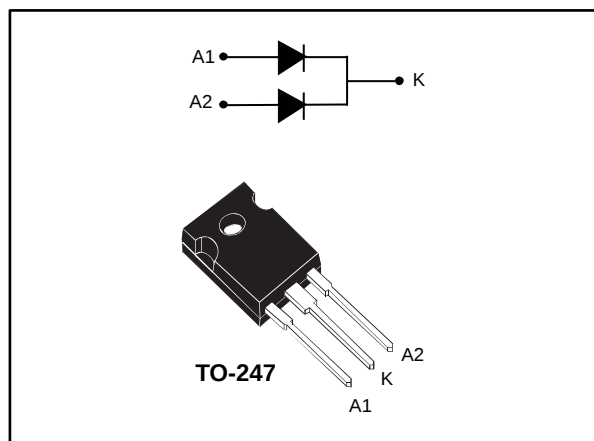


## Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



### Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduced switching and conduction losses

### Description

This device using ST Turbo 2 600 V technology, is specially suited as boost diode in continuous mode power factor corrections and hard switching conditions.

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

**Table 1: Device summary**

| Symbol          | Value    |
|-----------------|----------|
| $I_{F(AV)}$     | 2 x 15 A |
| $V_{RRM}$       | 600 V    |
| $I_{RM}$ (typ.) | 8 A      |
| $T_J$ (max.)    | 175 °C   |
| $V_F$ (typ.)    | 1.8 V    |
| $t_{rr}$ (max.) | 50 ns    |

# 1 Characteristics

**Table 2: Absolute ratings (limiting values, per diode)**

| Symbol       | Parameter                              |                                                     | Value       | Unit |
|--------------|----------------------------------------|-----------------------------------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                                                     | 600         | V    |
| $I_{F(RMS)}$ | Forward rms current                    |                                                     | 30          | A    |
| $I_{F(AV)}$  | Average forward current                | $T_c = 115\text{ °C}$ , $\delta = 0.5$ , per diode  | 15          | A    |
|              |                                        | $T_c = 100\text{ °C}$ , $\delta = 0.5$ , per device | 30          |      |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10\text{ ms}$ sinusoidal                     | 120         | A    |
| $T_{stg}$    | Storage temperature range              |                                                     | -65 to +175 | °C   |
| $T_j$        | Maximum operating junction temperature |                                                     | 175         | °C   |

**Table 3: Thermal parameters**

| Symbol        | Parameter        |           | Max. value | Unit |
|---------------|------------------|-----------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 1.5        | °C/W |
|               |                  | Total     | 1.0        |      |
| $R_{th(c)}$   | Coupling         |           | 0.5        |      |

**Table 4: Static electrical characteristics (per diode)**

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    |      | 60   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 70   | 800  |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 15\text{ A}$ | -    |      | 2.9  | V             |
|             |                         | $T_j = 125\text{ °C}$ |                     | -    | 1.4  | 1.8  |               |

**Notes:**

<sup>(1)</sup>Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

<sup>(2)</sup>Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

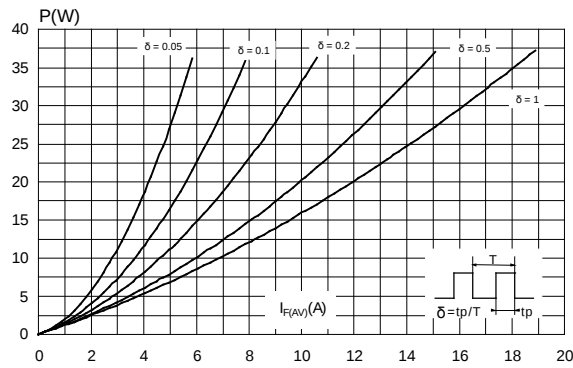
$$P = 1.16 \times I_{F(AV)} + 0.043 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics

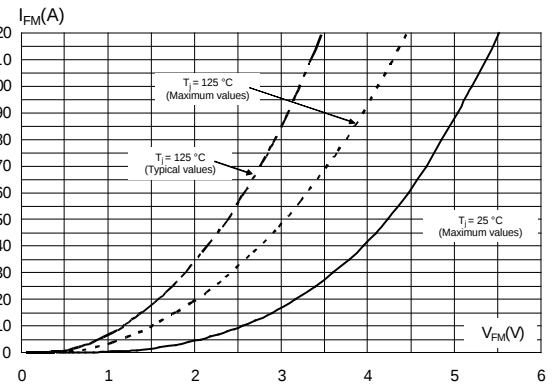
| Symbol   | Parameters               | Test conditions       |                                                                                                   | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|---------------------------------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ °C}$  | $I_F = 0.5\text{ A}$ ,<br>$I_{rr} = 0.25\text{ A}$ ,<br>$I_R = 1\text{ A}$                        | -    |      | 30   | ns   |
|          |                          |                       | $I_F = 1\text{ A}$ ,<br>$dI_F/dt = -50\text{ A/}\mu\text{s}$ ,<br>$V_R = 30\text{ V}$             | -    |      | 50   |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 15\text{ A}$ ,<br>$dI_F/dt = -200\text{ A/}\mu\text{s}$ ,<br>$V_R = 400\text{ V}$          | -    | 7.5  | 9.0  | A    |
| S factor | Softness factor          |                       |                                                                                                   | -    | 0.15 |      |      |
| $Q_{rr}$ | Reverse recovery charges |                       |                                                                                                   | -    | 220  |      | nC   |
| $t_{fr}$ | Forward recovery time    | $T_j = 25\text{ °C}$  | $I_F = 15\text{ A}$ ,<br>$dI_F/dt = 120\text{ A/}\mu\text{s}$ ,<br>$V_{FR} = 1.1 \times V_{Fmax}$ | -    |      | 200  | ns   |
| $V_{FP}$ | Forward recovery voltage |                       |                                                                                                   | -    |      | 6    | V    |

## 1.1 Characteristics (curves)

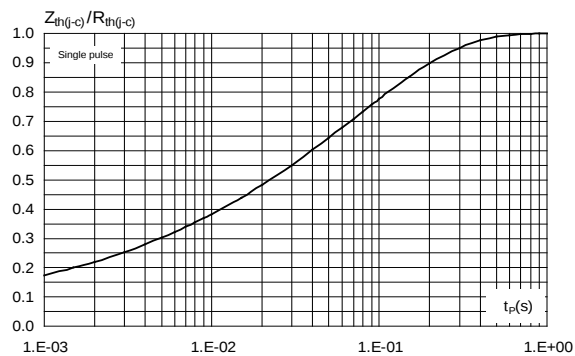
**Figure 1: Conduction losses versus average current (per leg)**



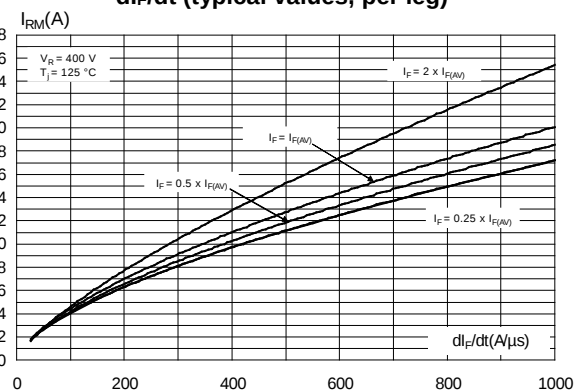
**Figure 2: Forward voltage drop versus forward current (per leg)**



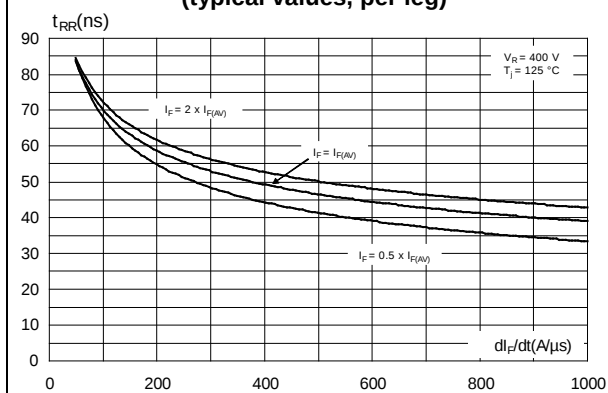
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration**



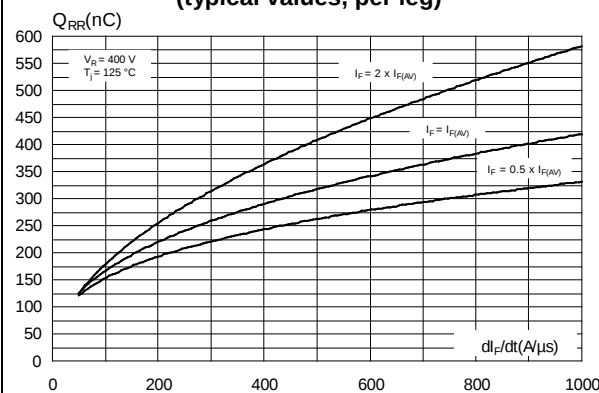
**Figure 4: Peak reverse recovery current versus di/dt (typical values, per leg)**



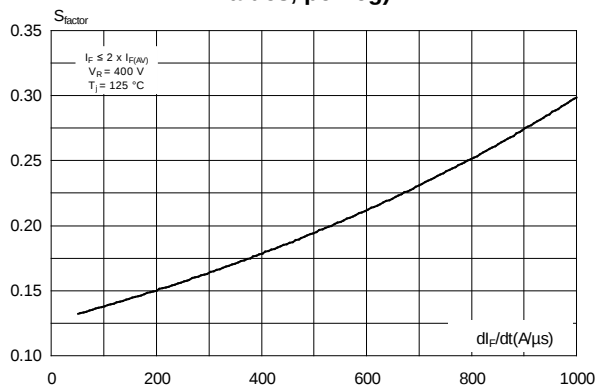
**Figure 5: Reverse recovery time versus di/dt (typical values, per leg)**



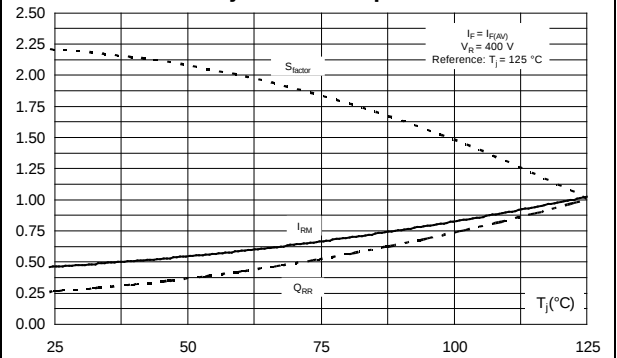
**Figure 6: Reverse recovery charges versus di/dt (typical values, per leg)**



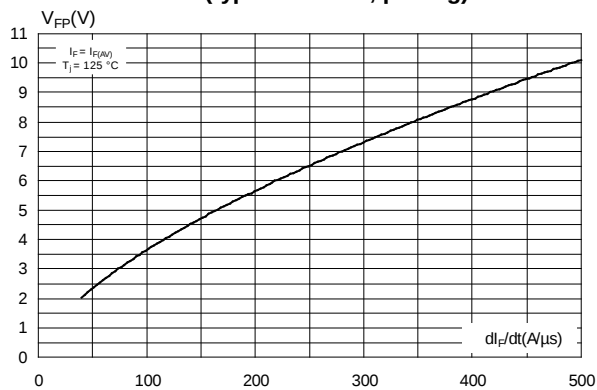
**Figure 7: Softness factor versus  $di_F/dt$  (typical values, per leg)**



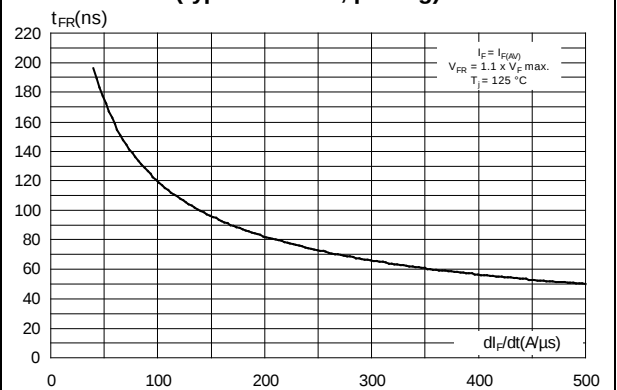
**Figure 8: Relative variation of dynamic parameters versus junction temperature**



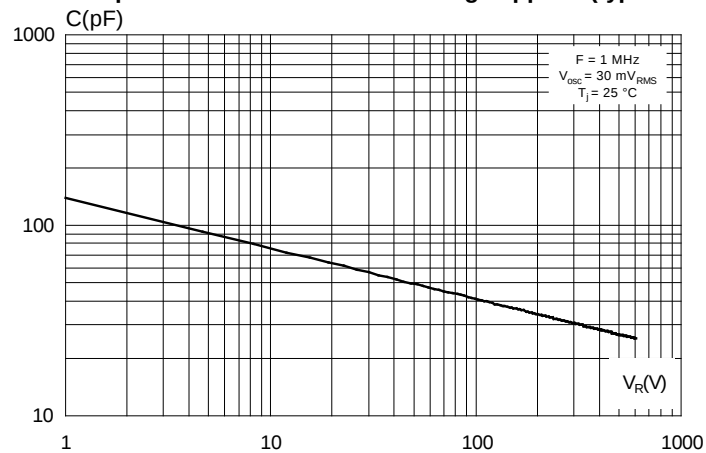
**Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values, per leg)**



**Figure 10: Forward recovery time versus  $di_F/dt$  (typical values, per leg)**



**Figure 11: Junction capacitance versus reverse voltage applied (typical values, per leg)**



## 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.

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque values: 0.8 N·m
- Maximum torque value: 1.0 N·m

### 2.1 TO-247 package information

Figure 12: TO-247 package outline

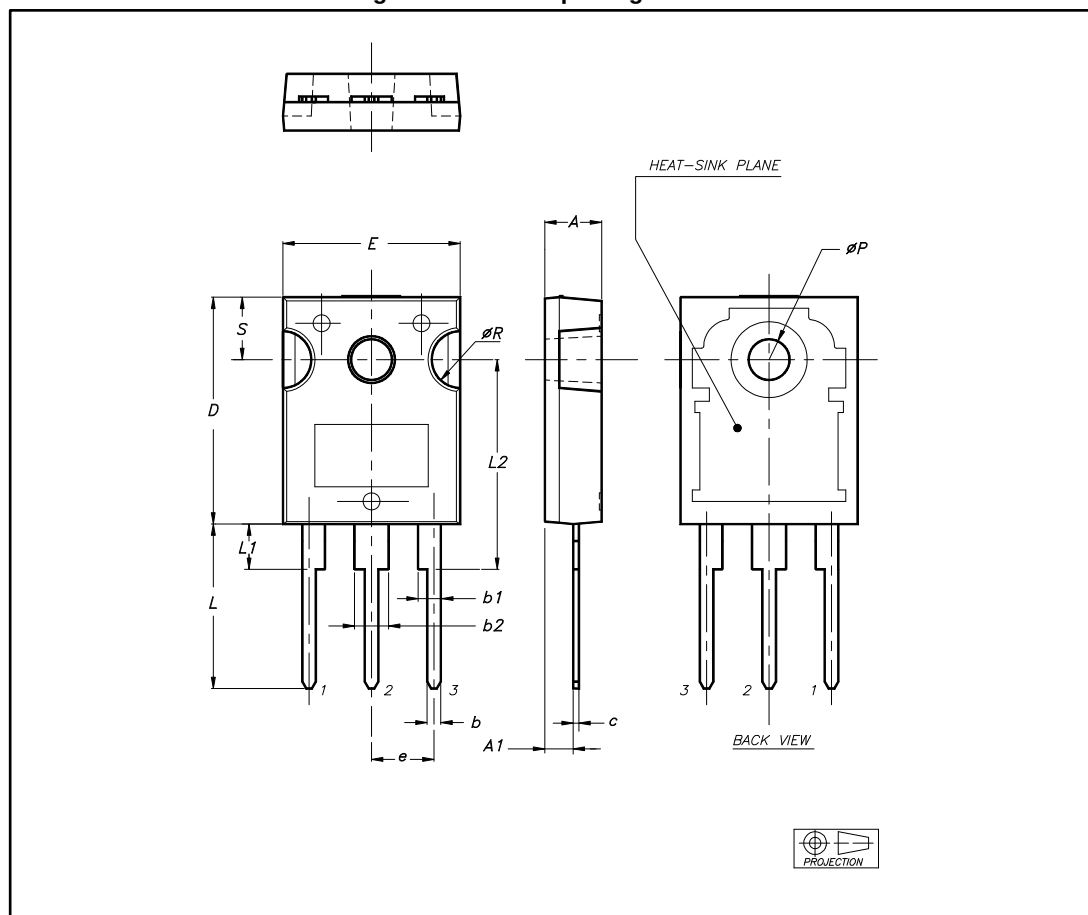


Table 6: TO-247 package mechanical data

| Ref.              | Dimensions  |       |       |        |       |       |
|-------------------|-------------|-------|-------|--------|-------|-------|
|                   | Millimeters |       |       | Inches |       |       |
|                   | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A                 | 4.85        |       | 5.15  | 0.191  |       | 0.203 |
| A1                | 2.20        |       | 2.60  | 0.086  |       | 0.102 |
| b                 | 1.00        |       | 1.40  | 0.039  |       | 0.055 |
| b1                | 2.00        |       | 2.40  | 0.078  |       | 0.094 |
| b2                | 3.00        |       | 3.40  | 0.118  |       | 0.133 |
| c                 | 0.40        |       | 0.80  | 0.015  |       | 0.031 |
| D <sup>(1)</sup>  | 19.85       |       | 20.15 | 0.781  |       | 0.793 |
| E                 | 15.45       |       | 15.75 | 0.608  |       | 0.620 |
| e                 | 5.30        | 5.45  | 5.60  | 0.209  | 0.215 | 0.220 |
| L                 | 14.20       |       | 14.80 | 0.559  |       | 0.582 |
| L1                | 3.70        |       | 4.30  | 0.145  |       | 0.169 |
| L2                |             | 18.50 |       |        | 0.728 |       |
| ØP <sup>(2)</sup> | 3.55        |       | 3.65  | 0.139  |       | 0.143 |
| ØR                | 4.50        |       | 5.50  | 0.177  |       | 0.217 |
| S                 | 5.30        | 5.50  | 5.70  | 0.209  | 0.216 | 0.224 |

**Notes:**

<sup>(1)</sup>Dimension D plus gate protusion does not exceed 20.5 mm

<sup>(2)</sup>Resin thickness around the mounting hole is not less than 0.9 mm.

### 3 Ordering information

Table 7: Ordering information

| Order code  | Marking     | Package | Weight | Base qty. | Delivery mode |
|-------------|-------------|---------|--------|-----------|---------------|
| STTH30R06CW | STTH30R06CW | TO-247  | 4.36 g | 30        | Tube          |

### 4 Revision history

Table 8: Document revision history

| Date        | Revision | Changes                                                           |
|-------------|----------|-------------------------------------------------------------------|
| July-2001   | 1        | Last issue.                                                       |
| 18-Jun-2014 | 2        | Updated title. ECOPACK statement updated.                         |
| 16-Feb-18   | 3        | Updated <a href="#">Section 1.1: "Characteristics (curves)"</a> . |

**IMPORTANT NOTICE – PLEASE 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 acknowledgement.

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. 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.

© 2018 STMicroelectronics – All rights reserved