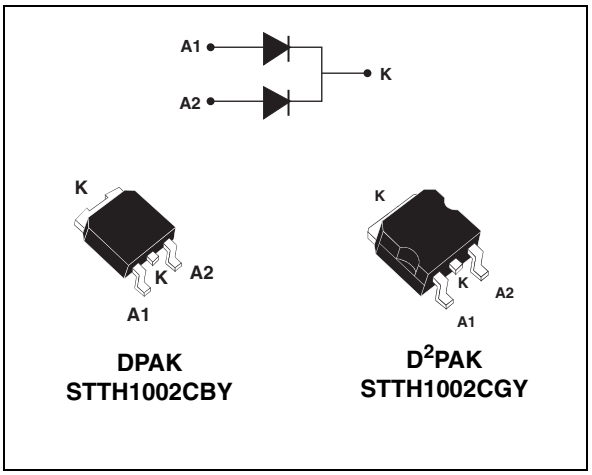
# STTH1002C-Y

## Automotive high efficiency ultrafast diode

### Features

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- High junction temperature
- Low leakage current
- AEC-Q101 qualified




DPAK
STTH1002CBY

D²PAK
STTH1002CGY

### Description

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

Packaged in DPAK and D²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection for automotive applications.

**Table 1. Device summary**

| Symbol | Value |
|---|---|
| $I_{F(AV)}$ | Up to 2 x 8 A |
| $V_{RRM}$ | 200 V |
| $T_j$ (max) | 175 °C |
| $V_F$(typ) | 0.78 V |
| $t_{rr}$ (typ) | 20 ns |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode)**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | | 200 | V |
| $I_{F(RMS)}$ | Forward rms current | | $D^2PAK$ | 20 | A |
| | | | DPAK | 10 | |
| $I_{F(AV)}$ | Avarage forward current $\delta = 0.5$ | $T_c$ = 155 °C | Per diode | 5 | A |
| | | $T_c$ = 150 °C | Per device | 10 | |
| | | $T_c$ = 135 °C | Per diode | 8 | |
| | | $T_c$ = 125 °C | Per device | 16 | |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | | 50 | A |
| $T_{stg}$ | Storage temperature range | | | -65 to + 175 | °C |
| $T_j$ | Operating junction temperature range | | | -40 to + 175 | °C |

**Table 3. Thermal parameters**

| Symbol | Parameter | | Value (max) | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | Per diode | 4.0 | °C/W |
| | | Per device | 2.5 | |
| $R_{th(j-c)}$ | Coupling | | 1.0 | |

When the diodes 1 and 2 are used simultaneously:
$\Delta T_j$ (diode1) = P(diode1) x $R_{th(j-c)}$ (per diode) + P(diode2) x $R_{th(c)}$

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

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | | | 5 | µA |
| | | $T_j$ = 125 °C | | | 3 | 40 | |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 5 A | | | 1.1 | V |
| | | $T_j$ = 25 °C | $I_F$ = 10 A | | | 1.25 | |
| | | $T_j$ = 150 °C | $I_F$ = 5 A | | 0.78 | 0.89 | |
| | | $T_j$ = 150 °C | $I_F$ = 10 A | | | 1.05 | |

1. Pulse test: $t_p$ = 5 ms, $\delta$ < 2 %
2. Pulse test: $t_p$ = 380 µs, $\delta$ < 2 %

To evaluate the conduction losses use the following equation:
$P = 0.73 \times I_{F(AV)} + 0.032\ I_F{}^2{}_{(RMS)}$

**Table 5. Dynamic electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $T_j$ = 25 °C | $I_F$ = 1 A $V_R$ = 30 V<br>$dI_F/dt$ = 100 A/µs | | 20 | 25 | ns |
| $I_{RM}$ | Reverse recovery current | $T_j$ = 125 °C | $I_F$ = 5 A $V_R$ = 160 V<br>$dI_F/dt$ = 200 A/µs | | 5.9 | 7.6 | A |
| $t_{fr}$ | Forward recovery time | $T_j$ = 25 °C | $I_F$ = 5 A $dI_F/dt$ = 100 A/µs<br>$V_{FR}$ = 1.1 x $V_{Fmax}$ | | | 110 | ns |
| $V_{FP}$ | Forward recovery voltage | $T_j$ = 25 °C | $I_F$ = 5 A $dI_F/dt$ = 100 A/µs | | 2.4 | | V |

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

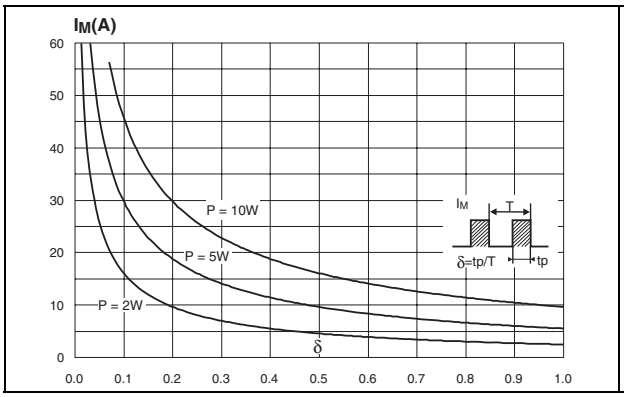



**Figure 2. Forward voltage drop versus forward current (typical values, per diode)**

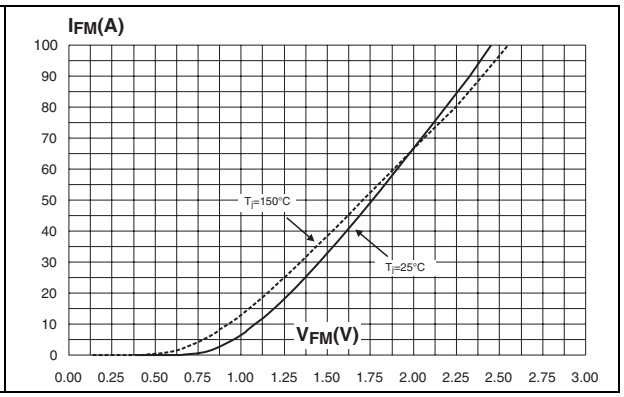



**Figure 3. Forward voltage drop versus forward current (maximum values, per diode)**

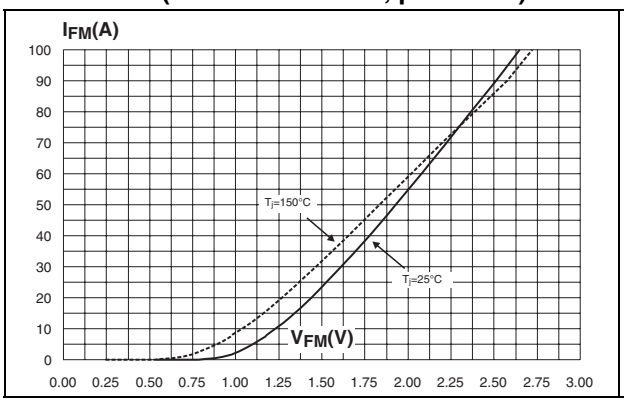



**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**

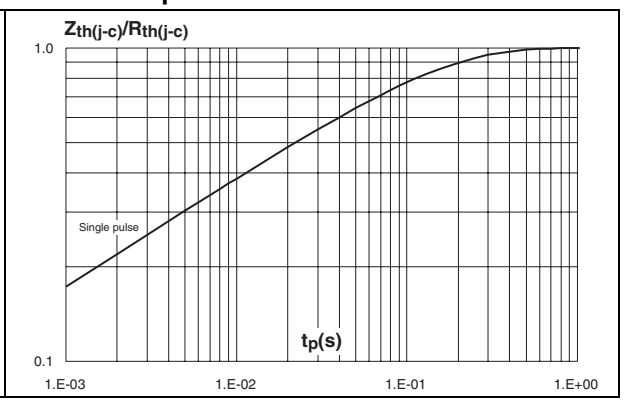



**Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)**

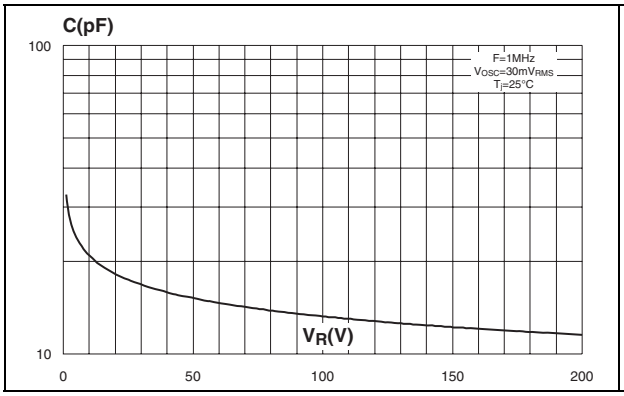



**Figure 6. Reverse recovery charges versus $dI_F/dt$ (typical values, per diode)**

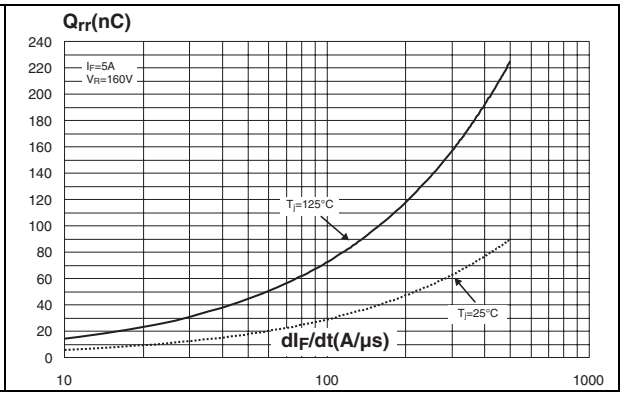


**Figure 7. Reverse recovery time versus $dI_F/dt$ (typical values, per diode)**

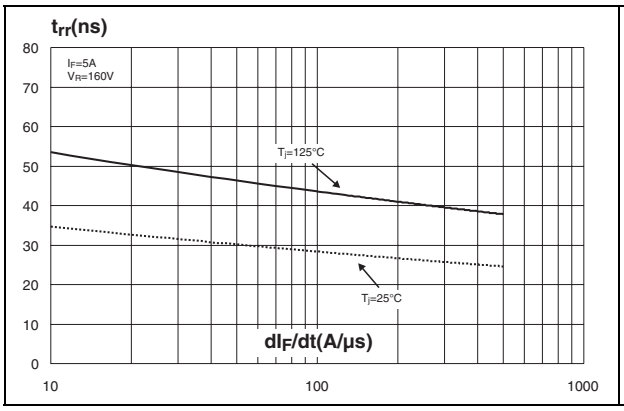



**Figure 8. Peak reverse recovery current versus $dI_F/dt$ (typical values, per diode)**

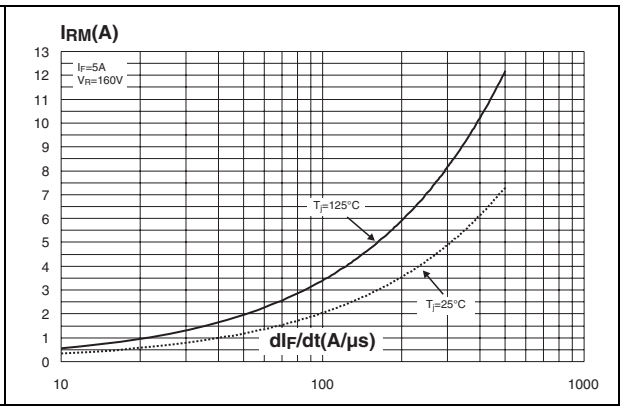



**Figure 9. Dynamic parameters versus junction temperature**

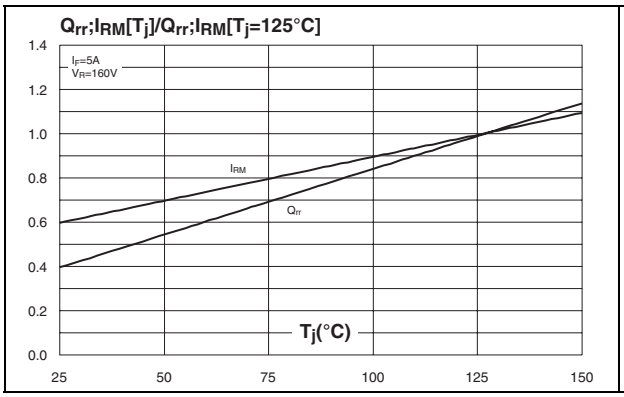



**Figure 10. Thermal resistance junction to ambient versus copper surface under tab for $D^2PAK$**

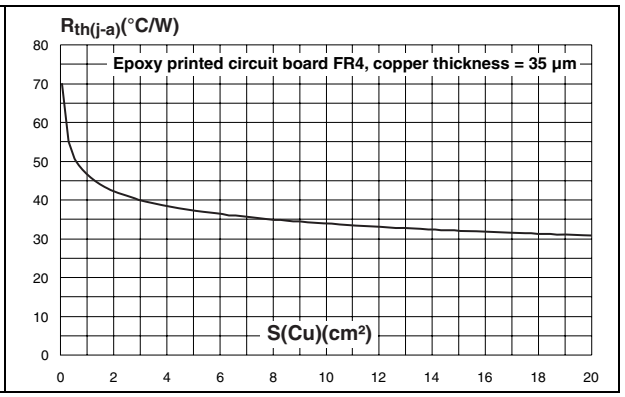
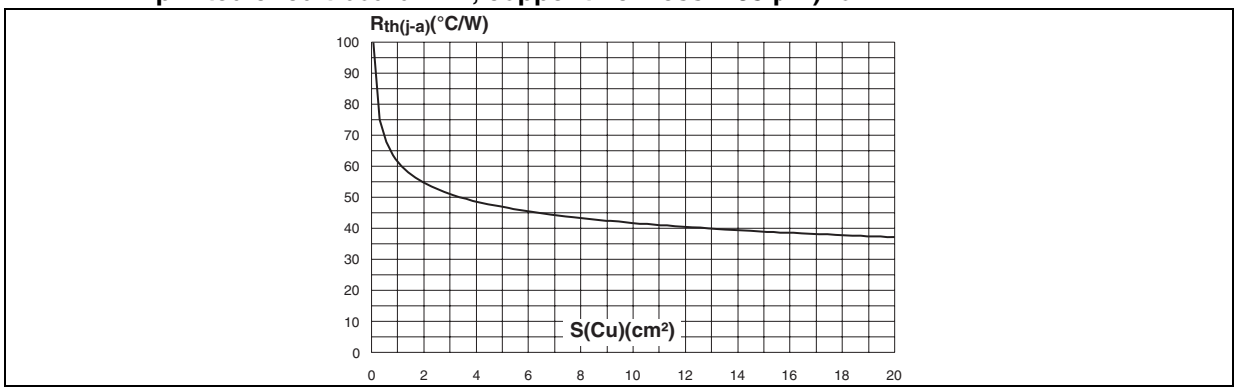



**Figure 11. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness = 35 µm) for DPAK**

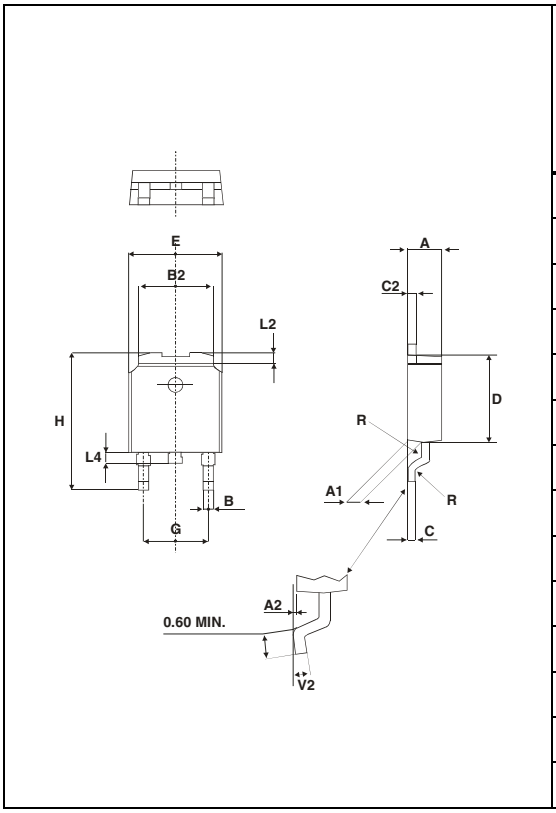


# 2 Package mechanical data

- Epoxy meets UL94, V0
- Cooling method: by conduction (method 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. DPAK dimensions**




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 2.20 | 2.40 | 0.086 | 0.094 |
| A1 | 0.90 | 1.10 | 0.035 | 0.043 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.64 | 0.90 | 0.025 | 0.035 |
| B2 | 5.20 | 5.40 | 0.204 | 0.212 |
| C | 0.45 | 0.60 | 0.017 | 0.023 |
| C2 | 0.48 | 0.60 | 0.018 | 0.023 |
| D | 6.00 | 6.20 | 0.236 | 0.244 |
| E | 6.40 | 6.60 | 0.251 | 0.259 |
| G | 4.40 | 4.60 | 0.173 | 0.181 |
| H | 9.35 | 10.10 | 0.368 | 0.397 |
| L2 | 0.80 typ. | | 0.031 typ. | |
| L4 | 0.60 | 1.00 | 0.023 | 0.039 |
| V2 | 0° | 8° | 0° | 8° |

**Figure 12. Footprint (dimensions in mm)**

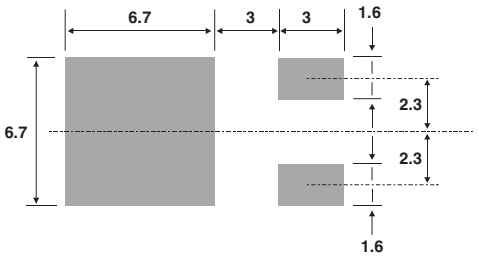
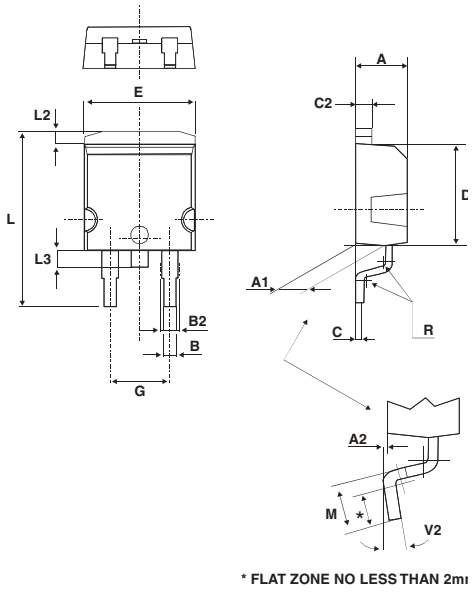
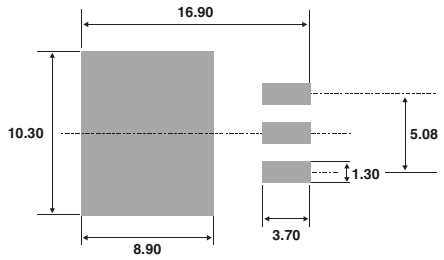


Table 7. D²PAK dimensions




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.49 | 2.69 | 0.098 | 0.106 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.70 | 0.93 | 0.027 | 0.037 |
| B2 | 1.14 | 1.70 | 0.045 | 0.067 |
| C | 0.45 | 0.60 | 0.017 | 0.024 |
| C2 | 1.23 | 1.36 | 0.048 | 0.054 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| E | 10.00 | 10.40 | 0.393 | 0.409 |
| G | 4.88 | 5.28 | 0.192 | 0.208 |
| L | 15.00 | 15.85 | 0.590 | 0.624 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |
| L3 | 1.40 | 1.75 | 0.055 | 0.069 |
| M | 2.40 | 3.20 | 0.094 | 0.126 |
| R | 0.40 typ. | | 0.016 typ. | |
| V2 | 0° | 8° | 0° | 8° |

Figure 13. Footprint (dimensions in mm)



# 3 Ordering information

**Table 8. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STTH1002CBY-TR | STTH1002CY | DPAK | 0.3 g | 2500 | Tape and reel |
| STTH1002CGY-TR | STTH1002CGY | $D^2PAK$ | 1.48 g | 1000 | |

# 4 Revision history

**Table 9. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 21-Oct-2010 | 1 | First issue. |
| 03-Nov-2011 | 2 | Updated *Table 7* and *Table 8.* |

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