

## TURBO 2 ULTRAFast HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

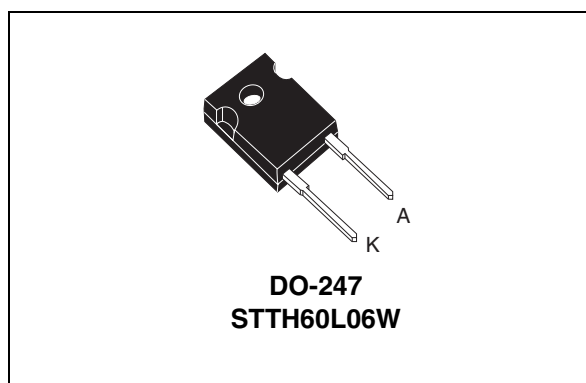
|                |               |
|----------------|---------------|
| $I_{F(AV)}$    | <b>60 A</b>   |
| $V_{RRM}$      | <b>600 V</b>  |
| $T_j$          | <b>175°C</b>  |
| $V_F$ (typ)    | <b>0.95 V</b> |
| $t_{rr}$ (max) | <b>70 ns</b>  |

**FEATURES AND BENEFITS**

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

**DESCRIPTION**

The STTH60L06, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode. Thanks to its low  $V_F$  characteristics, this device exhibits high performances in free-wheeling applications.


**Table 2: Order Codes**

| Part Number | Marking    |
|-------------|------------|
| STTH60L06W  | STTH60L06W |

**Table 3: Absolute Ratings** (limiting values)

| Symbol       | Parameter                              |                                              | Value        | Unit |
|--------------|----------------------------------------|----------------------------------------------|--------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                                              | 600          | V    |
| $I_{F(RMS)}$ | RMS forward current                    |                                              | 90           | A    |
| $I_{F(AV)}$  | Average forward current                | $T_c = 110^\circ\text{C} \quad \delta = 0.5$ | 60           | A    |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10\text{ms sinusoidal}$               | 400          | A    |
| $T_{stg}$    | Storage temperature range              |                                              | -65 to + 175 | °C   |
| $T_j$        | Maximum operating junction temperature |                                              | 175          | °C   |

Table 4: Thermal Resistance

| Symbol        | Parameter        | Value (max). | Unit |
|---------------|------------------|--------------|------|
| $R_{th(j-c)}$ | Junction to case | 0.75         | °C/W |

Table 5: Static Electrical Characteristics

| Symbol     | Parameter               | Test conditions           | Min. | Typ | Max. | Unit          |
|------------|-------------------------|---------------------------|------|-----|------|---------------|
| $I_R^*$    | Reverse leakage current | $T_j = 25^\circ\text{C}$  |      |     | 50   | $\mu\text{A}$ |
|            |                         | $T_j = 150^\circ\text{C}$ |      |     | 160  |               |
| $V_F^{**}$ | Forward voltage drop    | $T_j = 25^\circ\text{C}$  |      |     | 1.55 | V             |
|            |                         | $T_j = 150^\circ\text{C}$ |      |     | 0.95 |               |

Pulse test: \*  $t_p = 5 \text{ ms}$ ,  $\delta < 2\%$

\*\*  $t_p = 380 \mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:  $P = 0.93 \times I_{F(AV)} + 0.0045 I_F^2 (\text{RMS})$

Table 6: Dynamic Characteristics

| Symbol   | Parameter                | Test conditions                                               | Min. | Typ | Max. | Unit |
|----------|--------------------------|---------------------------------------------------------------|------|-----|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25^\circ\text{C}$                                      |      |     | 70   | ns   |
|          |                          | $I_F = 0.5\text{A}$ $I_{rr} = 0.25\text{A}$ $I_R = 1\text{A}$ |      |     |      |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125^\circ\text{C}$                                     |      |     | 14   | A    |
|          |                          | $I_F = 60\text{A}$ $V_R = 400\text{V}$                        |      |     |      |      |
| $t_{fr}$ | Forward recovery time    | $T_j = 25^\circ\text{C}$                                      |      |     | 500  | ns   |
|          |                          | $I_F = 60\text{A}$ $dI_F/dt = 200 \text{ A}/\mu\text{s}$      |      |     |      |      |
| $V_{FP}$ | Forward recovery voltage | $T_j = 25^\circ\text{C}$                                      |      |     | 3    | V    |
|          |                          | $I_F = 60\text{A}$ $dI_F/dt = 200 \text{ A}/\mu\text{s}$      |      |     |      |      |

Figure 1: Conduction losses versus average forward current

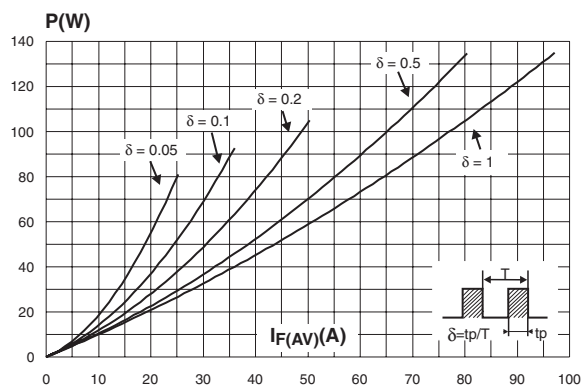
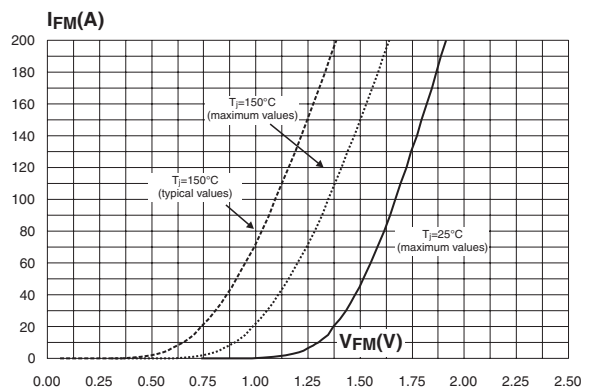
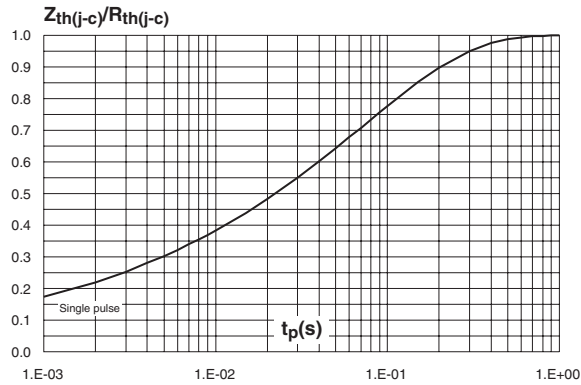


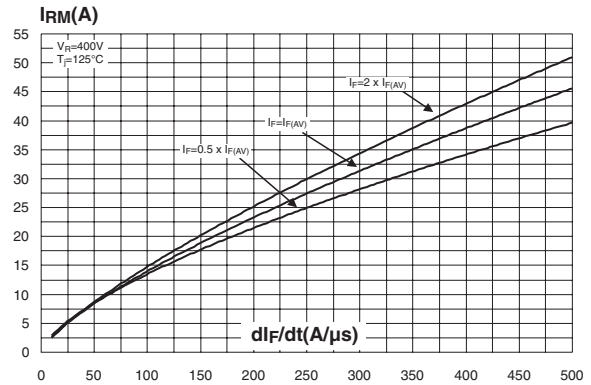
Figure 2: Forward voltage drop versus forward current



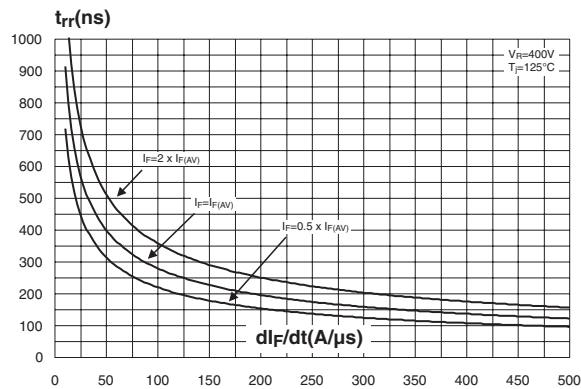
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration**



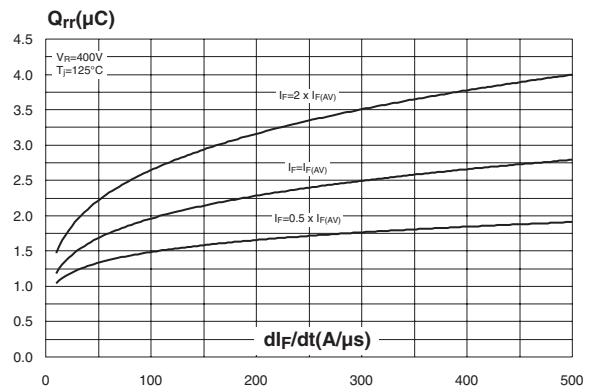
**Figure 4: Peak reverse recovery current versus  $di_F/dt$  (typical values)**



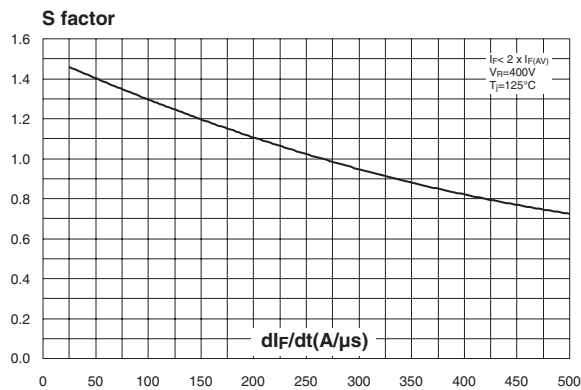
**Figure 5: Reverse recovery time versus  $di_F/dt$  (typical values)**



**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**

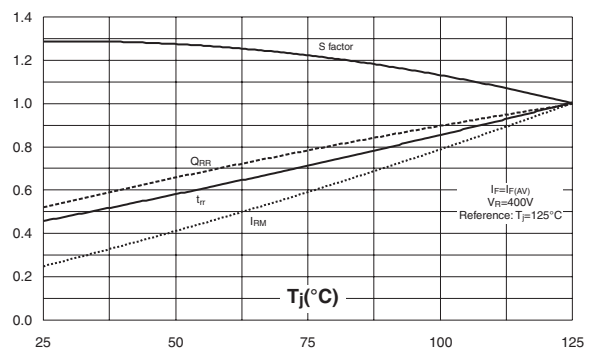


Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values)

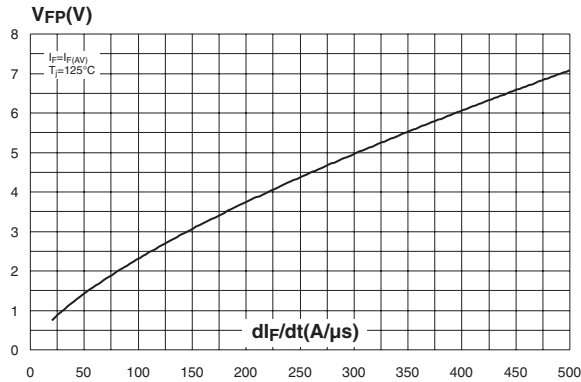


Figure 10: Forward recovery time versus  $di_F/dt$  (typical values)

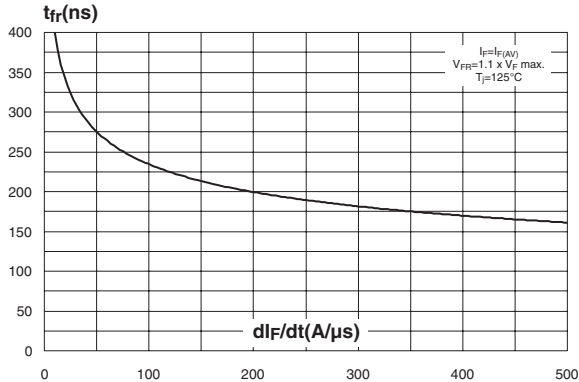


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

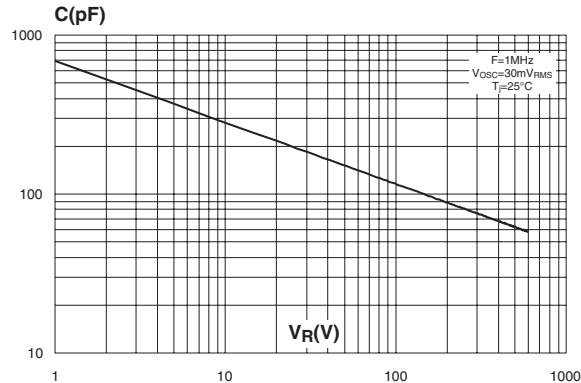


Figure 12: DO-247 Package Mechanical Data

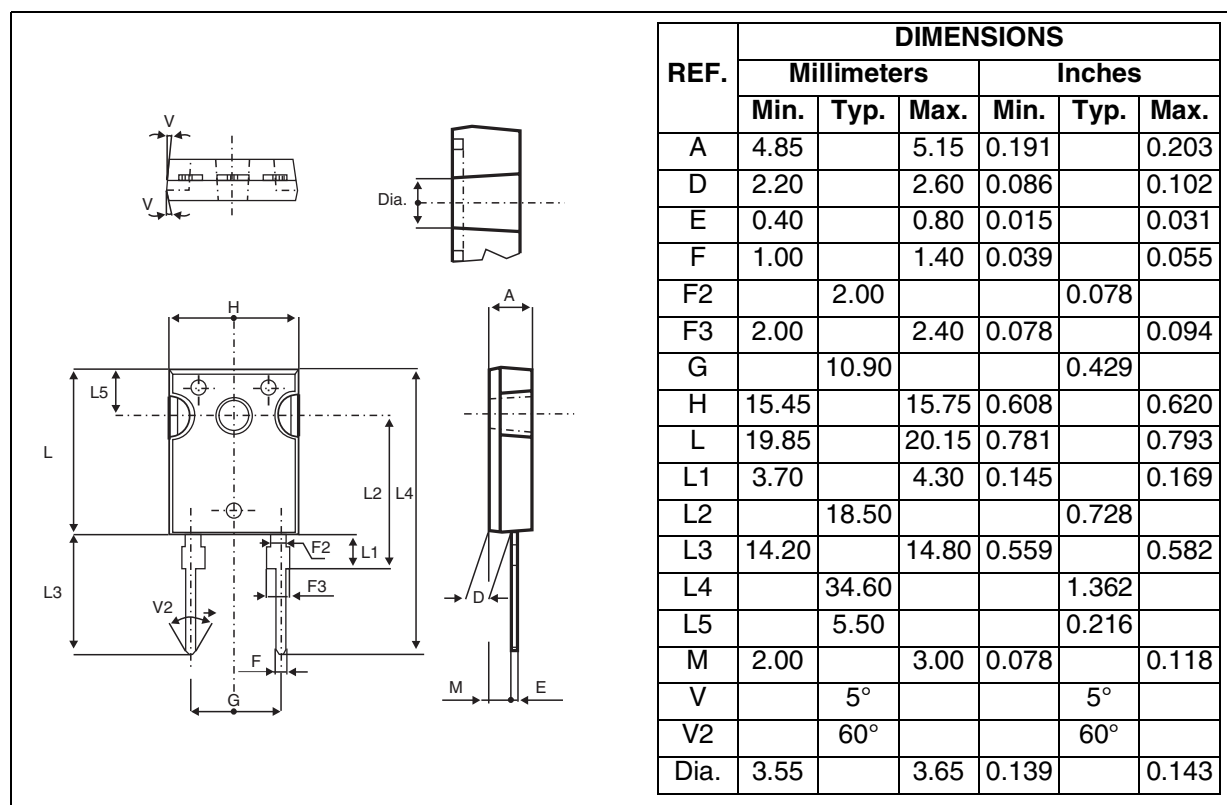


Table 7: Ordering Information

| Ordering type | Marking    | Package | Weight | Base qty | Delivery mode |
|---------------|------------|---------|--------|----------|---------------|
| STTH60L06W    | STTH60L06W | DO-247  | 4.40 g | 30       | Tube          |

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

Table 8: Revision History

| Date        | Revision | Description of Changes                                             |
|-------------|----------|--------------------------------------------------------------------|
| 07-Sep-2004 | 1        | First issue                                                        |
| 10-Sep-2004 | 2        | Junction to case value (page 2) changed from 0.70 °C/W to 0.75°C/W |

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