

## Product Overview

The APTDF300A120D16AG device is a 1200V, 300A fast diode phase-leg power module. The following figures show the electrical diagram and pinout location of the device.

Figure 1. Electrical Diagram

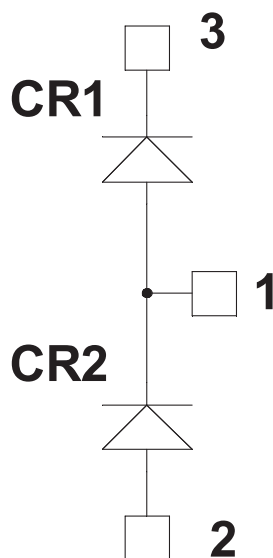
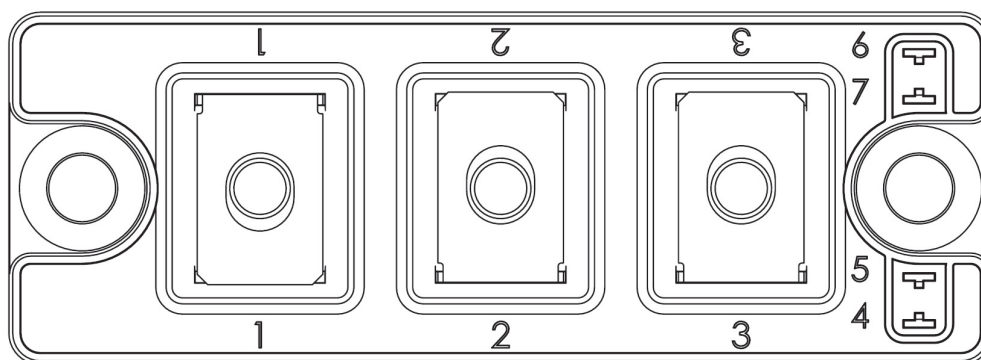


Figure 2. Pinout Location



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



These devices are sensitive to electrostatic discharge. Proper handling procedures must be followed.

## Features

The APTDF300A120D16AG device has the following key features:

- Fast-recovery times
- Soft-recovery characteristics
- High-blocking voltage
- High current
- Low-leakage current
- M6 power connectors
- Aluminum Nitride (AlN) substrate for improved thermal performance

## Benefits

The APTDF300A120D16AG device has the following benefits:

- Outstanding performance at high-frequency operation
- Low losses
- Low-noise switching
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- RoHS Compliant

## Application

The APTDF300A120D16AG device has the following applications:

- Uninterruptible Power Supply (UPS)
- Induction heating
- Welding equipment
- High-speed rectifiers

## 1. Electrical Specification

The following sections describe the electrical specifications of the APTDF300A120D16AG device.

### 1.1 Diode Characteristics (Per Diode)

The following table lists the absolute maximum ratings of the APTDF300A120D16AG device.

**Table 1-1.** Absolute Maximum Ratings

Symbol	Parameter			Maximum Ratings	Unit
$V_{RRM}$	Peak repetitive reverse voltage			1200	V
$I_F$	DC forward current		$T_C = 25\text{ }^\circ\text{C}$	600	A
			$T_C = 110\text{ }^\circ\text{C}$	300	
$I_{FSM}$	Non-repetitive forward surge current	$t_p = 8.3\text{ ms}$	$T_C = 45\text{ }^\circ\text{C}$	1500	
$I_{FRM}$	Repetitive forward current	$t_p = 1\text{ ms}$	—	600	

The following table lists the electrical characteristics of the APTDF300A120D16AG device.

**Table 1-2.** Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$V_F$	Diode forward voltage	$I_F = 300\text{A}$	—	2.4	3.5	V
		$I_F = 450\text{A}$	—	2.7	—	
		$I_F = 300\text{A}$ $T_J = 125\text{ }^\circ\text{C}$	—	1.8	—	
$I_{RRM}$	Reverse leakage current	$V_R = 1200\text{V}$	—	—	300	$\mu\text{A}$
$C_T$	Junction capacitance	$V_R = 200\text{V}$	—	330	—	pF

The following table lists the dynamic characteristics of the APTDF300A120D16AG device.

**Table 1-3.** Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 300\text{A}$ $V_R = 800\text{V}$	$T_J = 25\text{ }^\circ\text{C}$	—	385	—	ns
			$T_J = 125\text{ }^\circ\text{C}$	—	480	—	
$Q_{rr}$	Reverse recovery charge	$di/dt = 600\text{ A}/\mu\text{s}$	$T_J = 25\text{ }^\circ\text{C}$	—	3.16	—	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	—	15.7	—	
$I_{rm}$	Reverse recovery current		$T_J = 25\text{ }^\circ\text{C}$	—	18	—	A
			$T_J = 125\text{ }^\circ\text{C}$	—	57	—	
$t_{rr}$	Reverse recovery time	$I_F = 300\text{A}$	$T_J = 125\text{ }^\circ\text{C}$	—	210	—	ns
$Q_{rr}$	Reverse recovery charge	$V_R = 800\text{V}$		—	28	—	$\mu\text{C}$
$I_{rm}$	Reverse recovery current	$di/dt = 3000\text{ A}/\mu\text{s}$		—	210	—	A
$R_{thJC}$	Junction-to-case thermal resistance			—	—	0.094	$^\circ\text{C}/\text{W}$

## 1.2 Thermal and Package Characteristics

The following table lists the thermal and package characteristics of the APTDF300A120D16AG device.

**Table 1-4.** Thermal and Package Characteristics

Symbol	Characteristic	Min.	Max.	Unit
V <sub>ISOL</sub>	RMS isolation voltage, any terminal to case, t = 1 min, 50/60Hz	4000	—	V
T <sub>J</sub>	Operating junction temperature range	-40	175	°C
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25	
T <sub>STG</sub>	Storage temperature range	-40	125	
T <sub>C</sub>	Operating case temperature	-40	125	
Torque	Mounting torque			N.m
		For terminals M6 To heatsink	3 5	
Wt	Package weight	—	160	g

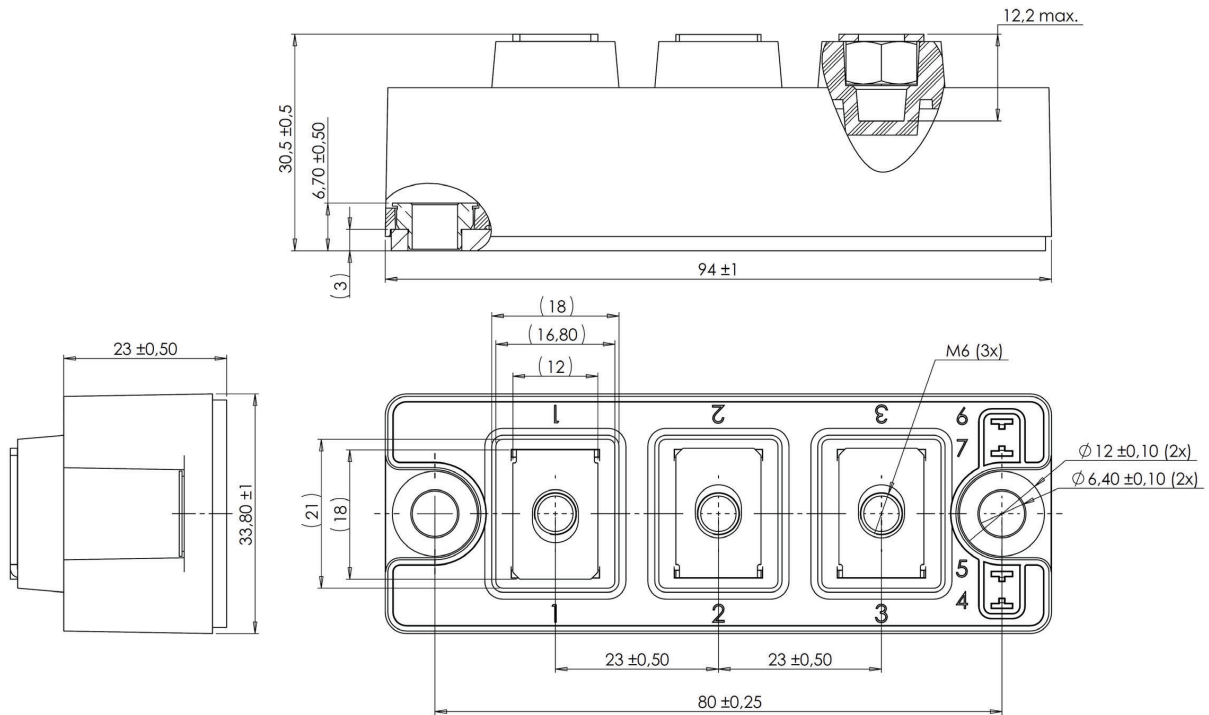
## 2. Package Specifications

The following section describes the package specification of the APTDF300A120D16AG device.

### 2.1 Package Outline

The following figure shows the package outline drawing of the APTDF300A120D16AG device. The dimensions in the following figure are in millimeters.

Figure 2-1. Package Outline Drawing



### 3. Typical Performance Curve

The following figures show the performance curves of the APTDF300A120D16AG device.

Figure 3-1. Maximum Thermal Impedance

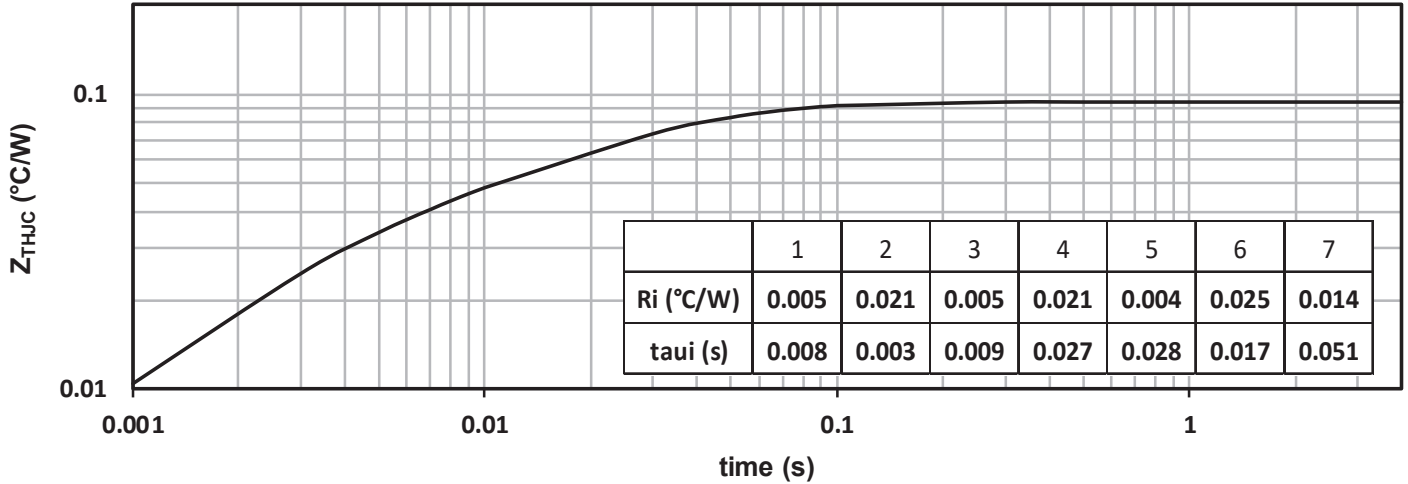


Figure 3-2. Forward Current vs. Forward Voltage

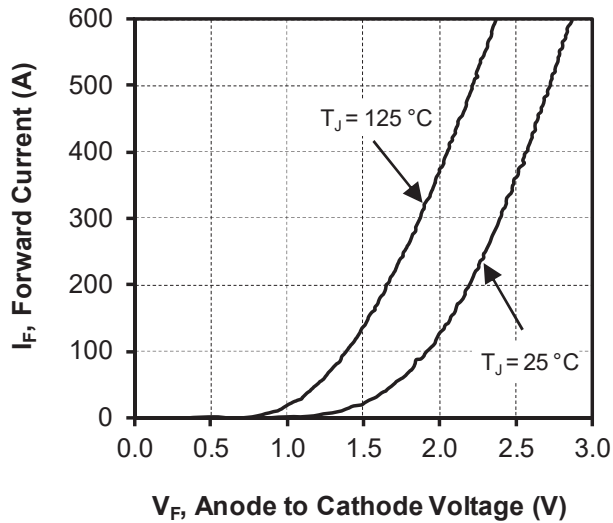


Figure 3-3.  $t_{rr}$  vs. Current Rate of Charge

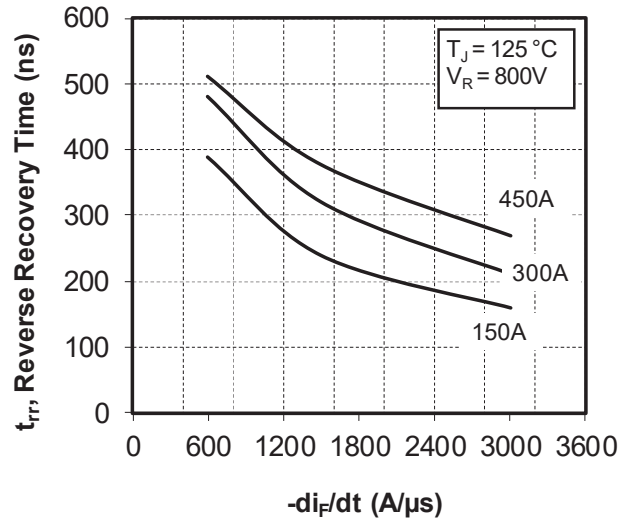


Figure 3-4.  $Q_{rr}$  vs. Current Rate Charge

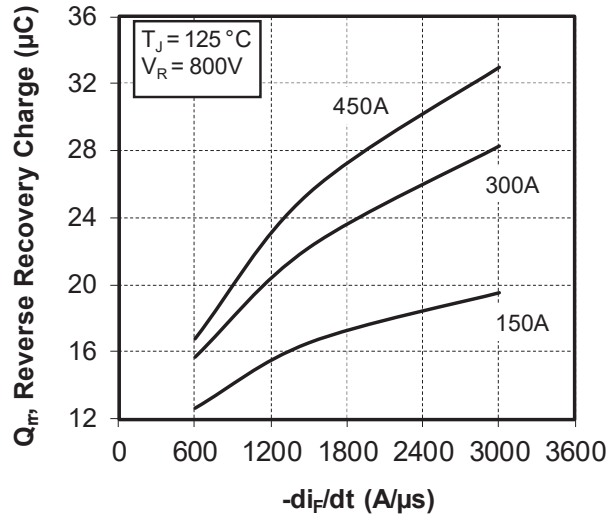


Figure 3-5.  $I_{RRM}$  vs. Current Rate of Charge

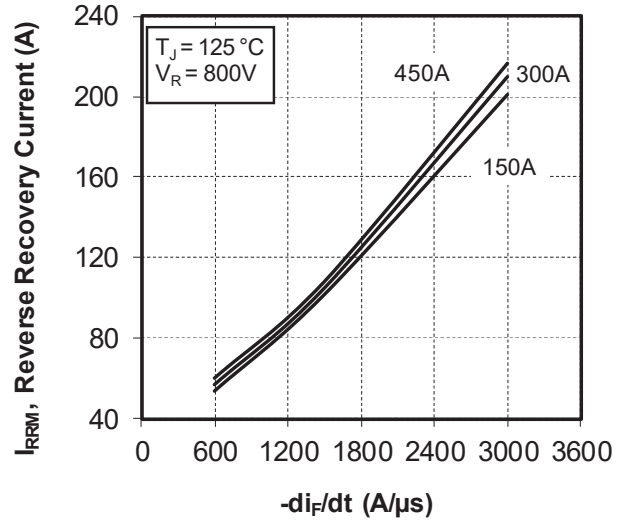


Figure 3-6. Capacitance vs. Reverse Voltage

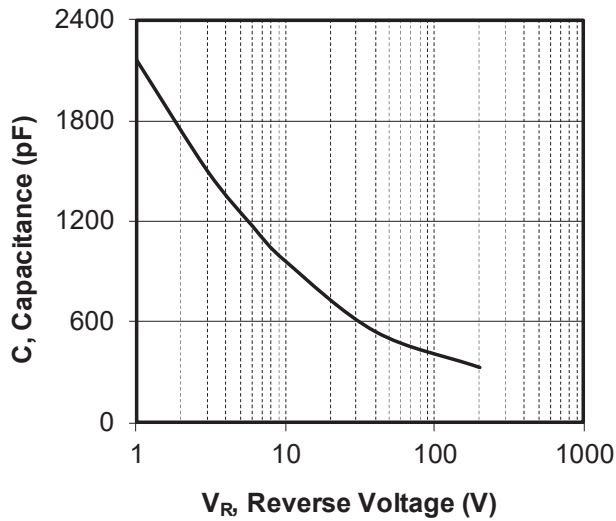
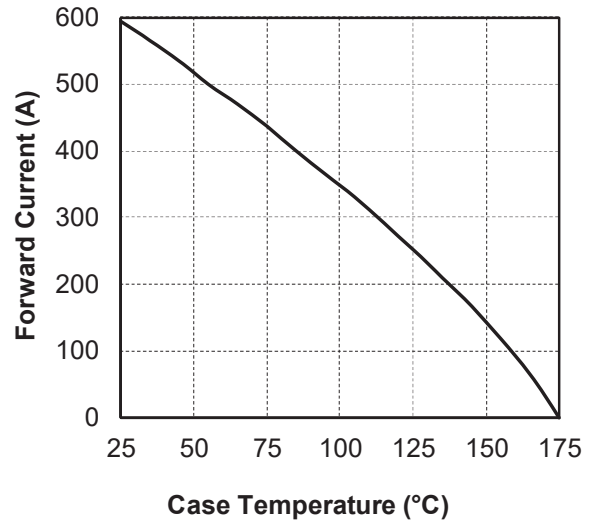


Figure 3-7. Forward Current vs. Case Temperature



## 4. Revision History

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

Revision	Date	Description
A	01/2024	Initial revision



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