

### 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        |
|----------------|---------|----------------|
| ASC700N1200MD3 | DWC3    | ASC700N1200MD3 |

### 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(continuous) $V_{GS}=20\text{V}$ | 700         | A                |
| $I_{DM}$       | Drain Current (pulsed)                        | 1400        | 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                                       |      |      | 700  | uA   |
| I <sub>GSS</sub>    | Gate-body Leakage Current         | V <sub>GS</sub> =20V, V <sub>DS</sub> =0V                                         |      |      | 7    | uA   |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =70mA                          | 2.0  |      | 4.0  | V    |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> =20V, I <sub>D</sub> =400A                                        |      | 2.4  | 3.2  | mΩ   |
| R <sub>G</sub>      | Gate Resistance                   | V <sub>GS</sub> =0V, f=1MHz                                                       |      | 3.0  |      | Ω    |
| g <sub>fs</sub>     | Transconductance                  | V <sub>DS</sub> =20V, I <sub>DS</sub> =560A                                       |      | 290  |      | S    |
| C <sub>iss</sub>    | Input Capacitance                 | V <sub>DS</sub> =800V, f=100kHz,<br>V <sub>AC</sub> =25mV                         |      | 30.7 |      | nF   |
| C <sub>oss</sub>    | Output Capacitance                |                                                                                   |      | 1.2  |      |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance      |                                                                                   |      | 63   |      | pF   |
| E <sub>on</sub>     | Turn-On Switching Energy          | V <sub>DD</sub> =600V, V <sub>GS</sub> =-5/+20V                                   |      | 7.6  |      | mJ   |
| E <sub>off</sub>    | Turn-Off Switching Energy         | I <sub>D</sub> =400A, R <sub>G(ext)</sub> =5Ω<br>Load=77uH, T <sub>J</sub> =150°C |      | 9.1  |      | mJ   |
| Q <sub>GS</sub>     | Gate-Source Charge                | V <sub>DD</sub> =1000V, V <sub>GS</sub> =-5/+20V<br>I <sub>D</sub> =600A,         |      | 255  |      | nC   |
| Q <sub>GD</sub>     | Gate-Drain Charge                 |                                                                                   |      | 260  |      |      |
| Q <sub>G</sub>      | Total Gate Charge                 |                                                                                   |      | 1500 |      |      |
| t <sub>d(on)</sub>  | Turn-on delay time                | V <sub>DD</sub> =600V, V <sub>GS</sub> =-5/+20V                                   |      | 76   |      | nS   |
| t <sub>r</sub>      | Rise Time                         | I <sub>D</sub> =250A, R <sub>G(ext)</sub> =5Ω                                     |      | 69   |      |      |
| t <sub>d(off)</sub> | Turn-off delay time               | Load=77uH, T <sub>J</sub> =150°C                                                  |      | 165  |      |      |
| t <sub>f</sub>      | Fall Time                         |                                                                                   |      | 42   |      |      |
| V <sub>sd</sub>     | Diode Forward voltage             | I <sub>f</sub> =400A, V <sub>GS</sub> =0                                          |      |      | 6    | V    |

**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 |      |      | 0.13 | °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 R <sub>100</sub> | T <sub>C</sub> = 100 °C, R <sub>100</sub> = 477Ω                                             | -5   |      | 5    | %    |
| B <sub>25/50</sub>  | 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    |
| B <sub>25/80</sub>  | 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    |
| B <sub>25/100</sub> | 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  $T_J$

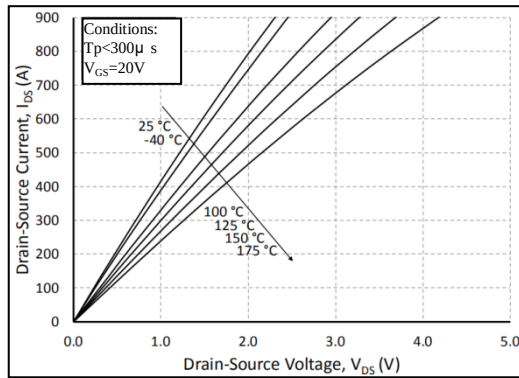


Figure 2. Normalized On-Resistance vs. Temperature

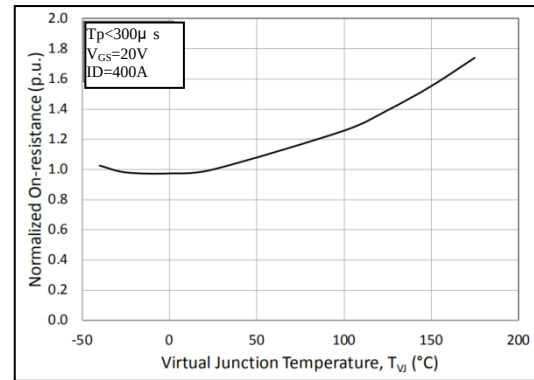


Figure 3. Threshold Voltage vs. Temperature

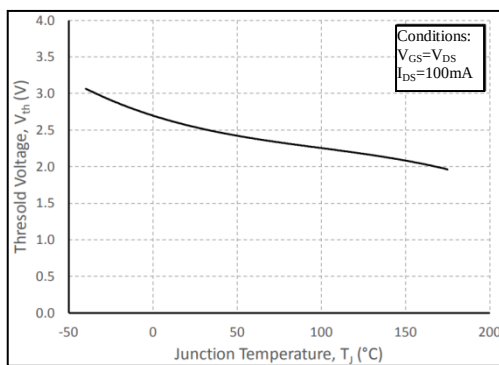


Figure 4. Transfer Characteristic for Various  $T_J$

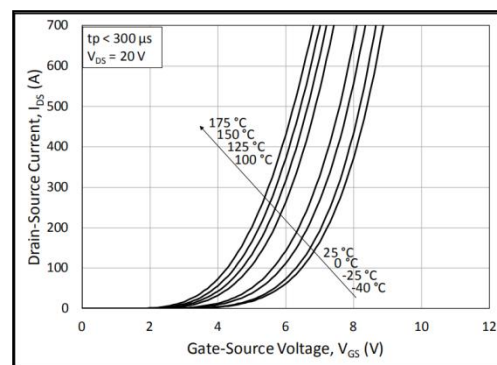


Figure 5. Diode Characteristic at 25 °C

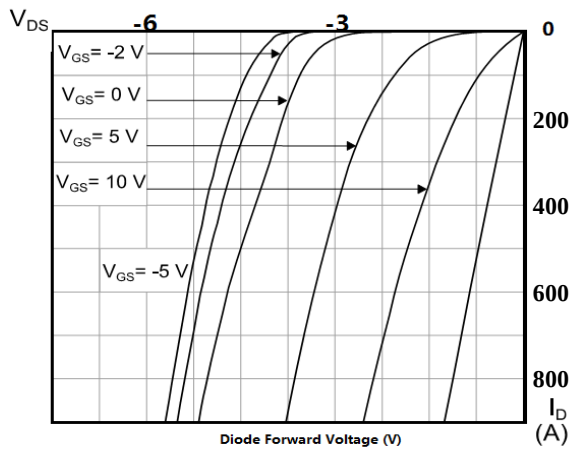


Figure 6. Typical Gate Charge Characteristics

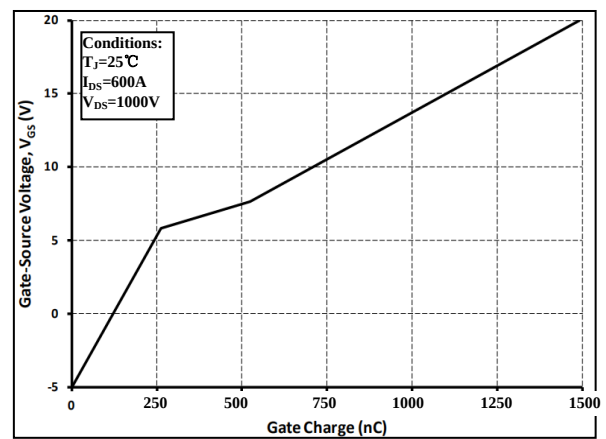


Figure 7. Typical Capacitances vs. Drain-Source Voltage

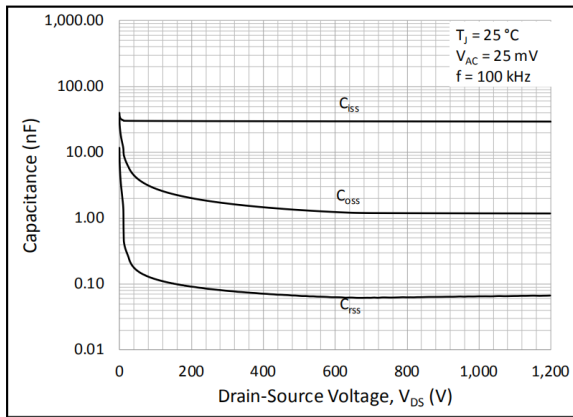


Figure 8. Inductive Switching Energy vs. Drain Current

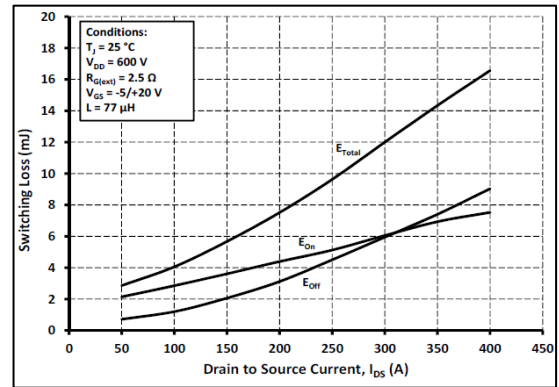


Figure 9. Resistive Switching Time Description

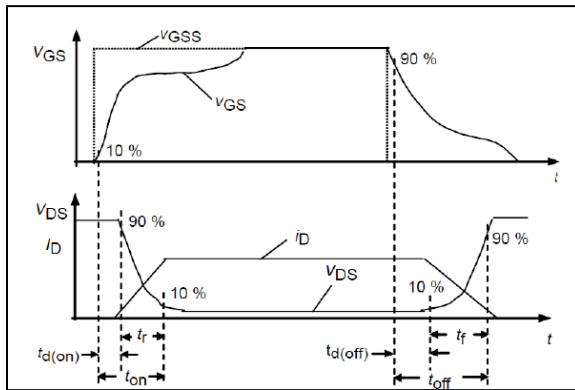
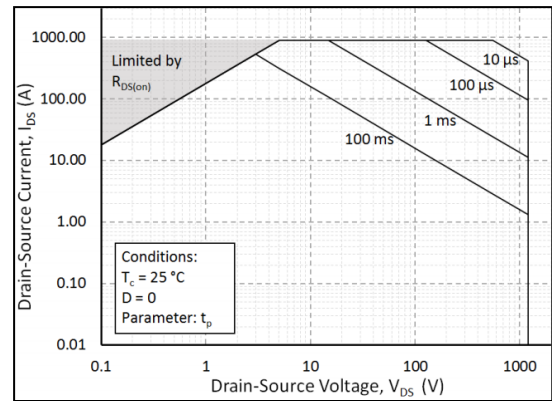
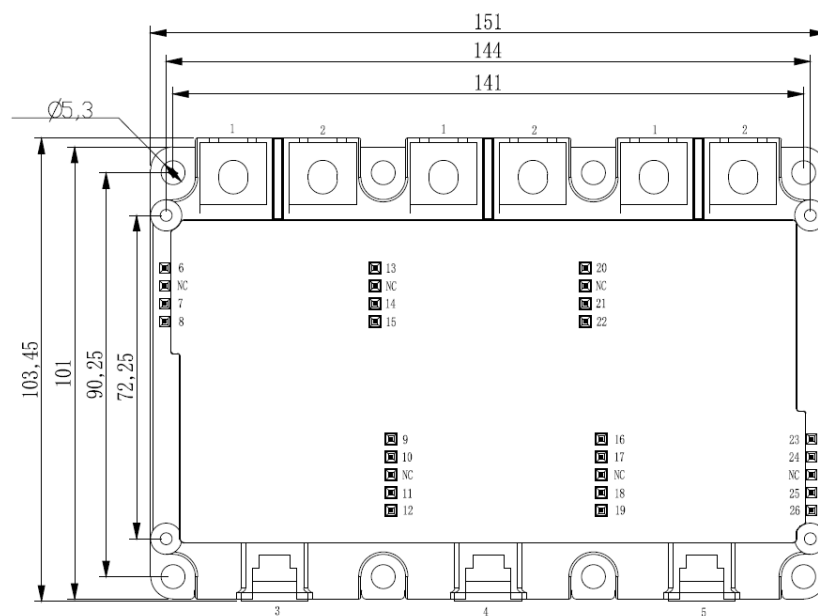


Figure 10. Safe Operating Area





**NC : no connect**

### Package Drawing:

