# STTH1003S

## HIGH EFFICIENCY RECTIFIER

**Table 1: Main Product Characteristics**

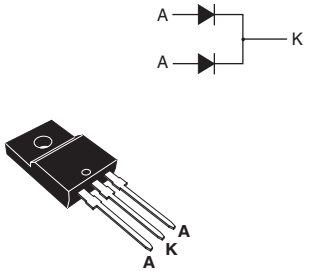
| | |
|---|---|
| $I_{F(AV)}$ | 10 A |
| $V_{RRM}$ | 300 V |
| $t_{rr}$ (typ) | 13 ns |
| $T_j$ | 175°C |
| $V_F$ (typ) | 0.9 V |

### FEATURES AND BENEFITS

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

### DESCRIPTION

The **STTH1003S** is an Ultrafast Recovery Power Rectifier dedicated to **energy recovery in PDP application**.
It is especially designed for clamping function in energy recovery block.
The compromise between forward voltage drop and recovery time offer optimized performances.







**TO-220FPAB**
**STTH1003SFP**




**D²PAK**
**STTH1003SG**




**DPAK**
**STTH1003SB**

**Table 2: Order Codes**

| Part Numbers | Marking |
|---|---|
| STTH1003SFP | STTH1003SFP |
| STTH1003SB | STTH1003SB |
| STTH1003SB-TR | STTH1003SB |
| STTH1003SG | STTH1003SG |
| STTH1003SG-TR | STTH1003SG |

**Table 3: Absolute Ratings** (limiting values)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 300 | V |
| $I_{F(RMS)}$ | RMS forward voltage | | 20 | A |
| $I_{F(AV)}$ | Average forward current | $T_c$ = 150°C $\delta$ = 0.5 | 10 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10ms sinusoidal | 100 | A |
| $I_{RSM}$ | Non repetitive avalanche current | $t_p$ = 20 µs square | 4 | A |
| $T_{stg}$ | Storage temperature range | | -65 to + 175 | °C |
| $T_j$ | Maximum operating junction temperature | | 175 | °C |

**Table 4:Thermal Parameters**

| Symbol | Parameter | Package | Value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | DPAK | 4 | °C/W |
| | | $D^2PAK$ | 4 | |
| | | TO220FP | 6 | |

**Table 5: Static Electrical Characteristics**

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

Pulse test: * tp = 5 ms, $\delta$ < 2%
** tp = 380 µs, $\delta$ < 2%

To evaluate the conduction losses use the following equation: $P = 0.86 \times I_{F(AV)} + 0.024\ I_F{}^2{}_{(RMS)}$

**Table 6: Recovery Characteristics**

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

**Figure 1: Forward voltage drop versus current (maximum values)**

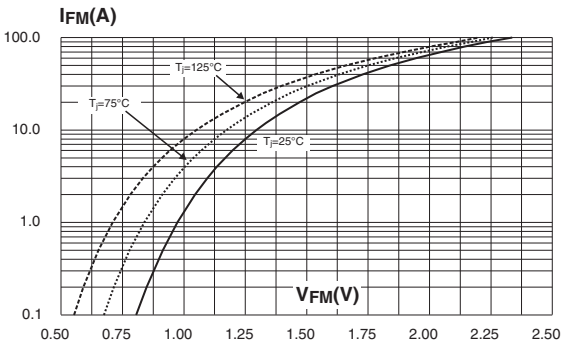



**Figure 2: Peak reverse recovery current versus $dI_F/dt$ (90% confidence)**

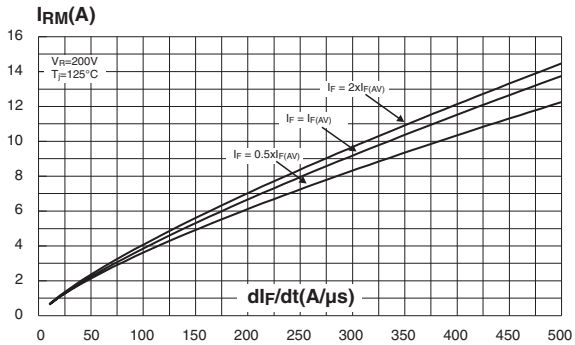


**Figure 3: Reverse recovery time versus $dI_F/dt$ (90% confidence)**

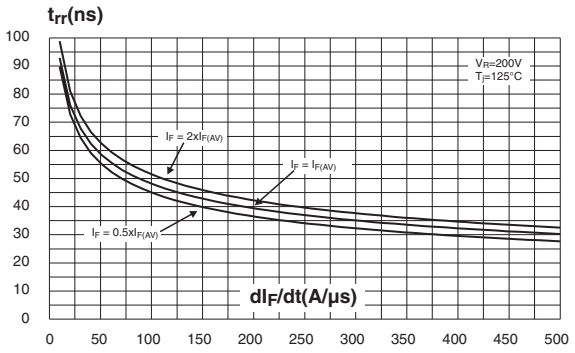



**Figure 4: Softness factor versus $dI_F/dt$ (typical values)**

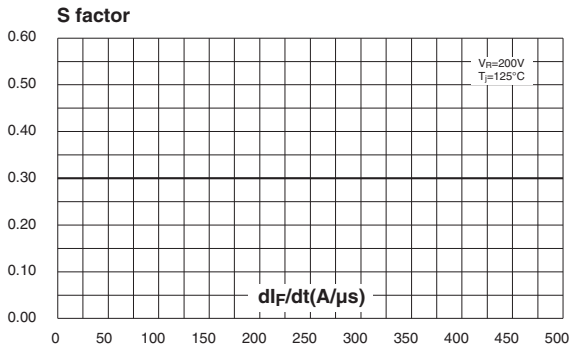



**Figure 5: Relative variations of dynamic parameters versus junction temperature (reference: Tj = 125°C)**

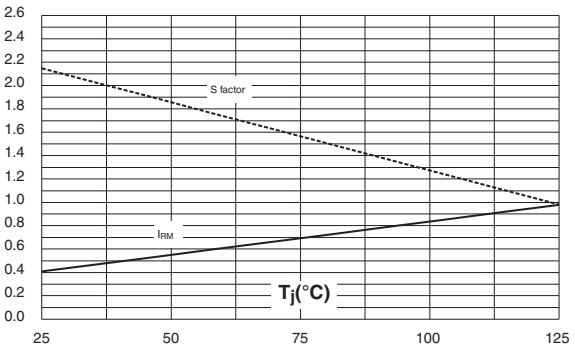



**Figure 6: Transient peak forward voltage versus $dI_F/dt$ (90% confidence)**

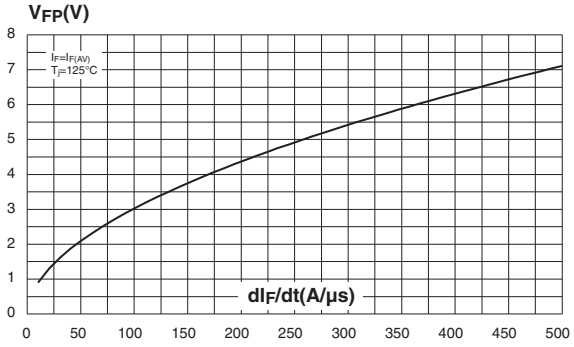



**Figure 7: Forward recovery time versus $dI_F/dt$ (90% confidence)**

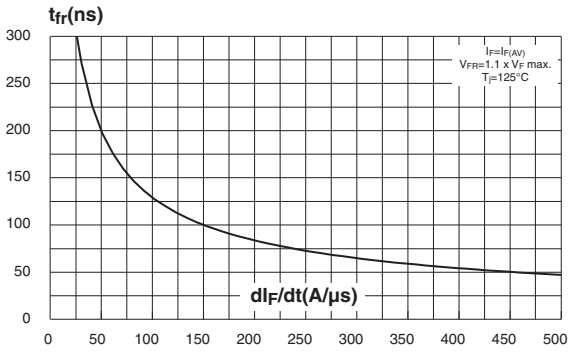
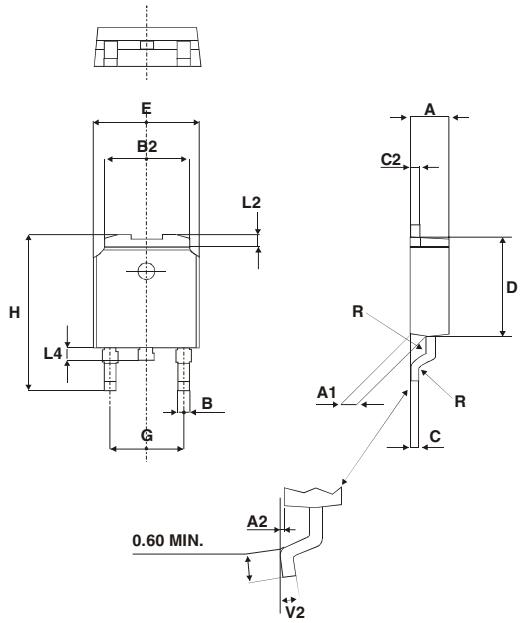


**Figure 8: DPAK Package Mechanical Data**




| 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 9: Foot Print dimensions (in millimeters)**

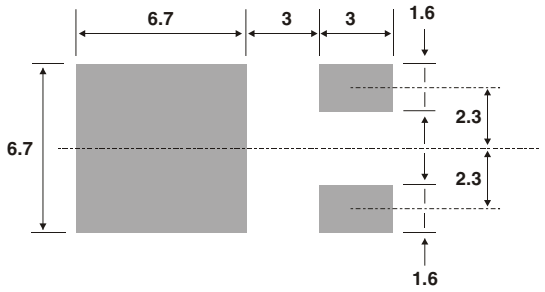
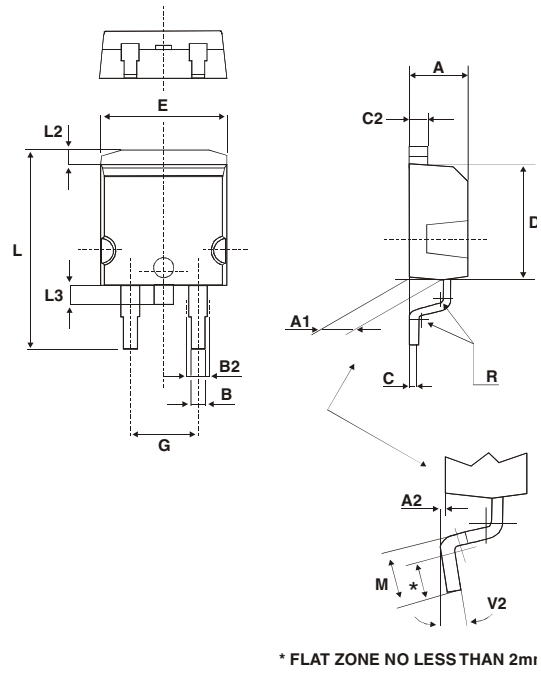


**Figure 10: D²PAK Package Mechanical Data**




| 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: Foot Print dimensions (in millimeters)**

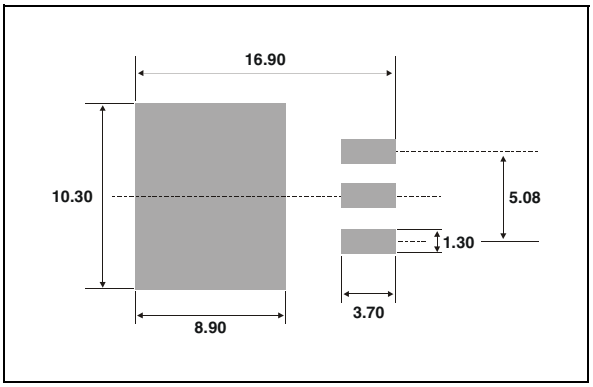
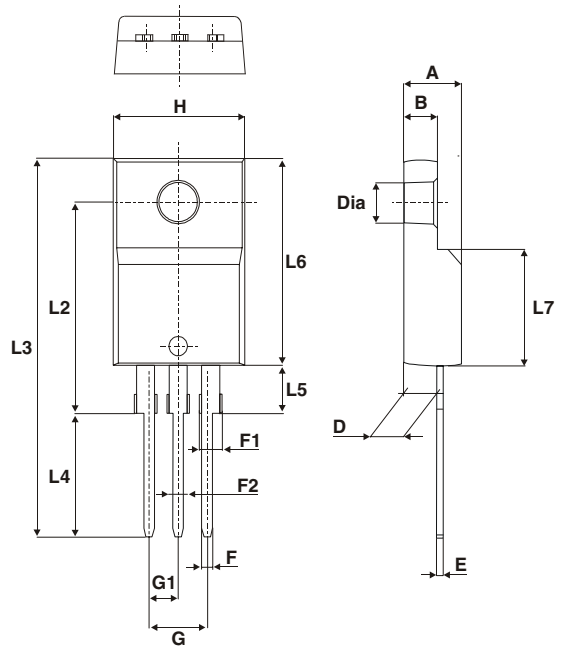


**Figure 12: TO-220FPAB Package Mechanical Data**




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| F2 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

**Table 7: Ordering Information**

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STTH1003SFP | STTH1003SFP | TO-220FPAB | 1.70 g | 50 | Tube |
| STTH1003SB | STTH1003SB | DPAK | 0.3 g | 75 | Tube |
| STTH1003SB-TR | STTH1003SB | | | 2500 | Tape & reel |
| STTH1003SG | STTH1003SG | $D^2PAK$ | 1.48 g | 50 | Tube |
| STTH1003SG-TR | STTH1003SG | | | 1000 | Tape & reel |

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N.
- Maximum torque value: 1.0 m.N.

**Table 8: Revision History**

| Date | Revision | Description of Changes |
|---|---|---|
| 24-Aug-2005 | 1 | First issue. |