

## High voltage ultrafast rectifier

### Features

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

### Description

The STTH112, which is using ST ultrafast high voltage planar technology, is specially suited for free-wheeling, clamping, snubbing, demagnetization in power supplies and other power switching applications

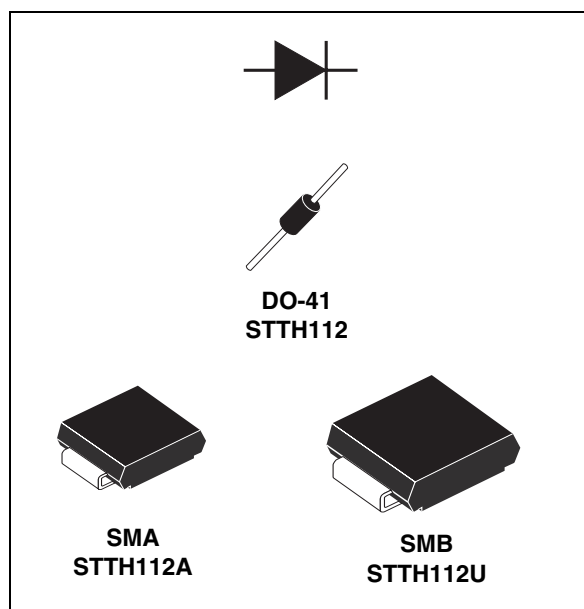


**Table 1. Device summary**

| Symbol      | Value  |
|-------------|--------|
| $I_{F(AV)}$ | 1 A    |
| $V_{RRM}$   | 1200 V |
| $T_j(max)$  | 175 °C |
| $V_F(max)$  | 1.65 V |

# 1 Electrical characteristics

## Absolute ratings (limiting values)

| Symbol             | Parameter                              |                      |       | Value      | Unit |
|--------------------|----------------------------------------|----------------------|-------|------------|------|
| V <sub>RRM</sub>   | Repetitive peak reverse voltage        |                      |       | 1200       | V    |
| V <sub>(RMS)</sub> | Voltage rms                            |                      |       | 850        | V    |
| I <sub>F(AV)</sub> | Average forward current                | TI = 85°C    δ =0.5  | DO-41 | 1          | A    |
|                    |                                        | TI = 115°C    δ =0.5 | SMA   |            |      |
|                    |                                        | TI = 125°C    δ =0.5 | SMB   |            |      |
| I <sub>FSM</sub>   | Forward surge current    t = 8.3 ms    | DO-41                |       | 20         | A    |
|                    |                                        | SMA                  |       | 18         |      |
|                    |                                        | SMB                  |       |            |      |
| T <sub>stg</sub>   | Storage temperature range              |                      |       | - 50 + 175 | °C   |
| T <sub>j</sub>     | Maximum operating junction temperature |                      |       | + 175      | °C   |

**Table 2. Thermal parameters**

| Symbol        | Parameter           |           |       | Value | Unit |
|---------------|---------------------|-----------|-------|-------|------|
| $R_{th(j-l)}$ | Junction to lead    | L = 10 mm | DO-41 | 45    | °C/W |
|               |                     |           | SMA   | 30    |      |
|               |                     |           | SMB   | 25    |      |
| $R_{th(j-a)}$ | Junction to ambient | L = 10 mm | DO-41 | 110   |      |

**Table 3. Static electrical characteristics**

| Symbol | Parameter               | Tests conditions       |                        | Min. | Typ. | Max. | Unit          |
|--------|-------------------------|------------------------|------------------------|------|------|------|---------------|
| $I_R$  | Reverse leakage current | $V_R = 1200 \text{ V}$ | $T_j = 25 \text{ °C}$  |      |      | 5    | $\mu\text{A}$ |
|        |                         |                        | $T_j = 125 \text{ °C}$ |      |      | 50   |               |
| $V_F$  | Forward voltage drop    | $I_F = 1 \text{ A}$    | $T_j = 25 \text{ °C}$  |      |      | 1.9  | V             |
|        |                         |                        | $T_j = 125 \text{ °C}$ |      | 1.17 | 1.65 |               |
|        |                         |                        | $T_j = 150 \text{ °C}$ |      | 1.10 | 1.55 |               |

**Table 4. Dynamic electrical characteristics**

| Symbol   | Parameter                | Tests conditions                                                       |                       | Min. | Typ. | Max. | Unit |
|----------|--------------------------|------------------------------------------------------------------------|-----------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $I_F = 0.5 \text{ A}$<br>$I_{rr} = 0.25 \text{ A}$ $I_R = 1 \text{ A}$ | $T_j = 25 \text{ °C}$ |      |      | 75   | ns   |
| $t_{fr}$ | Forward recovery time    | $I_F = 1 \text{ A}$<br>$dI_F/dt = 50 \text{ A}/\mu\text{s}$            | $T_j = 25 \text{ °C}$ |      |      | 500  | ns   |
| $V_{FP}$ | Forward recovery voltage | $V_{FR} = 1.1 \times V_{Fmax}$                                         |                       |      |      | 30   | V    |

**Figure 1. Conduction losses versus average current**

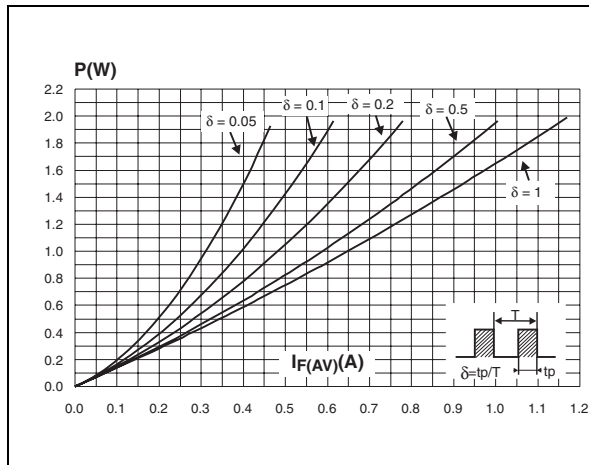


**Figure 2. Forward voltage drop versus forward current**

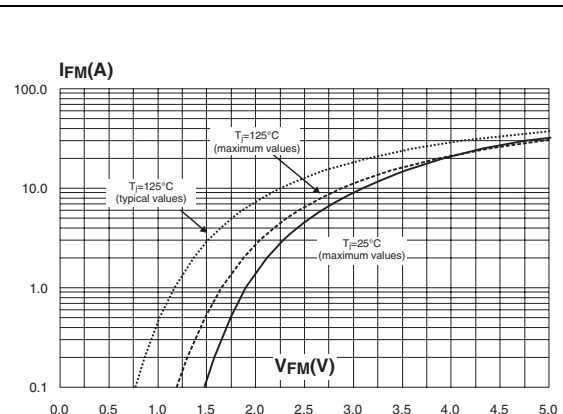


**Figure 3. Relative variation of thermal impedance junction ambient versus pulse duration (DO-41)**

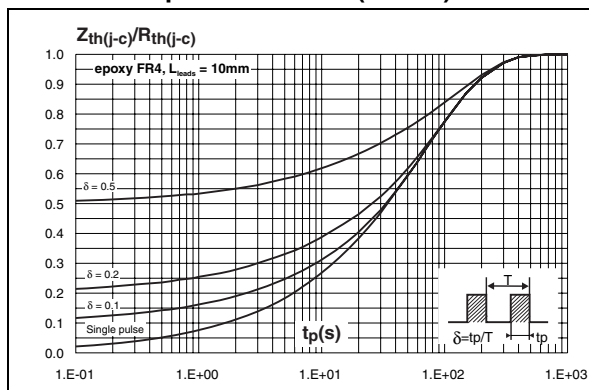


**Figure 4. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4) (SMA)**

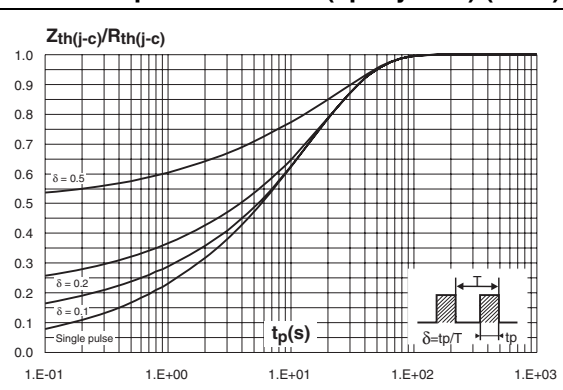


**Figure 5. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4)(SMB)**

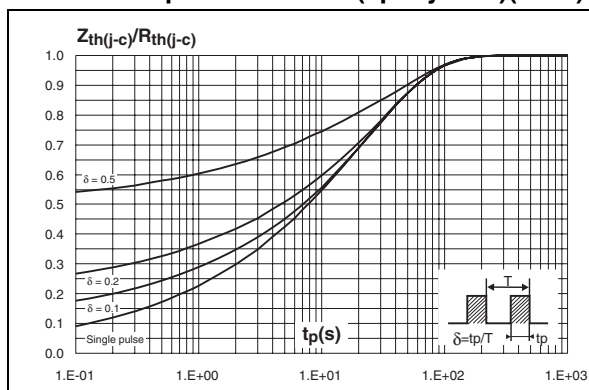


**Figure 6. Thermal resistance junction to ambient versus copper surface under each lead (DO-41, SMB)**

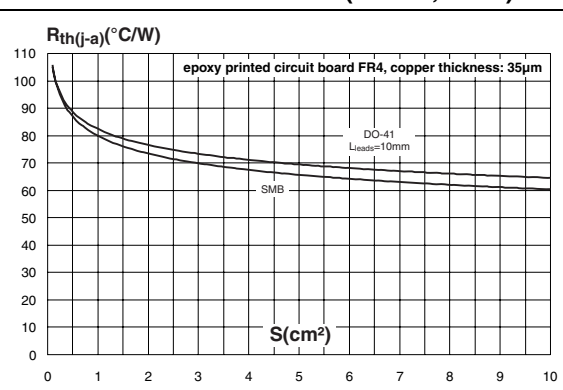
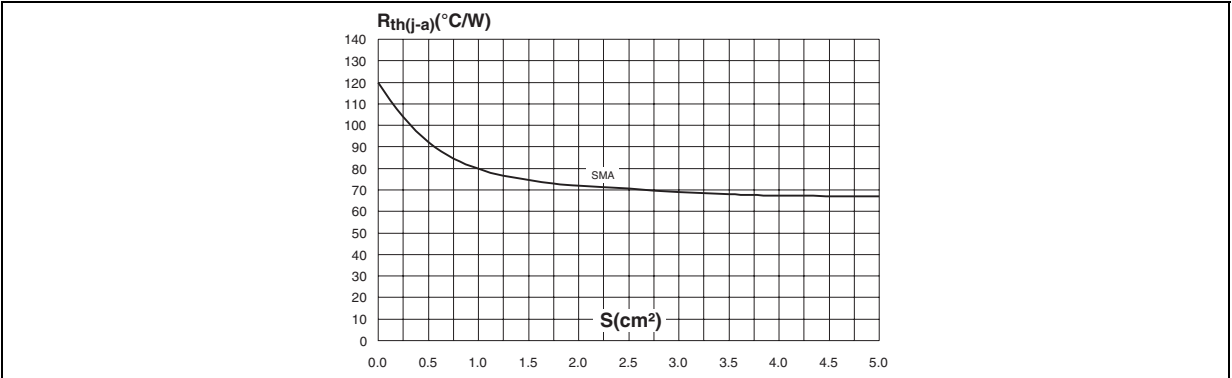


**Figure 7. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed circuit board FR4, copper thickness: 35μm) (SMA)**



## 2 Package information

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

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**Table 5. SMA dimensions**

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.094 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| b    | 1.25        | 1.65 | 0.049  | 0.065 |
| c    | 0.15        | 0.40 | 0.006  | 0.016 |
| D    | 2.25        | 2.90 | 0.089  | 0.114 |
| E    | 4.80        | 5.35 | 0.189  | 0.211 |
| E1   | 3.95        | 4.60 | 0.156  | 0.181 |
| L    | 0.75        | 1.50 | 0.030  | 0.059 |

**Figure 8. Footprint (dimensions in mm)**

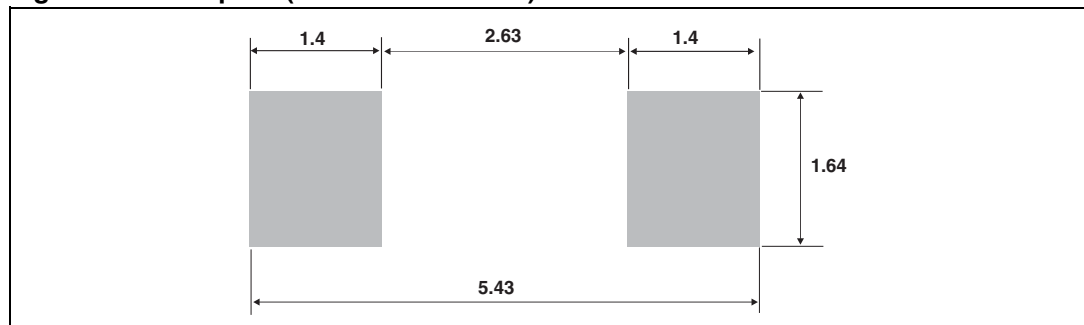
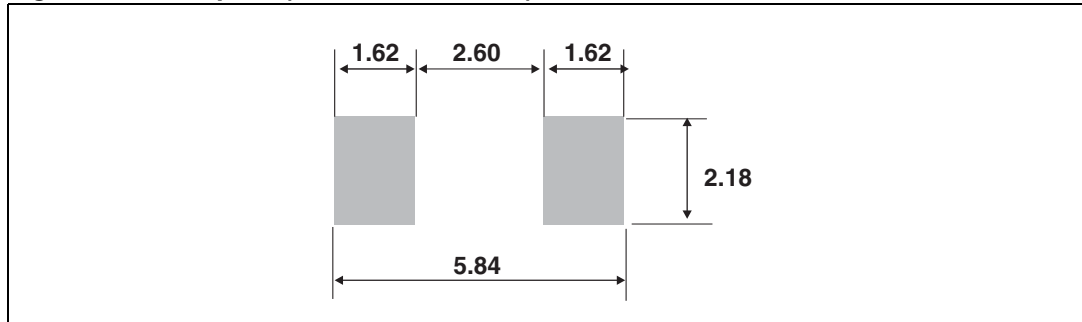


**Table 6. SMB dimensions**

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.096 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| 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 | 0.201  | 0.220 |
| E1   | 4.05        | 4.60 | 0.159  | 0.181 |
| L    | 0.75        | 1.50 | 0.030  | 0.059 |

**Figure 9. Footprint (dimensions in mm)****Table 7. DO-41 (plastic) dimensions**

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    | 4.07        | 5.20 | 0.160  | 0.205 |
| B    | 2.04        | 2.71 | 0.080  | 0.107 |
| C    | 25.4        |      | 1      |       |
| D    | 0.71        | 0.86 | 0.028  | 0.034 |

### 3 Ordering information

**Table 8. Ordering information**

| Order code | Marking | Package | Weight  | Base qty | Delivery Mode |
|------------|---------|---------|---------|----------|---------------|
| STTH112    | STTH112 | DO-41   | 0.34 g  | 2000     | Ammopack      |
| STTH112A   | H12     | SMA     | 0.068 g | 5000     | Tape and reel |
| STTH112U   | U12     | SMB     | 0.11 g  | 2500     | Tape and reel |
| STTH112RL  | STTH112 | DO-41   | 0.34 g  | 5000     | Tape and reel |

### 4 Revision history

**Table 9. Document revision history**

| Date        | Revision | Changes                                                                                                                                                     |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jan-2003    | 2        | Initial release.                                                                                                                                            |
| 22-Jun-2005 | 3        | New value of $T_j = 150\text{ °C}$ added to table 2.<br>Dimensions A1 E and D updated in Table 4.<br>Data sheet reformatted.<br>No other technical changes. |
| 20-Mar-2007 | 4        | Reformatted to current standards. Updated dimensions and footprints for SMA and SMB packages.                                                               |
| 30-Sep-2009 | 5        | Updated table 7 package dimensions.                                                                                                                         |

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