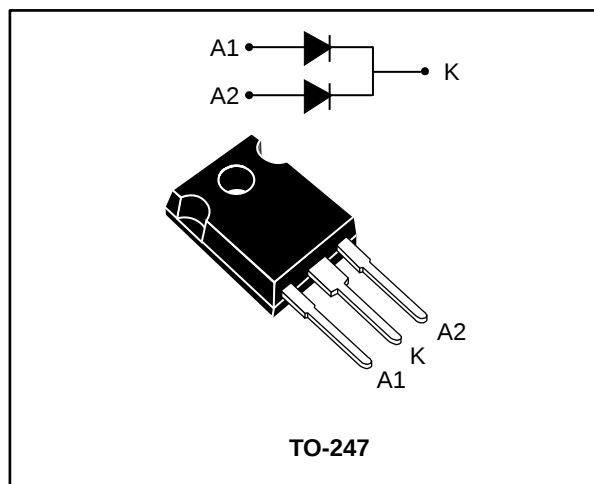


## High frequency secondary rectifier

Datasheet - production data



### Description

Dual rectifier suited for switch mode power supply and high frequency DC to DC converters. Packaged in TO-247, this device is intended for use in low voltage, high frequency inverters, free wheeling operation, welding equipment and telecom power supplies.

Table 1: Device summary

| Symbol          | Value    |
|-----------------|----------|
| $I_{F(AV)}$     | 2 x 30 A |
| $V_{RRM}$       | 300 V    |
| $V_F$ (max.)    | 1 V      |
| $t_{rr}$ (max.) | 55 ns    |

### Features

- Combines highest recovery and voltage performance
- Ultrafast, soft and noise-free recovery
- Low inductance and low capacitance allow simplified layout

# 1 Characteristics

**Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified)**

| Symbol              | Parameter                                       |                                   |            | Value       | Unit |
|---------------------|-------------------------------------------------|-----------------------------------|------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                 |                                   |            | 300         | V    |
| I <sub>F(RMS)</sub> | Forward rms current                             |                                   |            | 60          | A    |
| I <sub>F(AV)</sub>  | Average forward current<br>δ = 0.5, square wave | T <sub>c</sub> = 135 °C           | Per diode  | 30          | A    |
|                     |                                                 |                                   | Per device | 60          |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current            | t <sub>p</sub> = 10 ms sinusoidal |            | 300         | A    |
| I <sub>RSM</sub>    | Non repetitive peak reverse current             | t <sub>p</sub> = 100 μs square    |            | 4           | A    |
| T <sub>stg</sub>    | Storage temperature range                       |                                   |            | -65 to +175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature          |                                   |            | +175        | °C   |

**Table 3: Thermal parameters**

| Symbol               | Parameter        |           | Maximum | Unit |
|----------------------|------------------|-----------|---------|------|
| R <sub>th(j-c)</sub> | Junction to case | Per diode | 1       | °C/W |
|                      |                  | Total     | 0.55    |      |
| R <sub>th(c)</sub>   | Coupling         |           | 0.1     |      |

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P_{(\text{diode1})} \times R_{th(j-c)(\text{per diode})} + P_{(\text{diode2})} \times R_{th(c)}$$

**Table 4: Static electrical characteristics**

| Symbol                        | Parameter               | Test conditions         |                        | Min. | Typ. | Max. | Unit |
|-------------------------------|-------------------------|-------------------------|------------------------|------|------|------|------|
| I <sub>R</sub> <sup>(1)</sup> | Reverse leakage current | T <sub>j</sub> = 25 °C  | V <sub>R</sub> = 300 V | -    |      | 60   | μA   |
|                               |                         | T <sub>j</sub> = 125 °C |                        | -    | 60   | 600  |      |
| V <sub>F</sub> <sup>(2)</sup> | Forward voltage drop    | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 30 A  | -    |      | 1.25 | V    |
|                               |                         | T <sub>j</sub> = 125 °C |                        | -    | 0.85 | 1    |      |

**Notes:**

(1)Pulse test: t<sub>p</sub> = 5 ms, δ < 2 %

(2)Pulse test: t<sub>p</sub> = 380 μs, δ < 2 %

To evaluate the maximum conduction losses, use the following equation:

$$P = 0.75 \times I_{F(AV)} + 0.008 \times I_{F(RMS)}^2$$

Table 5: Dynamic 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>$I_R = 1\text{ A}$                                 | -    |      | 40   | ns   |
|              |                          |                       | $I_F = 1\text{ A},$<br>$dI_F/dt = -50\text{ A}/\mu\text{s},$<br>$V_R = 30\text{ V}$                      | -    |      | 55   |      |
| $t_{fr}$     | Forward recovery time    | $T_j = 25\text{ °C}$  | $I_F = 30\text{ A};$<br>$dI_F/dt = 200\text{ A}/\mu\text{s},$<br>$V_{FR} = 1.1 \times V_{F\text{ max.}}$ | -    |      | 350  | ns   |
| $V_{FP}$     | Forward recovery voltage |                       |                                                                                                          | -    |      | 5    | V    |
| $S_{factor}$ | Softness factor          | $T_j = 125\text{ °C}$ | $V_{CC} = 200\text{ V},$<br>$I_F = 30\text{ A},$<br>$dI_F/dt = 200\text{ A}/\mu\text{s}$                 | -    | 0.3  |      | -    |
| $I_{RM}$     | Reverse recovery current |                       |                                                                                                          | -    |      | 11   | A    |

## 1.1 Characteristics (curves)

Figure 1: Conduction losses versus average current (per diode)

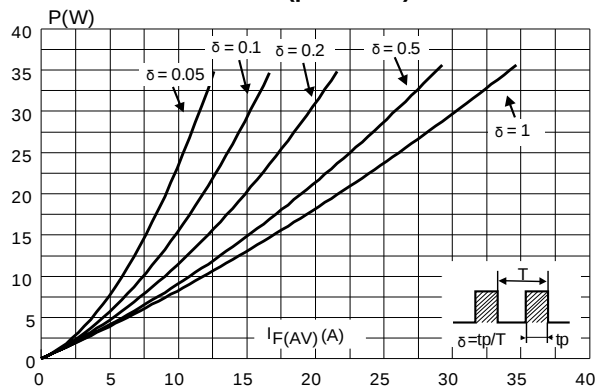


Figure 2: Forward voltage drop versus forward current (maximum values, per diode)

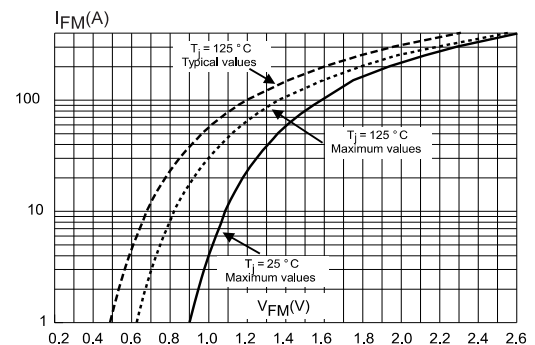


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-247)

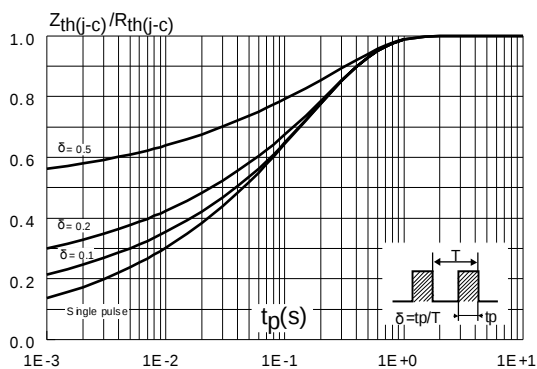
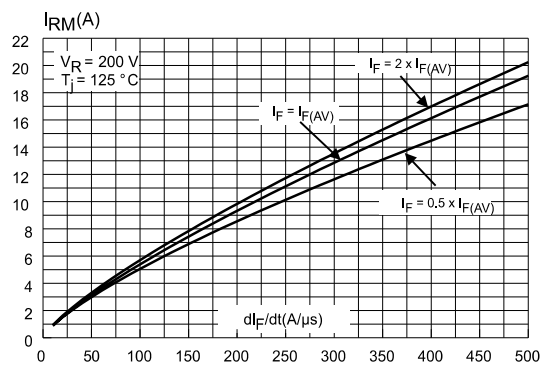
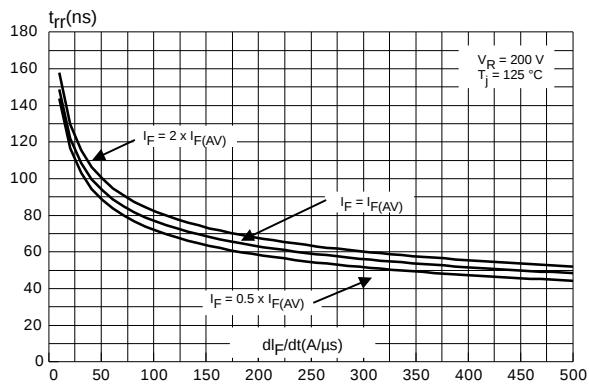


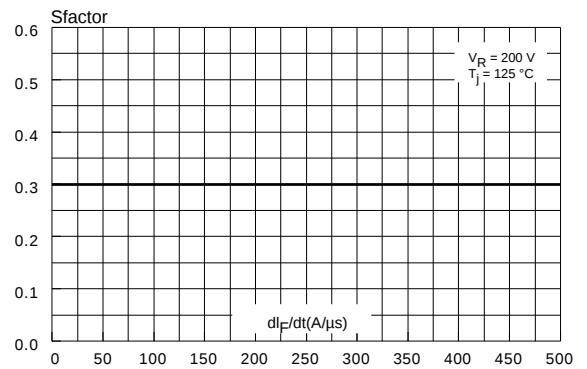
Figure 4: Peak reverse recovery current versus  $di_F/dt$  (90% confidence, per diode)



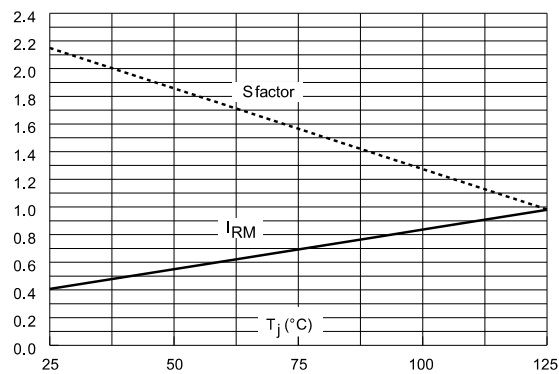
**Figure 5: Reverse recovery time versus  $di_F/dt$  (90% confidence, per diode)**



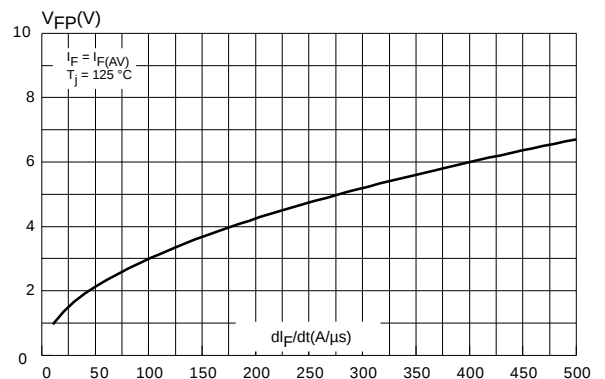
**Figure 6: Softness factor (tb/ta) versus  $di_F/dt$  (typical values, per diode)**



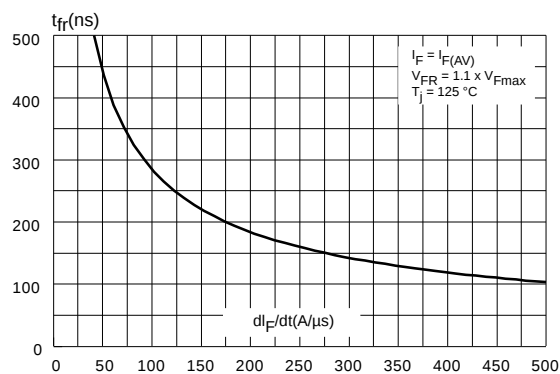
**Figure 7: Relative variation of dynamic parameters versus junction temperature ( $T_J = 125$  °C)**



**Figure 8: Transient peak forward voltage versus  $di_F/dt$  (90% confidence, per diode)**



**Figure 9: Forward recovery time versus  $di_F/dt$  (90% confidence, per diode)**



## 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: 0.55 N·m
- Maximum torque value: 1.0 N·m

### 2.1 TO-247 package information

Figure 10: TO-247 package outline

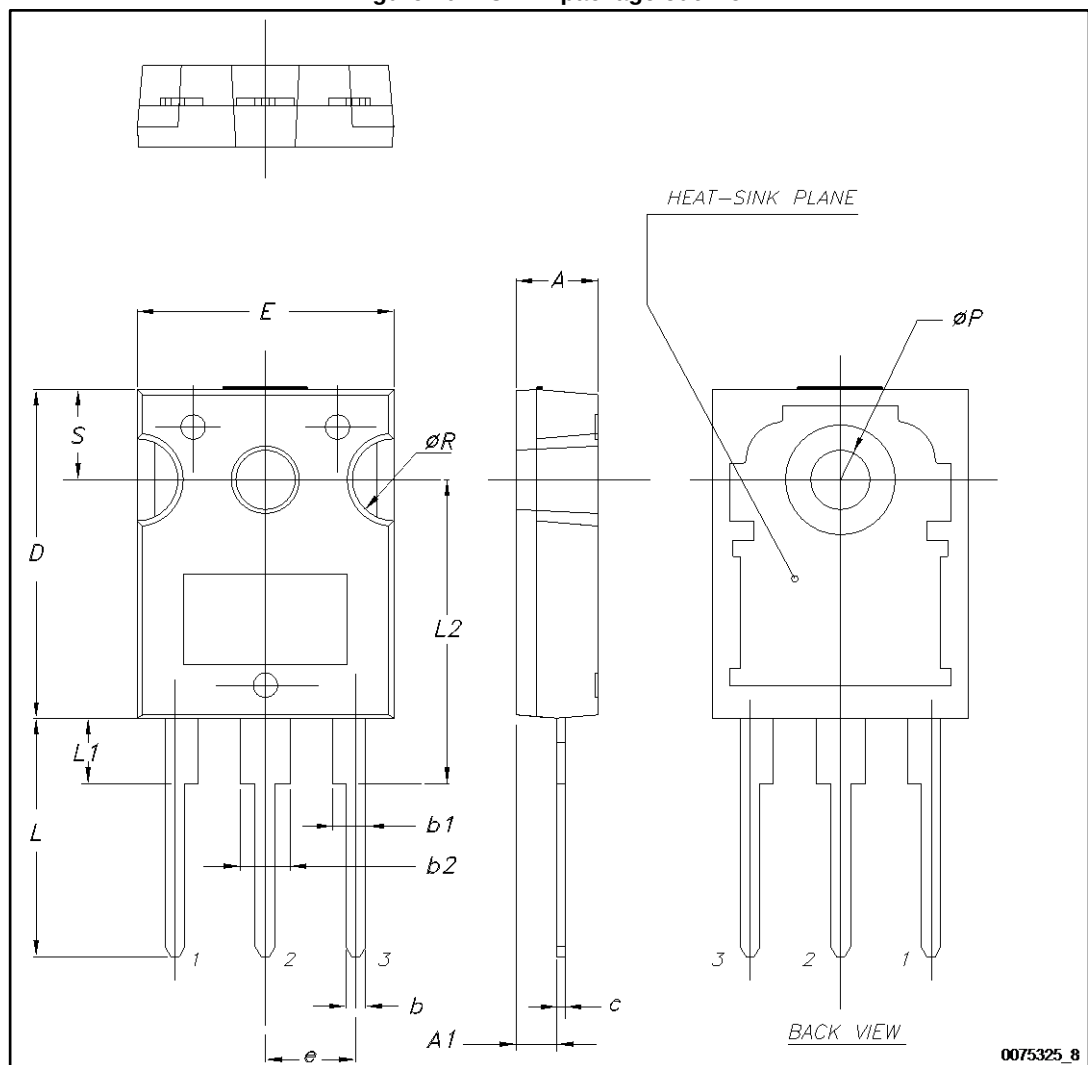


Table 6: TO-247 package mechanical data

| 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 |
|------------|------------|---------|--------|-----------|---------------|
| STTH6003CW | STTH6003CW | TO-247  | 4.36 g | 30        | Tube          |

### 4 Revision history

Table 8: Document revision history

| Date        | Revision | Changes                                                                          |
|-------------|----------|----------------------------------------------------------------------------------|
| Oct-1999    | 5C       | Previous revision.                                                               |
| 18-Jun-2014 | 6        | Removed ISOTOP package.<br>Updated <i>Section 2: Package information</i> .       |
| 21-Nov-2016 | 7        | Updated <a href="#">Table 7: "Ordering information"</a> .<br>Minor text changes. |

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