

**MSCDC300A170AG**  
**Datasheet**  
**SiC Diode Phase Leg Power Module**

December 2019



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a  **MICROCHIP** company

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# 1 Revision History

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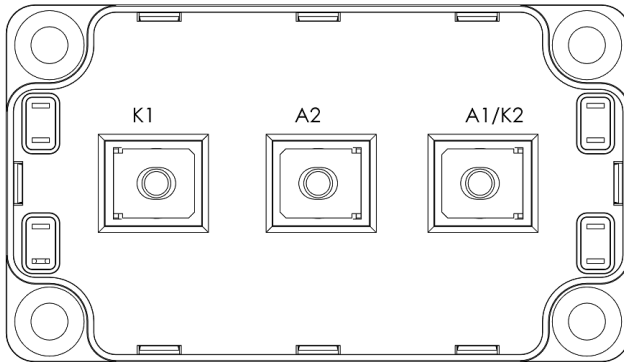
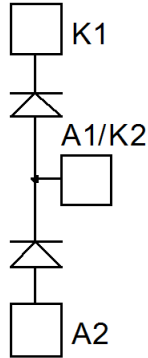
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

## 1.1 Revision 1.0

Revision 1.0 was published in December 2019. It is the first publication of this document.

## 2 Product Overview

This section provides the product overview for the MSCDC300A170AG device.



All ratings at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified.

**Caution:** These devices are sensitive to electrostatic discharge. Proper handling procedures should be followed.

### 2.1 Features

The following are key features of the MSCDC300A170AG device:

- Silicon Carbide (SiC) Schottky diode
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature independent switching behavior
  - Positive temperature coefficient on
- Low stray inductance
- M5 power connectors
- High level of integration
- Aluminum nitride (AlN) substrate for improved thermal performance

### 2.2 Benefits

The following are benefits of the MSCDC300A170AG device:

- Outstanding performance at high frequency operation

- Low noise switching
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- RoHS compliant

## 2.3 Applications

The MSCDC300A170AG device is designed for the following applications:

- Uninterruptible power supply (UPS)
- Induction heating
- Welding equipment
- High-speed rectifiers

## 3 Electrical Specifications

This section provides the electrical specifications for the MSCDC300A170AG device.

### 3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode for the MSCDC300A170AG device.

**Table 1 • Absolute Maximum Ratings**

| Symbol    | Parameter                       | Max Ratings                              | Unit |
|-----------|---------------------------------|------------------------------------------|------|
| $V_{RRM}$ | Repetitive peak reverse voltage | 1700                                     | V    |
| $I_F$     | DC forward current              | $T_C = 125\text{ }^\circ\text{C}$<br>300 | A    |

The following table shows the thermal and package characteristics of the MSCDC300A170AG.

**Table 2 • Thermal and Package Characteristics**

| Symbol     | Characteristic                                                          | Min           | Max             | Unit             |   |     |
|------------|-------------------------------------------------------------------------|---------------|-----------------|------------------|---|-----|
| $V_{ISOL}$ | RMS isolation voltage, any terminal to case $t = 1$ minute, 50 Hz/60 Hz | 4000          |                 | V                |   |     |
| $T_J$      | Operating junction temperature range                                    | -40           | 175             | $^\circ\text{C}$ |   |     |
| $T_{JOP}$  | Recommended junction temperature under switching conditions             | -40           | $T_{Jmax} - 25$ |                  |   |     |
| $T_{STG}$  | Storage temperature range                                               | -40           | 125             |                  |   |     |
| $T_C$      | Operating case temperature                                              | -40           | 125             |                  |   |     |
| Torque     | Mounting torque                                                         | To heatsink   | M6              | 3                | 5 | N.m |
|            |                                                                         | For terminals | M5              | 2                |   |     |
| Wt         | Package weight                                                          |               | 300             | g                |   |     |

### 3.2 Electrical Performance

The following table shows the electrical characteristics per diode of the MSCDC300A170AG.

**Table 3 • Electrical Characteristics**

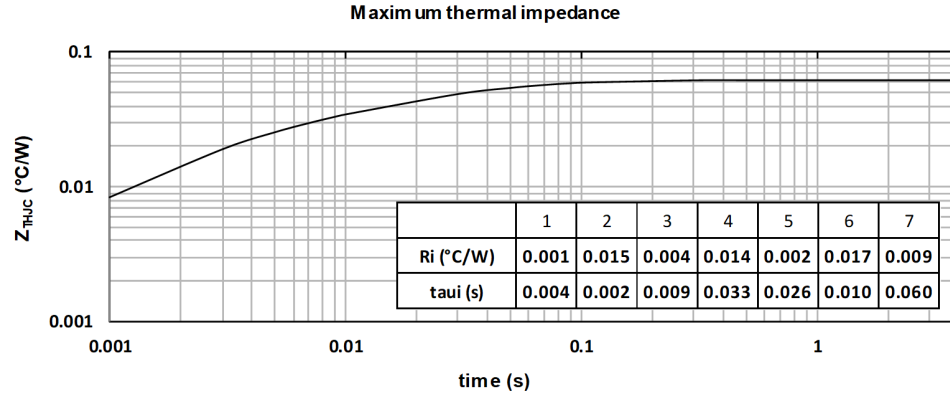
| Symbol   | Characteristic          | Test Conditions       | Min                               | Typ | Max | Unit |    |
|----------|-------------------------|-----------------------|-----------------------------------|-----|-----|------|----|
| $V_F$    | Diode forward voltage   | $I_F = 300\text{ A}$  | $T_J = 25\text{ }^\circ\text{C}$  |     | 1.5 | 1.8  | V  |
|          |                         |                       | $T_J = 175\text{ }^\circ\text{C}$ |     | 2   |      |    |
| $I_{RM}$ | Reverse leakage current | $V_R = 1700\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$  |     | 0.3 | 1.2  | mA |
|          |                         |                       | $T_J = 175\text{ }^\circ\text{C}$ |     | 1.5 |      |    |

| Symbol     | Characteristic                      | Test Conditions                        | Min | Typ | Max   | Unit                 |
|------------|-------------------------------------|----------------------------------------|-----|-----|-------|----------------------|
| $Q_C$      | Total capacitive charge             | $V_R = 900\text{ V}$                   |     | 2.5 |       | $\mu\text{C}$        |
| C          | Total capacitance                   | $f = 1\text{ MHz}, V_R = 600\text{ V}$ |     | 1.8 |       | nF                   |
|            |                                     | $f = 1\text{ MHz}, V_R = 900\text{ V}$ |     | 1.5 |       |                      |
| $R_{thJC}$ | Junction-to-case thermal resistance |                                        |     |     | 0.062 | $^{\circ}\text{C/W}$ |

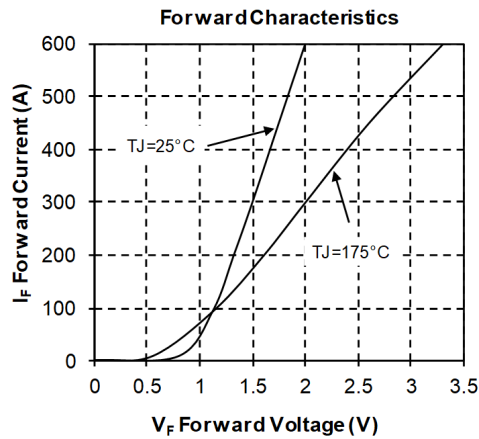
### 3.3 Typical Performance Curves

This section shows the typical performance curves for the MSCDC300A170AG device.

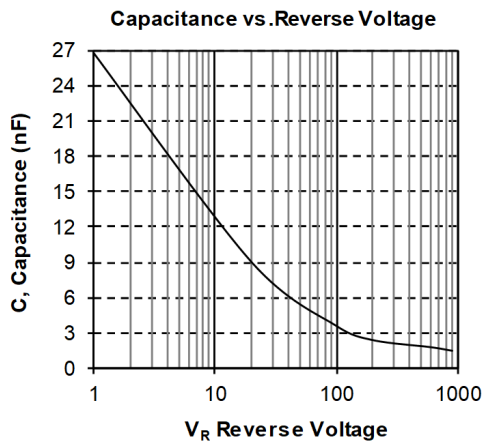
**Figure 1 • Maximum Transient Thermal Impedance**



**Figure 2 • Forward Current vs. Forward Voltage**



**Figure 3 • Capacitance vs. Reverse Voltage**





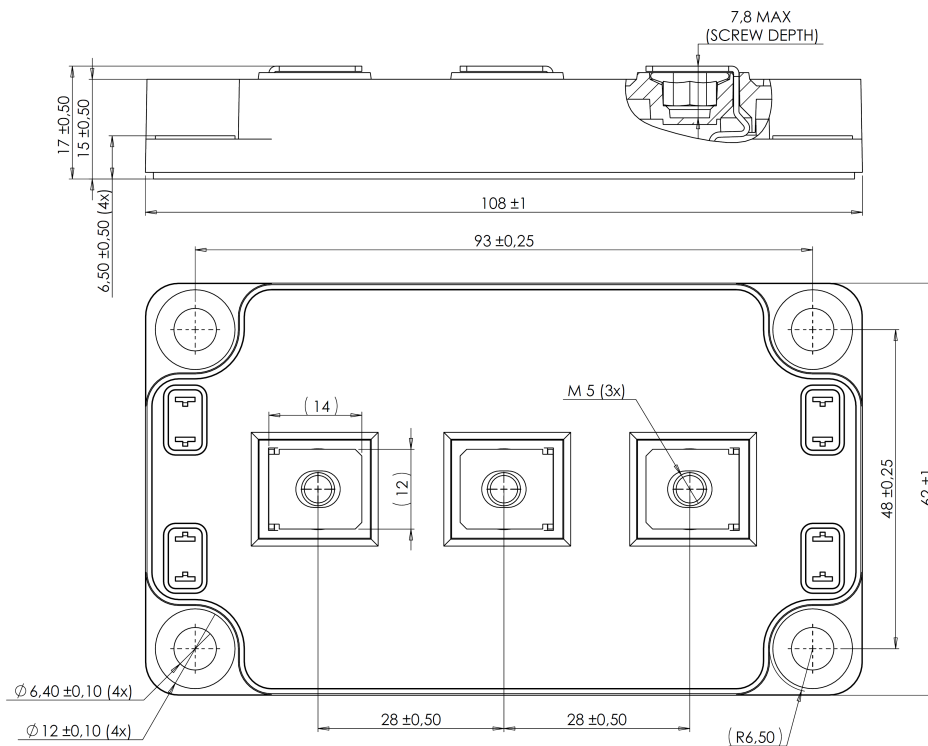
## 4 Package Specifications

This section shows the package specifications for the MSCDC300A170AG device.

### 4.1 Package Outline Drawing

The following image illustrates the package outline of the MSCDC300A170AG device. The dimensions in the following figure are in millimeters.

Figure 4 • Package Outline Drawing





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