Thank you for your interest in **onsemi** products.

Your technical document begins on the following pages.



Your Feedback is Important to Us!

Please take a moment to participate in our short survey. At **onsemi**, we are dedicated to delivering technical content that best meets your needs.

Help Us Improve – Take the Survey

This survey is intended to collect your feedback, capture any issues you may encounter, and to provide improvements you would like to suggest.

We look forward to your feedback.

To learn more about **onsemi**, please visit our website at <u>www.onsemi.com</u>

onsemi					W	1	LL	"onsemi"	
	U		onsemi	W					onsemi
		WWW			onsemi				W
		u n	onsemi	w					
				onsemi					

onsemi

<u>Silicon Carbide (SiC)</u> <u>MOSFET</u> - EliteSiC, 23 mohm, 650 V, M3S, D2PAK-7L

NVBG023N065M3S

Features

Typical $R_{DS(ON)} = 23 \text{ m}\Omega @ V_{GS} = 18 \text{ V}$ Ultra Low Gate Charge ($Q_{G(tot)} = 69 \text{ nC}$) High Speed Switching with Low Capacitance (Coss = 153 pF) 100% Avalanche Tested AEC-Q101 Qualified and PPAP Capable This Device is Halide Free and RoHS Compliant with Exemption 7a, Pb-Free 2LI (on Second Level Interconnection)

Applications

Automotive On Board Charger Automotive DC–DC Converter for EV/HEV

MAXIMUM RATINGS (T_J = 25 C unless otherwise noted)

Parameter	Symbol	Value	Unit	
Drain-to-Source Voltage	V _{DSS}	650	V	
Gate-to-Source Voltage	V _{GS}	-8/+22		
Continuous Drain Current	T _C = 25 C	I _D	70	А
				-

ELECTRICAL CHARACTERISTICS (T_J = 25 C unless otherwise specified) (continued)

Parameter	Symbol	Test Conditions	Min	Тур	Max	Unit
SWITCHING CHARACTERISTICS	3					
Turn-On Delay Time	t _{d(ON)}	$V_{GS} = -3/18 \text{ V}, I_D = 20 \text{ A}, V_{DD} = 400 \text{ V},$	-	9.6	-	ns
Turn-Off Delay Time	t _{d(OFF)}	$R_G = 4.7 \Omega_2, T_J = 175 C (Note 4, 5)$	_	41	-	
Rise Time	t _r		_	14	-	
Fall Time	t _f		_	12	-	
Turn-On Switching Loss	E _{ON}		_	51	-	μJ
Turn–Off Switching Loss	E _{OFF}		_	45	-	
Total Switching Loss	E _{TOT}		_	96	-	
SOURCE-TO-DRAIN DIODE CH	ARACTERISTICS					

Forward Diode Voltage		$I_{SD} = 20 \text{ A}, V_{GS} = -3 \text{ V}, T_{J} = 25 \text{ C}$	-	4.5	6.0	V
	V _{SD}	$I_{SD} = 20 \text{ A}, V_{GS} = -3 \text{ V}, T_{J} = 175 \text{ C}$ (Note 5)	-	4.2	-	
Reverse Recovery Time	t _{RR}	$V_{GS} = -3 V$, $I_{S} = 20 A$, $dI/dt = 1000 A/\mu s$,	-	19	_	ns
Charge time	ta	$v_{\rm DS} = 400 \text{v}, 1_{\rm J} = 25 \text{C} (\text{Note 5})$	-	11	-	
Discharge time	t _b		-	8	-	
_	Q _{RR}		-	97	-	nC
			-	-	-	

TYPICAL CHARACTERISTICS

Figure 1. Output Characteristics

Figure 2. Output Characteristics

0

Figure 3. Transfer Characteristics

Figure 4. On-Resistance vs. Gate Voltage

Figure 5. On-

TYPICAL CHARACTERISTICS

0.1

V_{DS}, Drain to Source Voltage (V)

Figure 7. Capacitance Characteristics

 $V_{\text{DS}},$ Drain to Source Voltage (V) Figure 8. Stored Energy vs. Drain to Source Voltage

Figure 9. Gate Charge Characteristics

Figure 10. Reverse Conduction Characteristics

Figure 11. Reverse Conduction Characteristics

Figure 12. Safe Operating Area

TYPICAL CHARACTERISTICS

I_D, Drain Current (A)

D²PAK7 (TO-263-7L HV) CASE 418BJ ISSUE B

А

c2

н

DATE 16 AUG 2019



*This information is generic. Please refer to device data sheet for actual part marking. Pb–Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. Onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or incruit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using onsemi