

Product Overview

The APTDX300KK170D16AG device is a 1700V, 300A fast diode common-cathode power module. The following figures show the electrical diagram and pinout location of the device.

Figure 1. Electrical Diagram

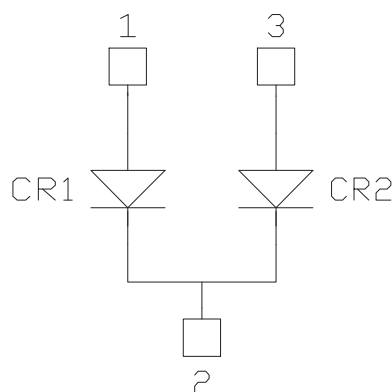
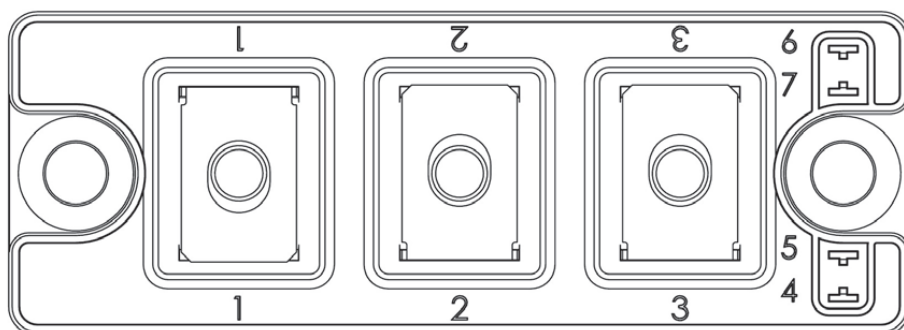


Figure 2. Pinout Location



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 APTDX300KK170D16AG 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 APTDX300KK170D16AG device has the following benefits:

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

Application

The APTDX300KK170D16AG 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 APTDX300KK170D16AG device.

1.1 Diode Characteristics (Per Diode)

The following table lists the absolute maximum ratings of the APTDX300KK170D16AG device.

Table 1-1. Absolute Maximum Ratings

| Symbol | Parameter | Maximum Ratings | Unit |
|-----------|--------------------------------------|---|------|
| V_{RRM} | Peak repetitive reverse voltage | 1700 | V |
| I_F | DC forward current | $T_C = 25\text{ }^\circ\text{C}$ | 345 |
| | | $T_C = 50\text{ }^\circ\text{C}$ | 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 APTDX300KK170D16AG device.

Table 1-2. Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------|-------------------------|----------------------|-----------------------------------|------|------|---------------|
| V_F | Diode forward voltage | $I_F = 300\text{A}$ | $T_J = 25\text{ }^\circ\text{C}$ | — | 2.35 | 2.7 |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | — | 2.25 | — |
| | | | $T_J = 175\text{ }^\circ\text{C}$ | — | 2.1 | — |
| I_{RRM} | Reverse leakage current | $V_R = 1700\text{V}$ | — | — | 25 | μA |

The following table lists the dynamic characteristics of the APTDX300KK170D16AG device.

Table 1-3. Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min. | Typ. | Max. | Unit |
|------------|-------------------------------------|---|-----------------------------------|------|-------|---------------------------|
| I_{rrm} | Reverse recovery current | $I_F = 300\text{A}$ $V_R = 900\text{V}$ $di/dt = 4750\text{ A}/\mu\text{s}$ | $T_J = 25\text{ }^\circ\text{C}$ | — | 323 | — |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | — | 350 | — |
| | | | $T_J = 175\text{ }^\circ\text{C}$ | — | 351 | — |
| Q_{rr} | Reverse recovery charge | | $T_J = 25\text{ }^\circ\text{C}$ | — | 37.6 | — |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | — | 71.5 | — |
| | | | $T_J = 175\text{ }^\circ\text{C}$ | — | 93.5 | — |
| E_{rr} | Reverse recovery energy | | $T_J = 25\text{ }^\circ\text{C}$ | — | 26.2 | — |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | — | 44.6 | — |
| | | | $T_J = 175\text{ }^\circ\text{C}$ | — | 57 | — |
| R_{thJC} | Junction-to-case thermal resistance | | — | — | 0.192 | $^\circ\text{C}/\text{W}$ |

1.2 Thermal and Package Characteristics

The following table lists the thermal and package characteristics of the APTDX300KK170D16AG device.

Table 1-4. Thermal and Package Characteristics

| Symbol | Characteristic | Min. | Max. | Unit |
|-------------------|---|---------------------------------|------------------------|------|
| V _{ISOL} | RMS isolation voltage, any terminal to case, t = 1 min, 50/60Hz | 4000 | — | V |
| T _J | Operating junction temperature range | -40 | 175 | °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 | | | N.m |
| | | For terminals M6 To heatsink | 3 5 | |
| Wt | Package weight | — | 160 | g |

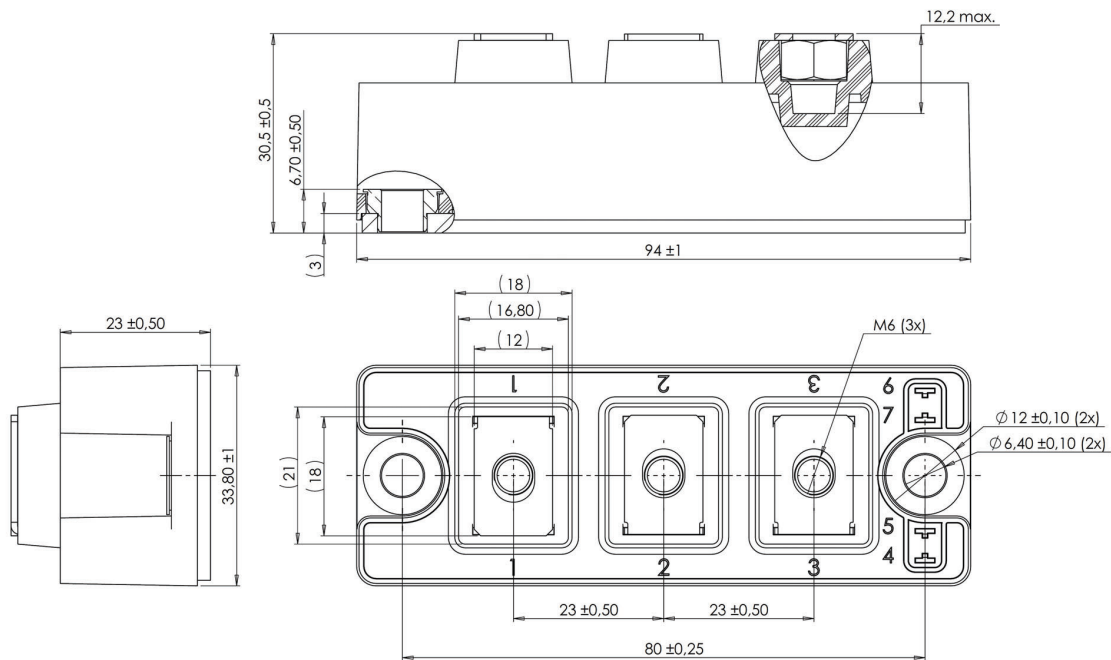
2. Package Specifications

The following section describes the package specification of the APTDX300KK170D16AG device.

2.1 Package Outline

The following figure shows the package outline drawing of the APTDX300KK170D16AG 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 APTDX300KK170D16AG device.

Figure 3-1. Maximum Thermal Impedance

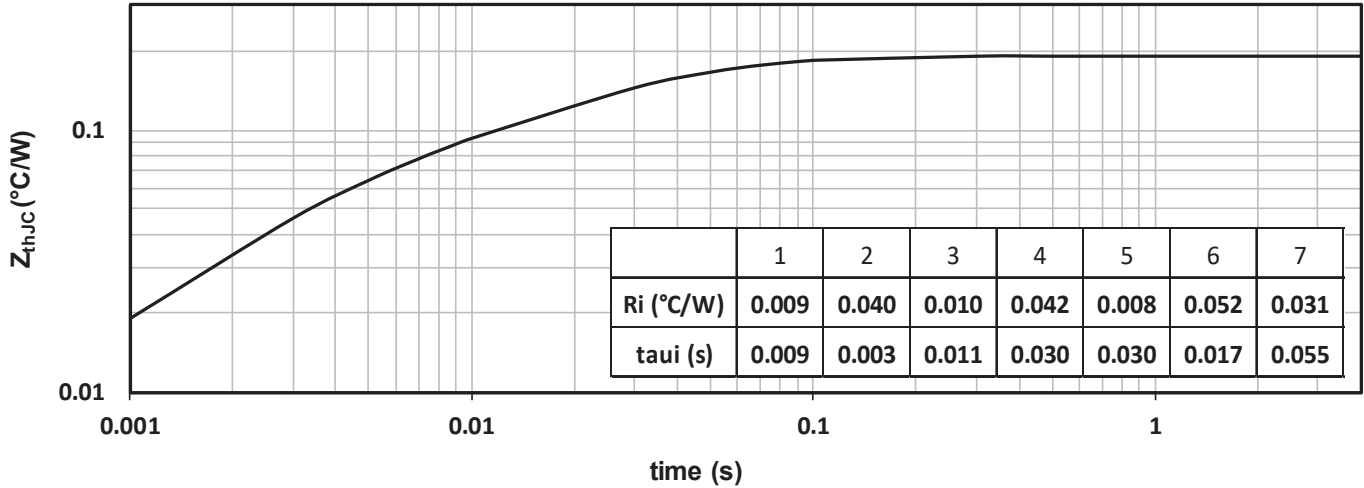


Figure 3-2. Forward Current vs. Forward Voltage

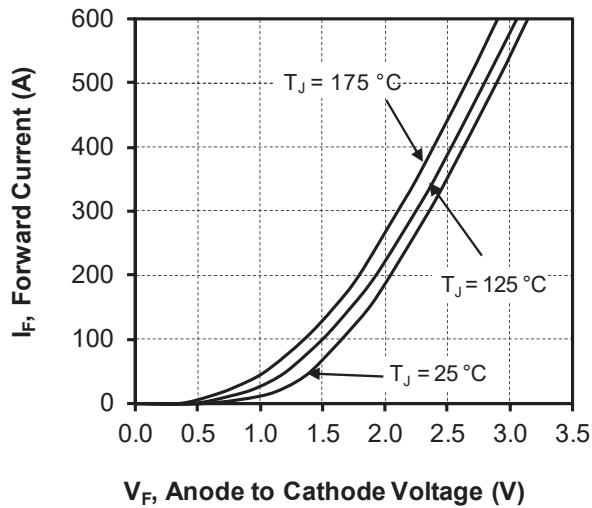


Figure 3-3. Energy losses vs Forward Current

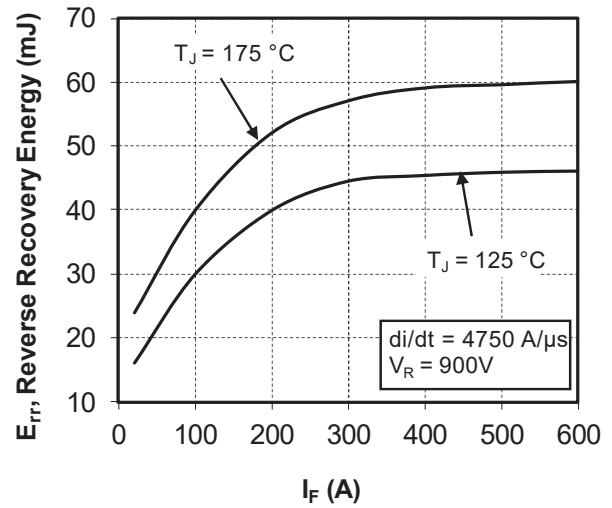
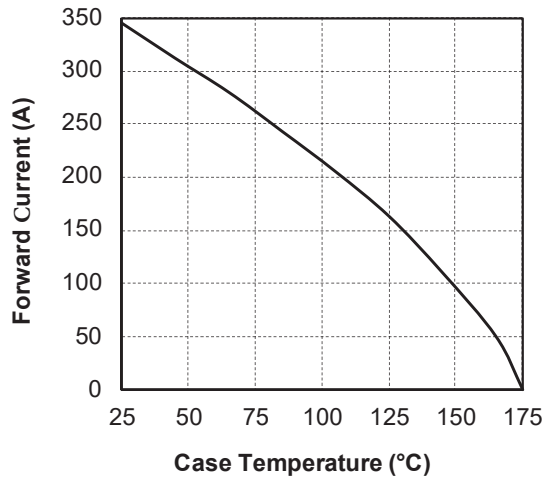


Figure 3-4. Forward Current vs. Case Temperature



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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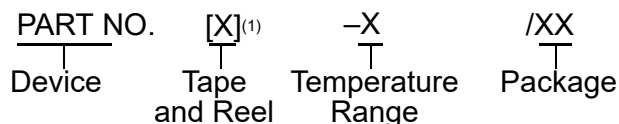
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| | | |
|-------------------------|--|-------------------------------------|
| Device: | Device A, Device B, etc | |
| Tape and Reel Option: | Blank | = Standard packaging (tube or tray) |
| | T | = Tape and Reel ⁽¹⁾ |
| Temperature Range: | I | = -40°C to +85°C (Industrial) |
| | E | = -40°C to +125°C (Extended) |
| Package: ⁽²⁾ | JQ | = UQFN |
| | P | = PDIP |
| | ST | = TSSOP |
| | SL | = SOIC-14 |
| | SN | = SOIC-8 |
| | RF | = UDFN |
| Pattern: | QTP, SQTP SM (Serial Quick Turn Programming capability), Code or Special Requirements (blank otherwise) | |

- Device A - I/P Industrial temperature, PDIP package
- Device B - E/SS Extended temperature, SSOP package

PIS_NOTES

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