# STTH2R02-Y

## Automotive ultrafast recovery diode

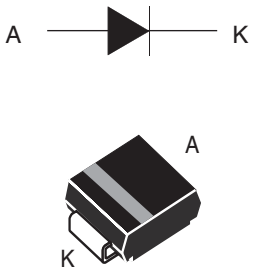
### Features

- very low conduction losses
- negligible switching losses
- low forward and reverse recovery times
- high junction temperature
- AEC-Q101 qualified

### Description

The STTH2R02 uses ST's new 200 V planar Pt doping technology, and it is specially suited for switching mode base drive and transistor circuits.

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




**SMB**
**STTH2R02UY**

**Table 1. Device summary**

| Symbol | Value |
|---|---|
| $I_{F(AV)}$ | 2 A |
| $V_{RRM}$ | 200 V |
| $T_j$ (max) | 175 °C |
| $V_F$ (typ) | 0.7 V |
| $t_{rr}$ (typ) | 15 ns |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at $T_j$ = 25 °C, unless otherwise specified)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 200 | V |
| $I_{FRM}$ | Repetitive peak forward current | $t_p$ = 5 µs, F = 5 kHz | 60 | A |
| $I_{F(RMS)}$ | Forward rms current | | 60 | A |
| $I_{F(AV)}$ | Average forward current, δ = 0.5 | $T_c$ = 90 °C | 2 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms Sinusoidal | 75 | 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 | Unit |
|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | 30 | °C/W |

**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 | | - | 2 | 20 | |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 6 A | - | - | 1.20 | V |
| | | $T_j$ = 25 °C | $I_F$ = 2 A | - | 0.89 | 1.0 | |
| | | $T_j$ = 100 °C | | - | 0.76 | 0.85 | |
| | | $T_j$ = 150 °C | | - | 0.70 | 0.80 | |

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:
$P = 0.68 \times I_{F(AV)} + 0.06\ I_F{}^2{}_{(RMS)}$

**Table 5. Dynamic characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $I_F$ = 1 A, $dI_F/dt$ = -50 A/µs, $V_R$ = 30 V, $T_j$ = 25 °C | - | 23 | 30 | ns |
| | | $I_F$ = 1 A, $dI_F/dt$ = -100 A/µs, $V_R$ = 30 V, $T_j$ = 25 °C | - | 15 | 20 | |
| $I_{RM}$ | Reverse recovery current | $I_F$ = 2 A, $dI_F/dt$ = -200 A/µs, $V_R$ = 160 V, $T_j$ = 125 °C | - | 3 | 4 | A |
| $t_{fr}$ | Forward recovery time | $I_F$ = 2 A, $dI_F/dt$ = 100 A/µs $V_{FR}$ = 1.1 x $V_{Fmax}$, $T_j$ = 25 °C | - | 40 | - | ns |
| $V_{FP}$ | Forward recovery voltage | $I_F$ = 2 A, $dI_F/dt$ = 100 A/µs, $T_j$ = 25 °C | - | 2.0 | - | V |

**Figure 1. Peak current versus duty cycle**

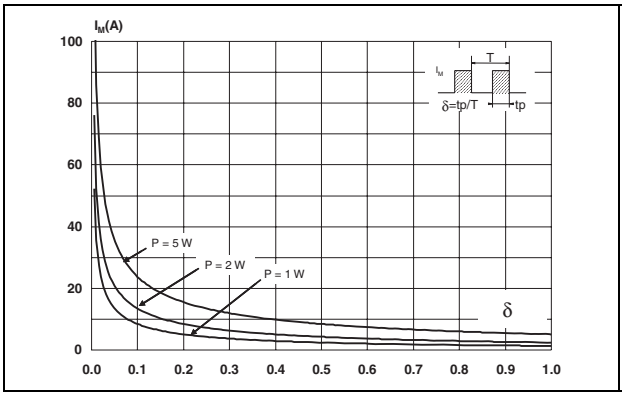



**Figure 2. Forward voltage drop versus forward current (typical values)**

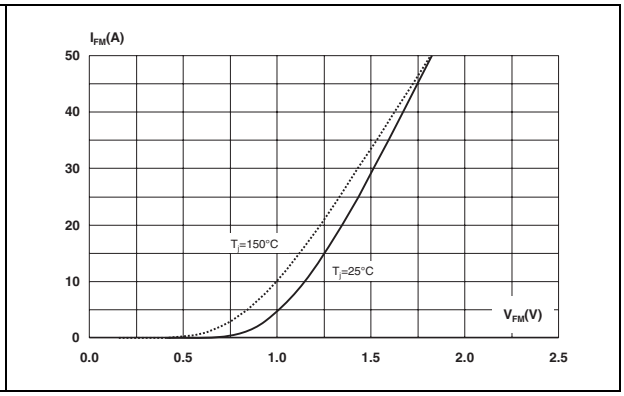



**Figure 3. Forward voltage drop versus forward current (maximum values)**

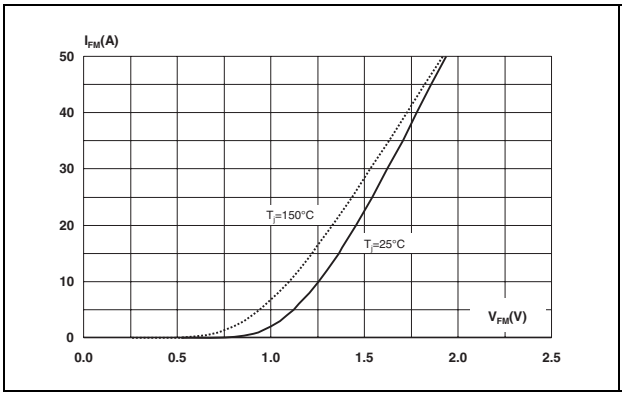



**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**

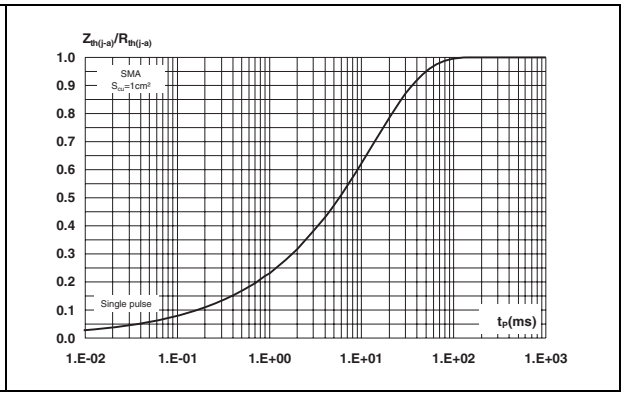


**Figure 5. Junction capacitance versus reverse applied voltage (typical values)**

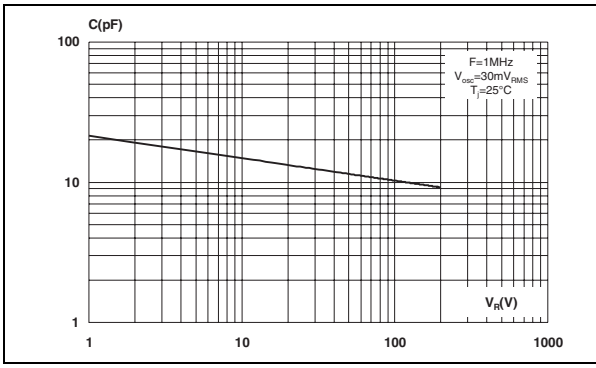



**Figure 6. Reverse recovery charges versus $dI_F/dt$ (typical values)**

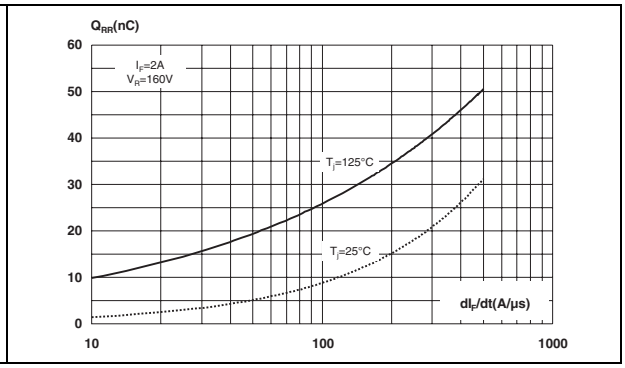



**Figure 7. Reverse recovery time versus $dI_F/dt$ (typical values)**

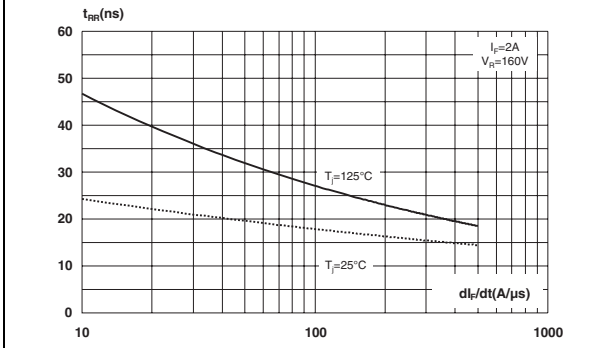



**Figure 8. Peak reverse recovery current versus $dI_F/dt$ (typical values)**

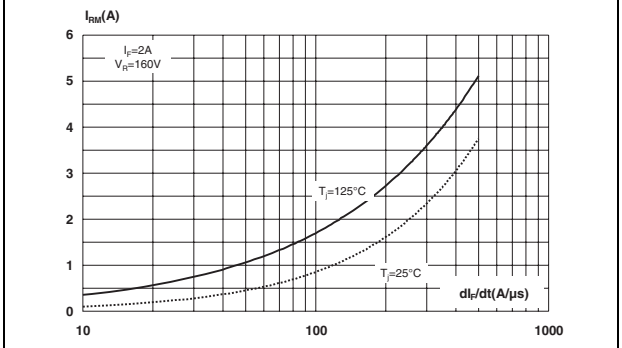



**Figure 9. Dynamic parameters versus junction temperature**

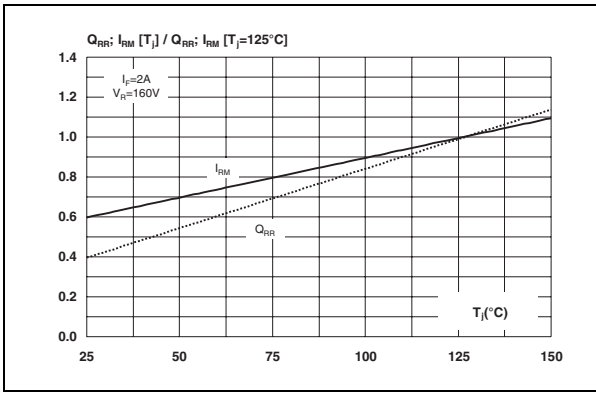
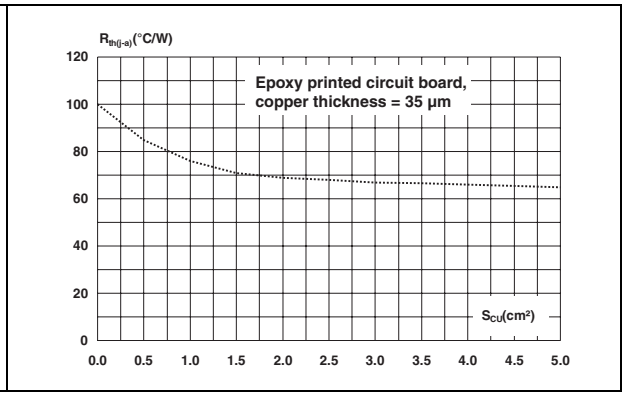
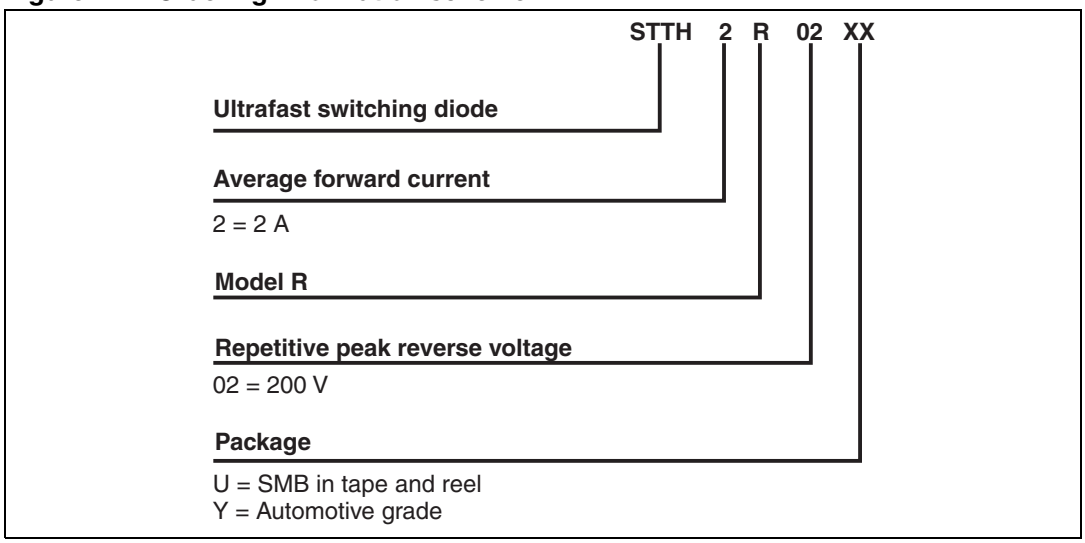



**Figure 10. Thermal resistance, junction to ambient, versus copper surface under each lead**



# 2 Ordering information scheme

**Figure 11. Ordering information scheme**

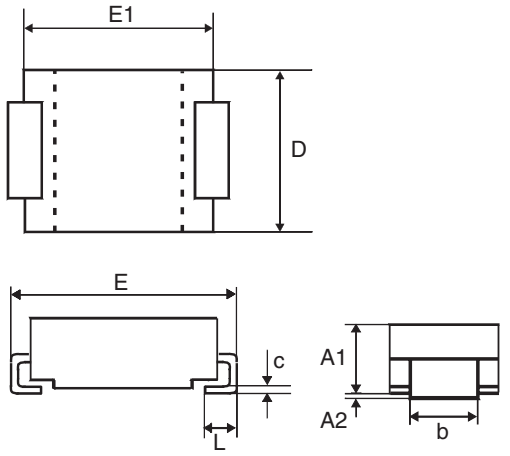


# 3 Package information

- Epoxy meets UL94, V0
- Lead-free package

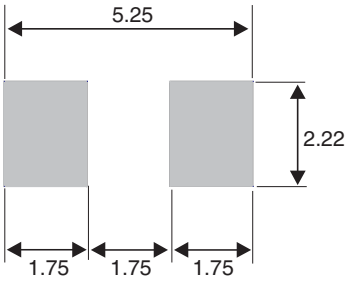
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

**Table 6. SMB dimensions**




| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A1 | 1.90 | 2.15 | 2.45 | 0.075 | 0.085 | 0.096 |
| A2 | 0.05 | 0.15 | 0.20 | 0.002 | 0.006 | 0.008 |
| b | 1.95 | | 2.20 | 0.077 | | 0.087 |
| c | 0.15 | | 0.41 | 0.006 | | 0.016 |
| E | 5.10 | 5.40 | 5.60 | 0.201 | 0.213 | 0.220 |
| E1 | 4.05 | 4.30 | 4.60 | 0.159 | 0.169 | 0.181 |
| D | 3.30 | 3.60 | 3.95 | 0.130 | 0.142 | 0.156 |
| L | 0.75 | 1.15 | 1.60 | 0.030 | 0.045 | 0.063 |

**Figure 12. SMB footprint (dimensions in mm)**



# 4 Ordering information

**Table 7. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STTH2R02UY | R2UY | SMB | 0.12 g | 2500 | Tape and reel |

# 5 Revision history

**Table 8. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 20-Oct-2010 | 1 | Initial release. |