

## Automotive high voltage power Schottky rectifier

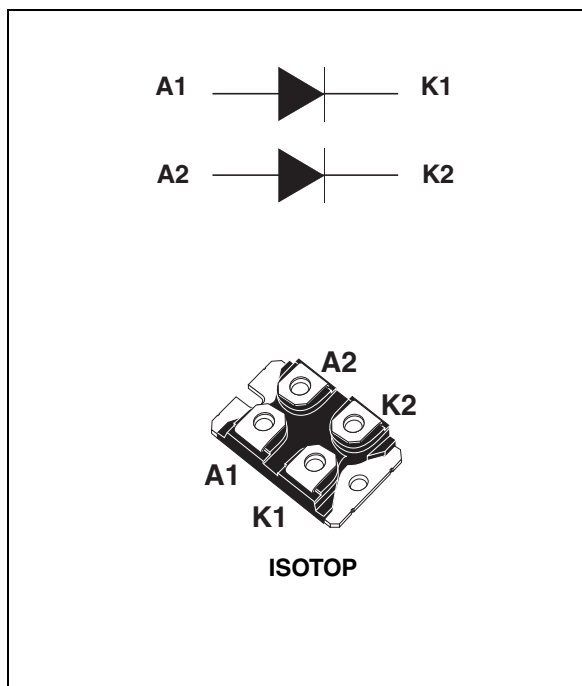
### Features

- Negligible switching losses
- Avalanche rated
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- Insulated package:
  - Electrical insulation = 2500 V rms,
  - Capacitance = 45 pF
- AEC-Q101 qualified

### Description

This high voltage Schottky rectifier is suitable for high frequency switch mode power supplies.

Packaged in ISOTOP, this device is intended for use in secondary rectification applications.



**Table 1. Device summary**

|             |           |
|-------------|-----------|
| $I_{F(AV)}$ | 2 x 100 A |
| $V_{RRM}$   | 170 V     |
| $T_j$       | 150 °C    |
| $V_F$ (typ) | 0.63 V    |

# 1 Characteristics

**Table 2. Absolute ratings - limiting values per diode at  $T_{amb} = 25\text{ °C}$ , unless otherwise specified**

| Symbol       | Parameter   | Value   | Unit |
|--------------|---|---|------|
| $V_{RRM}$    | Repetitive peak reverse voltage                       | 170   | V    |
| $I_{F(RMS)}$ | Forward rms current                                   | 200   | A    |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$               | $T_c = 105\text{ °C}$ per diode                     | A    |
| $I_{FSM}$    | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$ sinusoidal                     | A    |
| $P_{ARM}$    | Repetitive peak avalanche power                       | $t_p = 1\text{ }\mu\text{s}$ , $T_j = 25\text{ °C}$ | W    |
| $T_{stg}$    | Storage temperature range                             | -55 to + 150  | °C   |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup> | 150   | °C   |

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

**Table 3. Thermal parameters**

| Symbol        | Parameter                   | Value     | Unit |
|---------------|-----------------------------|-----------|------|
| $R_{th(j-c)}$ | Junction to case            | Per diode | 0.52 |
|               |                             | Total     | 0.31 |
| $R_{th(c)}$   | Coupling thermal resistance | 0.1       | °C/W |

When the diodes are used simultaneously:

$$T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)} \text{ (per diode)} + P_{(diode2)} \times R_{th(c)}$$

**Table 4. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | -    | -    | 200  | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ | -    | 30   | 100  | mA            |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | -    | -    | 0.85 | V             |
|             |                         | $T_j = 150\text{ °C}$ | -    | 0.63 | 0.68 |               |
|             |                         | $T_j = 25\text{ °C}$  | -    | -    | 1.01 |               |
|             |                         | $T_j = 150\text{ °C}$ | -    | 0.78 | 0.86 |               |

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:

$$P = 0.5 \times I_{F(AV)} + 0.0018 I_{F(RMS)}^2$$

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

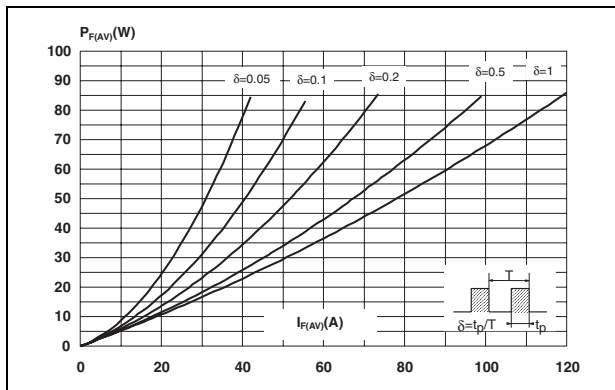


Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)

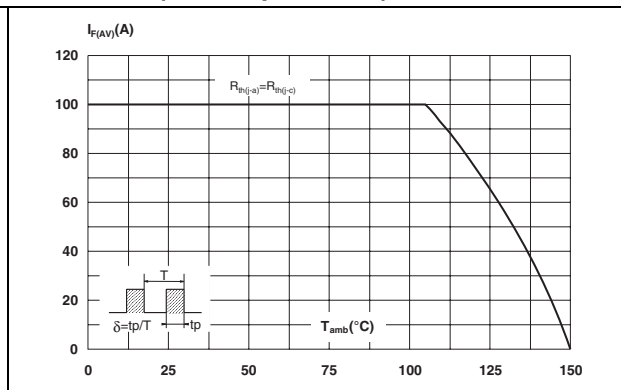


Figure 3. Non-repetitive surge peak forward current versus overload duration (maximum values per diode)

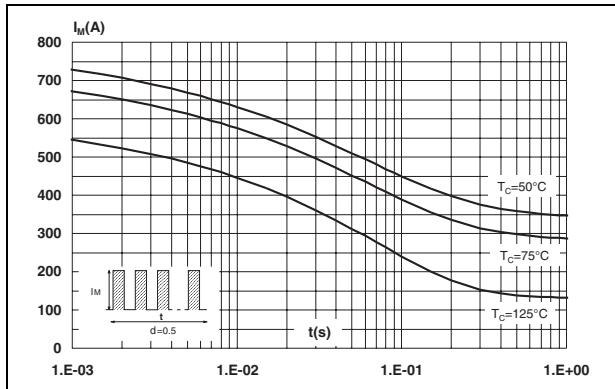


Figure 4. Relative variation of thermal impedance (junction to case) versus pulse duration

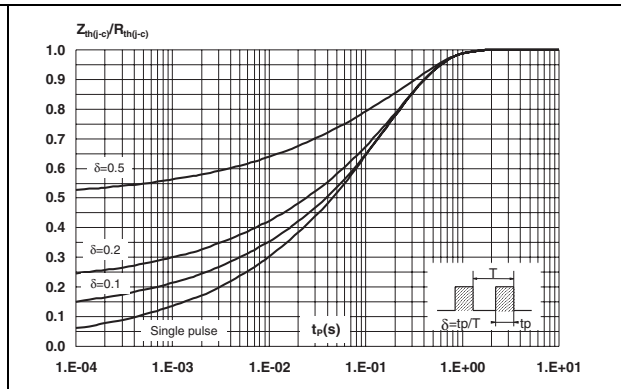


Figure 5. Reverse leakage current versus reverse voltage applied (typical values per diode)

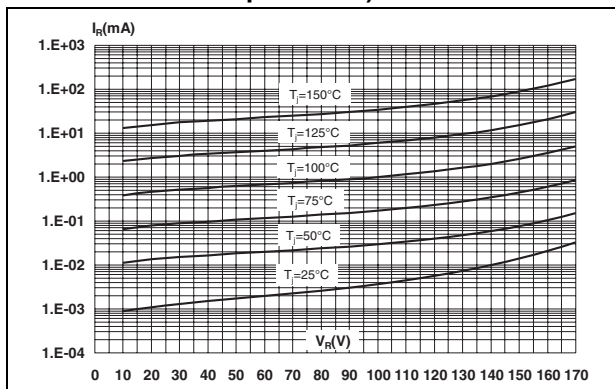
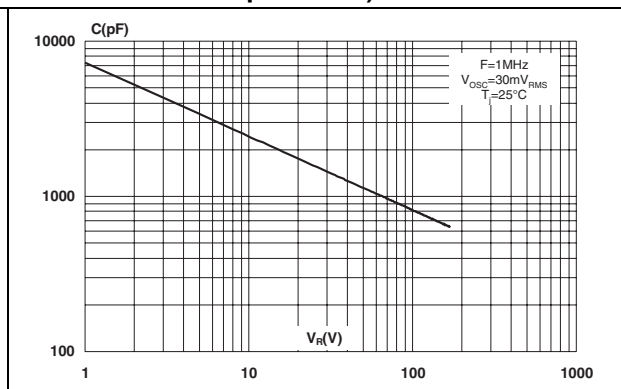
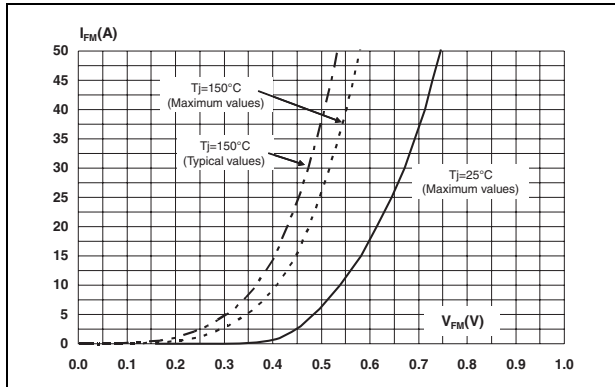


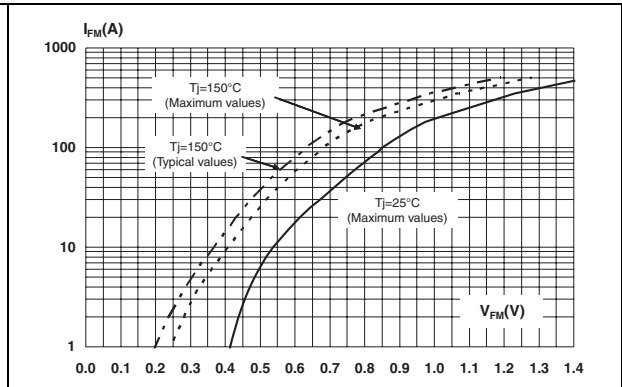
Figure 6. Junction capacitances versus reverse voltage applied (typical values per diode)



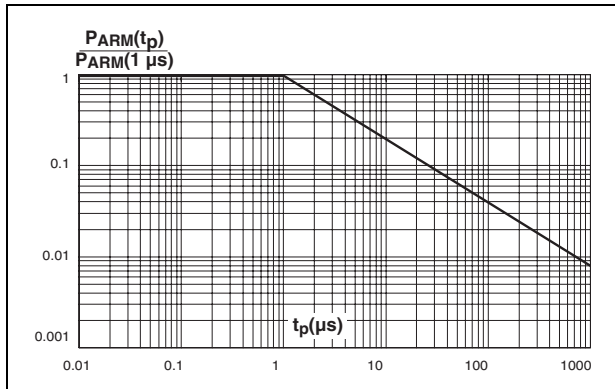
**Figure 7. Forward voltage drop versus forward current (per diode, low level)**



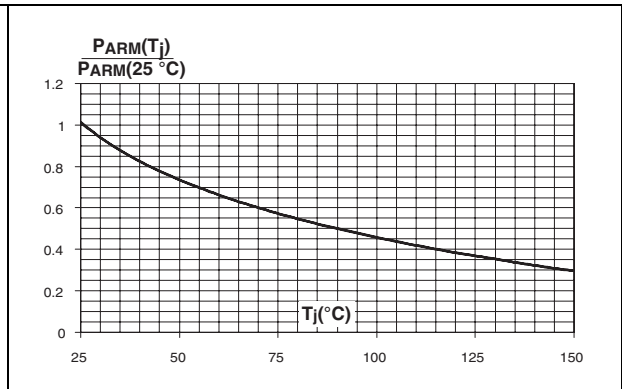
**Figure 8. Forward voltage drop versus forward current (per diode, high level)**



**Figure 9. Normalized avalanche power derating versus pulse duration**



**Figure 10. Normalized avalanche power derating versus junction temperature**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.3 N·m
- Maximum torque value: 1.5 N·m

STMicroelectronics strongly recommend the use of the screws delivered with this product. The use of anyother screws is entirely at the user’s own risk and will invalidate the warranty.

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**Table 5. ISOTOP dimensions**

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 11.80       | 12.20 | 0.465      | 0.480 |
| A1   | 8.90        | 9.10  | 0.350      | 0.358 |
| B    | 7.8         | 8.20  | 0.307      | 0.323 |
| C    | 0.75        | 0.85  | 0.030      | 0.033 |
| C2   | 1.95        | 2.05  | 0.077      | 0.081 |
| D    | 37.80       | 38.20 | 1.488      | 1.504 |
| D1   | 31.50       | 31.70 | 1.240      | 1.248 |
| E    | 25.15       | 25.50 | 0.990      | 1.004 |
| E1   | 23.85       | 24.15 | 0.939      | 0.951 |
| E2   | 24.80 typ.  |       | 0.976 typ. |       |
| G    | 14.90       | 15.10 | 0.587      | 0.594 |
| G1   | 12.60       | 12.80 | 0.496      | 0.504 |
| G2   | 3.50        | 4.30  | 0.138      | 0.169 |
| F    | 4.10        | 4.30  | 0.161      | 0.169 |
| F1   | 4.60        | 5.00  | 0.181      | 0.197 |
| P    | 4.00        | 4.30  | 0.157      | 0.69  |
| P1   | 4.00        | 4.40  | 0.157      | 0.173 |
| S    | 30.10       | 30.30 | 1.185      | 1.193 |

### 3 Ordering information

Table 6. Ordering information

| Order code     | Marking        | Package | Weight                    | Base qty <sup>(1)</sup> | Delivery mode |
|----------------|----------------|---------|---------------------------|-------------------------|---------------|
| STPS200170TV1Y | STPS200170TV1Y | ISOTOP  | 27 g<br>without<br>screws | 10<br>with screws       | Tube          |

1. This product is supplied with 40 terminal screws and washers for each tube. The screws and washers are supplied in a separate pack with the order.

### 4 Revision history

Table 7. Document revision history

| Date        | Revision | Changes  |
|-------------|----------|--|
| 02-Mar-2010 | 1        | First issue.                                       |
| 07-Oct-2011 | 2        | Added torque values in <a href="#">Section 2</a> . |

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