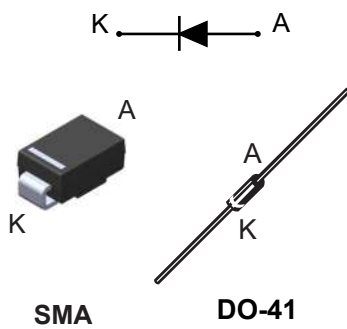


## 1000 V - 1 A high efficiency ultrafast diode



### 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 **STTH110**, which is using ST ultrafast high voltage planar technology, is especially suited for free-wheeling, clamping, snubbing, demagnetization in power supplies and other power switching applications.

| Product status  |        |
|-----------------|--------|
| STTH110         |        |
| Product summary |        |
| Symbol          | Value  |
| $I_{F(AV)}$     | 1 A    |
| $V_{RRM}$       | 1000 V |
| $T_{j(max.)}$   | 175 °C |
| $V_{F(typ.)}$   | 1.42 V |

# 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    |
| $V_{RMS}$   | Voltage rms  |  | 700         | V    |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ , square wave | SMA $T_L = 125\text{ °C}$              | 1           | A    |
|             |  | DO-41 $T_L = 100\text{ °C}$            |             |      |
| $I_{FSM}$   | Surge non repetitive forward current                 | SMA                                    | 18          | A    |
|             |  | DO-41 $t_p = 8.3\text{ ms sinusoidal}$ | 20          |      |
| $T_{stg}$   | Storage temperature range                            |  | -50 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    | SMA                 | 30         | °C/W |
|               | Junction to lead    | Lead length = 10 mm | 45         |      |
| $R_{th(j-a)}$ | Junction to ambient |                     | DO-41      |      |

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 | $T_j = 25\text{ °C}$  | $V_R = 1000\text{ V}$ | -    |      | 10   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                       | -    |      | 50   |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 1\text{ A}$    | -    |      | 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:

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

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    | $I_F = 1\text{ A}$ , $dI_F/dt = 50\text{ A}/\mu\text{s}$ , $V_{FR} = 1.1 V_{F(max)}$ | -    | -    | 300  | ns   |
| $V_{FP}$ | Forward recovery voltage |  | -    | -    | 18   | V    |

## 1.1 Characteristics (curves)

Figure 1. Conduction losses versus average current

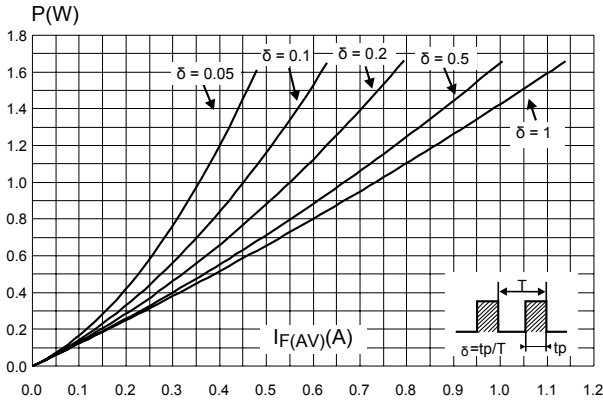


Figure 2. Forward voltage drop versus forward current (typical values)

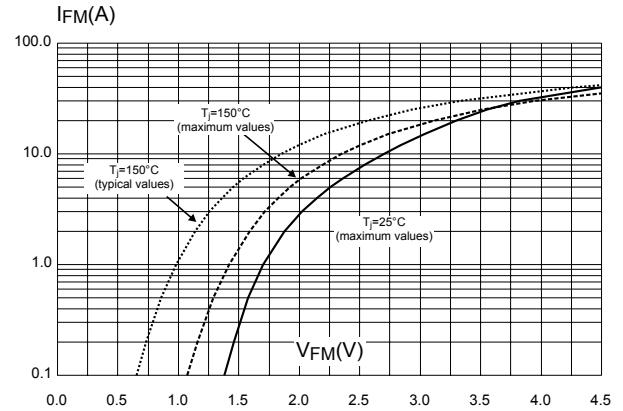


Figure 3. Relative variation of thermal impedance junction to ambient versus pulse duration (DO-41)

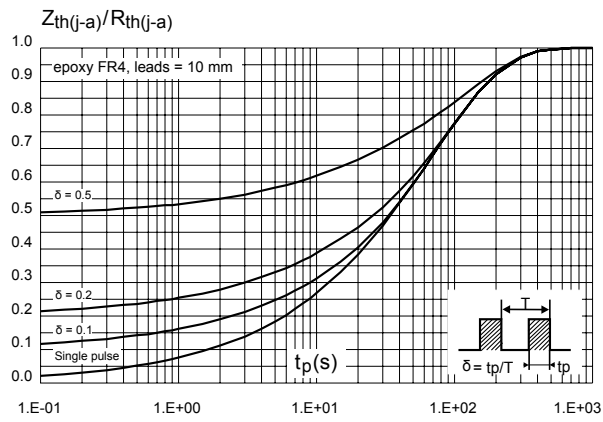
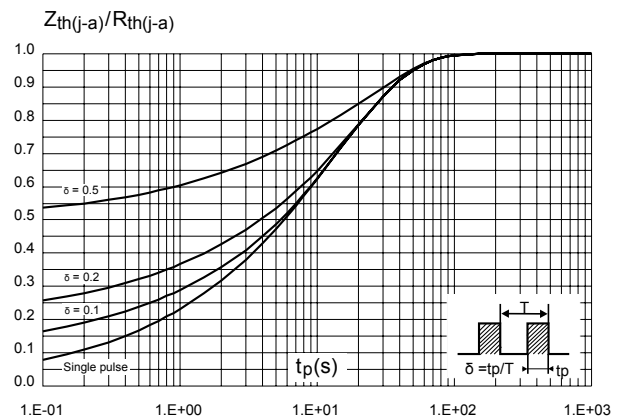
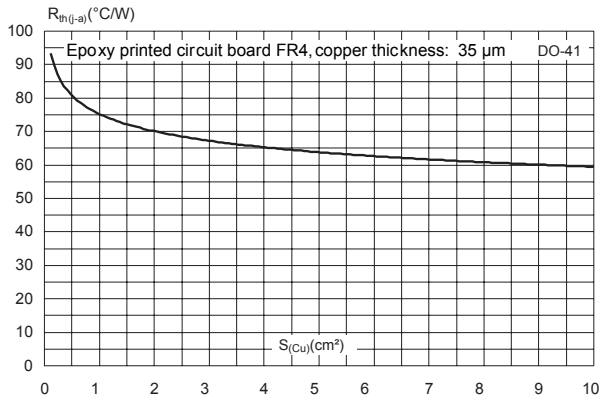


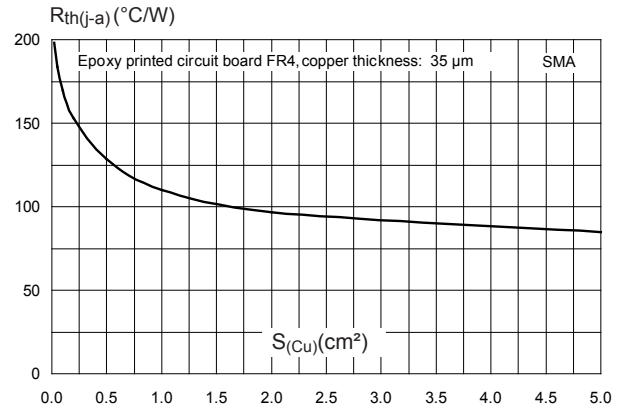
Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (SMA)



**Figure 5. Thermal resistance junction to ambient versus copper surface under each lead (DO-41)**



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



## 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-41 package information

- Epoxy meets UL 94, V0
- Band indicates cathode
- Bending method (DO-41): see Application note AN1471

Figure 7. DO-41 package outline

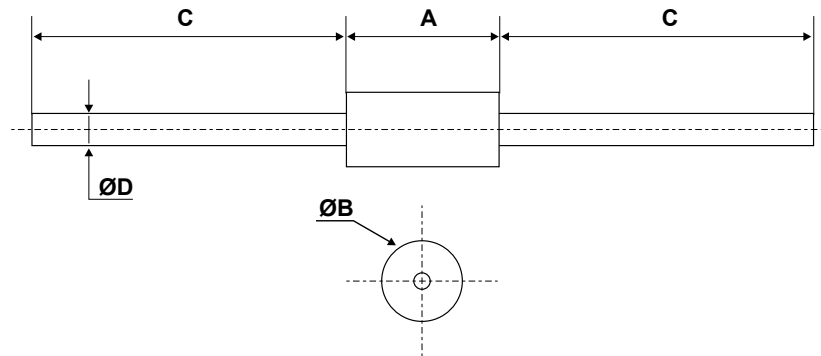


Table 5. DO-41 package mechanical data

| Ref. | Dimensions  |      |      |                             |      |        |
|------|-------------|------|------|-----------------------------|------|--------|
|      | Millimeters |      |      | Inches (for reference only) |      |        |
|      | Min.        | Typ. | Max. | Min.                        | Typ. | Max.   |
| A    | 4.07        | -    | 5.20 | 0.160                       | -    | 0.205  |
| B    | 2.04        | -    | 2.71 | 0.080                       | -    | 0.107  |
| C    | 25.40       | -    |      | 1.000                       | -    |        |
| D    | 0.71        | -    | 0.86 | 0.028                       | -    | 0.0034 |

## 2.2 SMA package information

- Epoxy meets UL94, V0
- Cooling method : by conduction (C)

Figure 8. SMA package outline

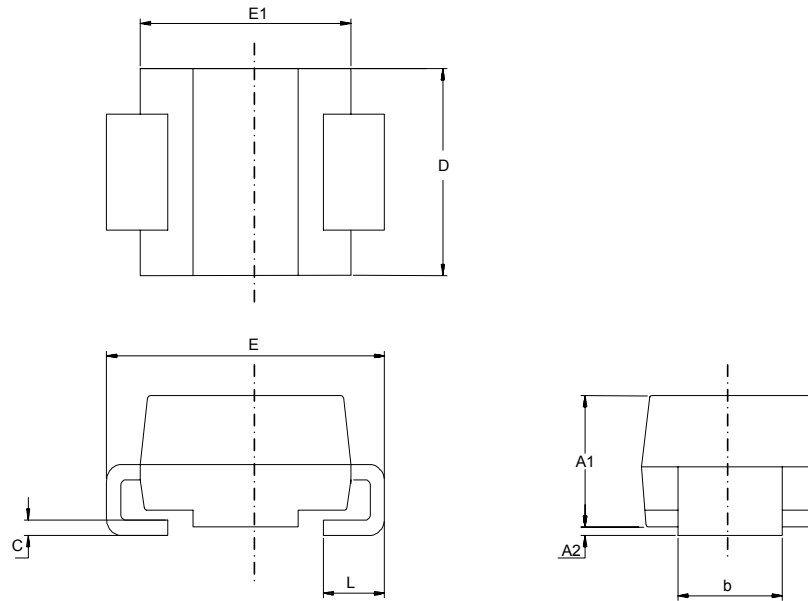
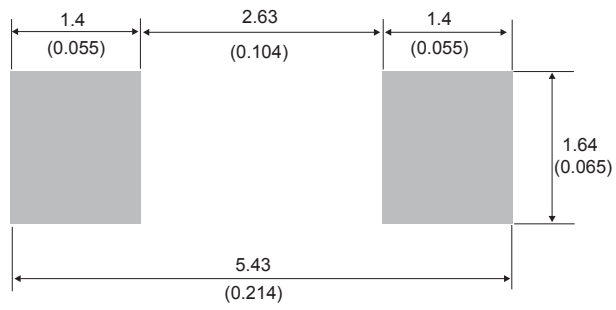


Table 6. SMA package mechanical data

| Ref. | Dimensions  |      |                             |       |
|------|-------------|------|-----------------------------|-------|
|      | Millimeters |      | Inches (for reference only) |       |
|      | Min.        | Max. | Min.                        | Max.  |
| A1   | 1.90        | 2.45 | 0.074                       | 0.097 |
| A2   | 0.05        | 0.20 | 0.001                       | 0.008 |
| b    | 1.25        | 1.65 | 0.049                       | 0.065 |
| c    | 0.15        | 0.40 | 0.005                       | 0.016 |
| D    | 2.25        | 2.90 | 0.088                       | 0.115 |
| E    | 4.80        | 5.35 | 0.188                       | 0.211 |
| E1   | 3.95        | 4.60 | 0.155                       | 0.182 |
| L    | 0.75        | 1.50 | 0.029                       | 0.060 |

Figure 9. SMA recommended footprint in mm (inches)





### 3 Ordering information

**Table 7. Ordering information**

| Order code | Marking | Package | Weight  | Base qty. | Delivery mode     |
|------------|---------|---------|---------|-----------|-------------------|
| STTH110    | STTH110 | DO-41   | 0.34 g  | 2000      | Ammopack          |
| STTH110A   | H10     | SMA     | 0.068 g | 5000      | Tape and reel 13" |
| STTH110RL  | STTH110 | DO-41   | 0.34 g  | 5000      | Tape and reel 13" |

## Revision history

**Table 8. Document revision history**

| Date         | Revision | Changes                           |
|--------------|----------|-----------------------------------|
| Jan-2003     | 1        | Initial release.                  |
| 30-Sept-2009 | 2        | Updated Table 8.                  |
| 20-Dec-2013  | 3        | Updated Table 4.                  |
| 11-Dec-2019  | 4        | Updated <a href="#">Table 3</a> . |

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