Capacitance E₀S V₀S = 800V · V₀S = 4V/+15V - 1380 - µJ Turn-On Switching Energy E₀S V₀S = 800V · V₀S = 4V/+15V - 1380 - µJ Turn-Off Switching Energy E₀s V₀S = 800V · V₀S = 800V - 34 - N Switching Characteristics t₁ V₀S = 44I+15V - 33 -	Gate-Source Leakage Current	I _{GSS}	V _{GS} =15V , V _{DS} =0V	-	1	200	nA	
Drain-Source On-State Resistance R _{DS(m)} V _{GS} = 15V · I _D = 80A - 14 18 mΩ								
Transconductance Grs V _{1S} = 20V·1 ₀ =80A - 68 - S	Gate Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_D = 27mA$	2.0	2.5	3.8	٧	
Dynamic Characteristics Input Capacitance C _{1ss} C _{1ss}	Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =15V , I _D =80A	-	14	18	mΩ	
Input Capacitance	Transconductance	g fs	V _{DS} = 20V · I _D =80A	-	68	-	S	
Output Capacitance C _{oss} V _{DS} =1000V V _{GS} =0V Freq.=100kHz - 260 - pF Reverse Transfer Capacitance C _{rss} Freq.=100kHz - 16 - C _{oss} Stored Energy E _{oss} V _{DS} =800V · V _{OS} =-4V/+15V I _D =80A · R _{G(ext)} =2.0Ω L=100µH - 1380 - μJ Turn-Off Switching Energy E _{off} V _{DS} =800V · V _{OS} =-4V/+15V I _D =80A · R _{G(ext)} =2.0Ω - 1380 - μJ Switching Characteristics Turn-On Delay Time t _{G(on)} V _{DS} =800V V _{OS} =-4V+15V I _D =80A - 34 - - rs -								
Reverse Transfer Capacitance Crss Feq.=100kHz - 166 - - - - - - - -	Input Capacitance	C _{iss}		-	6300	-		
Reverse Transfer Capacitance Crss Freq.=100kHz - 16 -	Output Capacitance	C _{oss}		-	260	-	pF	
Turn-On Switching Energy E _{on} V _{DS} =800V , V _{GS} =4V/+15V 1380 - 21	Reverse Transfer Capacitance	C _{rss}		-	16	-		
Turn-Off Switching Energy E _{off} I _D =80A , R G _(ext) = 2.0Ω - 210 -	Coss Stored Energy	E _{oss}		-	150	-	μJ	
Turn-Off Switching Energy E _{off} L=100μH - 210 -	Turn-On Switching Energy	Eon		-	1380	-	- μJ	
Turn-On Delay Time t _{d(on)} V _{DS} =800V C _S =-4/+15V C _S	Turn-Off Switching Energy	E _{off}	i i	-	210	-		
Rise Time tr V _{GS} = -4/+15V - 33 - 3	Switching Characteristics							
Turn-Off Delay Time t _r I _D =80A R _{Q(ext)} =2.0Ω - 50	Turn-On Delay Time	t _{d(on)}	V _{DS} =800V	-	34	-		
	Rise Time	t _r	I _D =80A R _{G(ext)} =2.0Ω	-	33	-	- ns	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Turn-Off Delay Time	t _{d(off)}		-	50	-		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Fall Time	t _f		-	11	-		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Total Gate Charge	Qg	V _{GS} =-4/+15V	-	250	ı		
	Gate to Source Charge	Q_{gs}		-	76	ı	nC	
Inverse Diode Forward Voltage V _{SD} V _{GS} =-4V · I _{SD} =40A - 4.0 - V Continuous Diode Forward Current I _S V _{GS} =-4V - - 100 A Reverse Recovery Time T _{rr} V _{GS} =-4V - 24 - ns Reverse Recovery Charge Q _{rr} I _{SD} =80A · V _R =800V, dif/dt=4200A/μs - 630 - nC Peak Reverse Recovery Current I _{rrm} dif/dt=4200A/μs - 48 - A	Gate to Drain Charge	\mathbf{Q}_{gd}	I _D =80A	-	98	-		
Continuous Diode Forward Current I s V _{GS} =-4V - - 100 A Reverse Recovery Time T _{rr} V _{GS} =-4V - 24 - ns Reverse Recovery Charge Q _{rr} I _{SD} =80A · V _R =800V, dif/dt=4200A/μs - 630 - nC Peak Reverse Recovery Current I _{rrm} dif/dt=4200A/μs - 48 - A	Body Diode Characteristics	Body Diode Characteristics						
Reverse Recovery Time T _{rr} V _{GS} =-4V - 24 - ns Reverse Recovery Charge Q _{rr} I _{SD} =80A · V _R =800V, dif/dt=4200A/μs - 630 - nC Peak Reverse Recovery Current I _{rrm} dif/dt=4200A/μs - 48 - A	Inverse Diode Forward Voltage	V_{SD}	V _{GS} =-4V , I _{SD} =40A	-	4.0	-	V	
Reverse Recovery Charge Q _{rr} I _{sp=80A} , V _R =800V, - 630 - nC	Continuous Diode Forward Current	Is	V _{GS} =-4V	-	-	100	Α	
Reverse Recovery Charge Q rr Isp=80A · VR=800V, dif/dt=4200A/μs - 630 - nC Peak Reverse Recovery Current I rrm - 48 - A	Reverse Recovery Time	T _{rr}	V _{GS} =-4V	-	24	-	ns	
Peak Reverse Recovery Current I _{rrm} - 48 - A	Reverse Recovery Charge	Qm	I _{SD} =80A , V _R =800V,		630	_	nC	
Thermal Resistance	Peak Reverse Recovery Current	I _{rrm}	dif/dt=4200A/μs	-	48	-	Α	
Thermal Resistance, Junction-to-Case $R_{\theta_{JC}}$ - 0.25 - $^{\circ}$ C/W	Thermal Resistance, Junction-to-Case	R hetaЈс		-	0.25	-	°C/W	

Rev1.0 - 2 - May 2024



Fig 1. Output Characteristics, T_J = -55°C

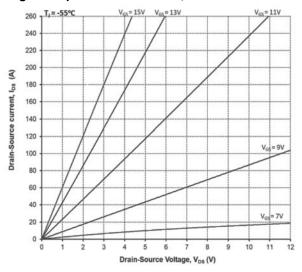


Fig 3. Output Characteristics, T_J = 175°C

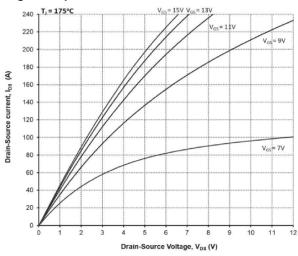


Fig 5. On-Resistance vs. Drain Current For Various Temperatures

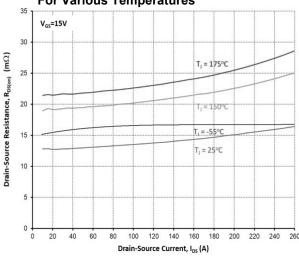


Fig 2. Output Characteristics, T_J = 25°C

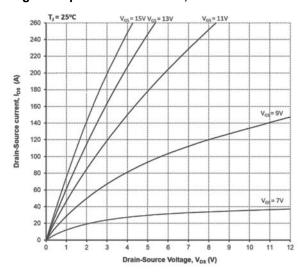


Fig 4. On-Resistance vs. Temperature

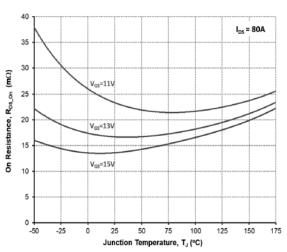
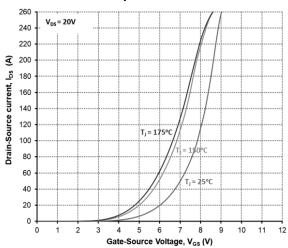


Fig 6. Transfer Characteristic For Various Junction Temperatures



Rev1.0 - 3 - May 2024



Fig 7. Threshold Voltage vs. Temperature

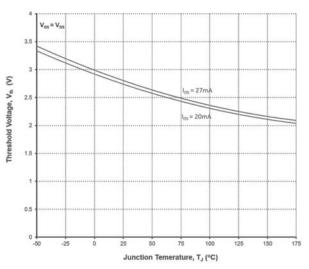


Fig 9. Body Diode Characteristics @ 25°C

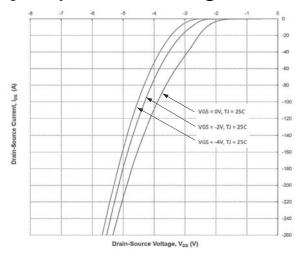


Fig 11. Gate Charge Characteristics

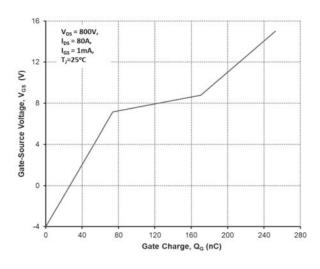


Fig 8.Body Diode Characteristics @ -55°C

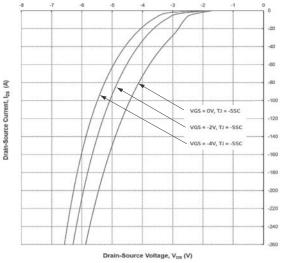


Fig 10. Body Diode Characteristics @ 175°C

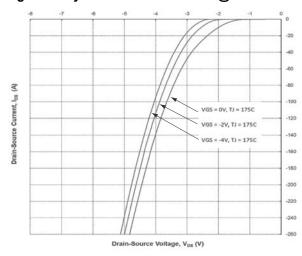
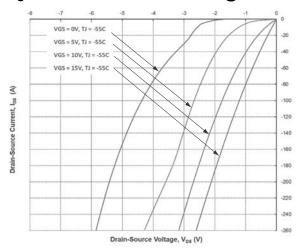


Fig 12. 3rd Quadrant Characteristics @ -55°C



Rev1.0



Fig 13. 3rd Quadrant Characteristics @ 25°C

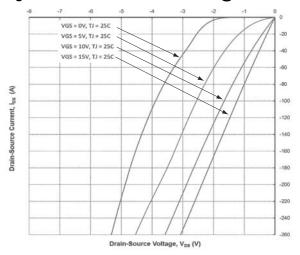


Fig 15. Output Capacitor Stored Energy

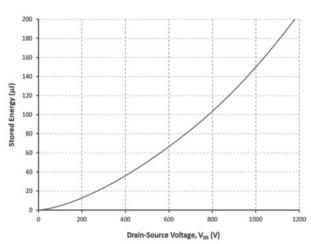


Fig 17. Capacitances vs. Drain-Source Voltage (0-1200V)

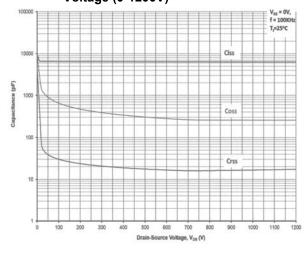


Fig 14. 3rd Quadrant Characteristics @ 175°C

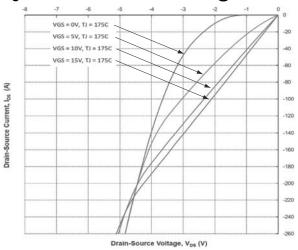


Fig 16. Capacitances vs. Drain-Source Voltage (0-200V)

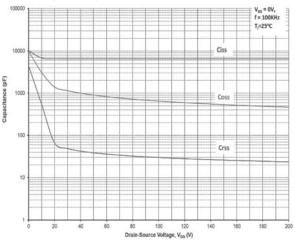


Fig 18. Continuous Drain Current Derating vs. Case Temperature

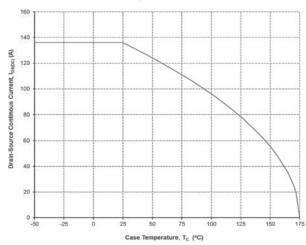




Fig 19. Maximum Power Dissipation Derating vs. Case Temperature

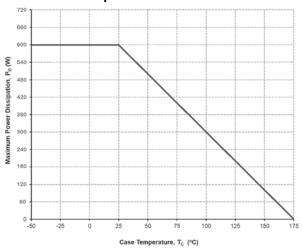


Fig 21. Safe Operating Area

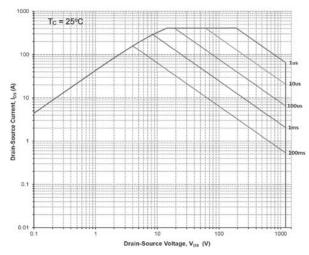


Fig 23. Switching Energy vs External Gate Resistor

Rev1.0

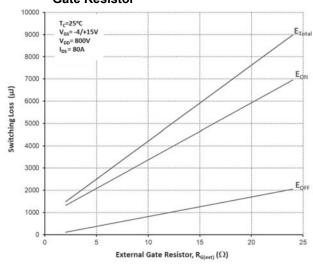


Fig 20. Transient Thermal Impedance (Junction to Case)

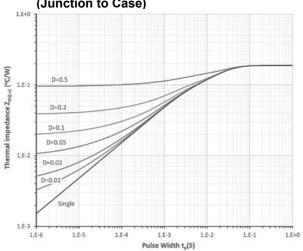


Fig 22. Switching Energy vs Drain Current

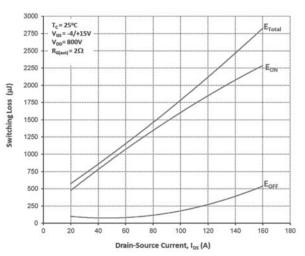
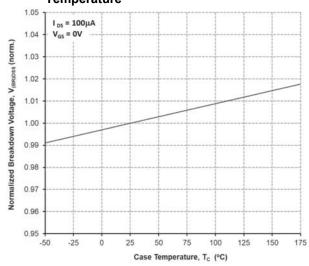


Fig 24. Normalized Breakdown Voltage vs Temperature





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.

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.