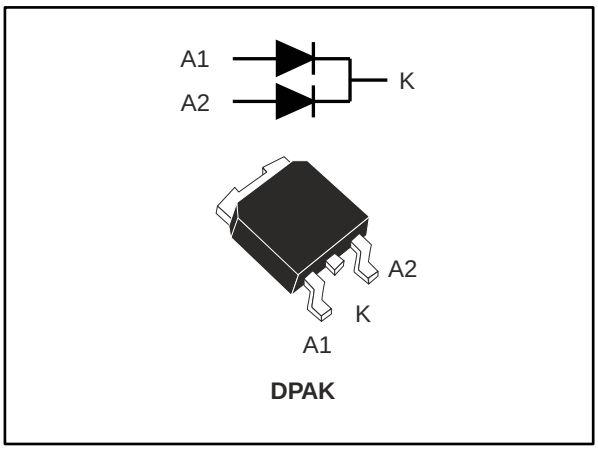
# STTH602C-Y

## Automotive ultrafast recovery diode

Datasheet - production data




## Features

- AEC-Q101 qualified
- Suited for SMPS
- Low losses
- Low forward and reverse recovery time
- High surge current capability
- High junction temperature
- PPAP capable

## Description

This dual center tap diode is suited for switch mode power supplies and high frequency DC to DC converters.

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

**Table 1: Device summary**

| Symbol | Value |
|---|---|
| $I_{F(AV)}$ | 2 x 3 A |
| $V_{RRM}$ | 200 V |
| $V_F$(typ.) | 0.80 V |
| $T_j$(max.) | 175 °C |
| $T_{rr}$(typ.) | 14 ns |

# 1 Characteristics

**Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 200 | V |
| $I_{F(RMS)}$ | Forward rms current | | 11 | A |
| $I_{F(AV)}$ | Average forward current δ = 0.5, square wave | $T_c$ = 160 °C | 3 | A |
| | | $T_c$ = 155 °C | 6 | |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | 60 | 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 | | Max. value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | Per diode | 5 | °C/W |
| | | Per device | 3 | |
| $R_{th(c)}$ | Coupling | | 1 | |

When the two diodes 1 and 2 are used simultaneously:

$\Delta T_j$(diode 1) = P (diode 1) x $R_{th(j-c)}$ (Per diode) + P (diode 2) x $R_{th(c)}$

**Table 4: Static electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$ (1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | | 3 | µA |
| | | $T_j$ = 125 °C | | - | 3 | 30 | |
| $V_F$ (2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 3 A | - | 0.98 | 1.1 | V |
| | | $T_j$ = 150 °C | | - | 0.8 | 0.95 | |
| | | $T_j$ = 25 °C | $I_F$ = 6 A | - | 1.1 | 1.25 | |
| | | $T_j$ = 150 °C | | - | 0.9 | 1.05 | |

**Notes:**

(1)Pulse test: $t_p$ = 5 ms, δ < 2%

(2)Pulse test: $t_p$ = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 0.85 \times I_{F(AV)} + 0.033 \times I_{F^2(RMS)}$

**Table 5: Dynamic characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $I_F$ = 1 A, $dI_F/dt$ = -100 A/µs, $V_R$ = 30 V, $T_j$ = 25 °C | - | 14 | 20 | ns |
| | | $I_F$ = 1 A, $dI_F/dt$ = -50 A/µs, $V_R$ = 30 V, $T_j$ = 25 °C | - | 21 | 30 | |
| $I_{RM}$ | Reverse recovery current | $I_F$ = 3 A, $dI_F/dt$ = 200 A/µs, $V_R$ = 160 V, $T_j$ = 125 °C | - | 4 | 5.5 | A |
| $t_{fr}$ | Forward recovery time | $I_F$ = 3 A, $dI_F/dt$ = 200 A/µs $V_{FR}$ = 1.1 x $V_{Fmax}$, $T_j$ = 25 °C | - | 24 | | ns |
| $V_{FP}$ | Forward recovery voltage | $I_F$ = 3 A, $dI_F/dt$ = 200 A/µs, $T_j$ = 25 °C | - | 3.7 | | V |

## 1.1 Characteristics (curves)

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

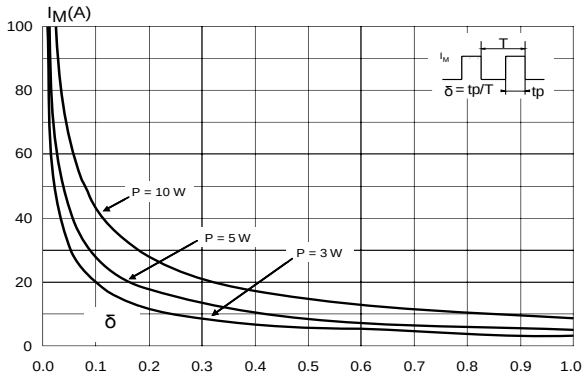



**Figure 2: Forward voltage drop versus forward current (typical values, per diode)**

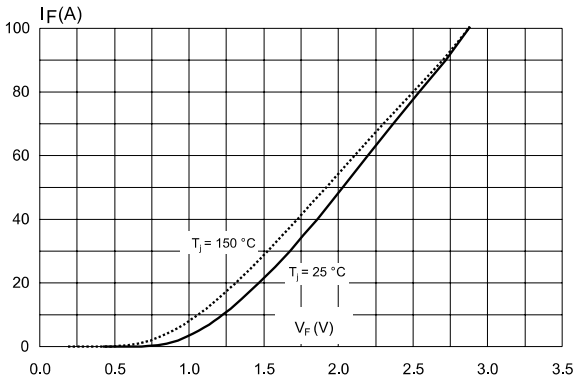



**Figure 3: Forward voltage drop versus forward current (maximum values, per diode)**

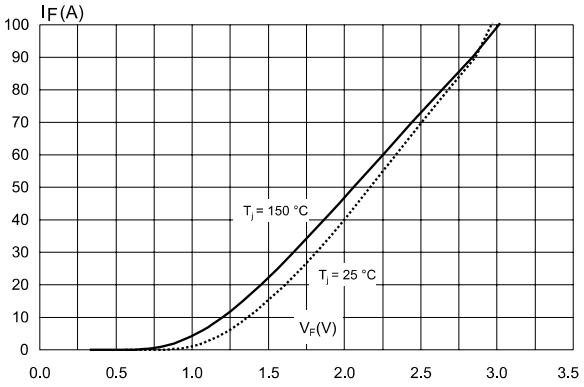



**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (per diode)**

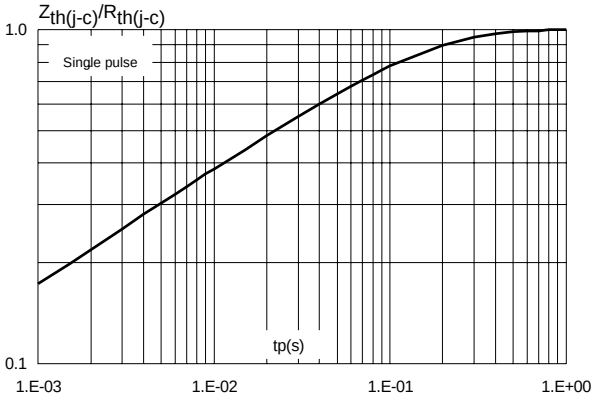



**Figure 5: Junction capacitance versus reverse applied voltage (typical values, per diode)**

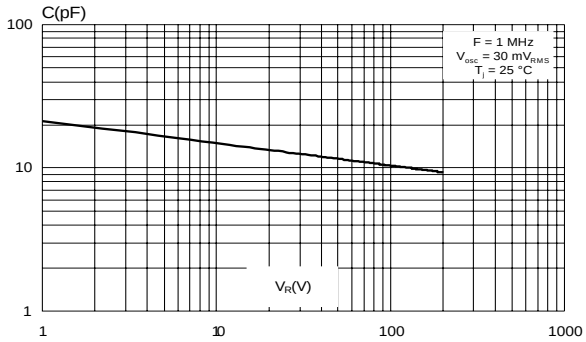



**Figure 6: Reverse recovery charges versus $dI_F/dt$ (typical values, per diode)**

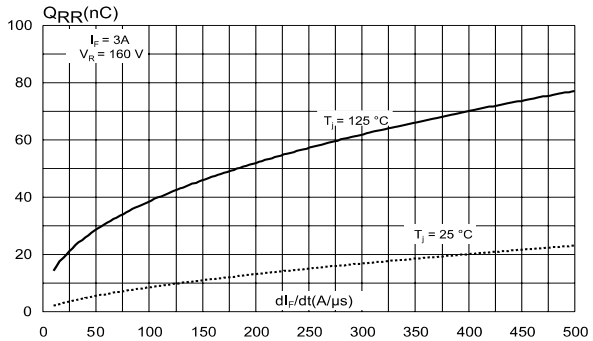


**Figure 7: Reverse recovery time versus $dI_F/dt$ (typical values, per diode)**

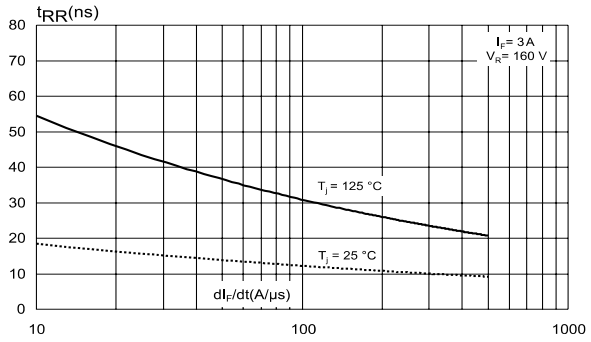



**Figure 8: Reverse recovery current versus $dI_F/dt$ (typical values, per diode)**

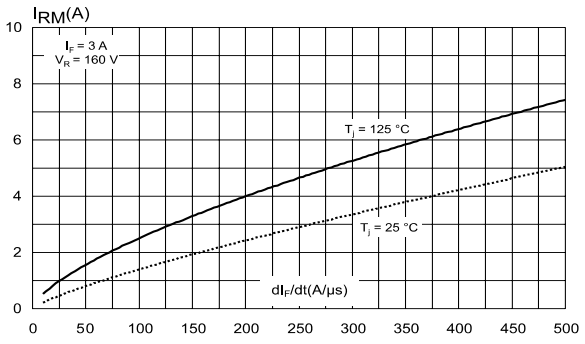



**Figure 9: Dynamic parameters versus junction temperature**

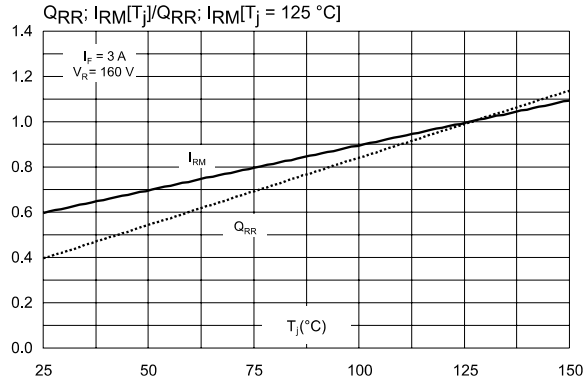
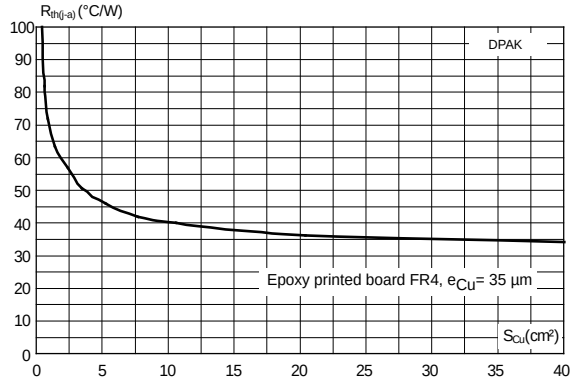



**Figure 10: Thermal resistance junction to ambient versus copper surface under tab for DPAK package (typical values)**



# 2 Package information

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.

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

## 2.1 DPAK package information

**Figure 11: DPAK package outline**

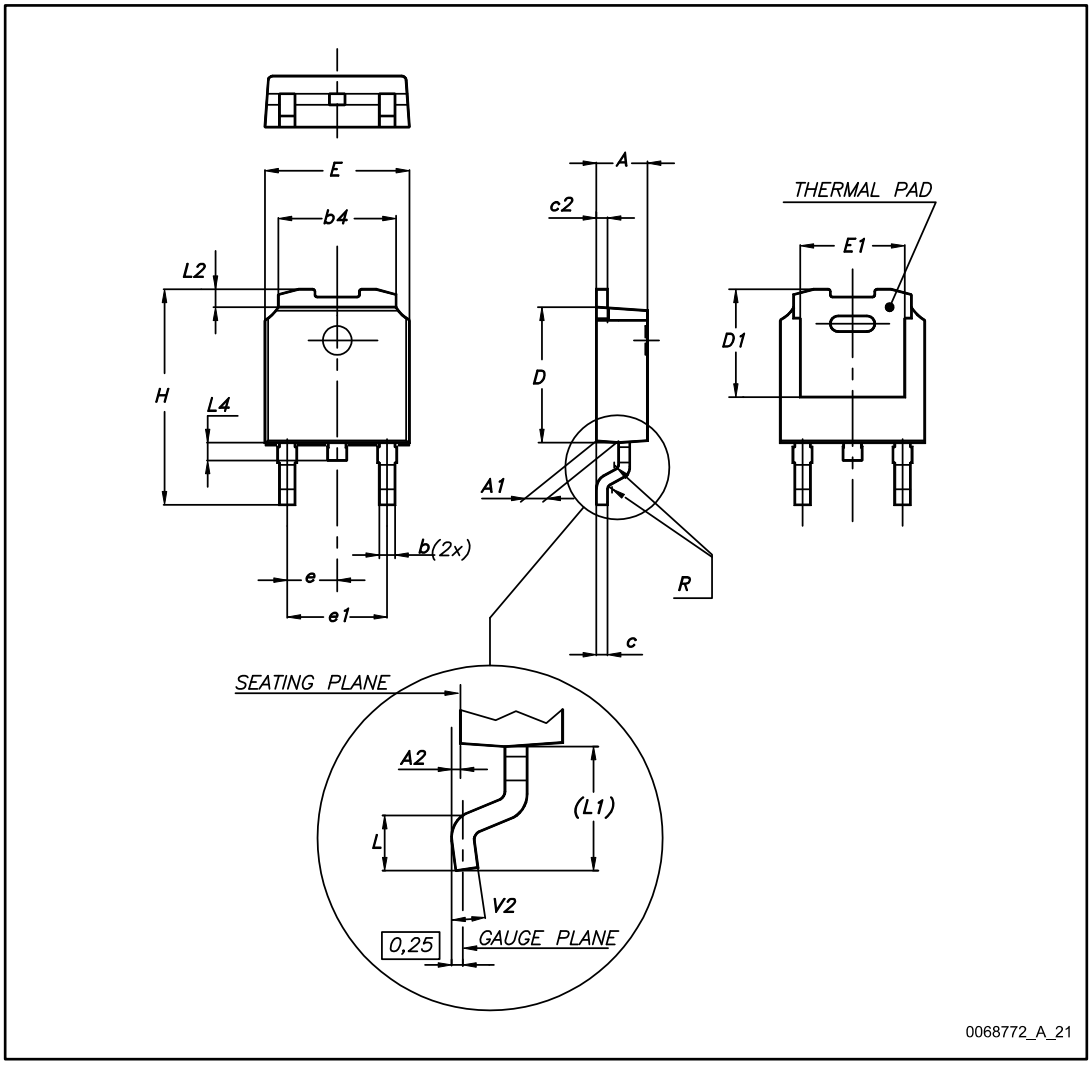
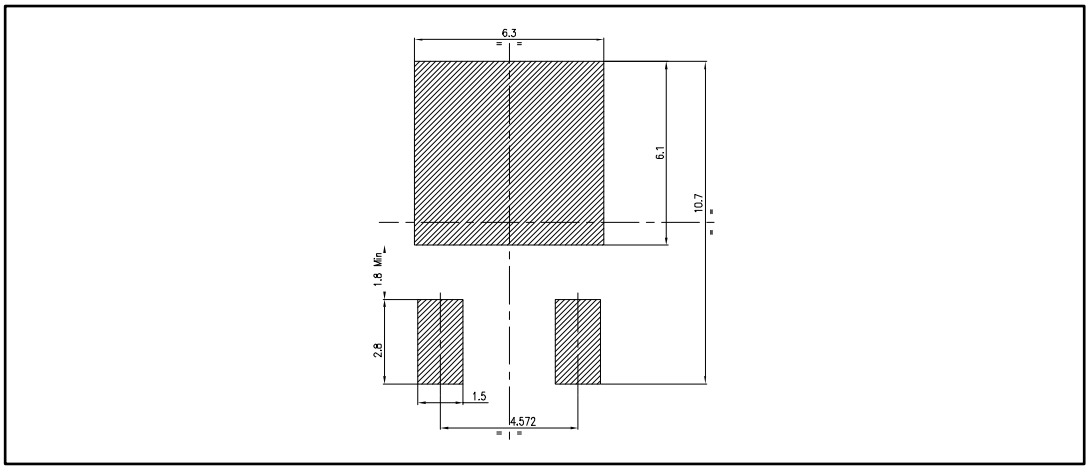


**Table 6: DPAK mechanical data**

| Dim. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.20 | | 2.40 | 0.087 | | 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 |
| b4 | 5.20 | | 5.40 | 0.205 | | 0.213 |
| c | 0.45 | | 0.60 | 0.018 | | 0.024 |
| c2 | 0.48 | | 0.60 | 0.019 | | 0.024 |
| D | 6.00 | | 6.20 | 0.236 | | 0.244 |
| D1 | 4.95 | 5.10 | 5.25 | 0.195 | 0.201 | 0.207 |
| E | 6.40 | | 6.60 | 0.252 | | 0.260 |
| E1 | 5.10 | 5.20 | 5.30 | 0.201 | 0.205 | 0.209 |
| e | 2.16 | 2.28 | 2.40 | 0.085 | 0.090 | 0.094 |
| e1 | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | 9.35 | | 10.10 | 0.368 | | 0.398 |
| L | 1.00 | | 1.50 | 0.039 | | 0.059 |
| (L1) | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |
| L2 | 0.65 | 0.80 | 0.95 | 0.026 | 0.031 | 0.037 |
| L4 | 0.60 | | 1.00 | 0.024 | | 0.039 |
| R | | 0.20 | | | 0.008 | |
| V2 | 0° | | 8° | 0° | | 8° |

**Figure 12: DPAK recommended footprint (dimensions are in mm)**



# 3 Ordering information

**Table 7: Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| STTH602CBY-TR | STTH6 02CBY | DPAK | 0.30 g | 2500 | Tape and reel |

# 4 Revision history

**Table 8: Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 24-Oct-2012 | 1 | First issue. |
| 16-Mar-2017 | 2 | Updated *Table 3: "Thermal parameters"*.<br>Minor text changes. |

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