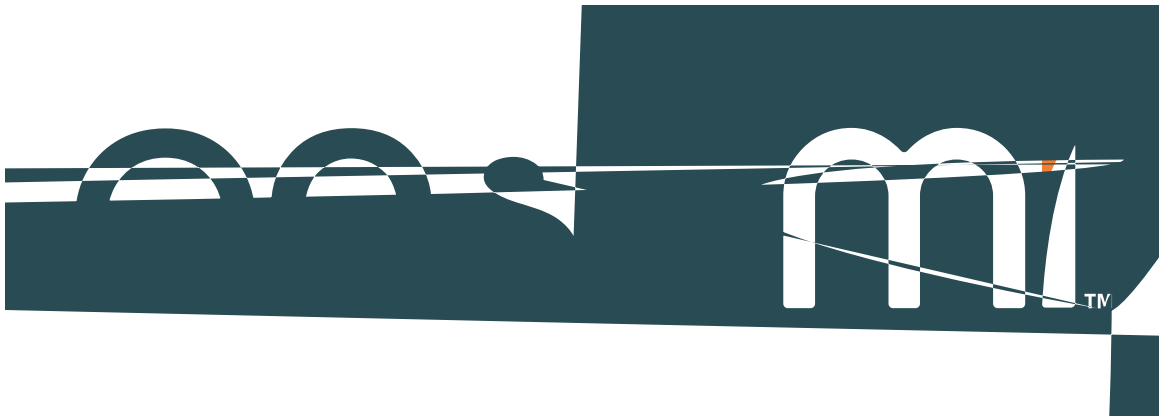


Is Now Part of



For more information, please visit our website at
www.nsmi.com



Maximum Ratings

Symbol	Value	Units
V_{DS}	650	V
V_{GS}	-25 to +25	V
	54	A
	40	A
I_{DM}	125	A
E_{AS}	76	



Electrical Characteristics (T_J)

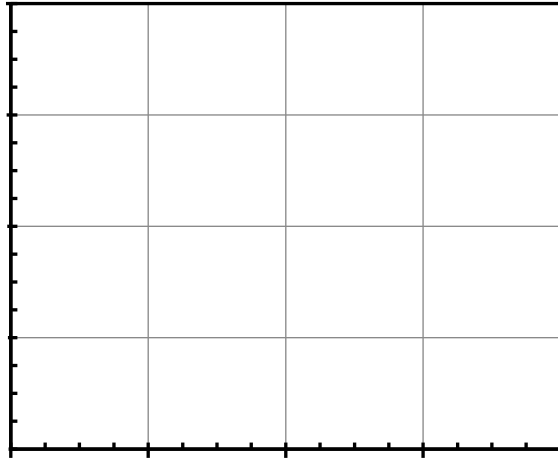


Typical Performance - Dynamic

		Min	Typ	Max	
	C_{iss}		1500		
	C_{oss}		200		
	C_{rss}		2.2		
	$C_{oss(er)}$		146		pF
Effective output capacitance, time related	$C_{oss(tr)}$	$V_{DS}=0V$ to 400V, $V_{GS}=0V$	325		pF
C_{oss}	E_{oss}		11.7		J
Total gate charge	Q_G	$V_{DS}=400V$, $I_D=40A$,	51		
Gate-drain charge	Q_{GD}	$V_{GS} = -5V$ to 15V	11		nC
Gate-source charge	Q_{GS}		19		
	$t_{d(on)}$		35		
	t_r		24		
	$t_{d(off)}$		57		
	t_f		14		
	E_{ON}		500		
	E_{OFF}		118		
Total switching energy including R_S energy ⁴	E_{TOTAL}		618		
Snubber R_S energy during turn-on	E_{RS_ON}		1.7		
Snubber R_S energy during turn-off	E_{RS_OFF}		4.5		
Turn-on delay time	$t_{d(on)}$		35		
Rise time	t_r	$V_{DS}=400V$, $I_D=40A$, Gate Driver = -5V to +15V,	22		ns
Turn-off delay time	$t_{d(off)}$	Turn-on $R_{G,EXT}=1.8 \Omega$,	60		
Fall time	t_f	Turn-off $R_{G,EXT}=22 \Omega$:	13		
Turn-on energy including R_S energy ⁴	E_{ON}	Inductive Load,	479		
Turn-off energy including R_S energy ⁴	E_{OFF}	FWD: same device with	124		
Total switching energy including R_S energy ⁴	E_{TOTAL}	$V_{GS} = -5V$ and $R_S = 22 \Omega$; RC snubber: $R_S=5 \Omega$ and	603		J
Snubber R_S energy during turn-on	E_{RS_ON}	$C_S=150pF$, $T_J=150^\circ C$	1.8		
Snubber R_S energy during turn-off	E_{RS_OFF}		5.3		

4. The switching performance are evaluated with a RC snubber circuit as shown in Figure 24.





9. 3rd quadrant characteristics at $T_j = -55^\circ\text{C}$

Figure 10. 3rd quadrant characteristics at $T_j = 25^\circ\text{C}$

11. 3rd quadrant characteristics at $T_j = 175^\circ\text{C}$

Figure 12. Typical stored energy in C_{SS} at $V_{GS} = 0\text{V}$

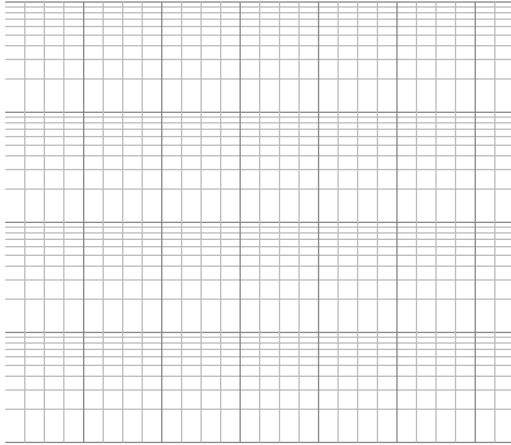


Figure 13. Typical capacitances at $f = 100\text{kHz}$ and $V_{GS} = 0\text{V}$

Figure 14. DC drain current derating

Figure 15. Total power dissipation

Figure 16. Maximum transient thermal impedance





(a)

(b)

(a)

(b)



(a)

(b)

Figure 22. Clamped inductive switching energy including RC snubber energy loss (a) and RC snubber energy I

(a)

(b)



Figure 24. Clamped inductive load switching test circuit
An RC snubber ($R_S = 5\Omega$ and $C_S = 150\text{pF}$) is required to improve the turn-off waveforms.

Applications Information

SiC FETs are enhancement-mode power switches formed by a high-voltage SiC depletion-mode JFET and a low-voltage silicon MOSFET connected in series. The silicon MOSFET serves as the control unit while the SiC JFET provides high voltage blocking in the off state. This combination of devices in a single package provides compatibility with standard gate drivers and offers superior performance in terms of low on-resistance ($R_{DS(on)}$), output capacitance (C_{oss}).

Like other high performance power switches, proper PCB layout design to minimize circuit parasitics is strongly recommended due to the high dv/dt and di/dt rates. An external gate resistor is recommended when the FET is working in the diode mode in order to achieve the optimum reverse recovery performance. For more information on SiC FET operation, see www.unitedsic.com.

Disclaimer

UnitedSiC reserves the right to change or modify any of the products and their inherent physical and technical specifications without prior notice. UnitedSiC assumes no responsibility or liability for any errors or inaccuracies within.





TO-220-3L PACKAGE OUTLINE, PART MARKING AND TUBE SPECIFICATIONS

PART MARKING

PACKING TYPE

ANTI-STATIC TUBE

QUANTITY /TUBE : 50 UNITS

DISCLAIMER

United Silicon Carbide, Inc. reserves the right to change or modify any of the products and their inherent physical and technical specifications without prior notice. United Silicon Carbide, Inc. assumes no responsibility or liability for any errors or inaccuracies within.

Information on all products and contained herein is intended for description only. No license, express or

onsemi, **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 circuit, 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**
