

## Features

- High Temperature, Humidity, and Bias Operation
- Ultra Low Loss
- High-Frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation
- Ease of Paralleling
- AlSiC Baseplate and Aluminum Nitride Insulator

- Enables Compact, Lightweight, Efficient Systems
- Harsh Outdoor Environment Installation
- Mitigates Over-voltage Protection
- Reduced Thermal Requirements
- Reduced System Cost

## Package 151mm x 103mm x 35.2mm

Part Number	Package	Marking
ASC400N1200MD3	DWC3	ASC400N1200MD3

## System Benefits

### Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	1200	V
$V_{GS}$	Gate-Source Voltage(dynamic)	-10/+25	V
$I_D$	Drain Current	400	A
$I_{DM}$	Drain Current (pulsed)	800	A
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	1154	W
$T_C, T_{stg}$	Operating and Storage Temperature Range	-40 to +150	$^\circ\text{C}$
$T_J$	Junction Temperature	175	$^\circ\text{C}$
$L_{Stray}$	Stray Inductance	20	nH

## Electrical Characteristics (T<sub>C</sub> = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV <sub>DS</sub>	Drain-source Breakdown Voltage	V <sub>GS</sub> =0V	1200			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =1200V, V <sub>GS</sub> =0V			400	uA
I <sub>GSS</sub>	Gate-body Leakage Current	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V			4	uA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =40mA	2.0		4.0	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> =20V, I <sub>D</sub> =300A		4.2	5.5	mΩ
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, f=1MHz		3.0		Ω
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =800V, f=100kHz, V <sub>AC</sub> =25mV		19.1		nF
C <sub>oss</sub>	Output Capacitance			0.49		
C <sub>rss</sub>	Reverse Transfer Capacitance			100		
Q <sub>GS</sub>	Gate-Source Charge	V <sub>DD</sub> =1000V, V <sub>GS</sub> =-5/+20V I <sub>D</sub> =300A,		306.8		nC
Q <sub>GD</sub>	Gate-Drain Charge			313.2		
Q <sub>G</sub>	Total Gate Charge			952		
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> =600V, V <sub>GS</sub> =-5/+20V I <sub>D</sub> =300A, R <sub>G(ext)</sub> =5Ω Load=77uH, T <sub>J</sub> =150°C		76		nS
t <sub>r</sub>	Rise Time			69		
t <sub>d(off)</sub>	Turn-off delay time			165		
t <sub>f</sub>	Fall Time			42		
V <sub>sd</sub>	Diode Forward voltage	I <sub>f</sub> =300A, V <sub>GS</sub> =0		3.5	6	V

## Typical Performance-Reverse Diode(T<sub>J</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>FSD</sub>	Forward Voltage	V <sub>GS</sub> =0V, I <sub>F</sub> =200A, T <sub>J</sub> =25°C			6	V
I <sub>s</sub>	Continuous Diode Forward Current	V <sub>GS</sub> =0V, T <sub>J</sub> =25°C		200		A
I <sub>s(pulse)</sub>	Pulsed body diode current			400		A
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =-5V, I <sub>F</sub> =200A, V <sub>R</sub> =800V, di/dt=3.6k A/μs T <sub>J</sub> =25°C		98		ns
Q <sub>rr</sub>	Reverse Recovery Time			306		nC
I <sub>rrm</sub>	Peak Reverse Recovery Current				52	

## Thermal Characteristics

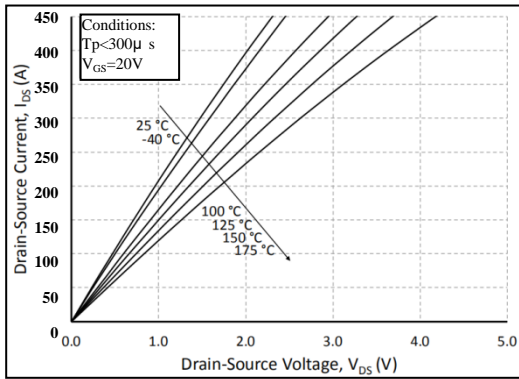
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	T <sub>C</sub> =90°C, P <sub>D</sub> =150W			0.12	°C/W

## NTC-Thermistor

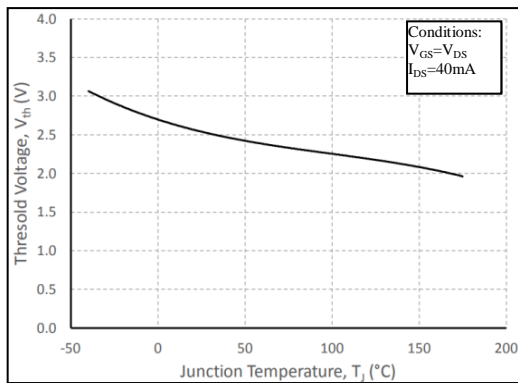
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R <sub>25</sub>	Rated resistance	T <sub>C</sub> =25°C		5.00		kΩ
ΔR/R	Deviation of R100	T <sub>C</sub> = 100 °C, R <sub>100</sub> = 477Ω	-5		5	%
B25/50	B-value	R <sub>2</sub> = R <sub>25</sub> exp [B <sub>25/50</sub> (1/T <sub>2</sub> - 1/(298,15 K))]		3380		k
B25/80	B-value	R <sub>2</sub> = R <sub>25</sub> exp [B <sub>25/80</sub> (1/T <sub>2</sub> - 1/(298,15 K))]		3468		k
B25/100	B-value	R <sub>2</sub> = R <sub>25</sub> exp [B <sub>25/100</sub> (1/T <sub>2</sub> - 1/(298,15 K))]		3523		k

**Typical Performance**

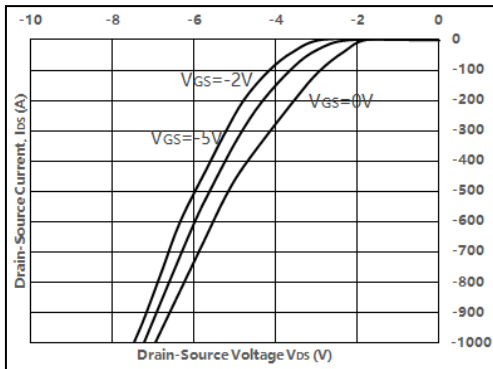
**Figure 1. Output Characteristics for Various  $T_J$**



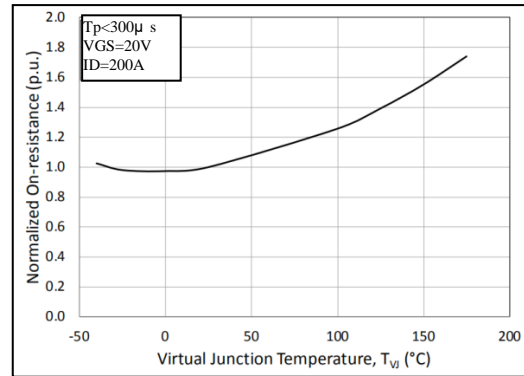
**Figure 3. Threshold Voltage vs. Temperature**



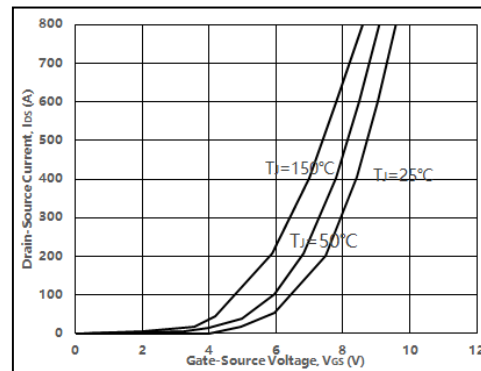
**Figure 5. Diode Characteristic at 25 °C**



**Figure 2. Normalized On-Resistance vs. Temperature**



**Figure 4. Transfer Characteristic for Various  $T_J$**



**Figure 6. Typical Gate Charge Characteristics**

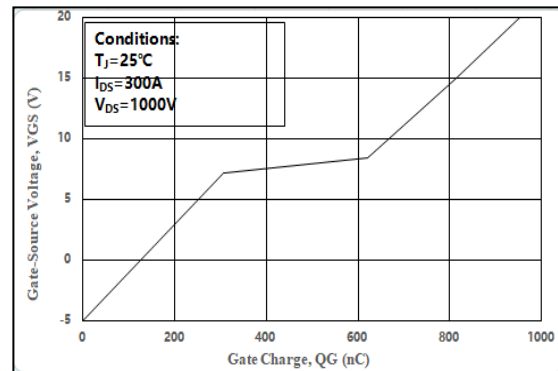


Figure 7. Typical Capacitances vs. Drain-Source Voltage

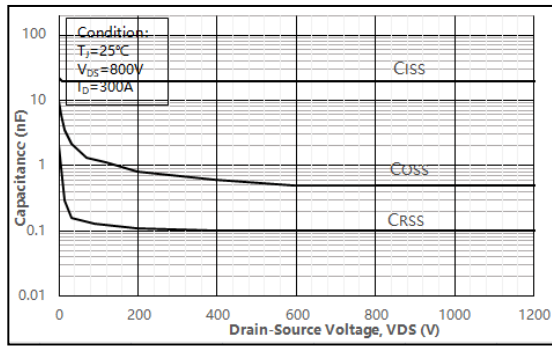


Figure 8. Inductive Switching Energy vs. Drain Current

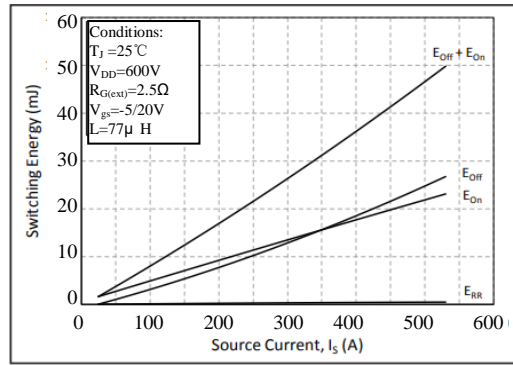


Figure 9. Resistive Switching Time Description

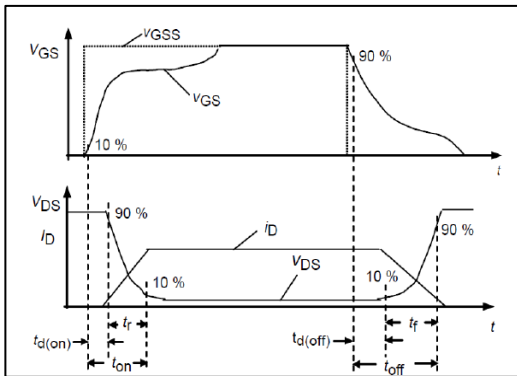
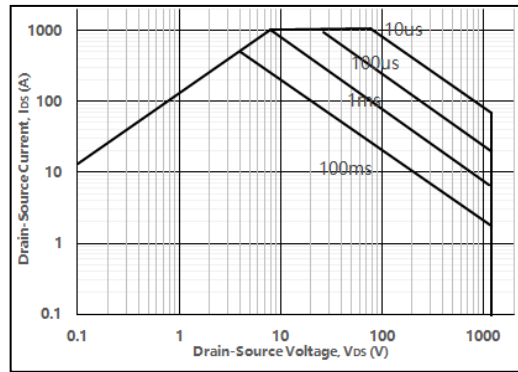
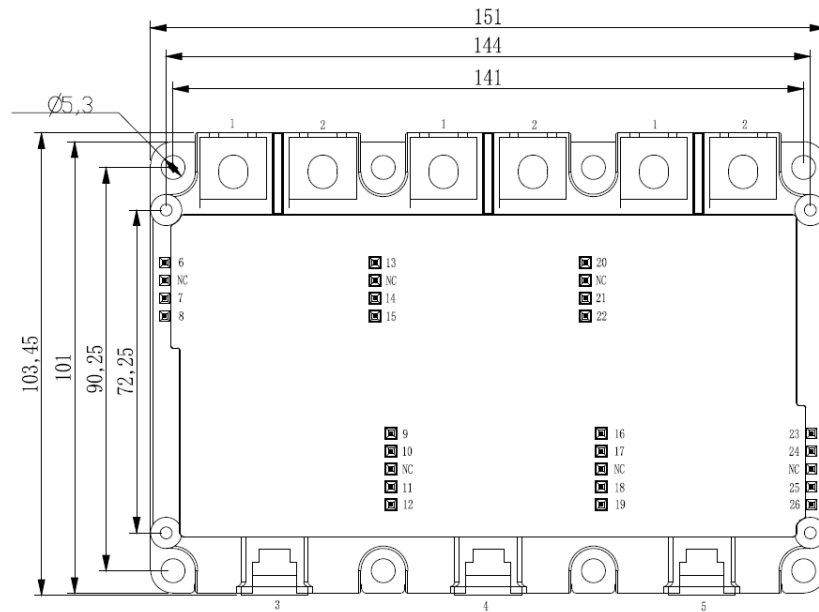
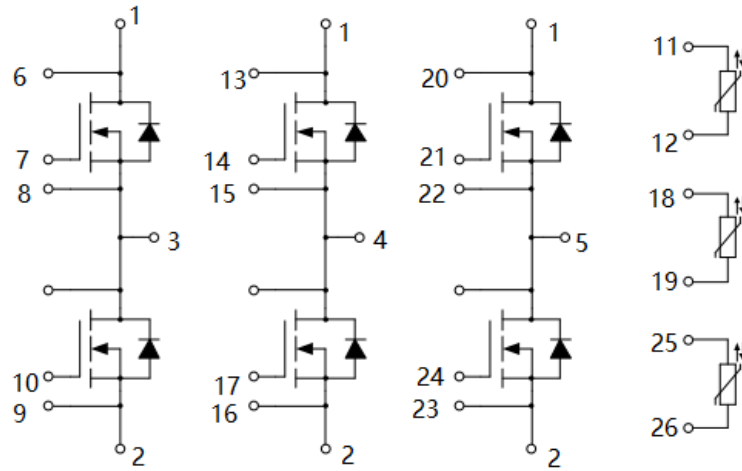


Figure 10. Safe Operating Area



**Circuit Diagram Headline**



**NC : no connect**

**Package Drawing:**

