

### High voltage ultrafast rectifier

#### Main product characteristics

| I <sub>F(AV)</sub>   | 1 A    |
|----------------------|--------|
| V <sub>RRM</sub>     | 1200 V |
| T <sub>j (max)</sub> | 175° C |
| V <sub>F (max)</sub> | 1.65 V |

#### Features and benefits

- Low forwarded 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, snubbering, demagnetization in power supplies and other power switching applications

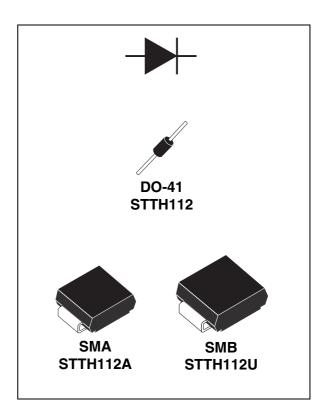


Table 1. Absolute ratings (limiting values)

|                    | The control of the co |             |                |       |       |    |
|--------------------|--|-------------|----------------|-------|-------|----|
| Symbol             | Parameter  |             | Value          | Unit  |       |    |
| $V_{RRM}$          | Repetitive peak reverse voltage  |             |                |       | 1200  | V  |
| V <sub>(RMS)</sub> | RMS voltage  |             |                |       | 850   | ٧  |
|                    |  |             | $\delta = 0.5$ | DO-41 |       |    |
| $I_{F(AV)}$        | I <sub>F(AV)</sub> Average forward current   | TI = 115° C | $\delta = 0.5$ | SMA   | 1     | Α  |
|                    |  | TI = 125° C | δ =0 .5        | SMB   |       |    |
|                    |  |             |                | DO-41 | 20    |    |
| $I_{FSM}$          | I <sub>FSM</sub> Forward surge current t = 8.3 ms  |             |                | SMA   | 18    | Α  |
|                    |  |             |                | SMB   | 10    |    |
| T <sub>stg</sub>   | Storage temperature range  |             |                |       |       | °C |
| T <sub>j</sub>     | Maximum operating junction temperature   |             |                |       | + 175 | °C |

Electrical characteristics STTH112

### 1 Electrical characteristics

Table 2. Thermal parameters

| Symbol                | Parameter           |           |       | Value | Unit |
|-----------------------|---------------------|-----------|-------|-------|------|
|                       |                     | L = 10 mm | DO-41 | 45    |      |
| R <sub>th (j-l)</sub> | Junction to lead    |           | SMA   | 30    | °C/W |
|                       |                     |           | SMB   | 25    | C/VV |
| R <sub>th (j-a)</sub> | Junction to ambient | L = 10 mm | DO-41 | 110   |      |

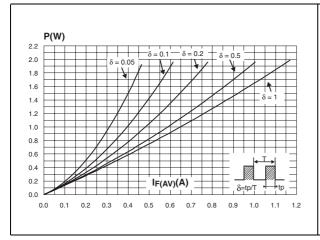
Table 3. Static electrical characteristics

| Symbol            | Parameter                              | Tests conditions       |                         | Min. | Тур. | Max. | Unit |
|-------------------|--|------------------------|-------------------------|------|------|------|------|
|                   | Povorco logizado gurrant               | V <sub>R</sub> = 1200V | T <sub>j</sub> = 25° C  |      |      | 5    | μА   |
| 'R                | I <sub>R</sub> Reverse leakage current |                        | T <sub>j</sub> = 125° C |      |      | 50   |      |
|                   |  |                        | T <sub>j</sub> = 25° C  |      |      | 1.9  |      |
| V <sub>F</sub> Fo | Forward voltage drop                   | I <sub>F</sub> = 1 A   | T <sub>j</sub> = 125° C |      | 1.17 | 1.65 | V    |
|                   |  |                        | T <sub>j</sub> = 150° C |      | 1.10 | 1.55 |      |

Table 4. Dynamic electrical characteristics

| Symbol          | Parameter                | Tests conditions   |                        | Min. | Тур. | Max. | Unit |
|-----------------|--------------------------|--|------------------------|------|------|------|------|
| t <sub>rr</sub> | Reverse recovery time    | $I_F = 0.5 A$<br>$I_{rr} = 0.25 A I_R = 1A$                                | T <sub>j</sub> = 25° C |      |      | 75   | ns   |
| t <sub>fr</sub> | Forward recovery time    | I <sub>F</sub> = 1 A   | T 050 0                |      |      | 500  | ns   |
| V <sub>FP</sub> | Forward recovery voltage | dI <sub>F</sub> /dt = 50 A/μs<br>V <sub>FR</sub> = 1.1 x V <sub>Fmax</sub> | T <sub>j</sub> = 25° C |      |      | 30   | V    |

Figure 1. Conduction losses versus average Figure 2. Forward voltage drop versus current forward current.



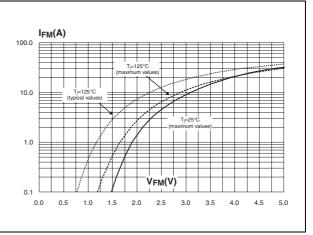
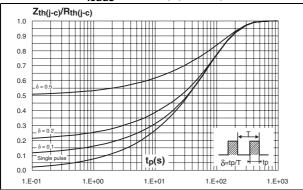


Figure 3. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4, L<sub>leads</sub> = 10mm) (DO-41).

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



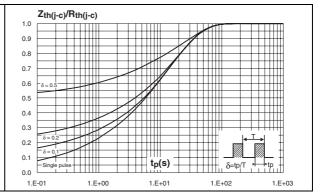
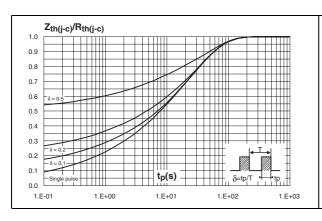


Figure 5. Relative variation of thermal impedance junction ambient versus pulse duration (epoxy FR4)(SMB).

Figure 6. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed circuit board FR4, copper thickness: 35 µm) (DO-41, SMB).



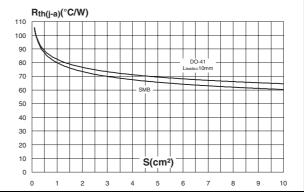
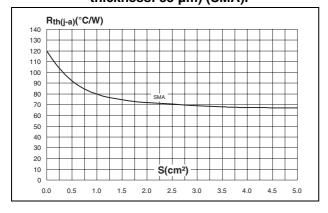


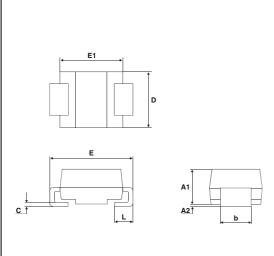
Figure 7. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed circuit board FR4, copper thickness: 35 µm) (SMA).



# 2 Package mechanical data

Epoxy meets UL 94, V0

Table 5. SMA dimensions



|      | Dimensions  |      |       |       |  |  |
|------|-------------|------|-------|-------|--|--|
| Ref. | Millimeters |      | Inc   | hes   |  |  |
|      | 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 |  |  |
| С    | 0.15        | 0.40 | 0.006 | 0.016 |  |  |
| D    | 2.25        | 2.90 | 0.089 | 0.114 |  |  |
| Е    | 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)

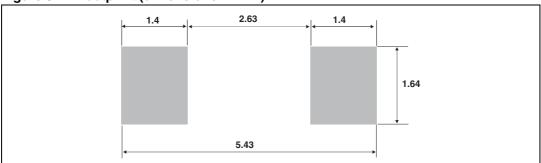
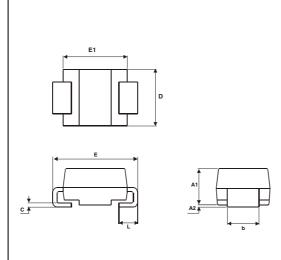


Table 6. SMB dimensions

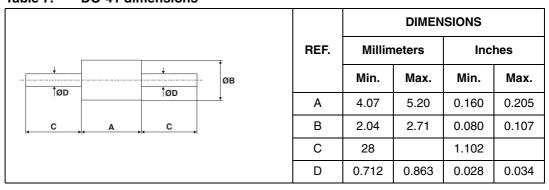


|      |             | Dimensions |       |       |  |  |
|------|-------------|------------|-------|-------|--|--|
| Ref. | Millimeters |            | Inc   | hes   |  |  |
|      | Min.        | Max.       | Min.  | Max.  |  |  |
| A1   | 1.90        | 2.45       | 0.075 | 0.096 |  |  |
| A2   | 0.05        | 0.20       | 0.002 | 0.008 |  |  |
| b    | 1.95        | 2.20       | 0.077 | 0.087 |  |  |
| С    | 0.15        | 0.40       | 0.006 | 0.016 |  |  |
| D    | 3.30        | 3.95       | 0.130 | 0.156 |  |  |
| Е    | 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 dimensions



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Ordering information STTH112

# 3 Ordering information

| Ordering 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

| Date        | Revision | Changes  |
|-------------|----------|--|
| Jan-2003    | 2        | Initial release.   |
| 22-Jun-2005 | 3        | New value of $T_j$ = 150°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.  |

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