

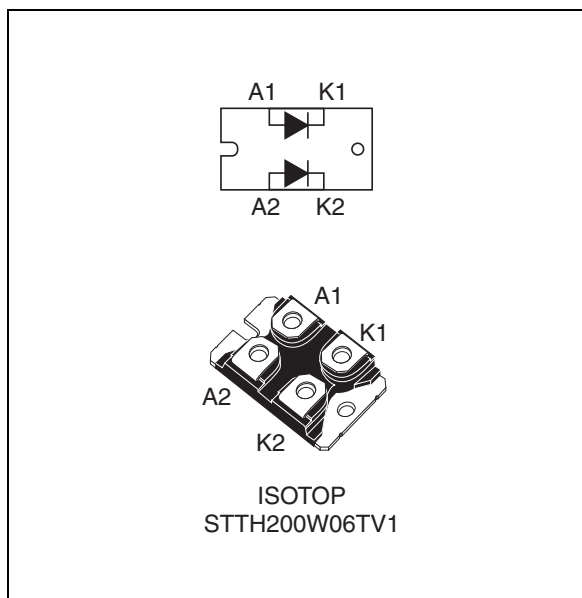
### Features

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching and conduction losses
- Insulated package
  - Insulating voltage = 2500 V rms
  - Capacitance = 45 pF
- Complies with UL standards (File ref: E81734)

### Description

The STTH200W06TV1, which uses ST Turbo 2, 600 V technology, is especially suited to be used for DC/AC and DC/AC converters in primary stage of MIG/MMA/TIG welding machine.

Packaged in ISOTOP, this device offers high power integration for all welding machines and industrial equipment.



**Table 1. Device summary**

| Symbol         | Value     |
|----------------|-----------|
| $I_{F(AV)}$    | 2 x 100 A |
| $V_{RRM}$      | 600 V     |
| $T_j$ (max)    | 150 °C    |
| $V_F$ (typ)    | 1.0 V     |
| $t_{rr}$ (typ) | 55 ns     |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at  $T_j = 25\text{ °C}$ , unless otherwise specified, per diode)**

| Symbol        | Parameter                               |                                 | Value        | Unit |
|---------------|-----------------------------------------|---------------------------------|--------------|------|
| $V_{RRM}$     | Repetitive peak reverse voltage         |                                 | 600          | V    |
| $I_{F(RMS)}$  | Forward rms current                     | Per diode                       | 145          | A    |
| $I_{F(peak)}$ | Average forward current, $\delta = 0.2$ | Per diode $T_c = 105\text{ °C}$ | 200          | A    |
| $I_{FSM}$     | Surge non repetitive forward current    | $t_p = 10\text{ ms}$ Sinusoidal | 800          | A    |
| $T_{stg}$     | Storage temperature range               |                                 | -65 to + 150 | °C   |
| $T_j$         | Maximum operating junction temperature  |                                 | 150          | °C   |

**Table 3. Thermal parameters**

| Symbol        | Parameter        |           | Value | Unit |
|---------------|------------------|-----------|-------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 0.7   | °C/W |
|               |                  | Total     | 0.4   |      |
| $R_{th(c)}$   | Coupling         |           | 0.1   |      |

When the two diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

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

| Symbol      | Parameter               | Test conditions       |                      | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|----------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$      | -    |      | 30   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                      | -    | 30   | 300  |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 100\text{ A}$ |      |      | 1.5  | V             |
|             |                         | $T_j = 150\text{ °C}$ |                      | -    | 1    | 1.3  |               |
|             |                         | $T_j = 25\text{ °C}$  | $I_F = 200\text{ A}$ | -    |      | 1.75 |               |
|             |                         | $T_j = 150\text{ °C}$ |                      | -    | 1.25 | 1.60 |               |

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:

$$P = 1.0 \times I_{F(AV)} + 0.003 \times I_{F(RMS)}^2$$

Table 5. Dynamic characteristics (per diode)

| Symbol       | Parameter                | Test conditions                   |                                                                                     | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|-----------------------------------|-------------------------------------------------------------------------------------|------|------|------|------|
| $I_{RM}$     | Reverse recovery current | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}, V_R = 400\text{ V}$<br>$di_F/dt = -200\text{ A}/\mu\text{s}$   | -    | 30   | 40   | A    |
| $Q_{RR}$     | Reverse recovery charge  |                                   |                                                                                     |      | 4600 |      | nC   |
| $S_{factor}$ | Softness factor          |                                   |                                                                                     |      | 0.4  |      |      |
| $t_{rr}$     | Reverse recovery time    | $T_j = 25\text{ }^\circ\text{C}$  | $I_F = 1\text{ A}, V_R = 30\text{ V}$<br>$di_F/dt = -100\text{ A}/\mu\text{s}$      | -    | 55   | 75   | ns   |
| $t_{fr}$     | Forward recovery time    | $T_j = 25\text{ }^\circ\text{C}$  | $I_F = 100\text{ A}, V_{FR} = 2.5\text{ V}$<br>$di_F/dt = 100\text{ A}/\mu\text{s}$ | -    |      | 2000 | ns   |
| $V_{FP}$     | Forward recovery voltage | $T_j = 25\text{ }^\circ\text{C}$  |                                                                                     | -    | 3.3  | 5    | V    |

Figure 1. Average forward power dissipation versus average forward current (per diode)

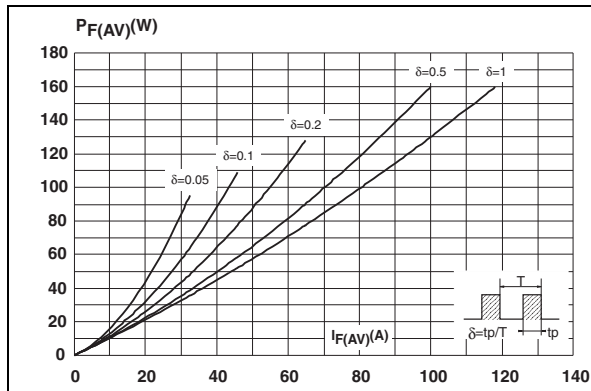


Figure 2. Forward voltage drop versus forward current (per diode)

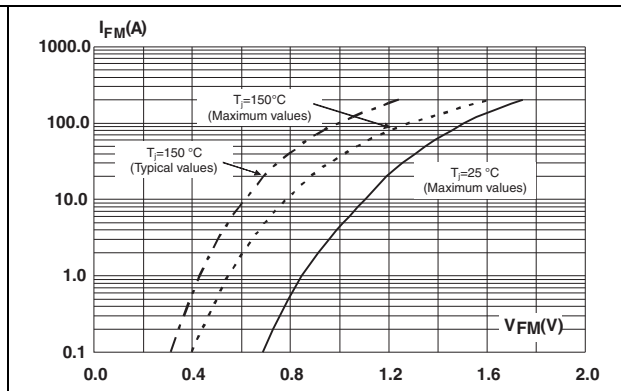


Figure 3. Relative variation of thermal impedance, junction to case, versus pulse duration

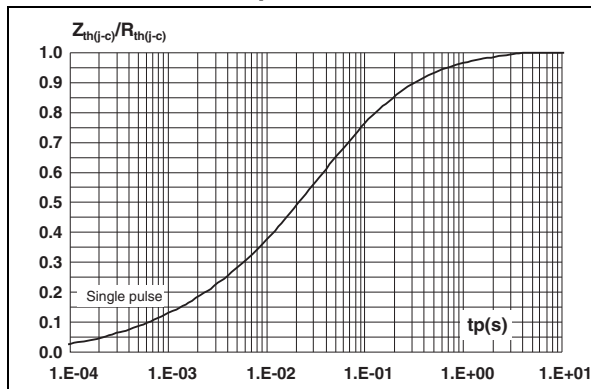


Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)

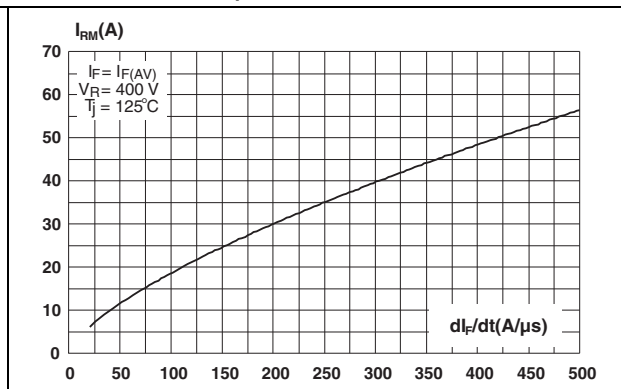


Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values, per diode)

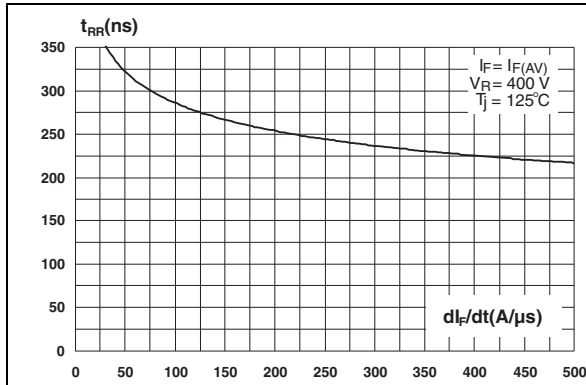


Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)

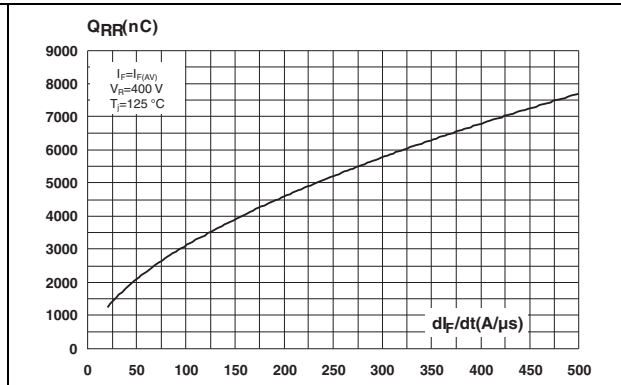


Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)

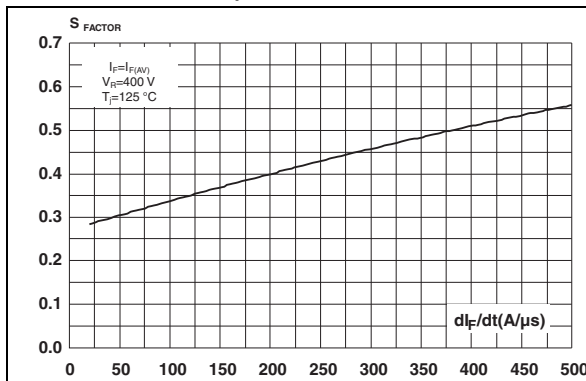


Figure 8. Relative variation of dynamic parameters versus junction temperature

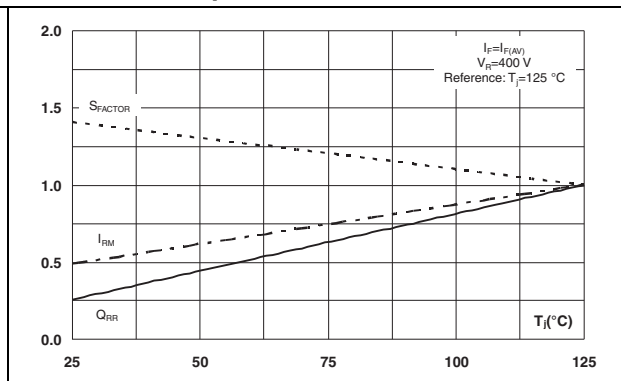


Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)

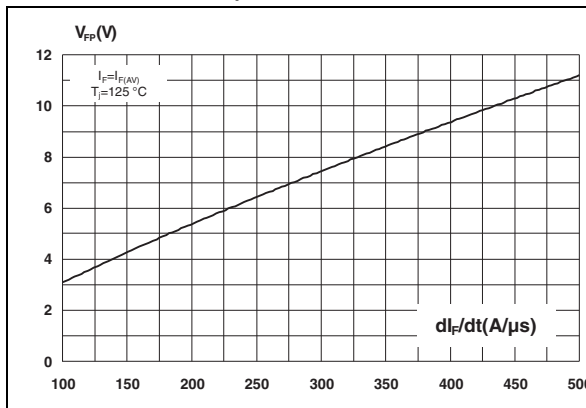


Figure 10. Forward recovery time versus  $di_F/dt$  (typical values, per diode)

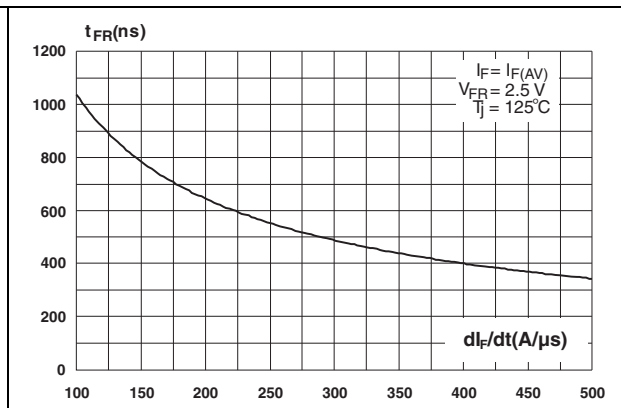
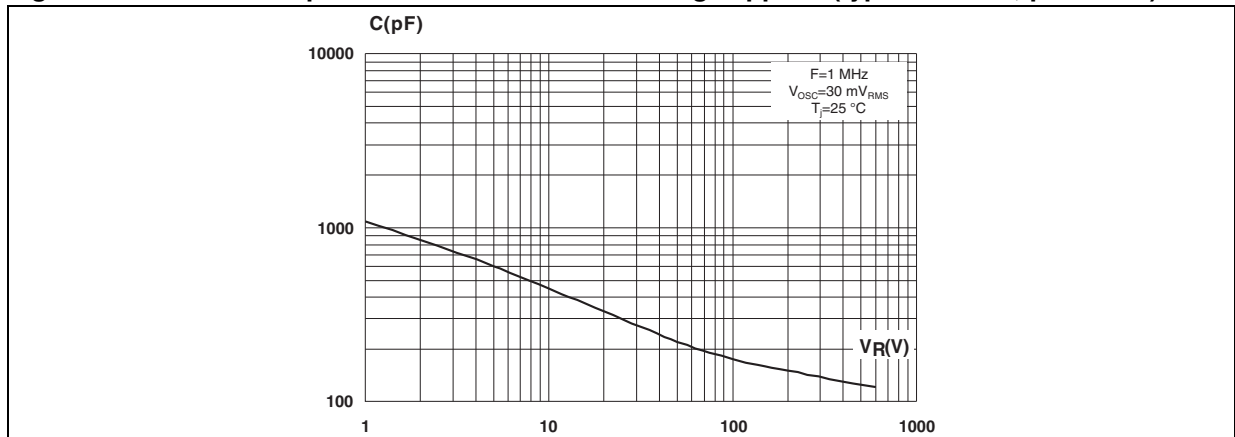
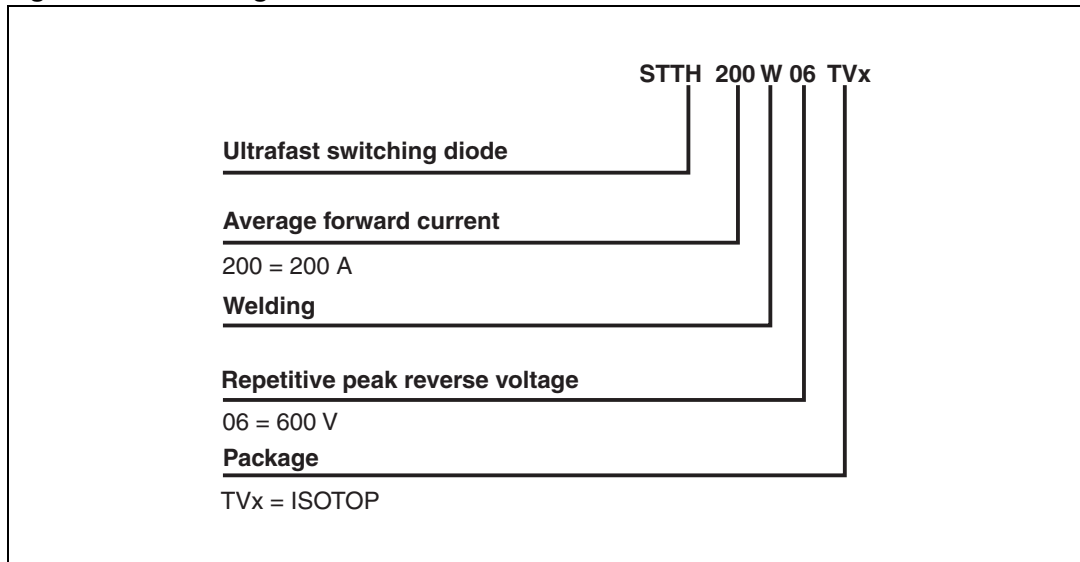


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



## 2 Ordering information scheme

Figure 12. Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.3 N·m (1.5 N·m maximum)

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**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 |

## 4 Ordering information

Table 7. Ordering information

| Order code    | Marking       | Package | Weight | Base qty <sup>(1)</sup> | Delivery mode |
|---------------|---------------|---------|--------|-------------------------|---------------|
| STTH200W06TV1 | STTH200W06TV1 | ISOTOP  | 27 g   | 10<br>with screws       | Tube          |

1. This product is supplied with 40 terminal screws and washers for each tube. The screws and washers are supplied in a separate pack with the order.

## 5 Revision history

Table 8. Document revision history

| Date        | Revision | Changes     |
|-------------|----------|-------------|
| 05-Oct-2012 | 1        | First issue |



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