

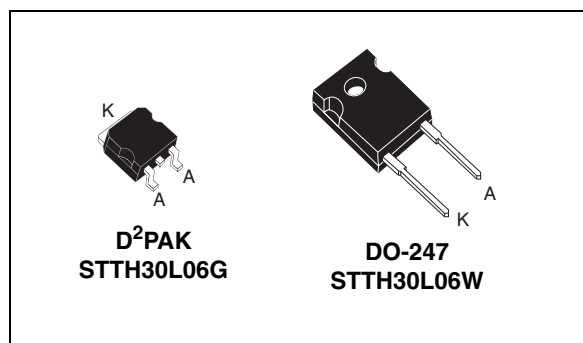
## Turbo 2 ultrafast high voltage rectifier

### Features

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

### Description

The STTH30L06, which is using ST Turbo 2 600 V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.



**Table 1. Device summary**

| Symbol         | Value  |
|----------------|--------|
| $I_{F(AV)}$    | 30 A   |
| $V_{RRM}$      | 600 V  |
| $T_j$          | 175 °C |
| $V_F$ (typ)    | 1.10 V |
| $t_{rr}$ (max) | 65 ns  |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

| Symbol       | Parameter                              |                                     | Value        | Unit |
|--------------|----------------------------------------|-------------------------------------|--------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                                     | 600          | V    |
| $I_{F(RMS)}$ | Forward rms voltage                    |                                     | 50           | A    |
| $I_{F(AV)}$  | Average forward current                | $T_c = 125\text{ °C}, \delta = 0.5$ | 30           | A    |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10\text{ ms sinusoidal}$     | 300          | A    |
| $T_{stg}$    | Storage temperature range              |                                     | -65 to + 175 | °C   |
| $T_j$        | Maximum operating junction temperature |                                     | 175          | °C   |

**Table 3. Thermal resistance**

| Symbol        | Parameter        | Value (max) | Unit |
|---------------|------------------|-------------|------|
| $R_{th(j-c)}$ | Junction to case | 1.1         | °C/W |

**Table 4. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     |      |      | 25   | $\mu\text{A}$ |
|             |                         | $T_j = 150\text{ °C}$ |                     |      | 80   | 800  |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 30\text{ A}$ |      |      | 1.55 | V             |
|             |                         | $T_j = 150\text{ °C}$ |                     |      | 1.0  | 1.25 |               |

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:  $P = 0.95 \times I_{F(AV)} + 0.010 I_F^2_{(RMS)}$

**Table 5. Dynamic Characteristics**

| Symbol   | Parameter                | Test conditions       |                                                                                       | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|---------------------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ °C}$  | $I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$                        |      |      | 65   | ns   |
|          |                          |                       | $I_F = 1\text{ A}, dl_F/dt = 50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$              |      | 65   | 90   |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 30\text{ A}, V_R = 400\text{ V}, dl_F/dt = 100\text{ A}/\mu\text{s}$           |      | 11.5 | 16   | A    |
| $t_{fr}$ | Forward recovery time    | $T_j = 25\text{ °C}$  | $I_F = 30\text{ A}, dl_F/dt = 100\text{ A}/\mu\text{s}, V_{FR} = 1.1 \times V_{Fmax}$ |      |      | 500  | ns   |
| $V_{FP}$ | Forward recovery voltage | $T_j = 25\text{ °C}$  | $I_F = 30\text{ A}, dl_F/dt = 100\text{ A}/\mu\text{s}, V_{FR} = 1.1 \times V_{Fmax}$ |      | 2.5  |      | V    |

Figure 1. Conduction losses versus average forward current

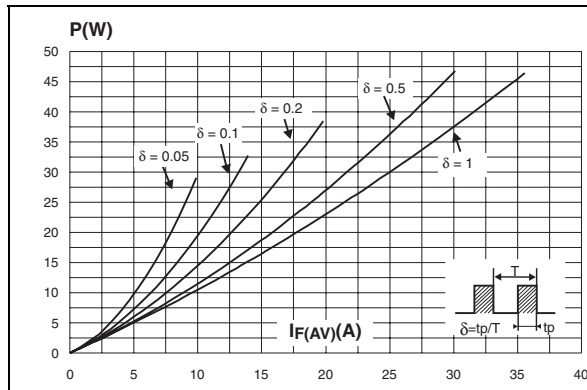


Figure 2. Forward voltage drop versus forward current

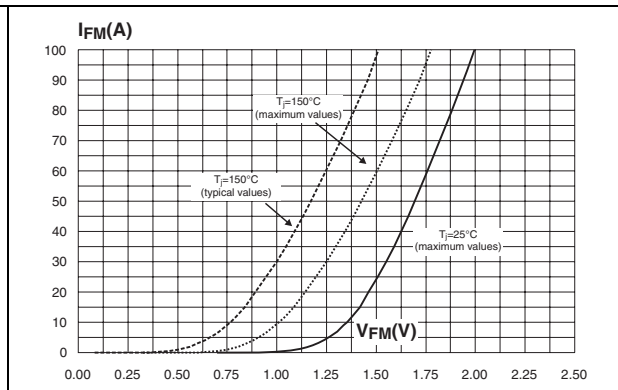
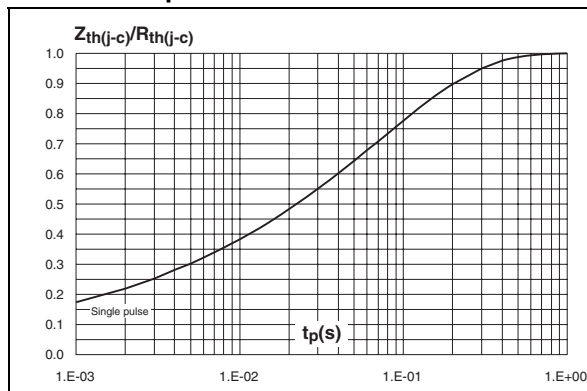
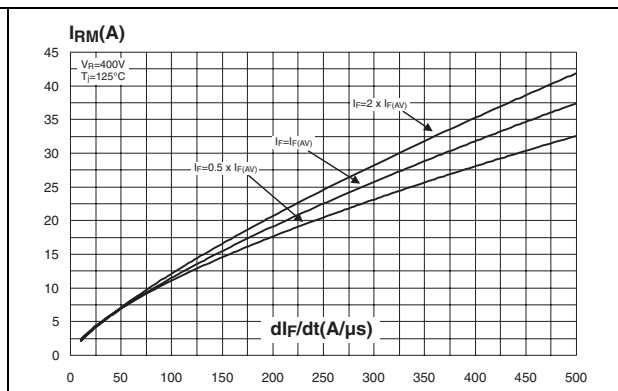
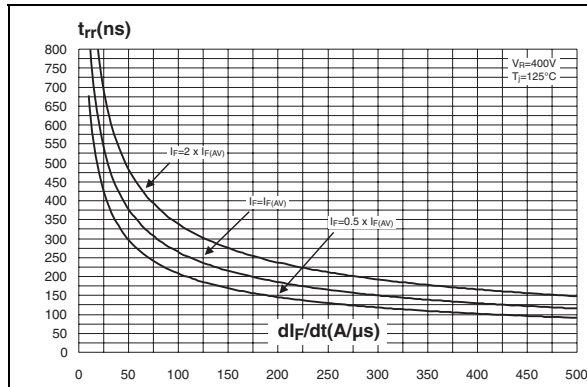
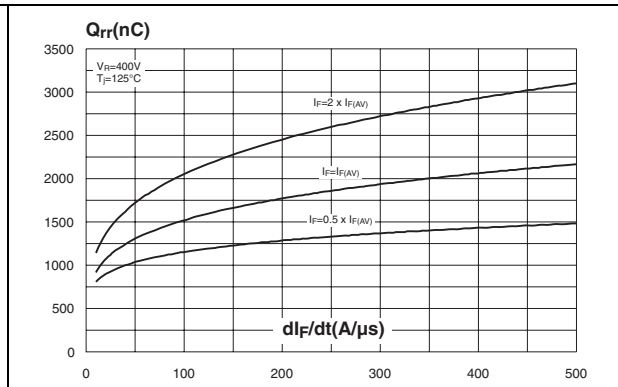
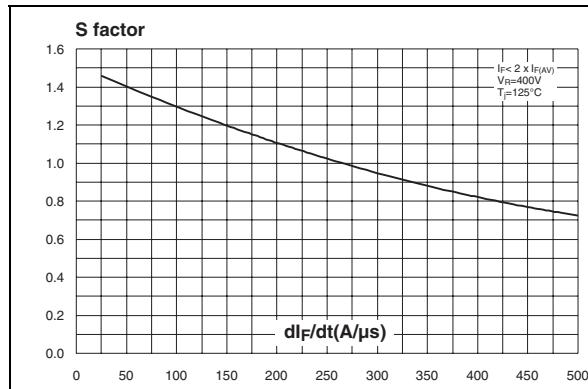


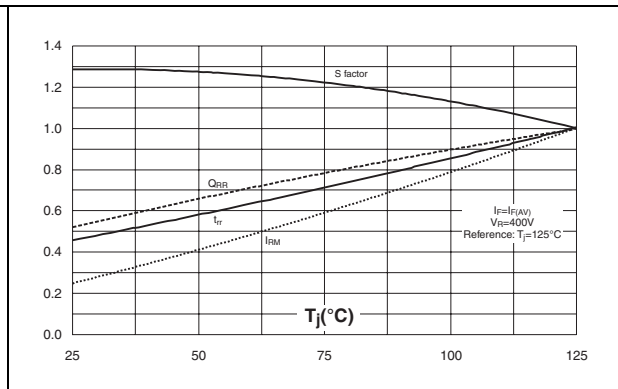
Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

Figure 4. Peak reverse recovery current versus  $di_F/dt$  (typical values)Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)

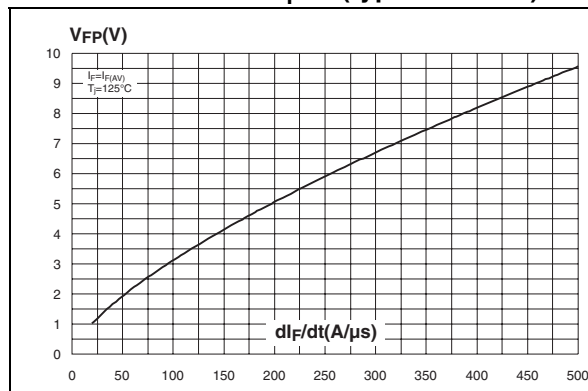
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



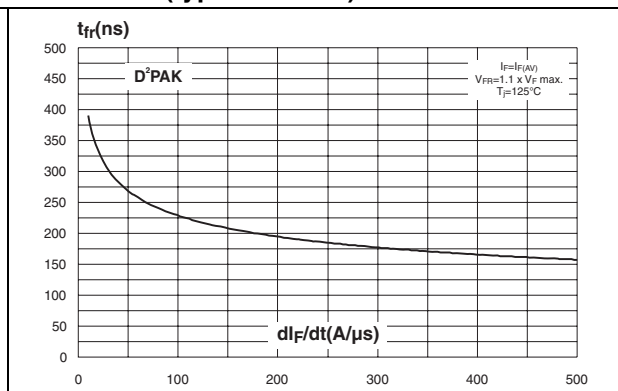
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



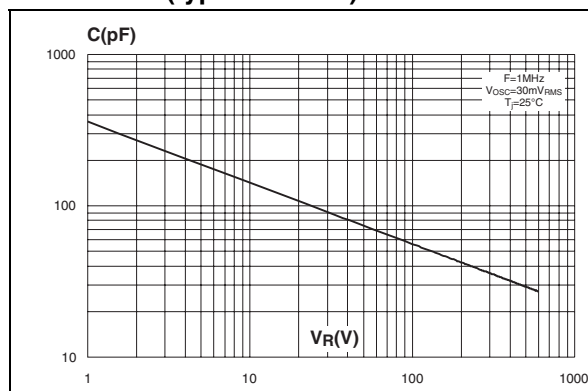
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



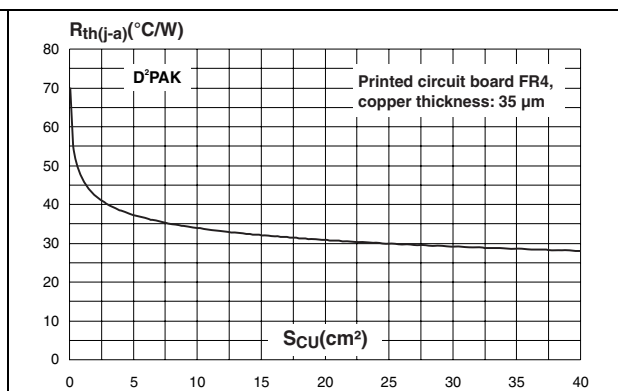
**Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)**



**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 12. Thermal resistance junction to ambient versus copper surface under tab**



## 2 Package information

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

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.

**Table 6. D<sup>2</sup>PAK dimensions**

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 4.40        | 4.60  | 0.173      | 0.181 |
| A1   | 2.49        | 2.69  | 0.098      | 0.106 |
| A2   | 0.03        | 0.23  | 0.001      | 0.009 |
| B    | 0.70        | 0.93  | 0.027      | 0.037 |
| B2   | 1.14        | 1.70  | 0.045      | 0.067 |
| C    | 0.45        | 0.60  | 0.017      | 0.024 |
| C2   | 1.23        | 1.36  | 0.048      | 0.054 |
| D    | 8.95        | 9.35  | 0.352      | 0.368 |
| E    | 10.00       | 10.40 | 0.393      | 0.409 |
| G    | 4.88        | 5.28  | 0.192      | 0.208 |
| L    | 15.00       | 15.85 | 0.590      | 0.624 |
| L2   | 1.27        | 1.40  | 0.050      | 0.055 |
| L3   | 1.40        | 1.75  | 0.055      | 0.069 |
| M    | 2.40        | 3.20  | 0.094      | 0.126 |
| R    | 0.40 typ.   |       | 0.016 typ. |       |
| V2   | 0°          | 8°    | 0°         | 8°    |

**Figure 13. D<sup>2</sup>PAK footprint (dimensions in mm)**

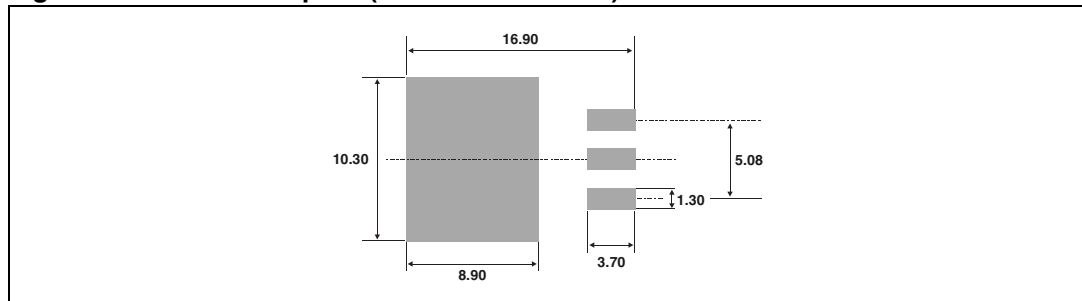
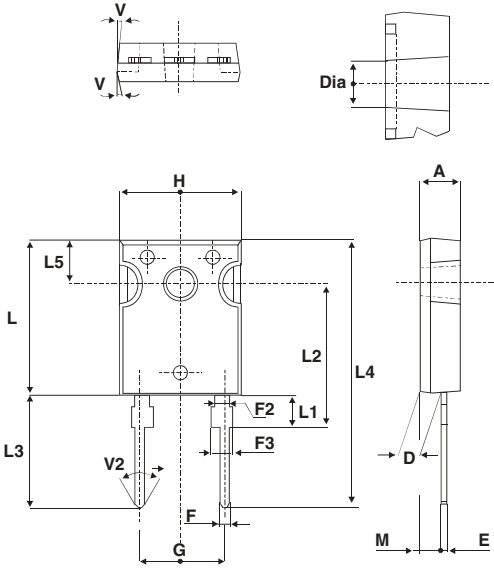


Table 7. DO247 dimensions

| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 4.85        |       | 5.15  | 0.191  |       | 0.203 |
| D    | 2.20        |       | 2.60  | 0.086  |       | 0.102 |
| E    | 0.40        |       | 0.80  | 0.015  |       | 0.031 |
| F    | 1.00        |       | 1.40  | 0.039  |       | 0.055 |
| F2   |             | 2.00  |       |        | 0.078 |       |
| F3   | 2.00        |       | 2.40  | 0.078  |       | 0.094 |
| G    |             | 10.90 |       |        | 0.429 |       |
| H    | 15.45       |       | 15.75 | 0.608  |       | 0.620 |
| L    | 19.85       |       | 20.15 | 0.781  |       | 0.793 |
| L1   | 3.70        |       | 4.30  | 0.145  |       | 0.169 |
| L2   |             | 18.50 |       |        | 0.728 |       |
| L3   | 14.20       |       | 14.80 | 0.559  |       | 0.582 |
| L4   |             | 34.60 |       |        | 1.362 |       |
| L5   |             | 5.50  |       |        | 0.216 |       |
| M    | 2.00        |       | 3.00  | 0.078  |       | 0.118 |
| V    |             | 5°    |       |        | 5°    |       |
| V2   |             | 60°   |       |        | 60°   |       |
| Dia. | 3.55        |       | 3.65  | 0.139  |       | 0.143 |



### 3 Ordering information

**Table 8. Ordering information**

| Order code    | Marking    | Package            | Weight | Base qty | Delivery mode |
|---------------|------------|--------------------|--------|----------|---------------|
| STTH30L06G    | STTH30L06G | D <sup>2</sup> PAK | 1.48 g | 50       | Tube          |
| STTH30L06G-TR | STTH30L06G | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape and reel |
| STTH30L06W    | STTH30L06W | DO-247             | 4.40 g | 30       | Tube          |

### 4 Revision history

**Table 9. Document revision history**

| Date        | Revision | Changes                                                                                               |
|-------------|----------|-------------------------------------------------------------------------------------------------------|
| 07-Sep-2004 | 1        | First issue.                                                                                          |
| 21-Oct-2004 | 2        | DOP3I package added.                                                                                  |
| 11-Jan-06   | 3        | On page 2:<br>– $I_{F(RMS)}$ corrected from 30 A to 50 A<br>– $I_{F(AV)}$ corrected from 50 A to 30 A |
| 10-Aug-2006 | 4        | Reformatted to current standards. SOD-93 package removed.                                             |
| 06-Sep-2011 | 5        | Updated $I_{FSM}$ from 160 A to 300 A. Removed TO-220 and DOP3I.                                      |

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