

Features

- Ultrafast recovery
- Low power losses
- High surge capability
- Low leakage current
- High junction temperature
- AEC-Q101 qualified

Description

The STTH1003S-Y is an ultrafast recovery power rectifier dedicated to energy recovery in automotive applications.

The STTH1003S-Y is especially designed for the clamping function in an energy recovery block. The compromise between forward voltage drop and recovery time offers optimized performances.

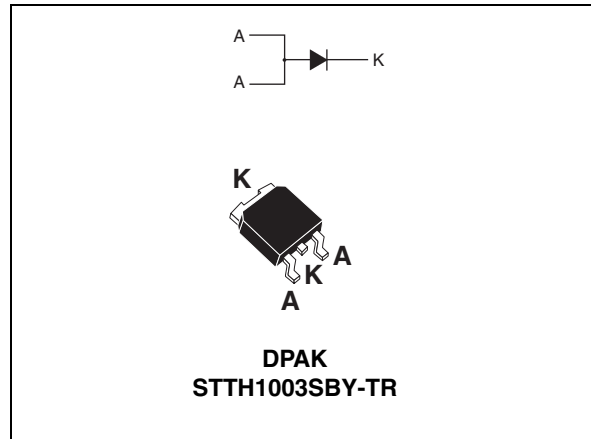


Table 1. Device summary

| | |
|----------------|--------|
| $I_{F(AV)}$ | 10 A |
| V_{RRM} | 300 V |
| t_{rr} (typ) | 13 ns |
| T_j | 175 °C |
| V_F (typ) | 0.9 V |

1 Characteristics

Table 2. Absolute ratings (limiting values)

| Symbol | Parameter | | Value | Unit |
|--------------|--------------------------------------|--------------------------------------|--------------|------|
| V_{RRM} | Repetitive peak reverse voltage | | 300 | V |
| $I_{F(RMS)}$ | Forward rms current | | 20 | A |
| $I_{F(AV)}$ | Average forward current | $T_c = 150\text{ °C } \delta = 0.5$ | 10 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms sinusoidal}$ | 100 | A |
| I_{RSM} | Non repetitive avalanche current | $t_p = 20\text{ }\mu\text{s square}$ | 4 | 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 | Unit |
|---------------|------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case | 4 | °C/W |

Table 4. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | - | 10 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 10 | 100 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 10\text{ A}$ | - | - | 1.30 | V |
| | | $T_j = 125\text{ °C}$ | | - | 0.9 | 1.1 | |

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:

$$P = 0.86 \times I_{F(AV)} + 0.024 I_{F(RMS)}^2$$

Table 5. Recovery characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|-----------------------|---|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$ | - | 13 | 17 | ns |
| | | | $I_F = 1\text{ A}, V_R = 30\text{ V}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ | - | 28 | 35 | |
| t_{fr} | Forward recovery time | $T_j = 25\text{ °C}$ | $I_F = 10\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ | - | - | 200 | ns |
| V_{FP} | Peak forward voltage | $T_j = 25\text{ °C}$ | $I_F = 10\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ | - | 2.5 | 3.5 | V |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 10\text{ A}, V_{CC} = 200\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ | - | 5.7 | 7.5 | A |
| S_{factor} | Softness factor | | | - | 0.3 | - | |

Figure 1. Forward voltage drop versus current (maximum values)

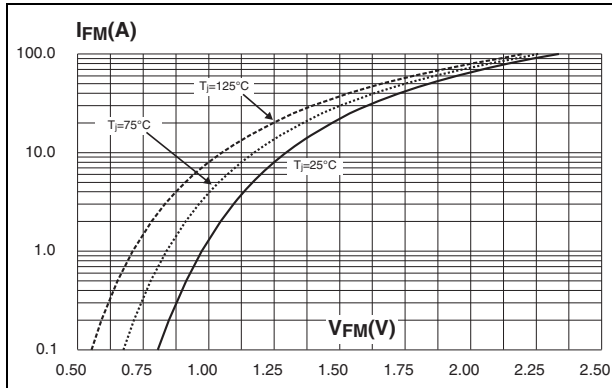


Figure 2. Peak reverse recovery current versus di_F/dt (90% confidence)

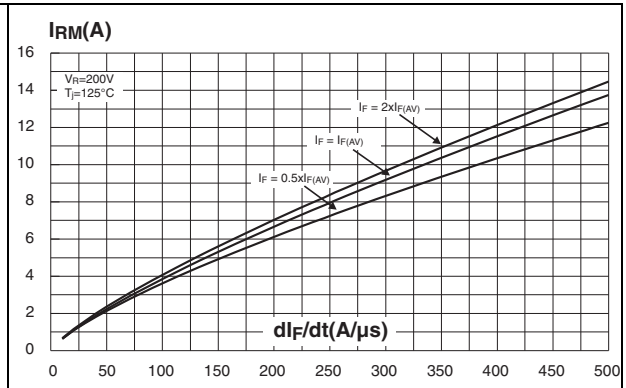


Figure 3. Reverse recovery time versus di_F/dt (90% confidence)

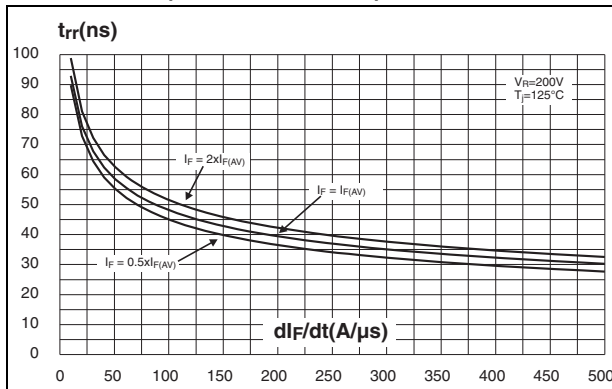


Figure 4. Softness factor versus di_F/dt (typical values)

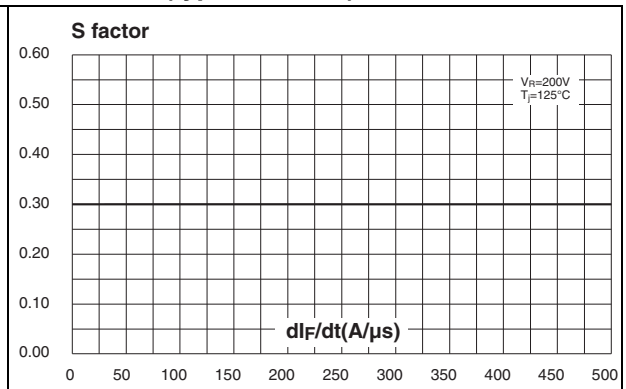


Figure 5. Relative variations of dynamic parameters versus junction temperature (reference: $T_j = 125\text{ }^\circ\text{C}$)

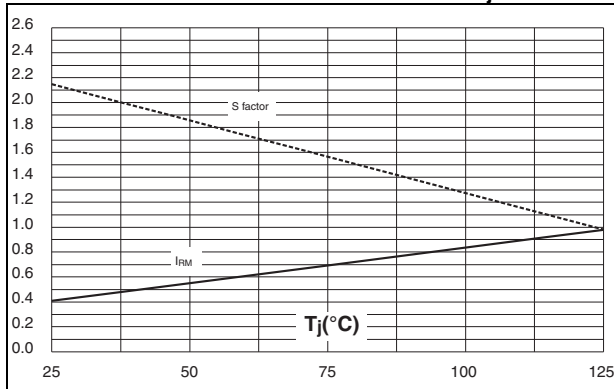


Figure 6. Transient peak forward voltage versus dI_F/dt (90% confidence)

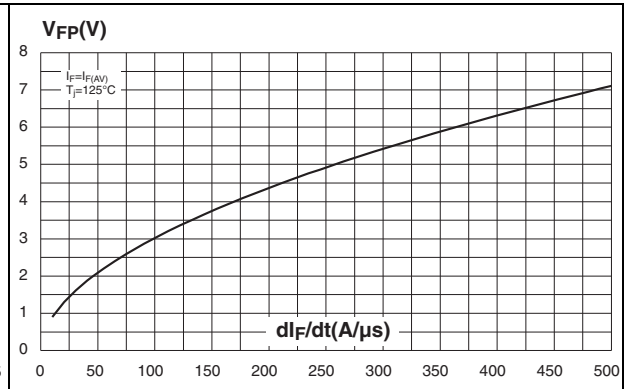
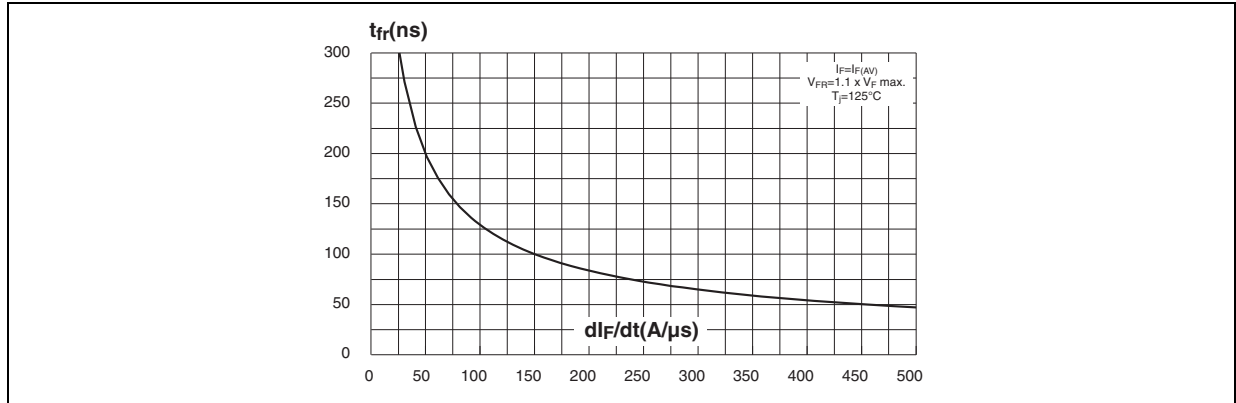


Figure 7. Forward recovery time versus dI_F/dt (90% confidence)



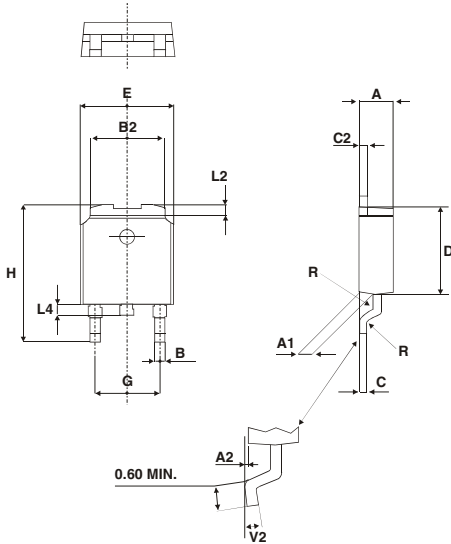
2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction

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° |



3 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|------------|---------|--------|----------|---------------|
| STTH1003SBY-TR | STTH1003SY | DPAK | 0.3 g | 2500 | Tape and reel |

4 Revision history

Table 8. Document revision history

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

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