

Turbo 2 ultrafast high voltage rectifier

Features

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

Description

The STTH200L06TV, which is using ST Turbo 2 600 V technology, is specially suited for use in switching power supplies, and industrial applications (such as welding), as rectification diode.

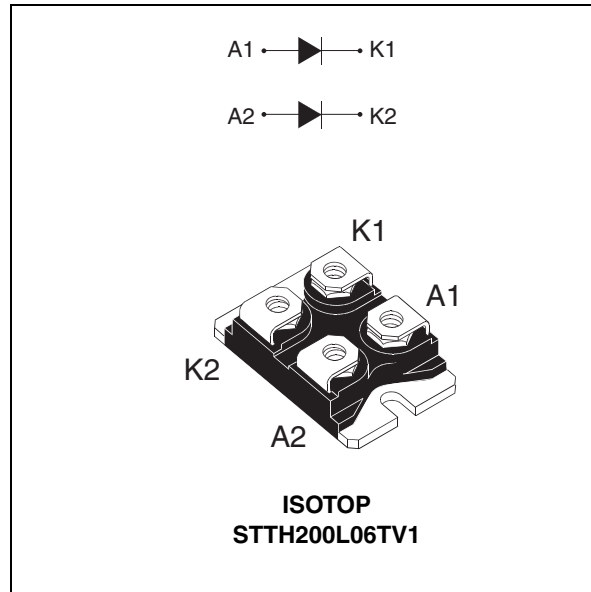


Table 1. Device summary

| Symbol | Value |
|----------------|-----------------|
| $I_{F(AV)}$ | Up to 2 x 120 A |
| V_{RRM} | 600 V |
| T_j | 150 °C |
| V_F (typ) | 0.95 V |
| t_{rr} (max) | 80 ns |

TM: ISOTOP is a trademark of STMicroelectronics

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 | | 180 | A |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ | $T_c = 65\text{ }^\circ\text{C}$ Per diode | 100 | A |
| | | $T_c = 35\text{ }^\circ\text{C}$ Per diode | 120 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ Sinusoidal | 800 | A |
| T_{stg} | Storage temperature range | | -55 to + 150 | $^\circ\text{C}$ |
| T_j | Maximum operating junction temperature | | 150 | $^\circ\text{C}$ |

Table 3. Thermal parameter

| Symbol | Parameter | | Maximum | Unit |
|---------------|------------------|-----------|---------|--------------------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 0.60 | $^\circ\text{C/W}$ |
| | | Total | 0.35 | |
| $R_{th(c)}$ | 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 (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------------------|----------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^\circ\text{C}$ | $V_R = V_{RRM}$ | | | 100 | μA |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | 100 | 1000 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}$ | | | 1.55 | V |
| | | $T_j = 150\text{ }^\circ\text{C}$ | | | 0.95 | 1.20 | |

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 maximum conduction losses use the following equation:

$$P = 0.93 \times I_{F(AV)} + 0.0027 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------------------|--|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$ | | | 80 | ns |
| | | | $I_F = 1\text{ A}, di_F/dt = 50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$ | | 85 | 120 | |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}, di_F/dt = 400\text{ A}/\mu\text{s}, di_F/dt = 100\text{ A}/\mu\text{s}$ | | 15 | 20 | A |
| t_{fr} | Forward recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_{FR} = 1.1 \times V_{Fmax}$ | | | 700 | ns |
| V_{FP} | Forward recovery voltage | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_{FR} = 1.1 \times V_{Fmax}$ | | 3.4 | | V |

Figure 1. Conduction losses versus average forward current (per diode)

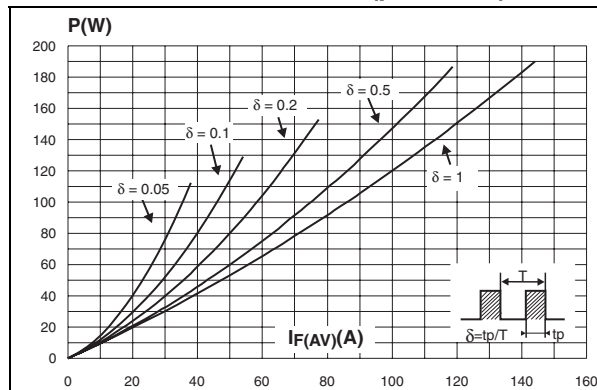


Figure 2. Forward voltage drop versus forward current (per diode)

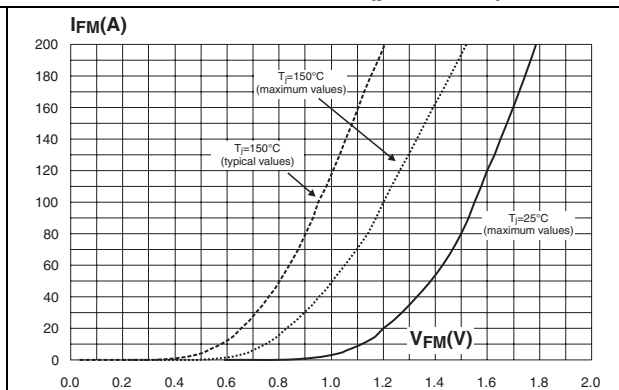


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

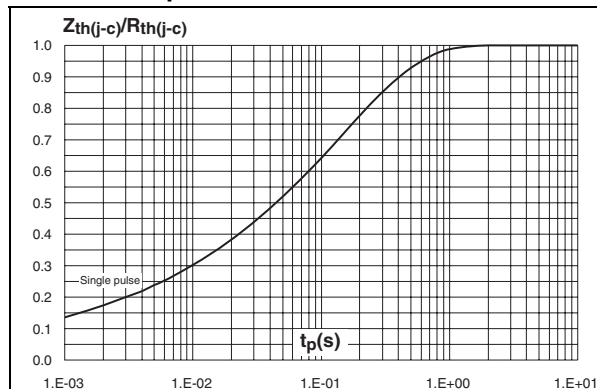


Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)

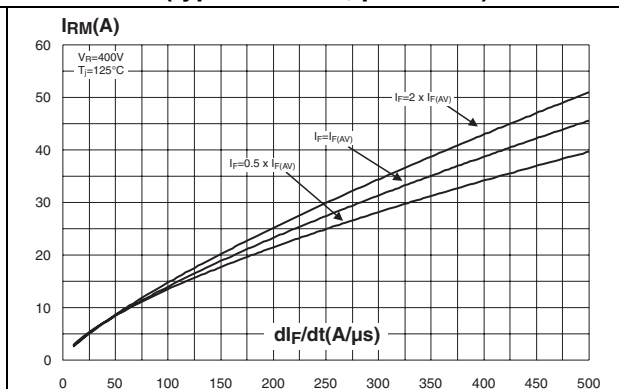


Figure 5. Reverse recovery time versus di_F/dt (typical values, per diode)

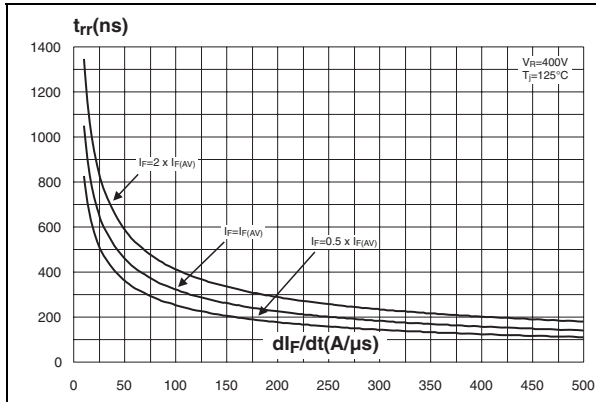


Figure 6. Reverse recovery charges versus di_F/dt (typical values, per diode)

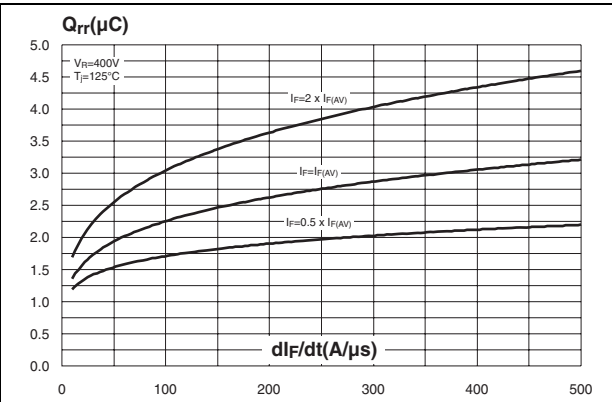


Figure 7. Reverse recovery softness factor versus di_F/dt (typical values, per diode)

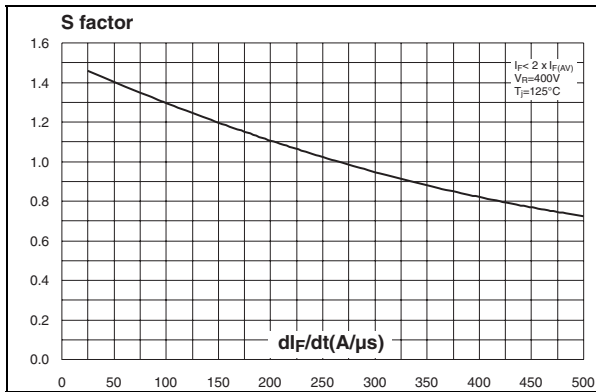


Figure 8. Relative variations of dynamic parameters versus junction temperature

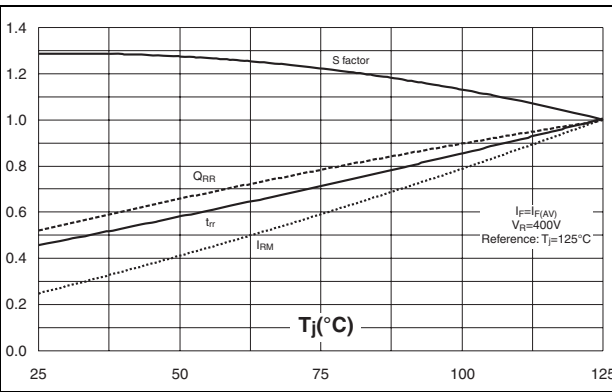


Figure 9. Transient peak forward voltage versus di_F/dt (typical values, per diode)

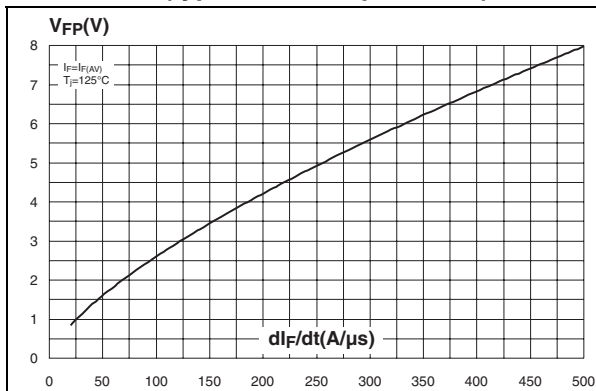


Figure 10. Forward recovery time versus di_F/dt (typical values, per diode)

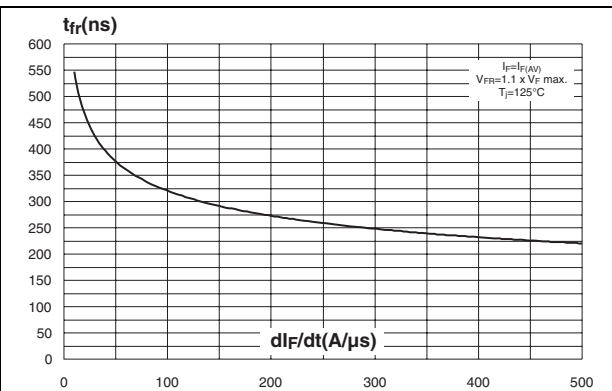
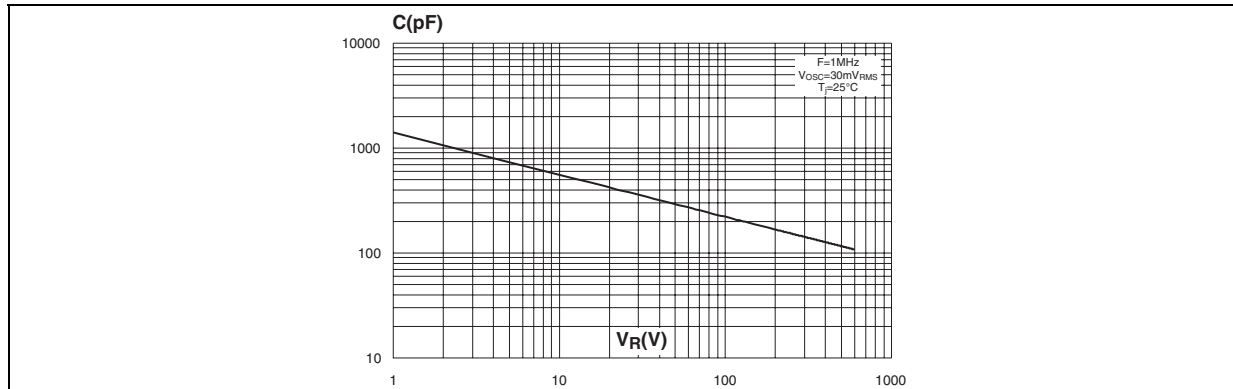


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



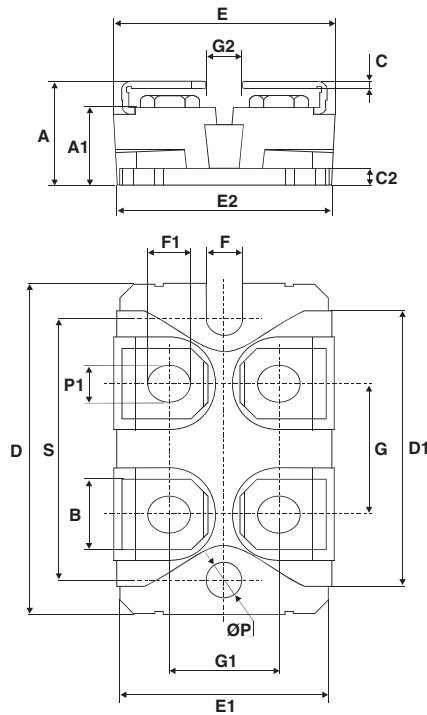
2 Package information

- 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. ECOPACK® is an ST trademark.

Table 6. ISOTOP dimensions

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 11.80 | 12.20 | 0.465 | 0.480 |
| A1 | 8.90 | 9.10 | 0.350 | 0.358 |
| B | 7.8 | 8.20 | 0.307 | 0.323 |
| C | 0.75 | 0.85 | 0.030 | 0.033 |
| C2 | 1.95 | 2.05 | 0.077 | 0.081 |
| D | 37.80 | 38.20 | 1.488 | 1.504 |
| D1 | 31.50 | 31.70 | 1.240 | 1.248 |
| E | 25.15 | 25.50 | 0.990 | 1.004 |
| E1 | 23.85 | 24.15 | 0.939 | 0.951 |
| E2 | 24.80 typ. | | 0.976 typ. | |
| G | 14.90 | 15.10 | 0.587 | 0.594 |
| G1 | 12.60 | 12.80 | 0.496 | 0.504 |
| G2 | 3.50 | 4.30 | 0.138 | 0.169 |
| F | 4.10 | 4.30 | 0.161 | 0.169 |
| F1 | 4.60 | 5.00 | 0.181 | 0.197 |
| P | 4.00 | 4.30 | 0.157 | 0.69 |
| P1 | 4.00 | 4.40 | 0.157 | 0.173 |
| S | 30.10 | 30.30 | 1.185 | 1.193 |



3 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|---------------|---------|--------------------------|---------------------|---------------|
| STTH200L06TV1 | STTH200L06TV1 | ISOTOP | 27 g (without screws) | 10 (with screws) | Tube |

4 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------------------------|
| 07-Sep-2004 | 1 | First issue. |
| 05-Sep-2011 | 2 | Updated Figure 6 . |

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