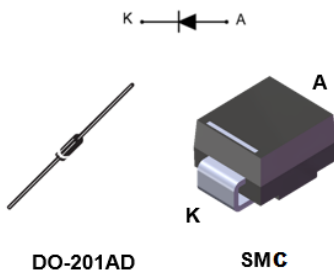


## 1000 V - 3 A high efficiency ultrafast diode



### Features

- Low forward voltage drop
- High reliability
- High surge current capability
- Soft switching for reduced EMI disturbances
- Planar technology
- ECOPACK2 compliant

### Applications

- Switching diode
- Auxiliary power supply

### Description

The STTH310, which uses ST ultrafast high voltage planar technology, is specially suited for free-wheeling, clamping, snubbing, demagnetization in power supplies and other power switching applications.

| Product status  |        |
|-----------------|--------|
| STTH310         |        |
| Product summary |        |
| Symbol          | Value  |
| $I_{F(AV)}$     | 3 A    |
| $V_{RRM}$       | 1000 V |
| $T_{j(max.)}$   | 175 °C |
| $V_{F(typ.)}$   | 0.98 V |
| $t_{rr(max.)}$  | 75 ns  |

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)**

| Symbol      | Parameter  |          | Value                            | Unit |   |
|-------------|--|----------|----------------------------------|------|---|
| $V_{RRM}$   | Repetitive peak reverse voltage                      |          | 1000                             | V    |   |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ , square wave | DO-201AD | $T_L = 75\text{ °C}$             | 3    | A |
|             |  | SMC      | $T_L = 75\text{ °C}$             |      |   |
| $I_{FSM}$   | Surge non repetitive forward current                 | DO-201AD | $t_p = 8.3\text{ ms}$ sinusoidal | 55   | A |
|             |  | SMC      |                                  | 45   |   |
| $T_{stg}$   | Storage temperature range                            |          | -65 to +175                      | °C   |   |
| $T_j$       | Maximum operating junction temperature               |          | +175                             | °C   |   |

**Table 2. Thermal resistance parameter**

| Symbol        | Parameter           |                     | Max. value | Unit |
|---------------|---------------------|---------------------|------------|------|
| $R_{th(j-l)}$ | Junction to lead    |                     | 20         | °C/W |
|               | Junction to lead    |                     | 20         |      |
| $R_{th(j-a)}$ | Junction to ambient | Lead length = 10 mm | 75         |      |

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       |                    | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$    | -    |      | 10   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    |      | 50   |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 3\text{ A}$ | -    |      | 1.7  | V             |
|             |                         | $T_j = 150\text{ °C}$ |                    | -    | 0.98 | 1.42 |               |

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 1.20 \times I_{F(AV)} + 0.075 \times I_F^2_{(RMS)}$$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

**Table 4. Dynamic characteristics ( $T_j = 25\text{ °C}$  unless otherwise stated)**

| Symbol   | Parameters               | Test conditions  | Min. | Typ. | Max. | Unit |
|----------|--------------------------|--|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ , $I_R = 1\text{ A}$                 | -    | -    | 75   | ns   |
| $t_{fr}$ | Forward recovery time    | $I_F = 3\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_{FR} = 1.1 V_{F(max)}$ | -    | -    | 300  | ns   |
| $V_{FP}$ | Forward recovery voltage |  | -    | -    | 12   | V    |

## 1.1 Characteristics (curves)

Figure 1. Conduction losses versus average current

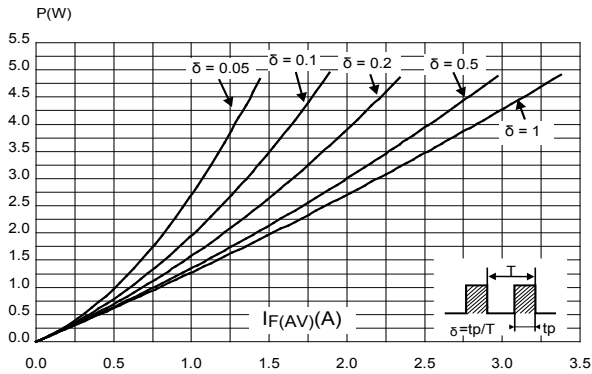


Figure 2. Forward voltage drop versus forward current

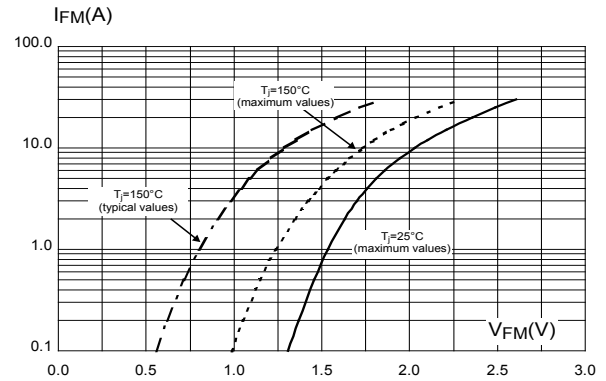


Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-201AD)

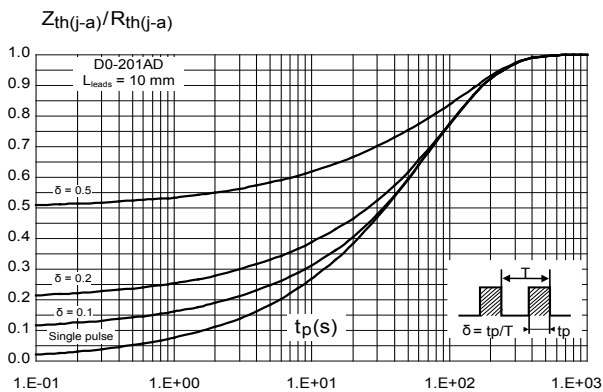


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMC)

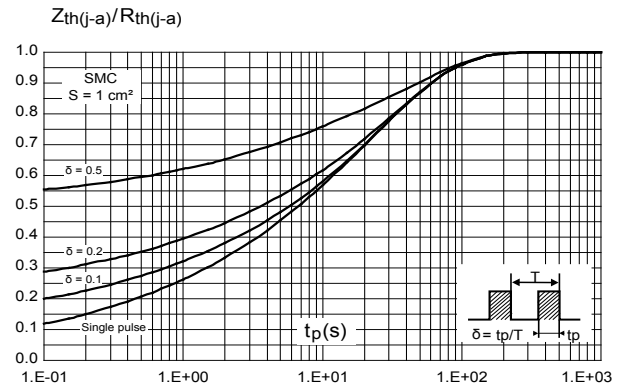


Figure 5. Thermal resistance versus lead length (DO-201AD)

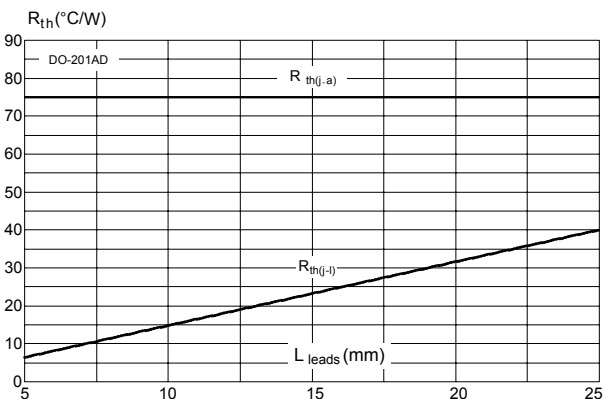
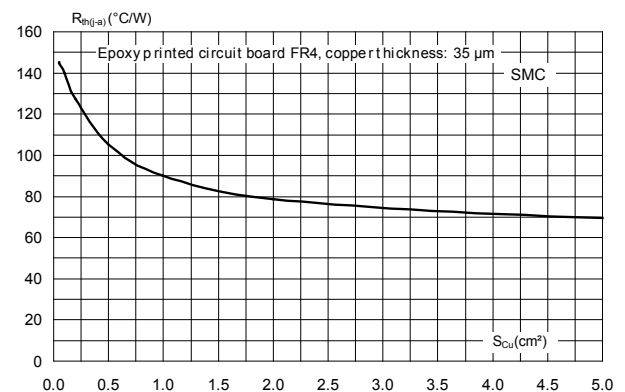


Figure 6. Thermal resistance junction to ambient versus copper surface under each lead (typical values) (SMC)



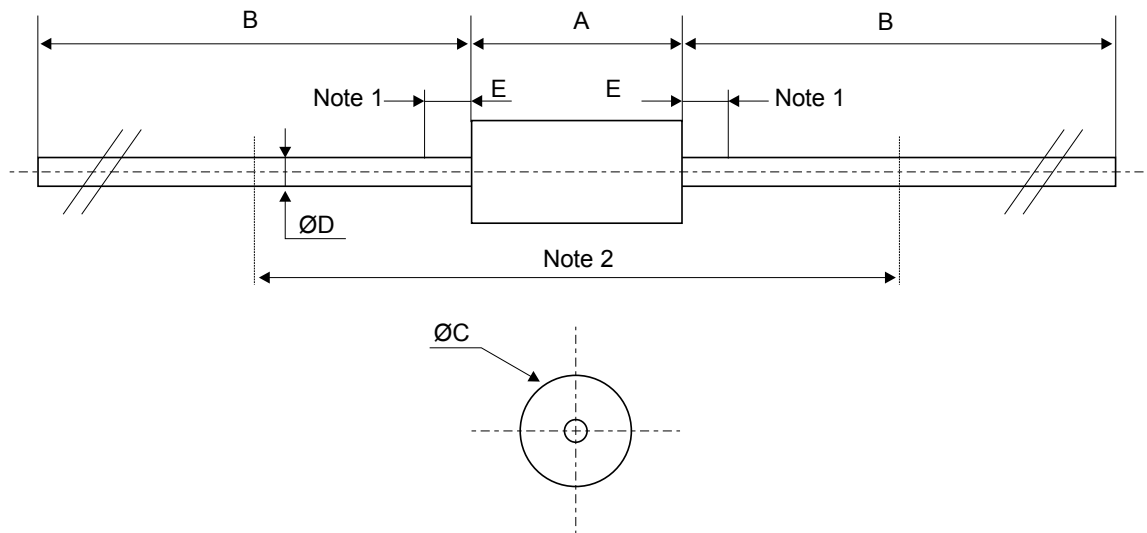
## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 DO-201AD package information

- Epoxy meets UL 94, V0

**Figure 7. DO-201AD package outline**



**Table 5. DO-201AD package mechanical data**

| Ref.                  | Dimensions  |      |      |                             |      |       |
|-----------------------|-------------|------|------|-----------------------------|------|-------|
|                       | Millimeters |      |      | Inches (for reference only) |      |       |
|                       | Min.        | Typ. | Max. | Min.                        | Typ. | Max.  |
| A                     |             | -    | 9.50 |                             | -    | 0.374 |
| B                     | 25.40       | -    |      | 1.000                       | -    |       |
| C                     |             | -    | 5.30 |                             | -    | 0.209 |
| D <sup>(1)</sup>      |             | -    | 1.30 |                             | -    | 0.051 |
| E                     |             | -    | 1.25 |                             | -    | 0.049 |
| Note 2 <sup>(2)</sup> | 15.00       |      |      | 0.590                       |      |       |

1. The lead diameter *D* is not controlled over zone *E*
2. The minimum length, which must stay straight between the right angles after bending, is 15 mm (0.59")

## 2.2 SMC package information

- Epoxy meets UL94, V0

Figure 8. SMC package outline

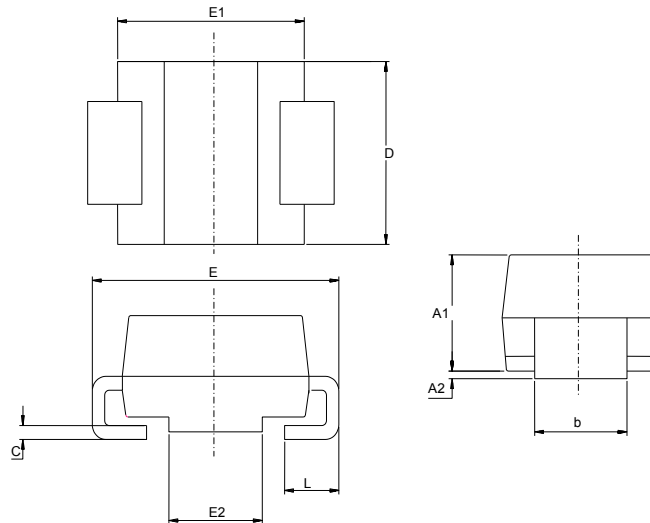
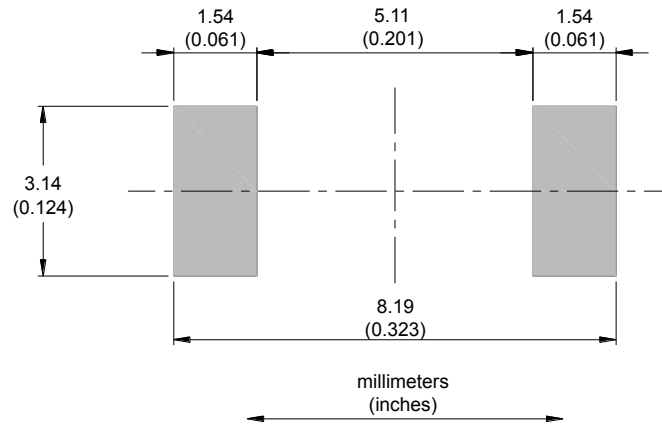


Table 6. SMC package mechanical data

| Ref. | Dimensions  |      |                             |        |
|------|-------------|------|-----------------------------|--------|
|      | Millimeters |      | Inches (for reference only) |        |
|      | Min.        | Max. | Min.                        | Max.   |
| A1   | 1.90        | 2.45 | 0.0748                      | 0.0965 |
| A2   | 0.05        | 0.20 | 0.0020                      | 0.0079 |
| b    | 2.90        | 3.20 | 0.1142                      | 0.1260 |
| c    | 0.15        | 0.40 | 0.0059                      | 0.0157 |
| D    | 5.55        | 6.25 | 0.2185                      | 0.2461 |
| E    | 7.75        | 8.15 | 0.3051                      | 0.3209 |
| E1   | 6.60        | 7.15 | 0.2598                      | 0.2815 |
| E2   | 4.40        | 4.70 | 0.1732                      | 0.1850 |
| L    | 0.75        | 1.50 | 0.0295                      | 0.0591 |

Figure 9. SMC recommended footprint



### 3 Ordering information

**Table 7. Ordering information**

| Order code | Marking | Package  | Weight  | Base qty. | Delivery mode |
|------------|---------|----------|---------|-----------|---------------|
| STTH310S   | S10     | SMC      | 0.245 g | 2500      | Tape and reel |
| STTH310    | STTH310 | DO-201AD | 1.16 g  | 600       | Ammopack      |
| STTH310RL  | STTH310 |          | 1.16 g  | 1900      | Tape and reel |



## Revision history

**Table 8. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| Jan-2003    | 1        | Initial release.   |
| 03-Apr-2007 | 2        | DO-201AD C2 package added. SMC package information updated.  |
| 07-Dec-2009 | 3        | Updated Table 6 package dimensions.  |
| 21-Jun-2012 | 4        | Updated $T_j$ in Table 1 and Table 2 and change min. $T_{stg}$ to $-65\text{ }^\circ\text{C}$ in Table 2.                      |
| 31-Mar-2020 | 5        | Updated <a href="#">Figure 4</a> , <a href="#">Figure 5</a> and <a href="#">Figure 6</a> .<br>Reformatted to current standard. |

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2020 STMicroelectronics – All rights reserved