

High efficiency ultrafast diode

Main product characteristics

| | |
|----------------|----------|
| $I_{F(AV)}$ | 2 x 30 A |
| V_{RRM} | 200 V |
| T_j (max) | 175° C |
| V_F (typ) | 0.75 V |
| t_{rr} (typ) | 22 ns |

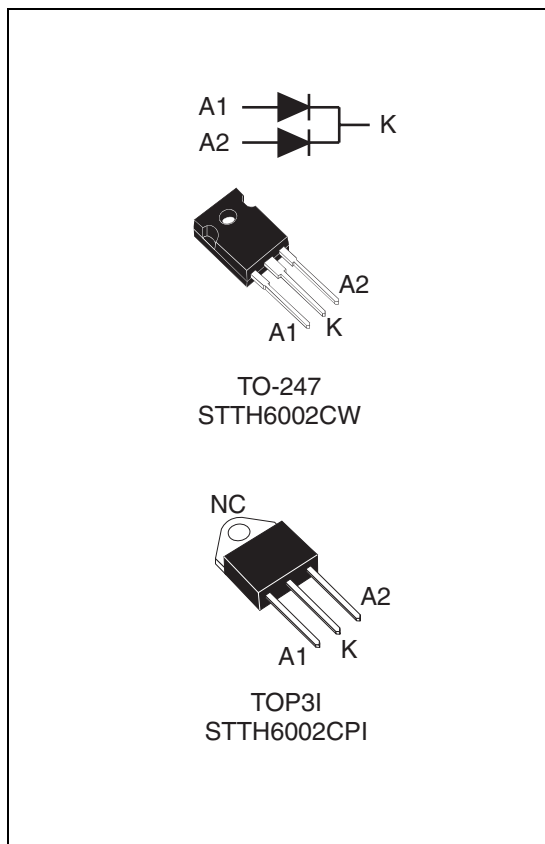
Features and benefits

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- High surge current capability
- High junction temperature

Description

Dual center tab rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in TO-247 and TOP31, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection



Order codes

| Part Number | Marking |
|-------------|-----------|
| STTH6002CW | STTH6002C |
| STTH6002CPI | STTH6002C |

1 Characteristics

Table 1. Absolute ratings (limiting values at $T_j = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | | Value | Unit | |
|--------------|---|---------------------------------|--------------------------------------|------------------|---|
| V_{RRM} | Repetitive peak reverse voltage | | 200 | V | |
| $I_{F(RMS)}$ | RMS forward current | | 50 | A | |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ | TO-247 | Per diode $T_c = 140^\circ\text{C}$ | 30 | A |
| | | | Per device $T_c = 125^\circ\text{C}$ | 60 | |
| | | TOP3I | Per diode $T_c = 120^\circ\text{C}$ | 30 | |
| | | | Per device $T_c = 105^\circ\text{C}$ | 60 | |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms Sinusoidal}$ | 330 | A | |
| T_{stg} | Storage temperature range | | -65 to +175 | $^\circ\text{C}$ | |
| T_j | Maximum operating junction temperature | | 175 | $^\circ\text{C}$ | |

Table 2. Thermal parameters

| Symbol | Parameter | | Value | Unit | |
|---------------|------------------|--------|-----------|------|--------------------|
| $R_{th(j-c)}$ | Junction to case | TO-247 | Per diode | 1.2 | $^\circ\text{C/W}$ |
| | | | Total | 0.8 | |
| | | TOP3I | Per diode | 1.8 | |
| | | | Total | 1.20 | |
| $R_{th(c)}$ | Coupling | TO-247 | 0.4 | | |
| | | TOP3I | 0.6 | | |

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 3. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Typ | Max. | Unit |
|-------------|-------------------------|---------------------------|---------------------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$ | $V_R = V_{RRM}$ | | 30 | μA |
| | | $T_j = 125^\circ\text{C}$ | | 30 | 300 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25^\circ\text{C}$ | $I_F = 30\text{ A}$ | | 1.05 | V |
| | | | $I_F = 60\text{ A}$ | | 1.18 | |
| | | $T_j = 150^\circ\text{C}$ | $I_F = 30\text{ A}$ | 0.75 | 0.84 | |
| | | | $I_F = 60\text{ A}$ | 0.9 | 0.99 | |

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:

$$P = 0.69 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$$

Table 4. Dynamic characteristics

| Symbol | Parameter | Test conditions | Typ | Max. | Unit |
|----------|--------------------------|---|-----|------|------|
| t_{rr} | Reverse recovery time | $I_F = 1\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25^\circ\text{C}$ | 22 | 27 | ns |
| I_{RM} | Reverse recovery current | $I_F = 30\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 160\text{ V}$, $T_j = 125^\circ\text{C}$ | 7.6 | 9.5 | A |
| t_{fr} | Forward recovery time | $I_F = 30\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$, $T_j = 25^\circ\text{C}$ | | 220 | ns |
| V_{FP} | Forward recovery voltage | $I_F = 30\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$, $T_j = 25^\circ\text{C}$ | 2.5 | | V |

Figure 1. Peak current versus duty cycle (per diode)

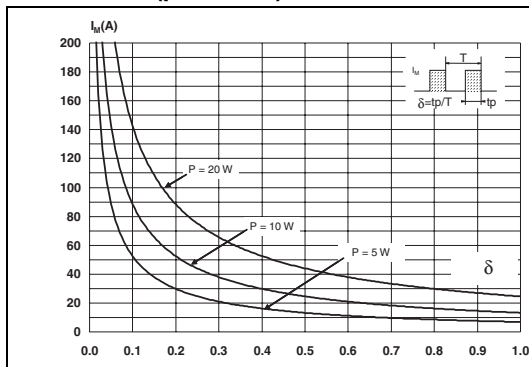


Figure 2. Forward voltage drop versus forward current (per diode)

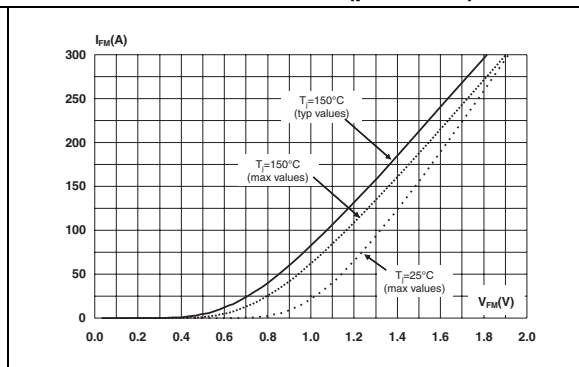


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

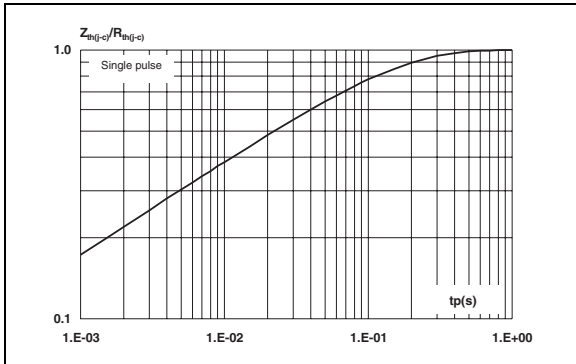


Figure 4. Junction capacitance versus reverse applied voltage (typical values)

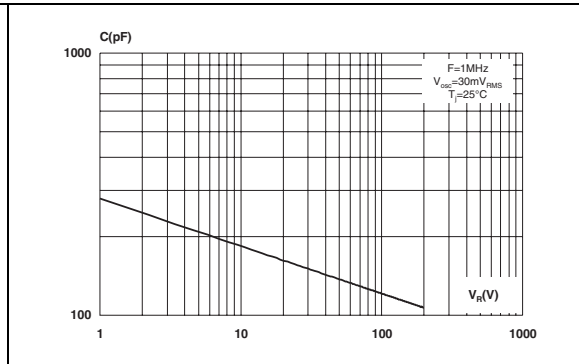


Figure 5. Reverse recovery charges versus di_F/dt (typical values)

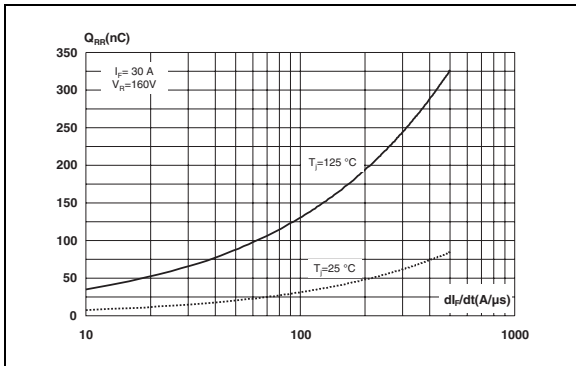


Figure 6. Reverse recovery time versus di_F/dt (typical values)

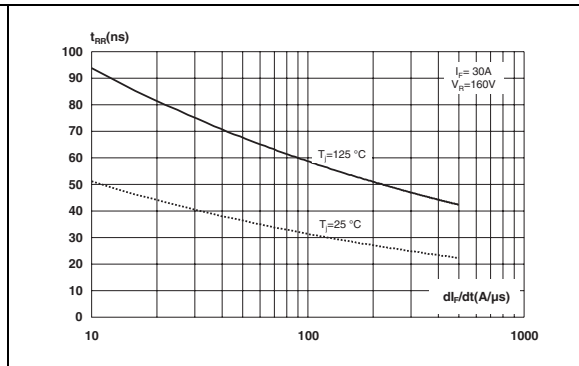


Figure 7. Peak reverse recovery current versus di_F/dt (typical values)

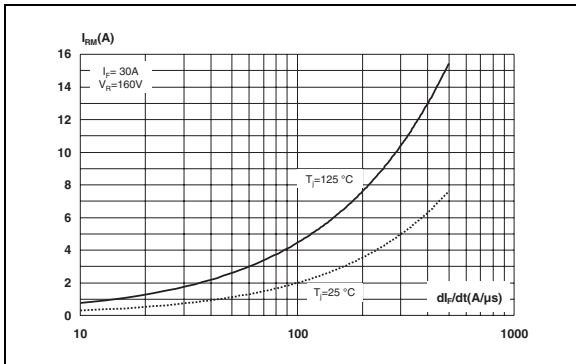
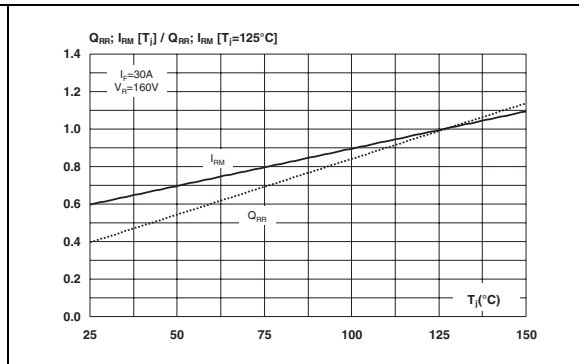
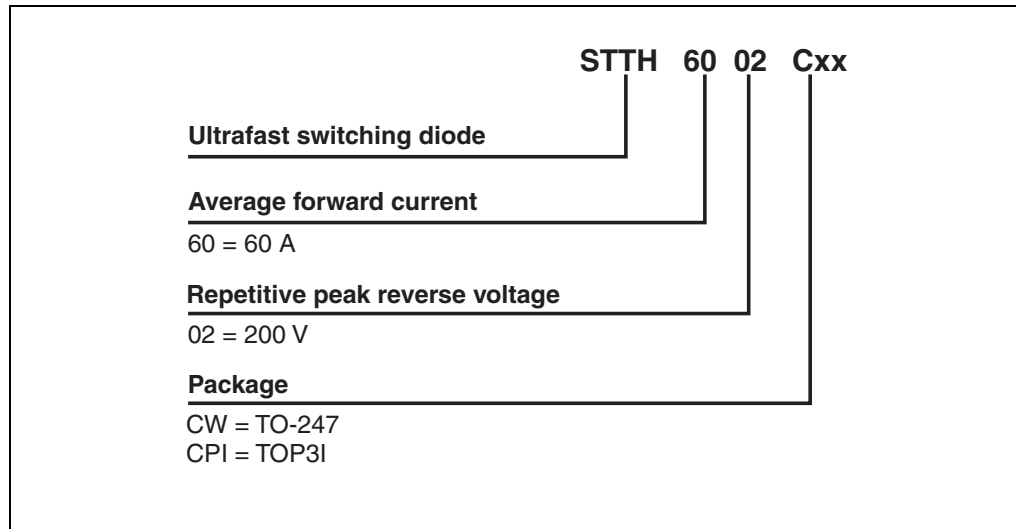


Figure 8. Dynamic parameters versus junction temperature



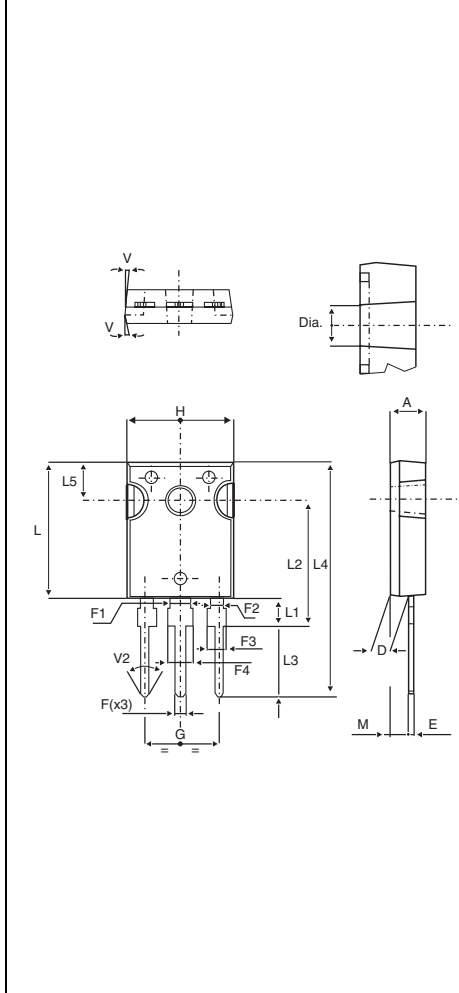
2 Ordering information scheme



3 Package information

Epoxy meets UL94, V0
 Cooling method: by conduction (C)
 Recommended torque value: 0.8 Nm
 Maximum torque value: 1.0 Nm

Table 5. TO-247 Dimensions



| REF. | DIMENSIONS | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ | Max. | Min. | Typ | Max. |
| A | 4.85 | | 5.15 | 0.191 | | 0.203 |
| D | 2.20 | | 2.60 | 0.086 | | 0.102 |
| E | 0.40 | | 0.80 | 0.015 | | 0.031 |
| F | 1.00 | | 1.40 | 0.039 | | 0.055 |
| F1 | | 3.00 | | | 0.118 | |
| F2 | | 2.00 | | | 0.078 | |
| F3 | 2.00 | | 2.40 | 0.078 | | 0.094 |
| F4 | 3.00 | | 3.40 | 0.118 | | 0.133 |
| G | | 10.90 | | | 0.429 | |
| H | 15.45 | | 15.75 | 0.608 | | 0.620 |
| L | 19.85 | | 20.15 | 0.781 | | 0.793 |
| L1 | 3.70 | | 4.30 | 0.145 | | 0.169 |
| L2 | | 18.50 | | | 0.728 | |
| L3 | 14.20 | | 14.80 | 0.559 | | 0.582 |
| L4 | | 34.60 | | | 1.362 | |
| L5 | | 5.50 | | | 0.216 | |
| M | 2.00 | | 3.00 | 0.078 | | 0.118 |
| V | | 5° | | | 5° | |
| V2 | | 60° | | | 60° | |
| Dia. | 3.55 | | 3.65 | 0.139 | | 0.143 |

Table 6. TOP3I dimensions

| REF | DIMENSIONS | | | |
|-----|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 1.45 | 1.55 | 0.057 | 0.061 |
| C | 14.35 | 15.60 | 0.565 | 0.614 |
| D | 0.5 | 0.7 | 0.020 | 0.028 |
| E | 2.7 | 2.9 | 0.106 | 0.114 |
| F | 15.8 | 16.5 | 0.622 | 0.650 |
| G | 20.4 | 21.1 | 0.815 | 0.831 |
| H | 15.1 | 15.5 | 0.594 | 0.610 |
| J | 5.4 | 5.65 | 0.213 | 0.222 |
| K | 3.4 | 3.65 | 0.134 | 0.144 |
| ØL | 4.08 | 4.17 | 0.161 | 0.164 |
| P | 1.20 | 1.40 | 0.047 | 0.055 |
| R | 4.60 Typ. | | 0.181 Typ. | |

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

4 Ordering information

| Part Number | Marking | Package | Weight | Base qty | Delivery mode |
|-------------|-----------|---------|--------|----------|---------------|
| STTH6002CW | STTH6002C | TO-247 | 4.46 g | 30 | Tube |
| STTH6002CPI | STTH6002C | TOP3I | 4.7 g | 30 | Tube |

5 Revision history

| Date | Revision | Description of Changes |
|-------------|----------|---|
| Feb-2004 | 1 | First issue |
| 05-Apr-2006 | 2 | Reformatted to current template. Package TOP3I added. |

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