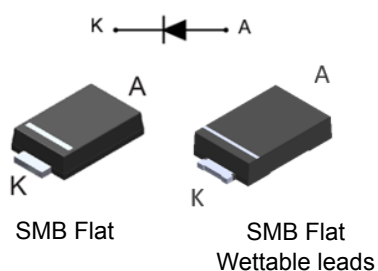


## Automotive high voltage ultrafast rectifier



### 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 [STTH110-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

[STTH110-Y](#)

#### Product summary

|                 |        |
|-----------------|--------|
| $I_{F(AV)}$     | 1 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  $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

| Symbol      | Parameter                       |                                                    | Value       | Unit               |
|-------------|---------------------------------|----------------------------------------------------|-------------|--------------------|
| $V_{RRM}$   | Repetitive peak reverse voltage |                                                    | 1000        | V                  |
| $I_{F(AV)}$ | Average forward current         | $T_L = 140\text{ }^{\circ}\text{C}$ $\delta = 0.5$ | 1           | A                  |
| $I_{FSM}$   | Forward surge current           | $t_p = 8.3\text{ ms}$                              | 20          | A                  |
| $T_{stg}$   | Storage temperature range       |                                                    | -65to + 175 | $^{\circ}\text{C}$ |
| $T_J^{(1)}$ | Operating temperature range     |                                                    | -40to + 175 | $^{\circ}\text{C}$ |

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 | 20    | $^{\circ}\text{C}/\text{W}$ |

**Table 3. Static electrical characteristic**

| Symbol      | Parameter               | Test conditions                     |                    | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-------------------------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_J = 25\text{ }^{\circ}\text{C}$  | $V_R = V_{RRM}$    | -    |      | 5    | $\mu\text{A}$ |
|             |                         | $T_J = 125\text{ }^{\circ}\text{C}$ |                    | -    | 1    | 50   |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_J = 25\text{ }^{\circ}\text{C}$  | $I_F = 1\text{ A}$ | -    |      | 1.7  | V             |
|             |                         | $T_J = 150\text{ }^{\circ}\text{C}$ |                    | -    | 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:

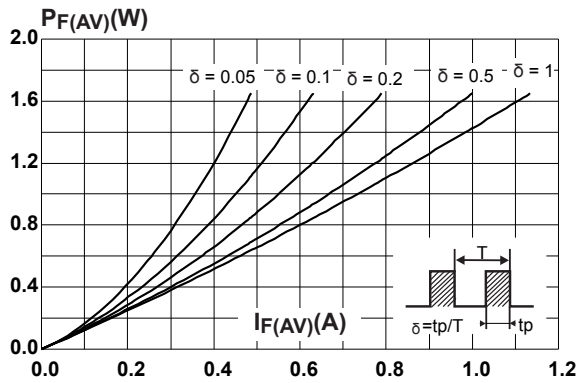
$$P = 1.20 \times I_{F(AV)} + 0.225 I_F^2(RMS)$$

**Table 4. Dynamic electrical characteristics**

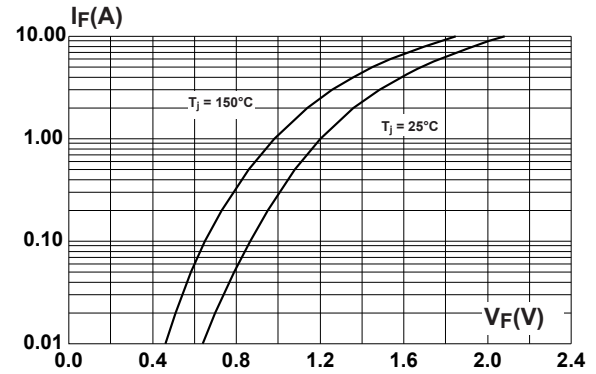
| Symbol   | Parameter                | Test conditions                    |                                                                                     | Min. | Typ. | Max. | Unit |
|----------|--------------------------|------------------------------------|-------------------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_J = 25\text{ }^{\circ}\text{C}$ | $I_F = 0.5\text{ A}$ ; $I_{rr} = 0.25\text{ A}$ ; $I_R = 1\text{ A}$                | -    | 52   | 75   | ns   |
| $t_{fr}$ | Forward recovery time    | $T_J = 25\text{ }^{\circ}\text{C}$ | $I_F = 1\text{ A}$ ; $dI_F/dt = 50\text{ A}/\mu\text{s}$ ; $V_{FR} = 2.70\text{ V}$ | -    |      | 300  |      |
| $V_{FP}$ | Forward recovery voltage |                                    |                                                                                     | -    | 10   | 15   | V    |

## 1.1 Electrical characteristics (curves)

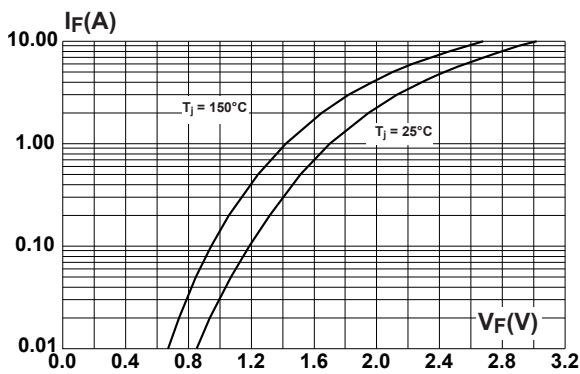
**Figure 1. Average forward power dissipation versus average forward current**



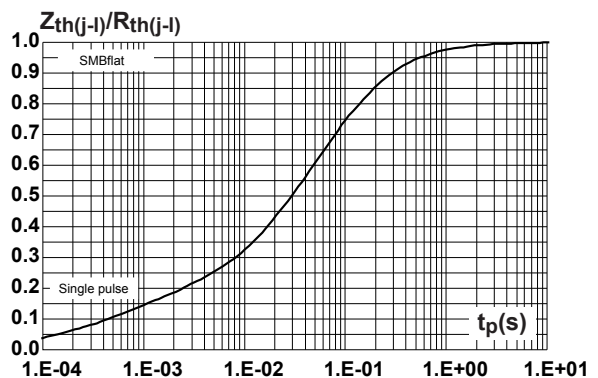
**Figure 2. Forward voltage drop versus forward current (typical values)**



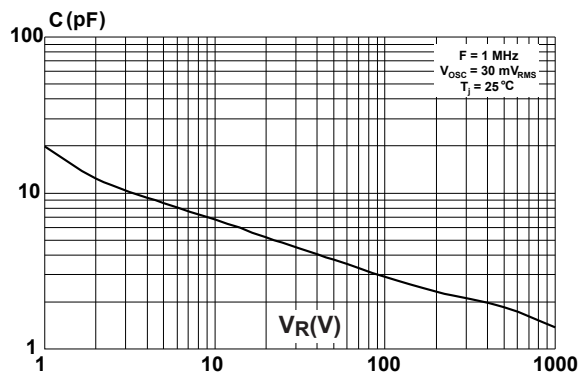
**Figure 3. Forward voltage drop versus forward current (maximum values)**



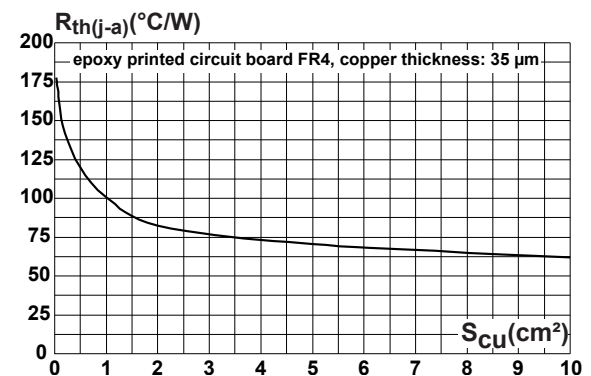
**Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration**



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



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



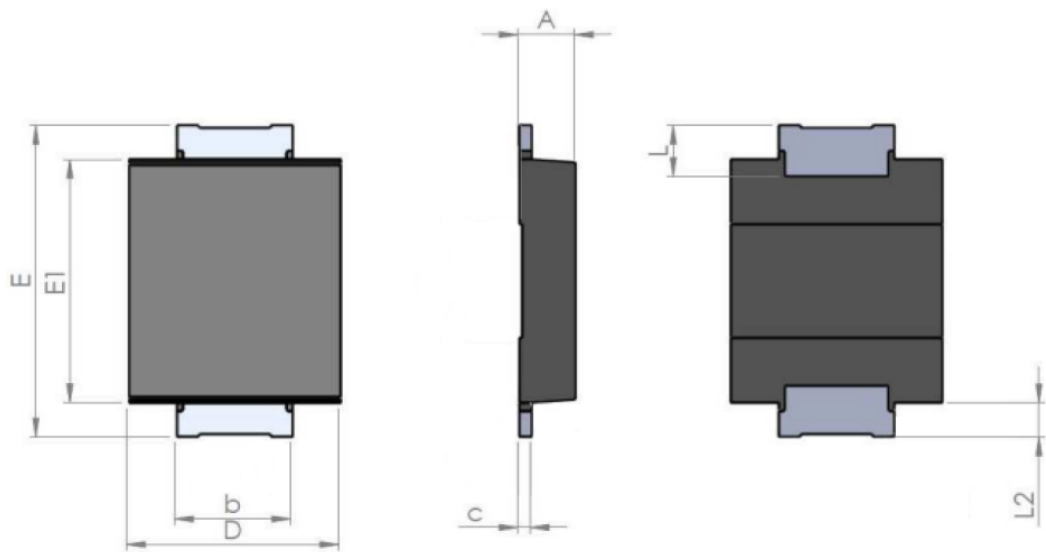
## 2 Package information

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

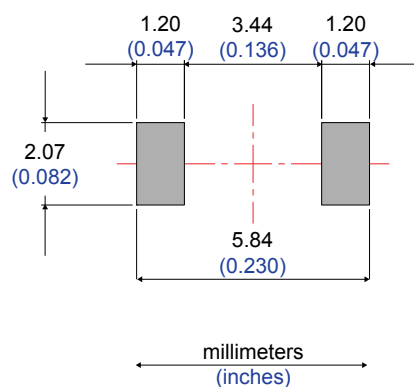
**Figure 7. SMB Flat package outline**



**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 |
|------------|---------|---------|--------|-----------|---------------|
| STTH110UFY | F110Y   | SMBflat | 50mg   | 5000      | Tape and reel |

## Revision history

**Table 6. Document revision history**

| Date        | Version | Changes                                                           |
|-------------|---------|-------------------------------------------------------------------|
| 05-Feb-2014 | 1       | Initial release.                                                  |
| 01-Mar-2022 | 2       | Updated <a href="#">Section 2.1</a> SMB Flat package information. |

**IMPORTANT NOTICE – 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 acknowledgment.

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.

© 2022 STMicroelectronics – All rights reserved