# STTH2003C-Y

## Automotive high efficiency ultrafast diode

**Datasheet – production data**

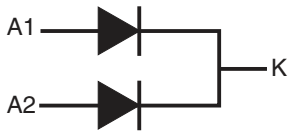
## Features

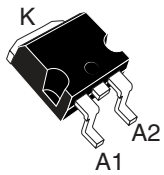
- High junction temperature
- Combines highest recovery and reverse voltage performance
- Ultrafast, soft and noise-free recovery
- AEC-Q101 qualified

## Description

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

Packaged in $D^2PAK$, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection for automotive applications.




**$D^2PAK$**
**STTH2003CGY-TR**

**Table 1. Device summary**

| | |
|---|---|
| $I_F(AV)$ | 2 x 10 A |
| $V_{RRM}$ | 300 V |
| $T_j$ (max) | 175 °C |
| $V_F$(max) | 1 V |
| $t_{rr}$ (max) | 40 ns |

# 1 Characteristics

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

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | | 300 | V |
| $I_{F(RMS)}$ | Forward current rms | | | 48 | A |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$ | $T_c = 140$ °C | Per diode<br>Per device | 10<br>20 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p = 10$ ms sinusoidal ($T_j = 25$ °C) | | 110 | A |
| $T_{stg}$ | Storage temperature range | | | -65 to + 175 | °C |
| $T_j$ | Operating junction temperature range | | | -40 to + 175 | °C |

**Table 3. Thermal resistance**

| Symbol | Parameter | | Value (Max.) | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | Per diode | 2.5 | °C/W |
| | | Total | 1.3 | |

**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 | $V_R = 300$ V | | | 20 | µA |
| | | $T_j = 125$ °C | | | 30 | 300 | |
| $V_F$(2) | Forward voltage drop | $T_j = 25$ °C | $I_F = 10$ A | | | 1.25 | V |
| | | $T_j = 125$ °C | | | 0.85 | 1 | |

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:

$P = 0.75 \times I_{F(AV)} + 0.025\ I_F{}^2{}_{(RMS))}$

**Table 5. Recovery characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $T_j$ = 25 °C | $I_F$ = 0.5 A, $I_{rr}$ = 0.25 A<br>$I_R$ = 1 A | | | 25 | ns |
| | | | $I_F$ = 1 A, $V_R$ = 30 V<br>$dI_F/dt$ = -50 A/µs | | | 40 | |
| $t_{fr}$ | Forward recovery time | $T_j$ = 25 °C | $I_F$ = 10 A<br>$dI_F/dt$ = 100 A/µs<br>$V_{FR}$ = 1.1 x $V_{Fmax}$ | | | 230 | ns |
| $V_{FP}$ | Peak forward voltage | $T_j$ = 25 °C | $I_F$ = 10 A,<br>$dI_F/dt$ = 100 A/µs | | | 3.5 | V |
| $I_{RM}$ | Reverse recovery current | $T_j$ = 125 °C | $I_F$ = 10 A, $V_{CC}$ = 200 V<br>$dI_F/dt$ = 200 A/µs | | | 8 | A |
| S factor | Softness factor | | | | 0.3 | | - |

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

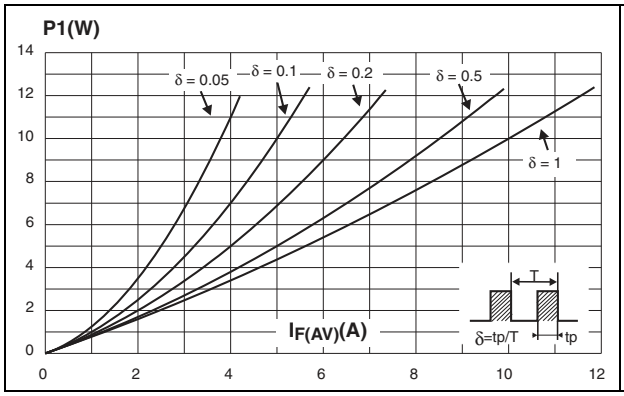



**Figure 2. Forward voltage drop versus forward current (maximum values, per diode)**

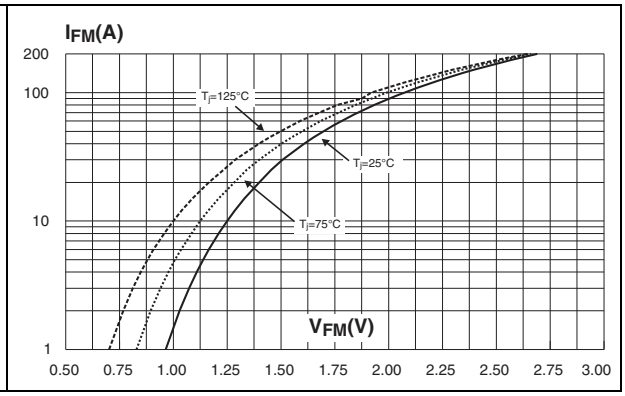



**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**

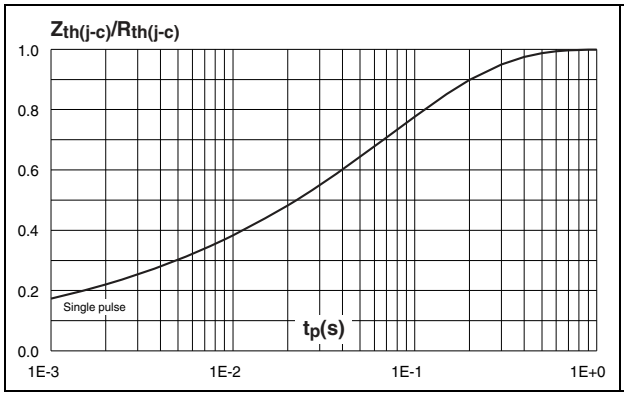



**Figure 4. Peak reverse recovery current versus $dI_F/dt$ (90% confidence, per diode)**

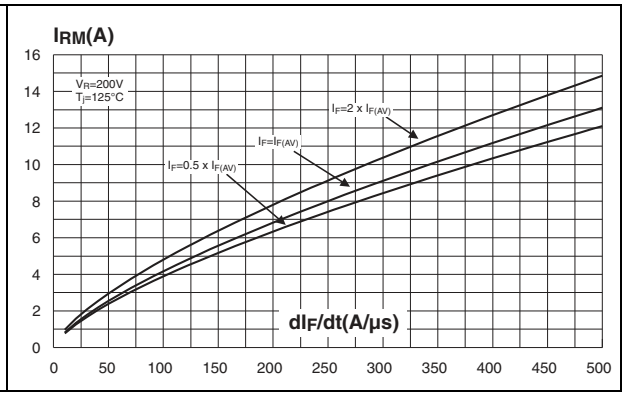


**Figure 5. Reverse recovery time versus $dI_F/dt$ (90% confidence, per diode)**

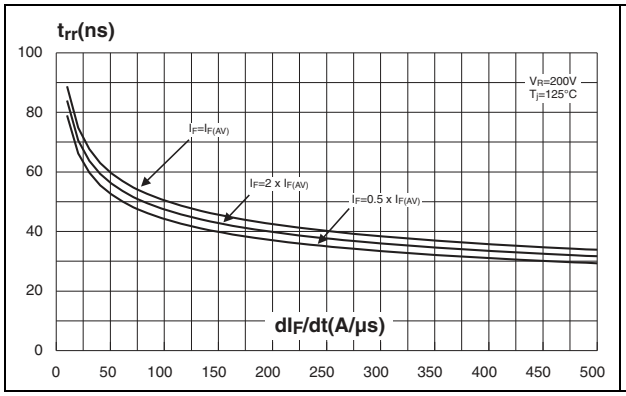



**Figure 6. Softness factor (tb/ta) versus $dI_F/dt$ (typical values, per diode)**

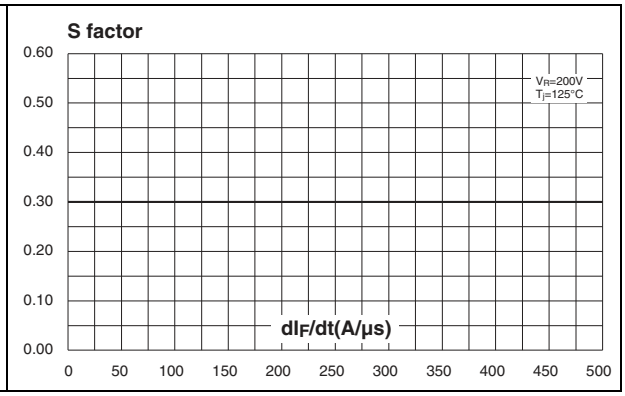



**Figure 7. Relative variation of dynamic parameters versus junction temperature (reference: $T_j$ = 125 °C)**

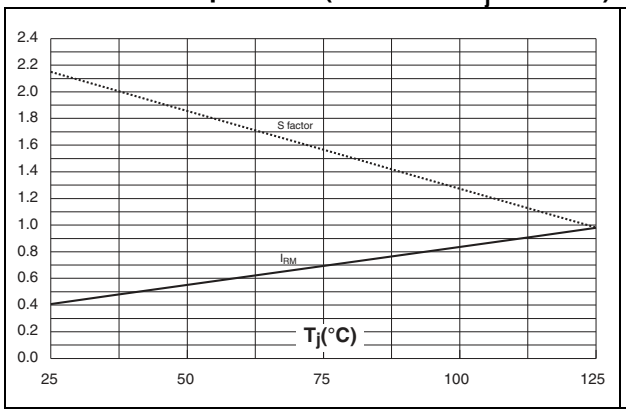



**Figure 8. Forward recovery time versus $dI_F/dt$ (90% confidence, per diode)**

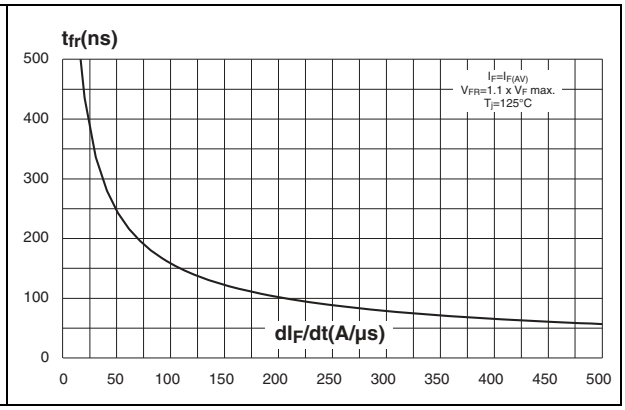



**Figure 9. Thermal resistance, junction to ambient, versus copper surface under tab**

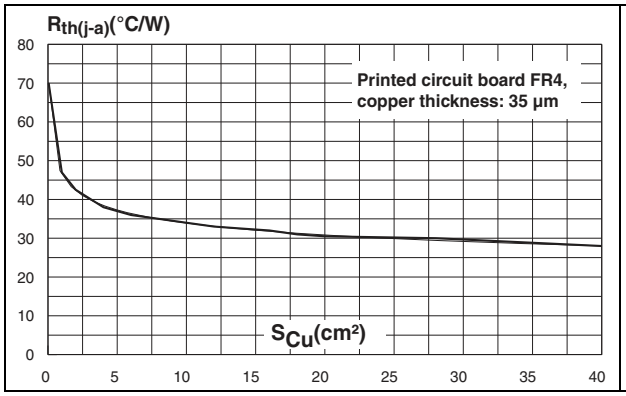
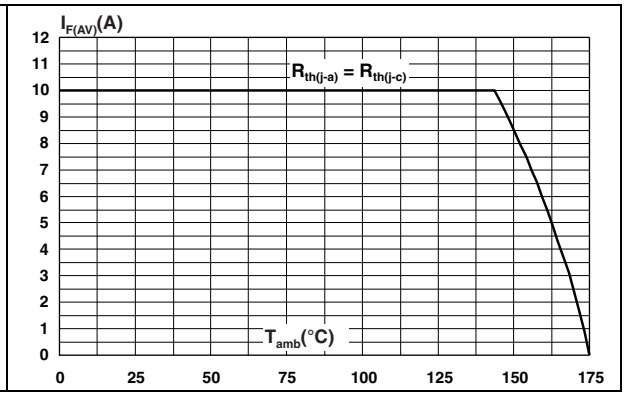



**Figure 10. Average forward current versus ambient temperature ($\delta$ = 0.5, per diode)**

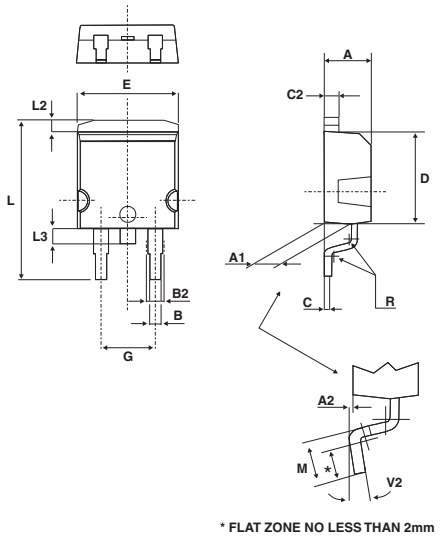


# 2 Package information

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

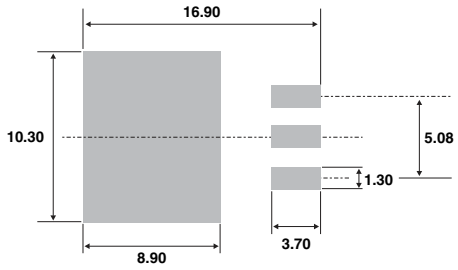
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com.* ECOPACK® is an ST trademark.

**Table 6. 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 11. Footprint (dimensions in mm)**



# 3 Ordering information

**Table 7. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STTH2003CGY-TR | STTH2003CGY | $D^2PAK$ | 1.48 g | 1000 | Tape and reel |

# 4 Revision history

**Table 8. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 24-Oct-2012 | 1 | Initial release. |

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