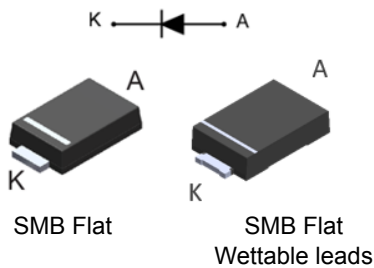



Automotive 1 A - 600 V turbo 2 ultrafast rectifier



Features

- AEC-Q101 qualified 
- Ultrafast recovery
- Low switching losses
- High surge capability
- Low leakage current
- High junction temperature
- **ECOPACK2** or **ECOPACK3** compliant component on demand
- V_{RRM} guaranteed from -40 to +175 °C

Description

The **STTH1R06-Y** is an ultrafast recovery power rectifier dedicated to energy recovery in automotive application housed in SMB Flat to improve space saving.

It is especially designed for clamping function in energy recovery block.

The compromise between forward voltage drop and recovery time offers optimized performances.



Product status link

[STTH1R06-Y](#)

Product summary

| | |
|-----------------|--------|
| $I_{F(AV)}$ | 1 A |
| V_{RRM} | 600 V |
| T_j (max.) | 175 °C |
| V_F (typ.) | 1.1 V |
| T_{rr} (typ.) | 30 ns |

1 Characteristics

Table 1. Absolute ratings (limiting values at $T_j = 25\text{ °C}$, unless otherwise specified)

| Symbol | Parameter | Value | Unit |
|-------------|--|--|--------------------|
| V_{RRM} | Repetitive peak reverse voltage, $T_j = -40$ to $+175\text{ °C}$ | 600 | V |
| $I_{F(AV)}$ | Average forward current | $T_L = 135\text{ °C}$, $\delta = 0.5$ | 1 |
| I_{FSM} | Forward surge current | $t_p = 10\text{ ms}$ | 17 |
| T_{stg} | Storage temperature range | -65 to $+175$ | $^{\circ}\text{C}$ |
| $T_j^{(1)}$ | Operating temperature range | -40 to $+175$ | $^{\circ}\text{C}$ |

1. $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 2. Thermal resistance

| Symbol | Parameter | Value | Unit |
|---------------|------------------|-------|----------------------|
| $R_{th(j-l)}$ | Junction to lead | 21 | $^{\circ}\text{C/W}$ |

Table 3. Static electrical characteristic

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 1 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 10 | 75 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$ | - | | 1.9 | V |
| | | $T_j = 150\text{ °C}$ | | - | 1.1 | 1.4 | |

1. Pulsetest: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulsetest: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1.1 \times I_{F(AV)} + 0.30 I_{F^2(RMS)}$$

Table 4. Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------|--------------------------|----------------------|---|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$; $dI_F/dt = -50\text{ A}/\mu\text{s}$; $V_R = 30\text{ V}$ | - | 30 | 45 | ns |
| t_{fr} | Forward recovery time | $T_j = 25\text{ °C}$ | $I_F = 3\text{ A}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $V_{FR} = 3.5\text{ V}$ | - | | 90 | |
| V_{FP} | Forward recovery voltage | | $I_F = 2\text{ A}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | | 8 | V |

1.1 Electrical characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

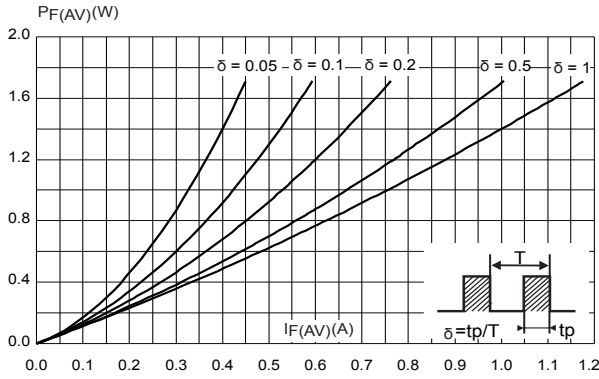


Figure 2. Forward voltage drop versus forward current (typical values)

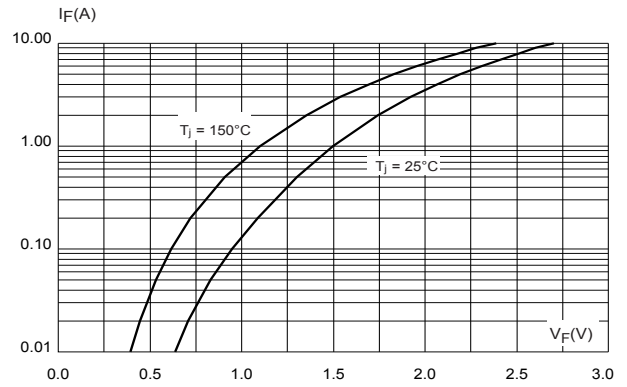


Figure 3. Forward voltage drop versus forward current (maximum values)

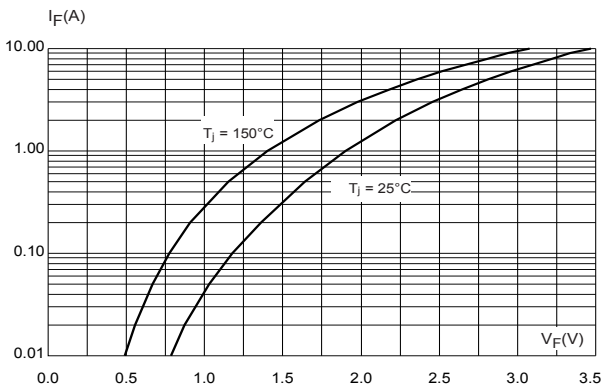


Figure 4. Relative variation of thermal impedance junction to lead versus pulse duration

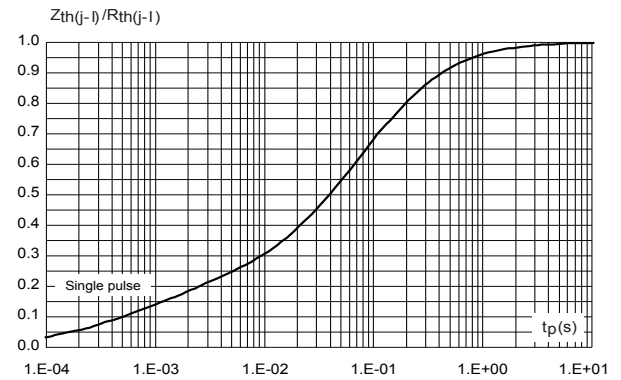


Figure 5. Peak reverse recovery current versus di_F/dt (typical values)

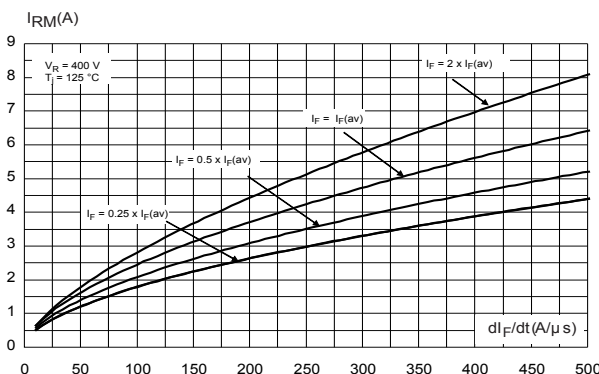


Figure 6. Reverse recovery time versus di_F/dt (typical values)

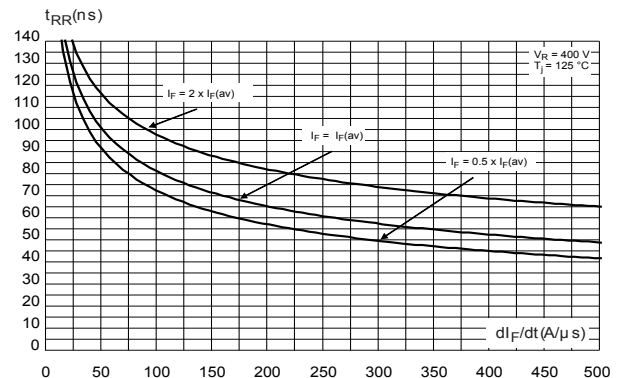


Figure 7. Reverse recovery charges versus di_F/dt (typical values)

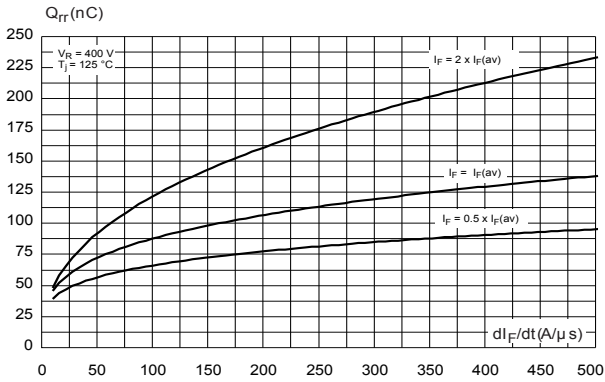


Figure 8. Reverse recovery softness factor versus di_F/dt (typical values)

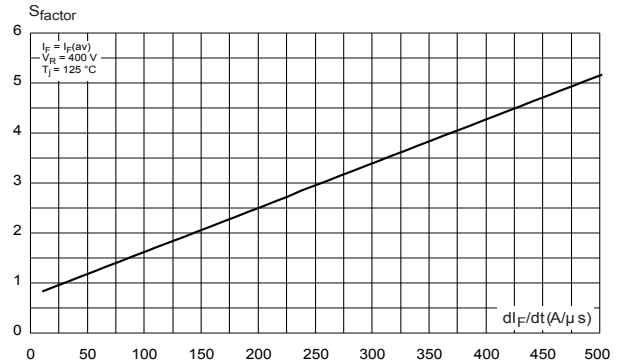


Figure 9. Relative variation of dynamic parameters versus junction temperature

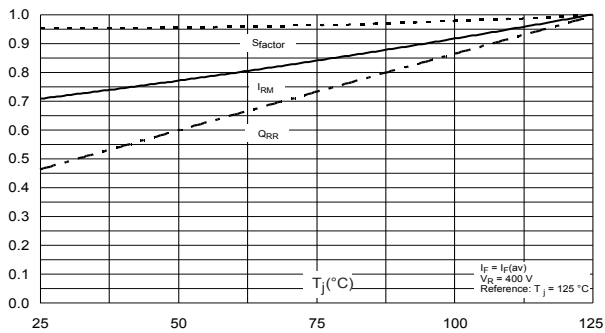


Figure 10. Transient peak forward voltage versus di_F/dt (typical values)

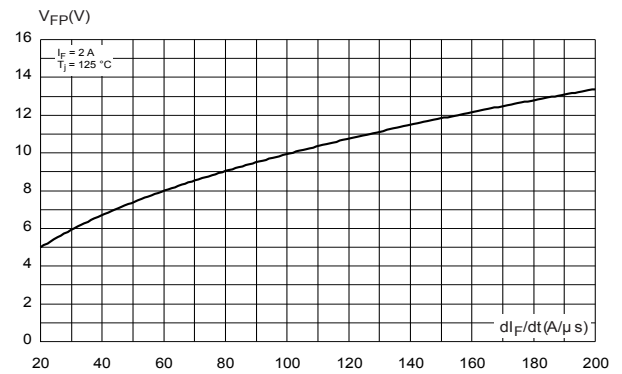


Figure 11. Forward recovery time versus di_F/dt (typical values)

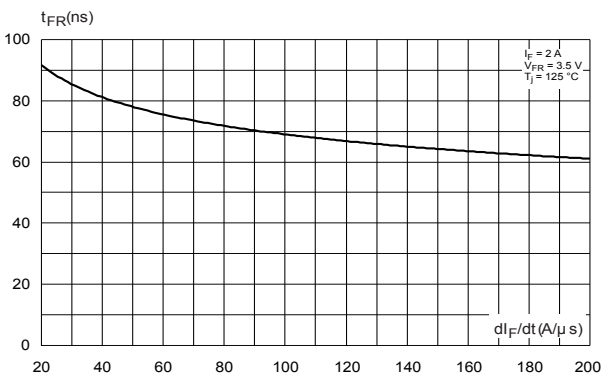


Figure 12. Junction capacitance versus reverse voltage applied (typical values)

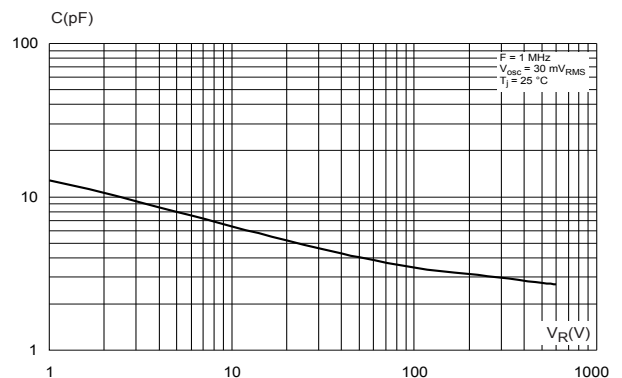
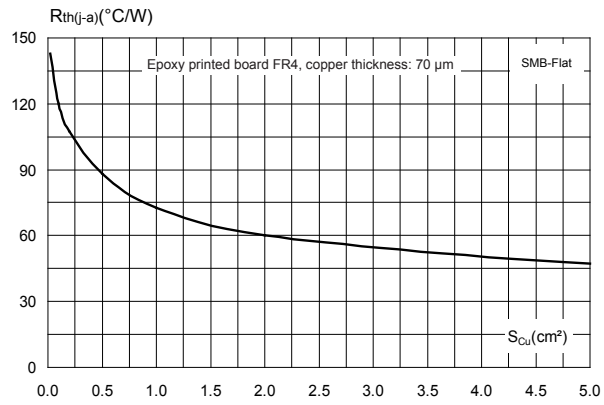


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead



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.

2.1 SMB Flat package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 14. SMB Flat package outline

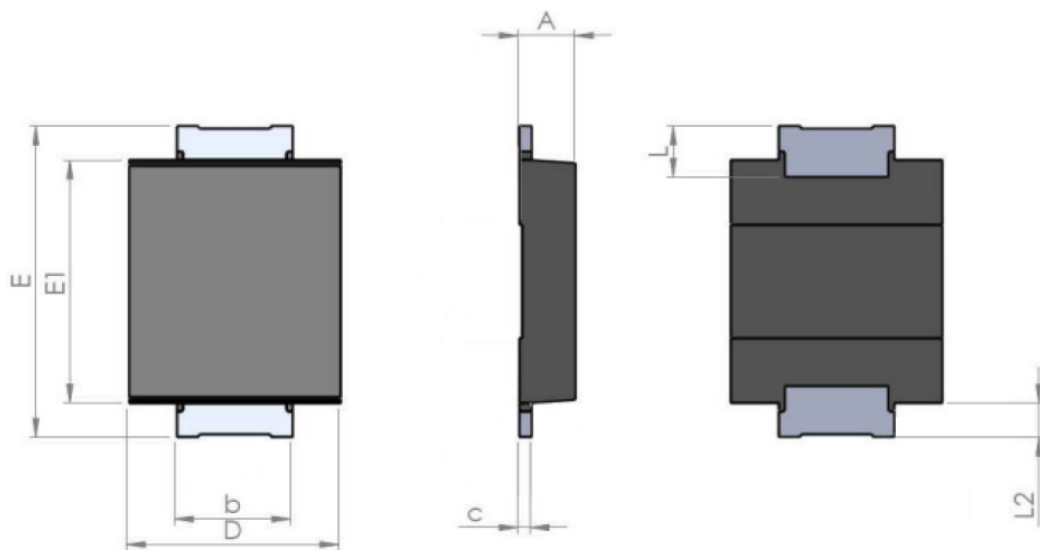
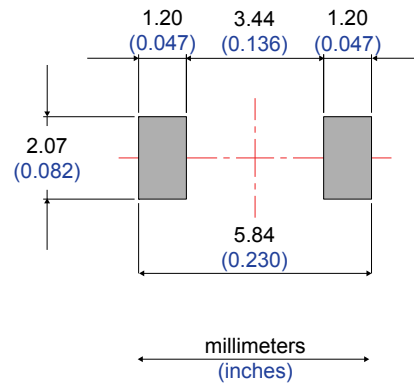


Table 5. SMB Flat mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.90 | | 1.10 | 0.035 | | 0.043 |
| b | 1.95 | | 2.20 | 0.077 | | 0.087 |
| c | 0.15 | | 0.40 | 0.006 | | 0.016 |
| D | 3.30 | | 3.95 | 0.130 | | 0.156 |
| E | 5.10 | | 5.60 | 0.200 | | 0.220 |
| E1 | 4.05 | | 4.60 | 0.159 | | 0.181 |
| L | 0.75 | | 1.50 | 0.030 | | 0.060 |
| L2 | | 0.60 | | | 0.024 | |

Figure 15. Footprint recommendations, dimensions in mm (inches)



3 Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|-------------|---------|---------|--------|-----------|---------------|
| STTH1R06UFY | F1R6Y | SMBflat | 50 mg | 5000 | Tape and reel |

Revision history

Table 6. Document revision history

| Date | Version | Changes |
|-------------|---------|---|
| 04-Aug-2014 | 1 | Initial release. |
| 26-Apr-2022 | 2 | Updated Section 2.1 SMB Flat package information. |

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