

Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Insulated package:
 - Electrical = 2500 V_{RMS}
 - Capacitance = 45 pF

Description

The STTH200W04TV1, which uses ST turbo 2, 400 V technology, is especially suited for use in DC/DC and DC/AC converters in secondary stage of MIG/MMA/TIG welding machine.

Packaged in ST's ISOTOP, this device offers high power integration for all welding machines and industrial applications.

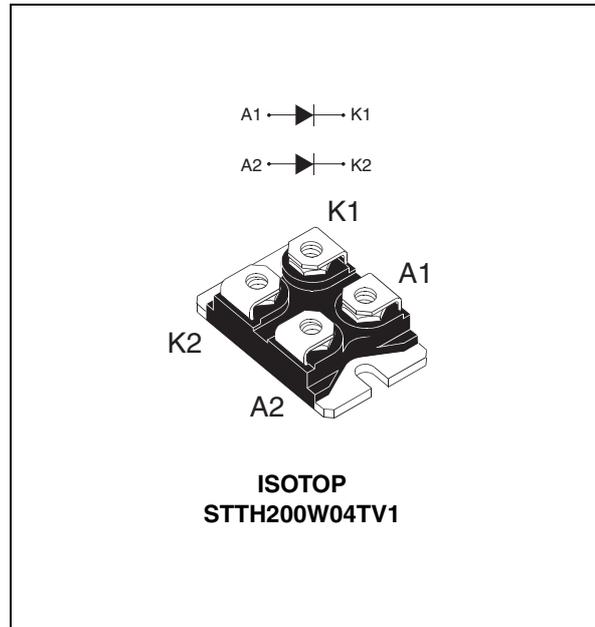


Table 1. Device summary

| Symbol | Value |
|----------------|-----------|
| $I_{F(AV)}$ | 2 x 100 A |
| V_{RRM} | 400 V |
| T_j (max) | 150 °C |
| V_F (typ) | 1.05 V |
| t_{rr} (typ) | 40 ns |

1 Characteristics

Table 2. Absolute ratings (limiting values, at 25 °C, unless otherwise specified, per diode)

| Symbol | Parameter | | | Value | Unit |
|---------------|--|---------------------------------|-----------|--------------|------|
| V_{RRM} | Repetitive peak reverse voltage | | | 400 | V |
| $I_{F(RMS)}$ | Forward rms current | | | 200 | A |
| $I_{F(Peak)}$ | Peak forward current, $\delta = 0.2$ | $T_c = 90\text{ °C}$ | Per diode | 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 resistance

| Symbol | Parameter | | Value (max). | Unit |
|---------------|------------------|-----------|--------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 0.9 | °C/W |
| | | Total | 0.5 | |
| $R_{th(c)}$ | Coupling | | 0.10 | °C/W |

When 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 | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | | | 40 | μA |
| | | $T_j = 125\text{ °C}$ | | | 40 | 400 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 100\text{ A}$ | | | 1.55 | V |
| | | $T_j = 150\text{ °C}$ | | | 1.05 | 1.30 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 200\text{ A}$ | | | 1.9 | |
| | | $T_j = 150\text{ °C}$ | | | 1.35 | 1.65 | |

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:

$$P = 0.95 \times I_{F(AV)} + 0.0035 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|-----------------------------------|---|------|------|------|---------------|
| Q_{RR} | Reverse recovery charge | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}, V_R = 320\text{ V}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ | | 0.9 | | μC |
| S_{factor} | Softness factor | | | | 0.3 | | |
| I_{RM} | Reverse recovery current | | | | 17 | 23 | A |
| t_{rr} | Reverse recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 1\text{ A}, V_R = 30\text{ V}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ | | 40 | 55 | ns |
| t_{fr} | Forward recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 100\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 2\text{ V}$ | | | 2 | μs |
| V_{FP} | Forward recovery voltage | | | | 3.0 | 4.5 | V |

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

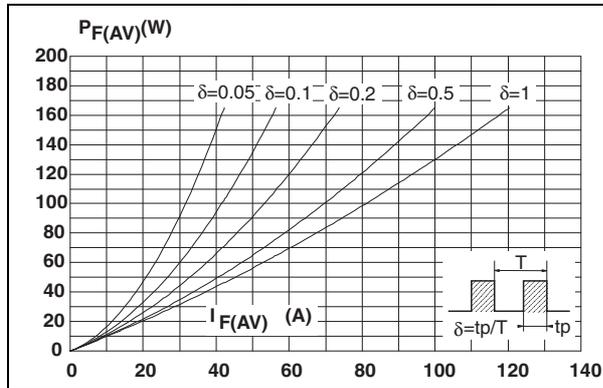


Figure 2. Forward voltage drop versus forward current (per diode)

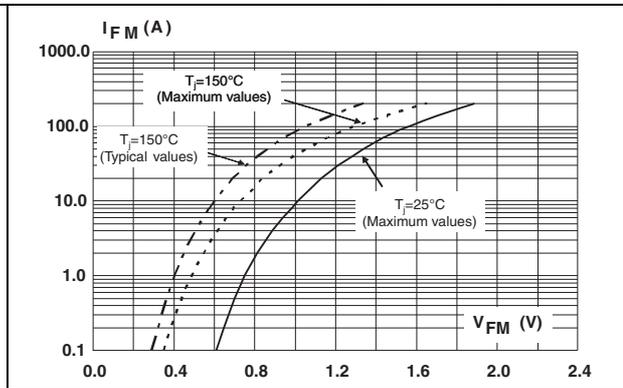


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

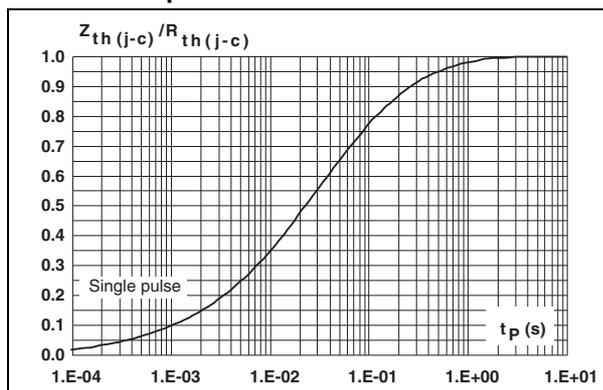


Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)

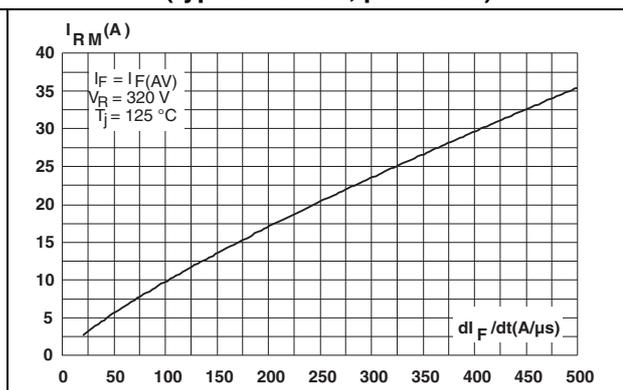


Figure 5. Reverse recovery time versus di_F/dt (typical values, per diode)

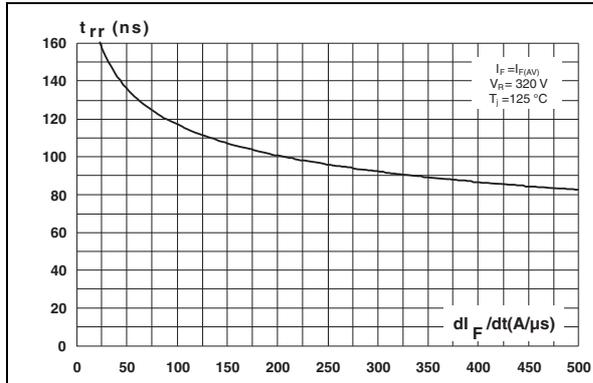


Figure 6. Reverse recovery charges versus di_F/dt (typical values, per diode)

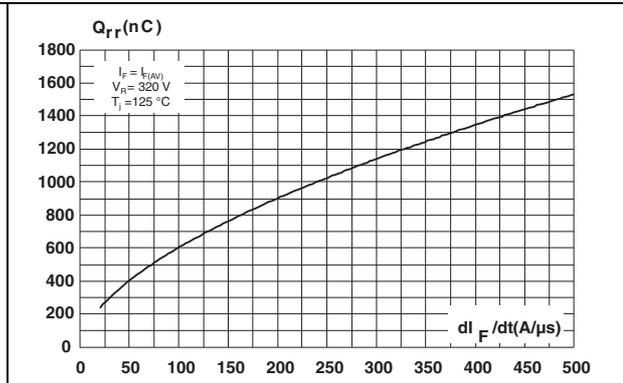


Figure 7. Reverse recovery softness factor versus di_F/dt (typical values, per diode)

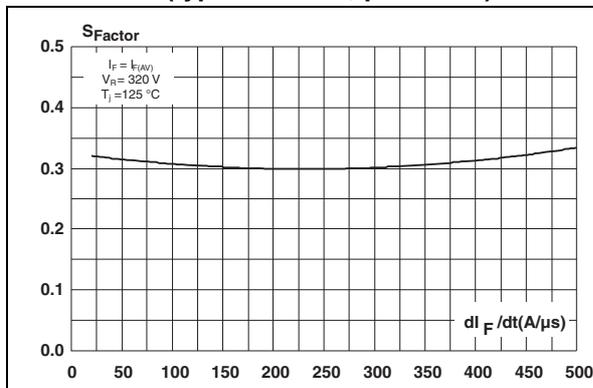


Figure 8. Relative variations of dynamic parameters versus junction temperature

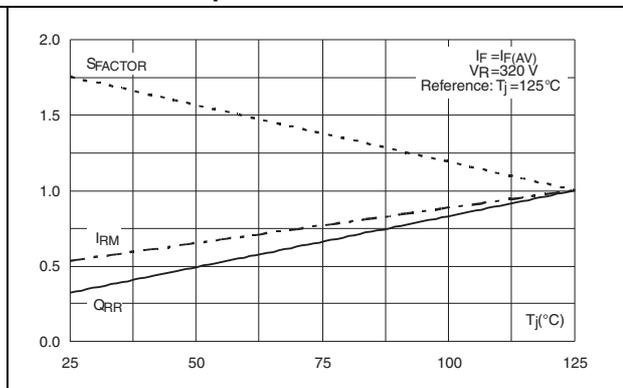


Figure 9. Transient peak forward voltage versus di_F/dt (typical values, per diode)

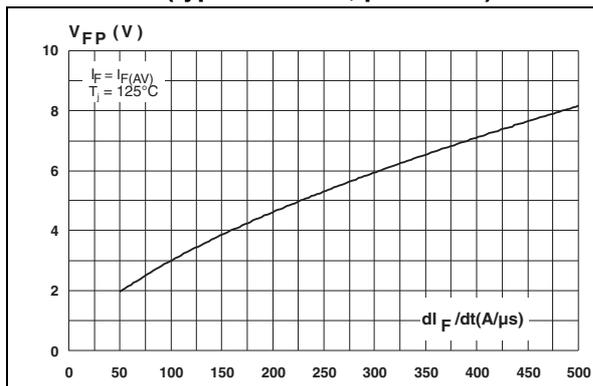


Figure 10. Forward recovery time versus di_F/dt (typical values, per diode)

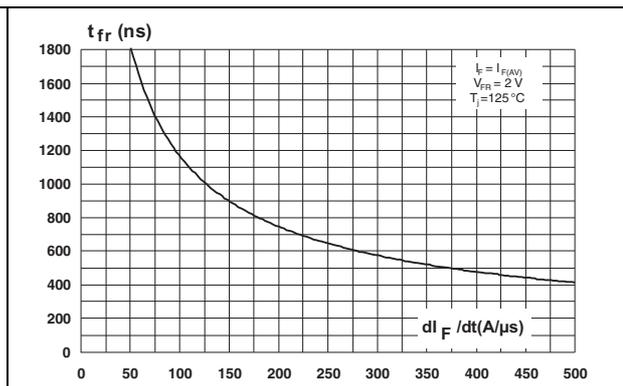
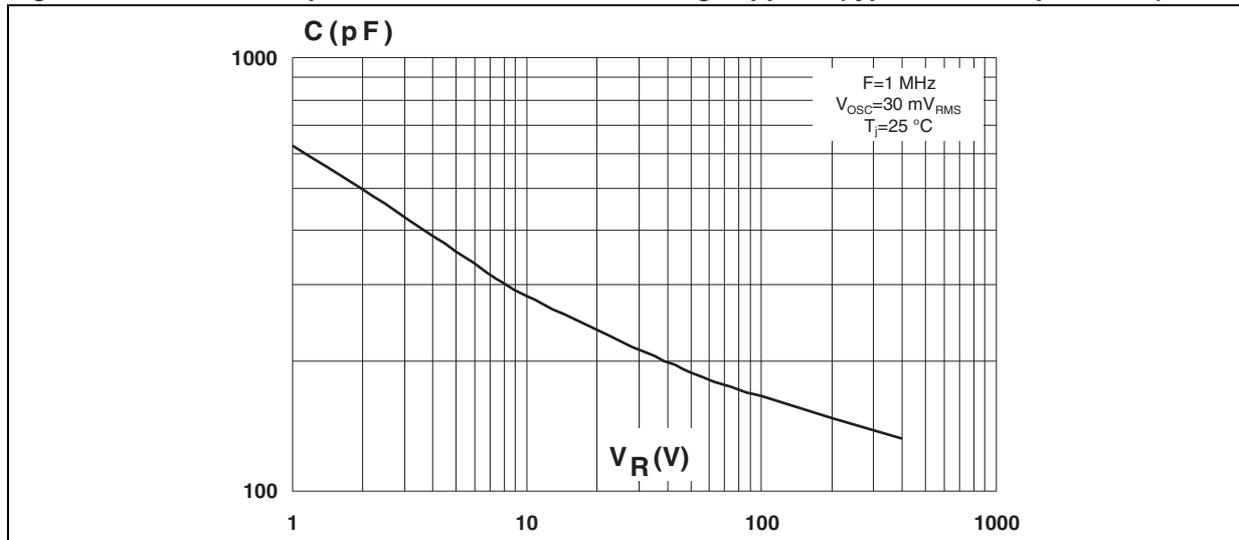


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



2 Package information

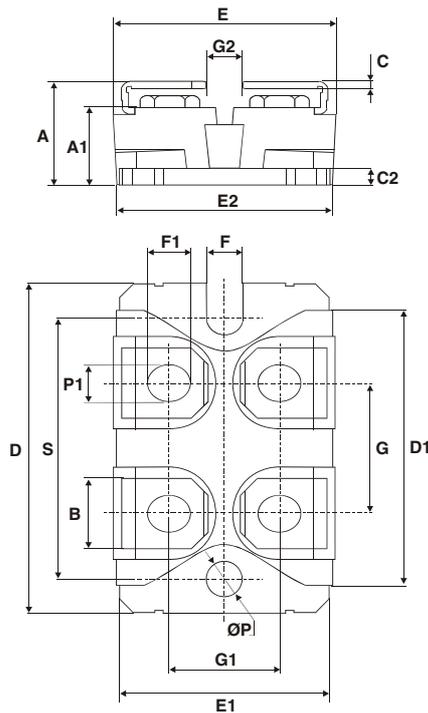
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.5 N·m
- Maximum torque value: 1.5 N·m

STMicroelectronics strongly recommend the uses of the screws delivered with this product. The use of another screw is entirely at the user's own risk and will invalidate the warranty.

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 ⁽¹⁾ | Delivery mode |
|---------------|---------------|---------|------------------------|-------------------------|---------------|
| STTH200W04TV1 | STTH200W04TV1 | ISOTOP | 27 g without screws | 10 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.

4 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 19-Jun-2012 | 1 | First issue. |
| 02-Oct-2012 | 2 | Updated Table 1 and Table 5 |

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