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STTH100W06C

Turbo 2 ultrafast high voltage rectifier

Datasheet – production data

Features

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses
- ECOPACK[®]2 compliant component
- Ribbon bonding for more robustness

Description

The STTH100W06CW, uses ST Turbo 2, 600 V technology. It is especially suited to be used for DC/DC and DC/AC converters in secondary stage of MIG/MMA/TIG welding machine. Housed in ST's TO-247, this device offers high power integration for all welding machines and industrial applications.

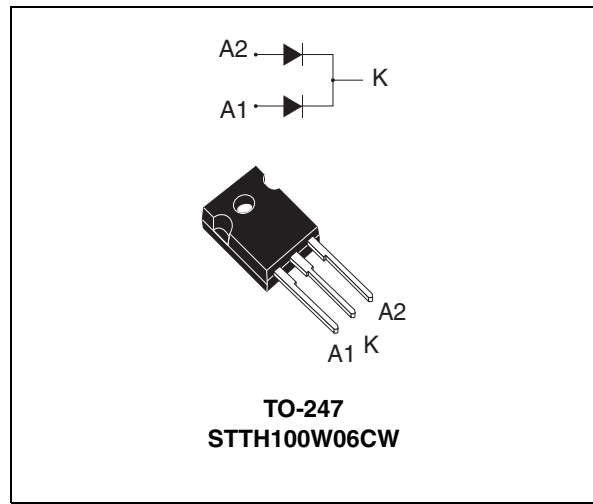


Table 1. Device summary

| Symbol | Value |
|-------------------|----------|
| $I_{F(AV)}$ | 2 x 50 A |
| V_{RRM} | 600 V |
| t_{rr} (typ) | 55 ns |
| $T_j(\text{max})$ | 175 °C |
| V_F (typ) | 0.92 V |

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 | 600 | V | |
| $I_{F(RMS)}$ | Forward rms current | 75 | A | |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ | $T_c = 135\text{ °C}$ Per diode | 50 | A |
| | | $T_c = 120\text{ °C}$ Per device | 100 | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 360 | 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 | Unit | |
|---------------|------------------|-----------|--------|--------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 0.55 | °C / W |
| | | Total | 0.35 | |
| $R_{th(c)}$ | Coupling | 0.15 | °C / W | |

When diodes 1 and 2 are used simultaneously:

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

Table 4. Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|----------------------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | | | 20 | μA |
| | | $T_j = 125\text{ °C}$ | | | 20 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 50\text{ A}$ | | 1.45 | V |
| | | $T_j = 150\text{ °C}$ | | | 0.92 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 100\text{ A}$ | | 1.65 | |
| | | $T_j = 150\text{ °C}$ | | | 1.15 | |

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:

$$P = 0.85 \times I_{F(AV)} + 0.006 I_{F(RMS)}^2$$

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Table 5. Dynamic electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|-----------------------------------|---|------|------|------|------|
| I_{RM} | Reverse recovery current | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 50\text{ A}, V_R = 400\text{ V}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ | | 30 | 40 | A |
| Q_{RR} | Reverse recovery charge | | | | 3700 | | nC |
| S_{factor} | Softness factor | | | | 0.3 | | |
| t_{rr} | Reverse recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 1\text{ A}, V_R = 30\text{ V}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ | | 55 | 75 | ns |
| t_{fr} | Forward recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 50\text{ A}, V_{FR} = 1.0\text{V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ | | | 200 | ns |
| V_{FP} | Forward recovery voltage | $T_j = 25\text{ }^\circ\text{C}$ | | | 1.3 | 2 | V |

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

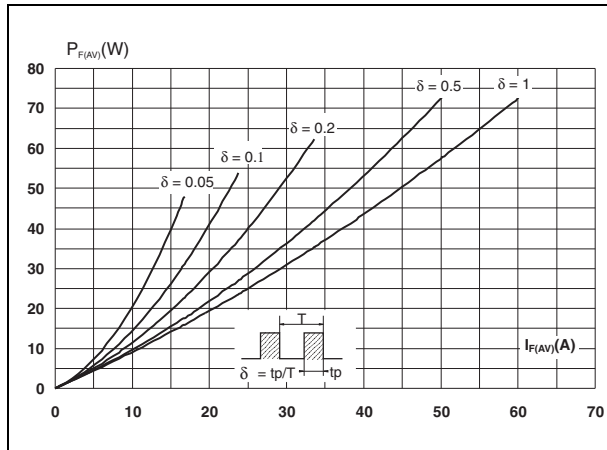


Figure 2. Forward voltage drop versus forward current (per diode)

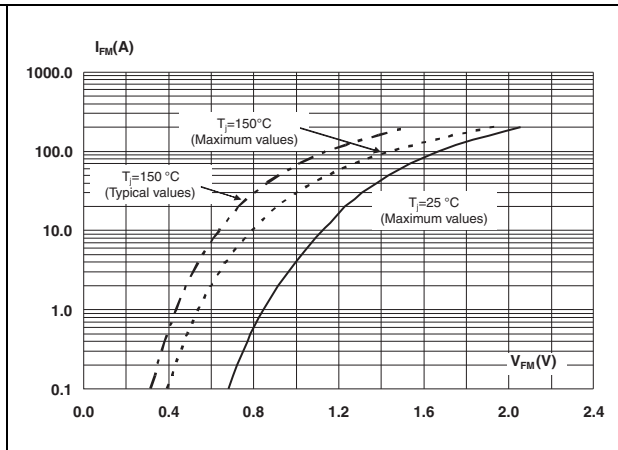


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

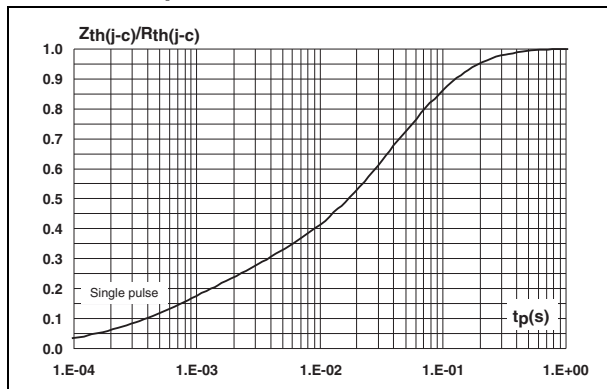
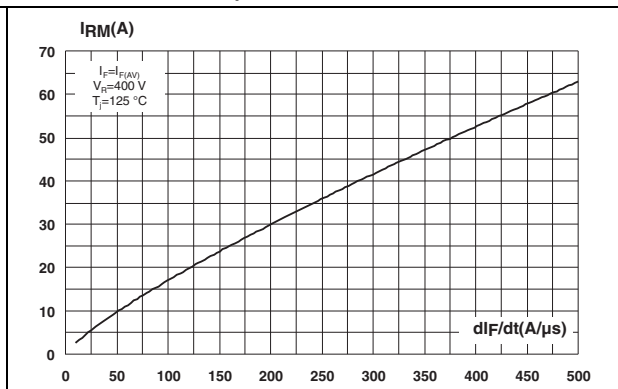


Figure 4. Peak reverse recovery current versus di_F/dt (typical values, per diode)



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

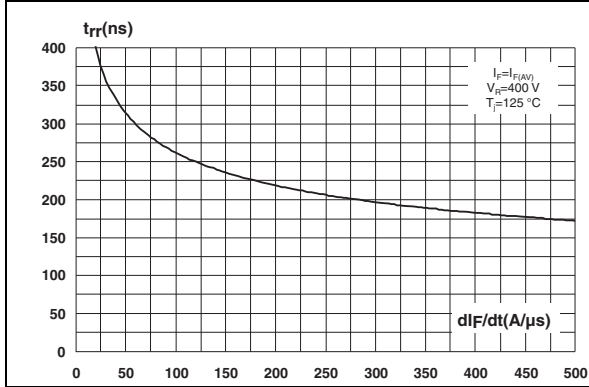


Figure 6. Reverse recovery charges versus di_F/dt (typical values, per diode)

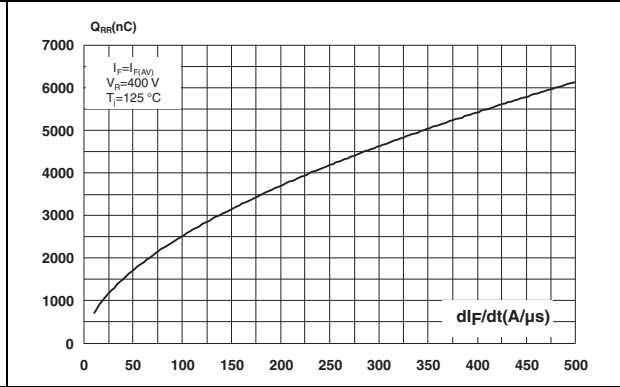


Figure 7. Reverse recovery softness factor versus di_F/dt (typical values, per diode)

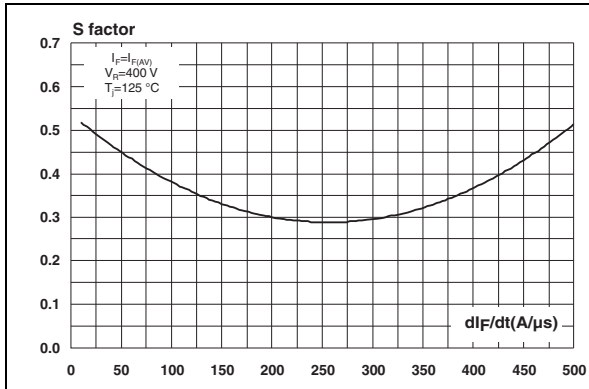


Figure 8. Relative variation of dynamic parameters versus junction temperature

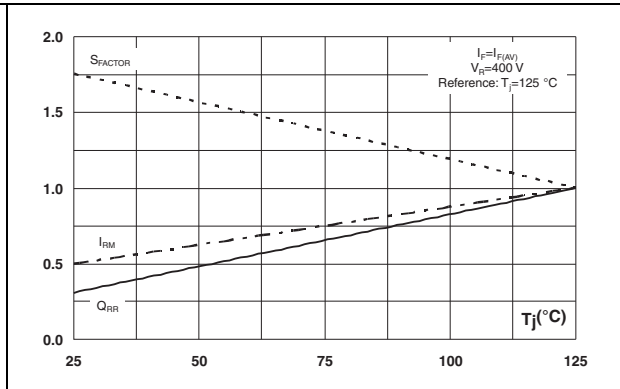


Figure 9. Transient peak forward voltage versus di_F/dt (typical values, per diode)

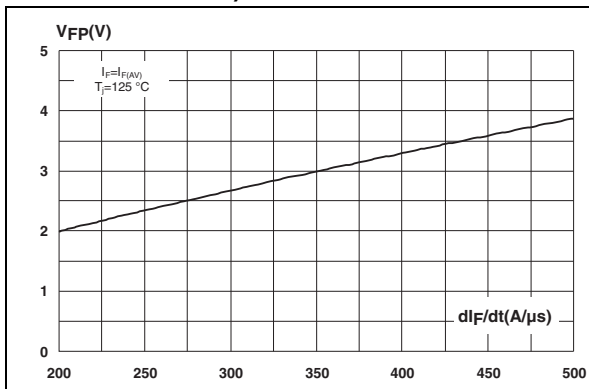
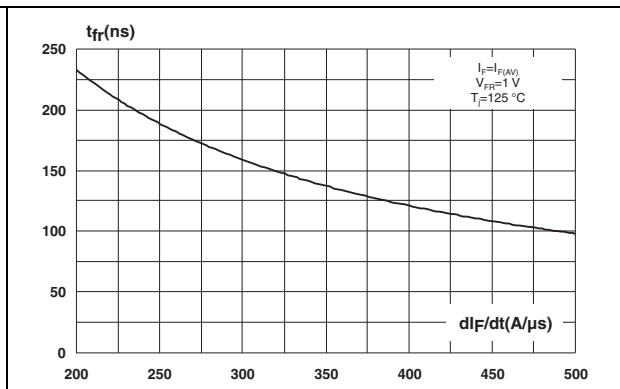


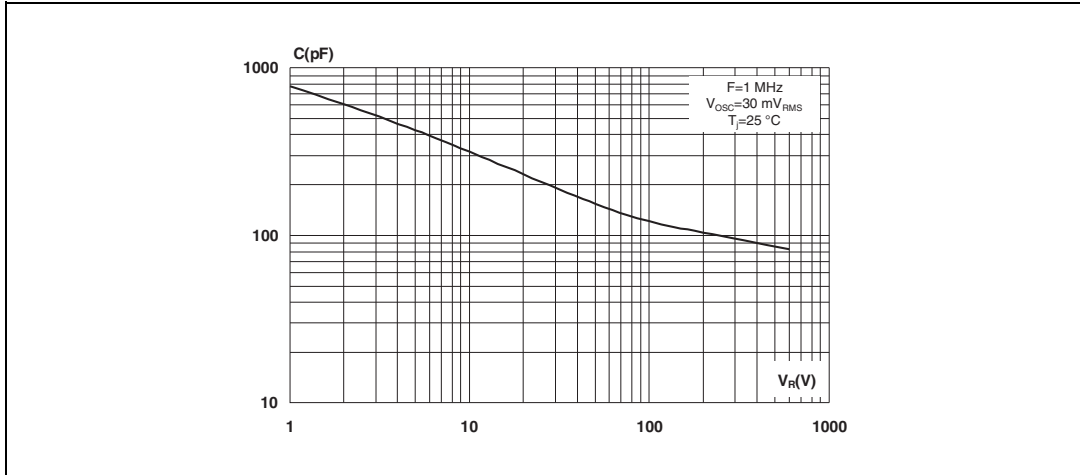
Figure 10. Forward recovery time versus di_F/dt (typical values, per diode)



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



Package information

STTH100W06C

2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (1.0 N·m maximum)

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. TO-247 dimensions

| Ref. | Dimensions | | | | | |
|-------------------|-------------|------|-------|------------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.85 | | 5.15 | 0.191 | | 0.203 |
| A1 | 2.20 | | 2.60 | 0.086 | | 0.102 |
| b | 1.00 | | 1.40 | 0.039 | | 0.055 |
| b1 | 2.00 | | 2.40 | 0.078 | | 0.094 |
| b2 | 3.00 | | 3.40 | 0.118 | | 0.133 |
| c | 0.40 | | 0.80 | 0.015 | | 0.031 |
| D ⁽¹⁾ | 19.85 | | 20.15 | 0.781 | | 0.793 |
| E | 15.45 | | 15.75 | 0.608 | | 0.620 |
| e | 5.30 | 5.45 | 5.60 | 0.209 | 0.215 | 0.220 |
| L | 14.20 | | 14.80 | 0.559 | | 0.582 |
| L1 | 3.70 | | 4.30 | 0.145 | | 0.169 |
| L2 | 18.50 typ. | | | 0.728 typ. | | |
| ∅P ⁽²⁾ | 3.55 | | 3.65 | 0.139 | | 0.143 |
| ∅R | 4.50 | | 5.50 | 0.177 | | 0.217 |
| S | 5.30 | 5.50 | 5.70 | 0.209 | 0.216 | 0.224 |

1. Dimension D plus gate protrusion does not exceed 20.5 mm
2. Resin thickness around the mounting hole is not less than 0.9 mm

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Ordering information

3 Ordering information

Table 7. Ordering information

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|--------------|---------|--------|----------|---------------|
| STTH100W06CW | STTH100W06CW | TO-247 | 4.46 g | 50 | Tube |

4 Revision history

Table 8. Document revision history

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

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