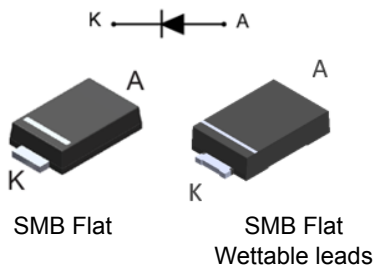



## Automotive 3 A - 1000 V ultrafast rectifier



### Features

- AEC-Q101 qualified 
- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature
- **ECOPACK2** or **ECOPACK3** compliant component on demand

### Description

The **STTH310-Y**, which is using ST's new 1000 V planar technology, is especially suited for switching mode base drive and transistor circuits.

The device is also intended for use as a free-wheeling diode in power supplies and other power switching applications in automotive K functions.



#### Product status link

[STTH310-Y](#)

#### Product summary

|                 |        |
|-----------------|--------|
| $I_{F(AV)}$     | 3 A    |
| $V_{RRM}$       | 1000 V |
| $T_j$ (max.)    | 175 °C |
| $V_F$ (typ.)    | 0.98 V |
| $T_{rr}$ (typ.) | 52 ns  |

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at  $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol      | Parameter                       |                                    | Value        | Unit |
|-------------|---------------------------------|------------------------------------|--------------|------|
| $V_{RRM}$   | Repetitive peak reverse voltage |                                    | 1000         | V    |
| $I_{F(AV)}$ | Average forward current         | $T_L = 95\text{ °C } \delta = 0.5$ | 3            | A    |
| $I_{FSM}$   | Forward surge current           | $t_p = 8.3\text{ ms}$              | 30           | A    |
| $T_{stg}$   | Storage temperature range       |                                    | -65 to + 175 | °C   |
| $T_j^{(1)}$ | Operating temperature range     |                                    | -40 to + 175 | °C   |

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance**

| Symbol        | Parameter        | Value | Unit |
|---------------|------------------|-------|------|
| $R_{th(j-l)}$ | Junction to lead | 16    | °C/W |

**Table 3. Static electrical characteristic**

| Symbol      | Parameter               | Test conditions       |                    | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
|             |                         |                       |                    |      |      |      |               |
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$    | -    |      | 10   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 1    | 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. Pulsetest:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

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

To evaluate the conduction losses use the following equation:

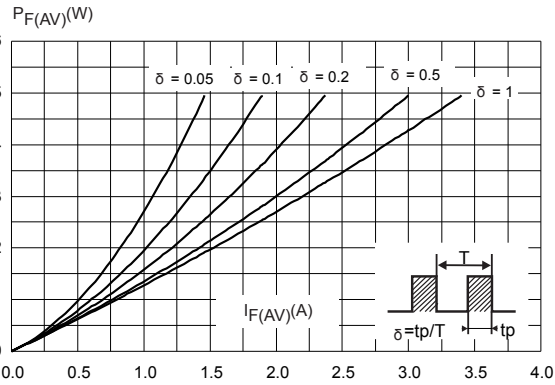
$$P = 1.20 \times I_{F(AV)} + 0.075 I_{F^2(RMS)}$$

**Table 4. Dynamic electrical characteristics**

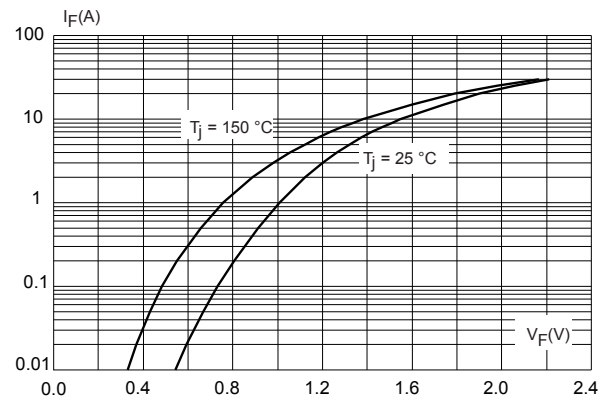
| Symbol   | Parameter                | Test conditions      |  | Min. | Typ. | Max. | Unit |
|----------|--------------------------|----------------------|--|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ °C}$ | $I_F = 0.5\text{ A}; I_{rr} = 0.25\text{ A}; I_R = 1\text{ A}$             | -    | 52   | 75   | ns   |
| $t_{fr}$ | Forward recovery time    | $T_j = 25\text{ °C}$ | $I_F = 3\text{ A}; dI_F/dt = 50\text{ A}/\mu\text{s}; V_{FR} = 4\text{ V}$ | -    |      | 300  |      |
| $V_{FP}$ | Forward recovery voltage |                      |  | -    | 8    | 12   | V    |

## 1.1 Electrical characteristics (curves)

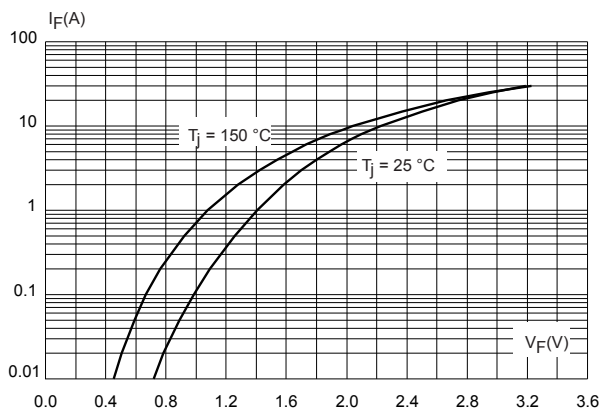
**Figure 1. Average forward power dissipation versus average forward current**



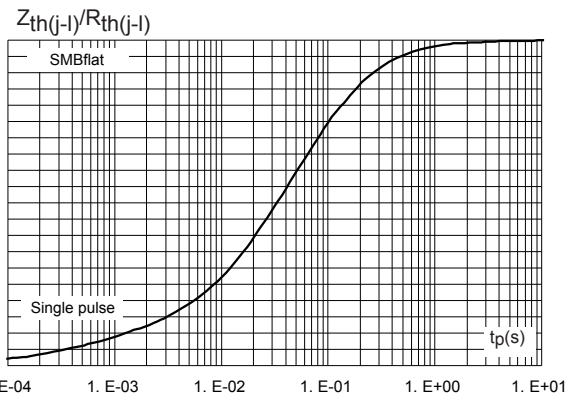
**Figure 2. Forward voltage drop versus forward current (typical values)**



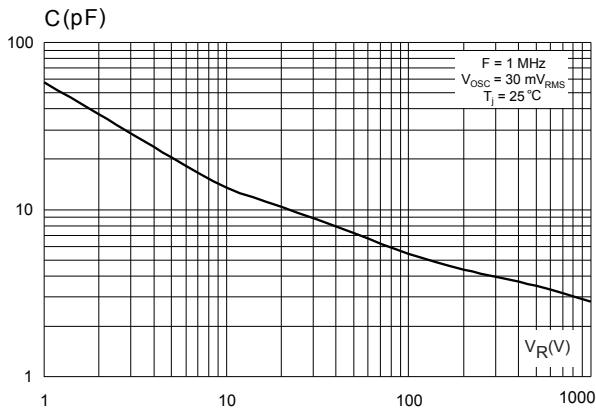
**Figure 3. Forward voltage drop versus forward current (maximum values)**



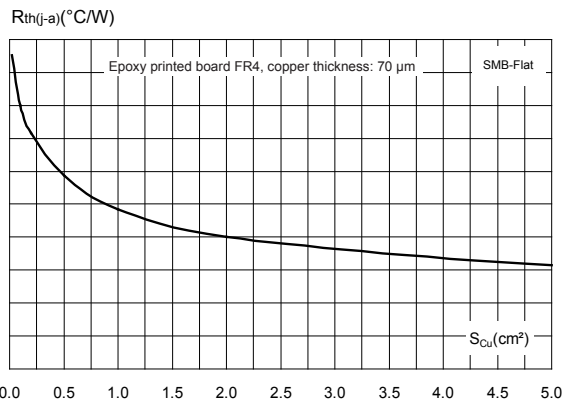
**Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration**



**Figure 5. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 6. Thermal resistance junction to ambient versus copper surface under each lead**



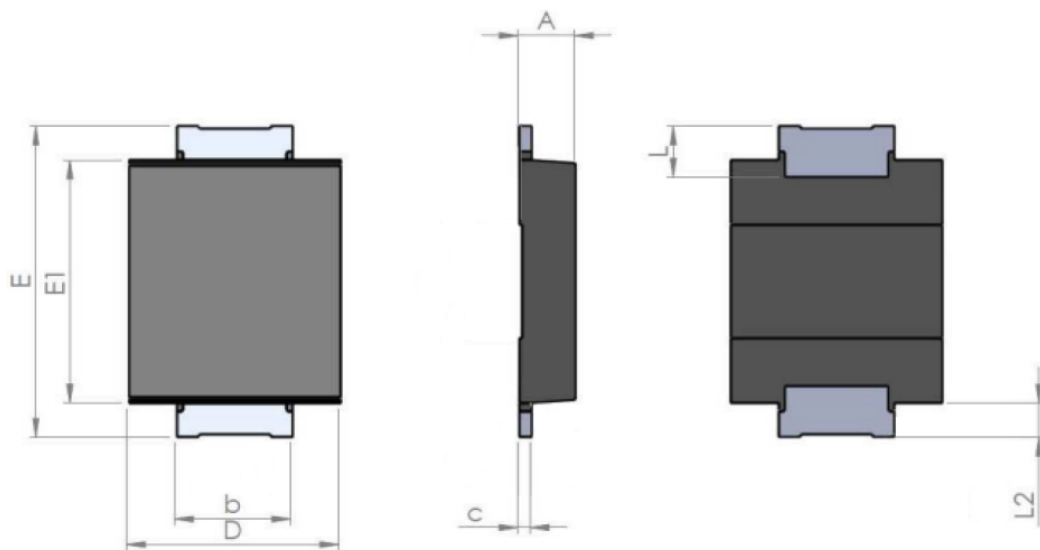
## 2 Package information

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 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

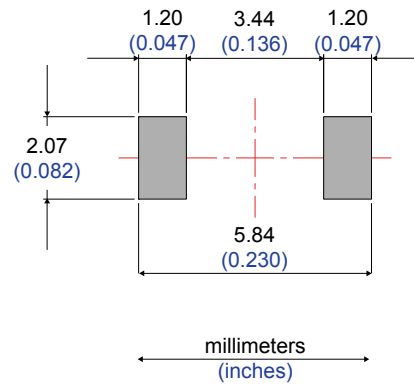
**Figure 7. SMB Flat package outline**



**Table 5. SMB Flat mechanical data**

| Ref. | Dimensions  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimeters |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    | 0.90        |      | 1.10 | 0.035  |       | 0.043 |
| b    | 1.95        |      | 2.20 | 0.077  |       | 0.087 |
| c    | 0.15        |      | 0.40 | 0.006  |       | 0.016 |
| D    | 3.30        |      | 3.95 | 0.130  |       | 0.156 |
| E    | 5.10        |      | 5.60 | 0.200  |       | 0.220 |
| E1   | 4.05        |      | 4.60 | 0.159  |       | 0.181 |
| L    | 0.75        |      | 1.50 | 0.030  |       | 0.060 |
| L2   |             | 0.60 |      |        | 0.024 |       |

Figure 8. Footprint recommendations, dimensions in mm (inches)



### 3 Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|------------|---------|---------|--------|-----------|---------------|
| STTH310UFY | F310Y   | SMBflat | 50 mg  | 5000      | Tape and reel |

## Revision history

**Table 6. Document revision history**

| Date        | Version | Changes   |
|-------------|---------|---|
| 05-Feb-2014 | 1       | Initial release.  |
| 18-Mar-2022 | 2       | Updated <a href="#">Section 2.1</a> SMB Flat package information. |

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