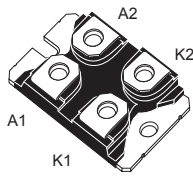
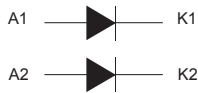



Automotive 170 V, 2 x 100 A, high voltage power Schottky rectifier



ISOTOP

Features

- AEC-Q101 qualified 
- PPAP capable
- Operating T_j from $-40\text{ }^\circ\text{C}$ to $+175\text{ }^\circ\text{C}$
- Negligible switching losses
- Low leakage current
- Avalanche rated
- Good trade-off between leakage current and forward voltage drop
- Insulated package ISOTOP comply with UL1557 insulation:
 - Insulated voltage: $2500\text{ V}_{\text{RMS}}$ sine
- ECOPACK2 compliant component

Applications

- DC/DC converter, especially in hybrid or electrical vehicles
- Secondary rectification
- LLC topologies
- Phase shift topologies

Description

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

Packaged in ISOTOP, the STPS200170TV1Y is intended for use in secondary rectification applications and more precisely in DC/DC converters in hybrid and electrical vehicles.

| Product status link | |
|--------------------------------|----------------------|
| STPS200170TV1Y | |
| Product summary | |
| Symbol | Value |
| $I_{F(AV)}$ | 2 x 100 A |
| V_{RRM} | 170 V |
| T_j (max.) | 175 $^\circ\text{C}$ |
| V_F (typ.) | 0.63 V |

1 Characteristics

Table 1. 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 ($T_j = -40\text{ °C}$ to $+175\text{ °C}$) | | 170 | V |
| $I_{F(RMS)}$ | Forward rms current | | 200 | A |
| $I_{F(AV)}$ | Average forward current, $\delta = 0.5$, square wave | $T_C = 140\text{ °C}$, per diode | 100 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 700 | A |
| P_{ARM} | Repetitive peak avalanche power | $t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$ | 7200 | W |
| T_{stg} | Storage temperature range | | -55 to +175 | $^{\circ}\text{C}$ |
| T_j | Operating junction temperature range ⁽¹⁾ | | -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 parameters

| Symbol | Parameter | Max. value | Unit |
|---------------|------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 0.4 |
| | | Total | 0.2 |

For more information, please refer to the following application note:

- AN5088: Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------------------|-------------------------|-----------------------|----------------------|------|------|------|---------------|
| I_R ⁽¹⁾ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 200 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 30 | 100 | mA |
| V_F ⁽²⁾ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 100\text{ A}$ | - | | 0.85 | V |
| | | $T_j = 150\text{ °C}$ | | - | 0.63 | 0.68 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 200\text{ A}$ | - | | 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 maximum conduction losses, use the following equation:

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

For more information, please refer to the following application notes related to the power losses:

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses in a power diode

1.1 Characteristics (curves)

Figure 1. Average forward current versus case temperature ($\delta = 0.5$, per diode)

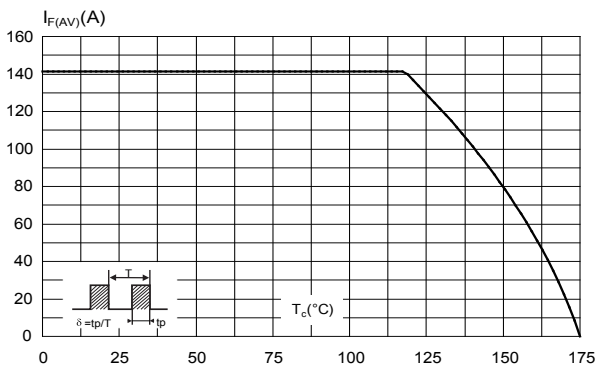


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration

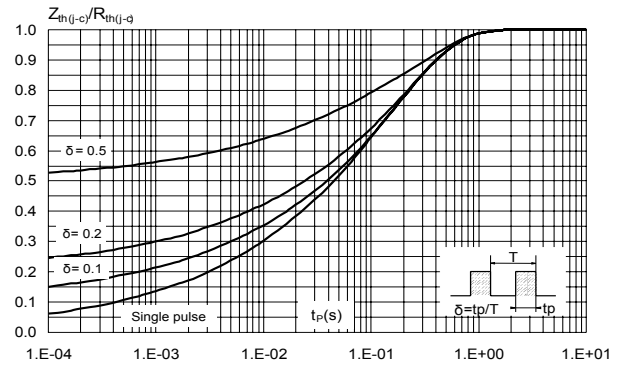


Figure 3. Reverse leakage current versus reverse voltage applied (typical values per diode)

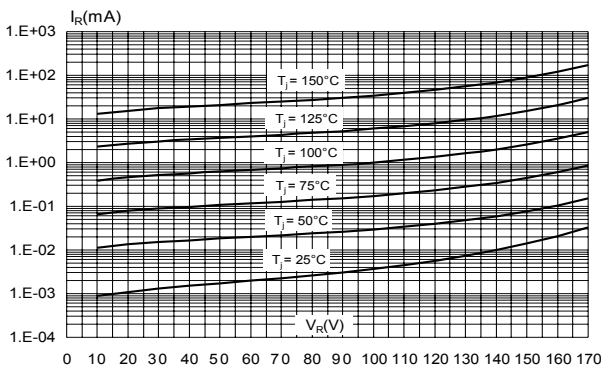


Figure 4. Junction capacitances versus reverse voltage applied (typical values per diode)

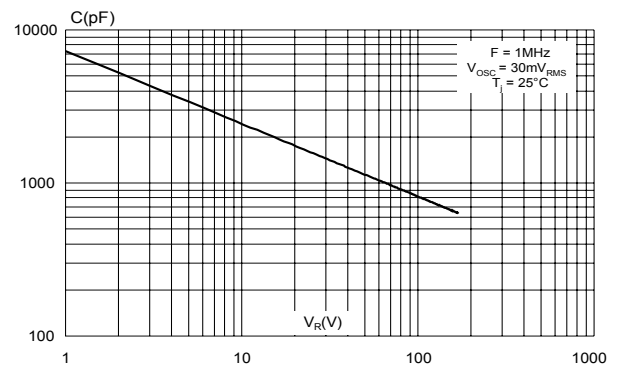


Figure 5. Forward voltage drop versus forward current (typical values, per diode)

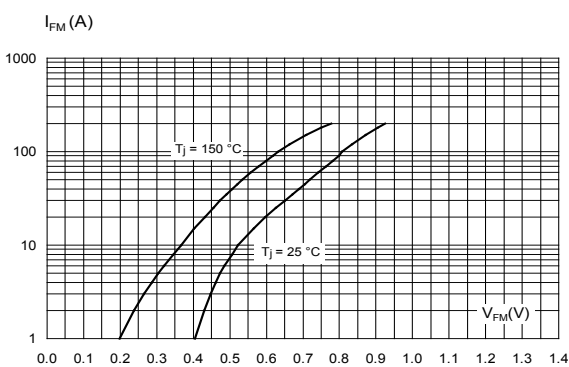
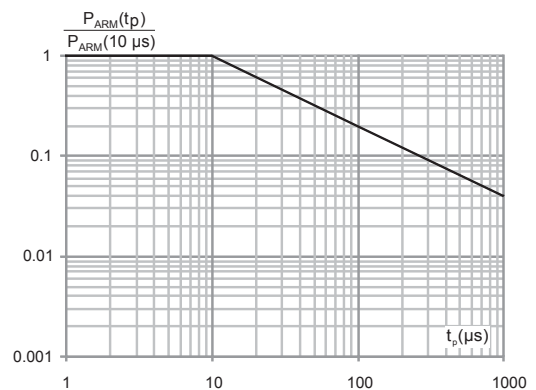


Figure 6. Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ\text{C}$)



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 ISOTOP 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 any other screws is entirely at the user's own risk and will invalidate the warranty.

Figure 7. ISOTOP package outline

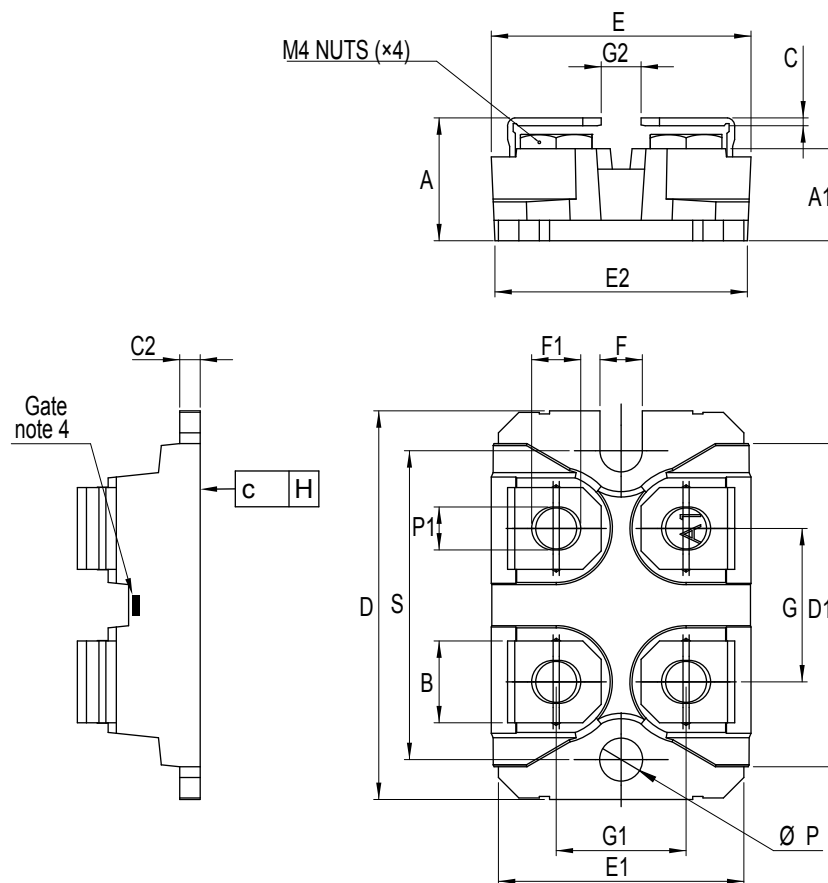


Table 4. ISOTOP package mechanical data

| Ref. | Dimensions | | | |
|--------|-------------|-------|-----------------------|-------|
| | Millimeters | | Inches ⁽¹⁾ | |
| | Min. | Max. | Min. | Max. |
| A | 11.80 | 12.20 | 0.460 | 0.480 |
| A1 | 8.90 | 9.10 | 0.350 | 0.358 |
| B | 7.80 | 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 | | 0.976 | |
| 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 |
| H | -0.05 | 0.10 | -0.002 | 0.004 |
| Diam P | 4.00 | 4.30 | 0.157 | 0.169 |
| P1 | 4.00 | 4.40 | 0.157 | 0.173 |
| S | 30.10 | 30.30 | 1.185 | 1.193 |

1. Inches given for reference only

3 Mounting information

3.1 Mounting on heatsink

Figure 8. Screws distance

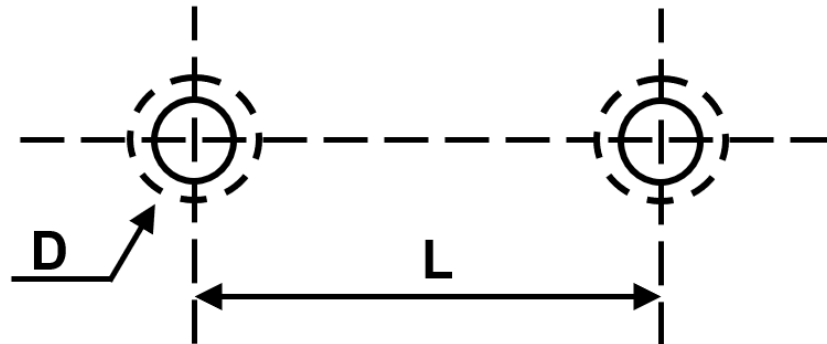


Table 5. Heatsink specification

| Parameter | Value |
|--|---|
| Flatness (max concavity or convexity between fixing holes) | $\leq 20 \mu\text{m}$ (0.78 mils) |
| Surface finish | $\pm 1.2 \mu\text{m}$ (± 0.05 mils) |
| Fixing holes | D = M4 L = $30 + 3 \text{ mm}$ ($1.181 + 0.012$ inch) |

Table 6. Mounting specification

| Parameter | Value |
|--------------|--|
| Fixing screw | M4 + lock washer |
| Torque | $1.3 \pm 0.2 \text{ N}\cdot\text{m}$ ($7.6 \pm 1.2 \text{ LBS}\cdot\text{inch}$) |
| Fixing holes | $\leq 0.05 \text{ }^\circ\text{CW}$ |

Table 7. Connectors

| Parameter | Value |
|------------------------------|--|
| Screws | See figure 9 |
| Torque | $1.3 \pm 0.2 \text{ N}\cdot\text{m}$ ($7.6 \pm 1.2 \text{ LBS}\cdot\text{inch}$) |
| Pull test (fast on pins) | $\leq 80 \text{ N}$ |
| Twist test | N/A |
| Contact area (screw version) | 45 mm^2 |
| Lead inductance | $\leq 5 \text{ nH}$ |

Figure 9. Mounting section

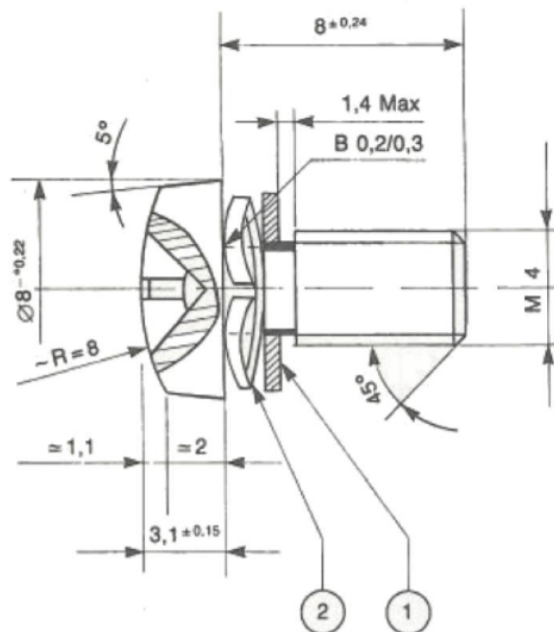
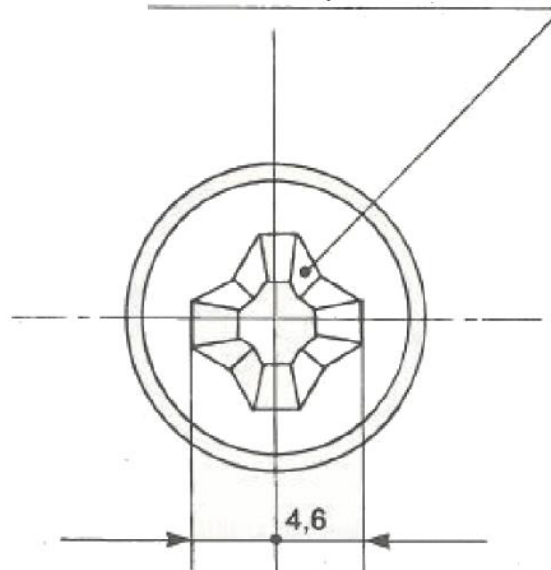


Figure 10. Cross form

Cruciform footprint



For more information, please refer to the following technical note related to the mounting :

- TN1331: Assembly recommendations for STMicroelectronics ISOTOP package

4 Ordering information

Table 8. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|----------------|-----------------|---------|---------------------|----------------|---------------|
| STPS200170TV1Y | STPS 200170TV1Y | ISOTOP | 27 g without screws | 10 with screws | Tube |

Revision history

Table 9. Document revision history

| Date | Version | Changes |
|-------------|---------|--|
| 02-Mar-2010 | 1 | First issue. |
| 07-Oct-2011 | 2 | Added torque values in Section 2. |
| 12-Nov-2015 | 3 | Updated features in cover page. Text added in Section 2. |
| 16-Apr-2018 | 4 | Removed figures 3 and 10. Updated Section Features, Section Description and Table 1. Absolute ratings (limiting values, per diode at $T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified). |
| 23-Nov-2020 | 5 | Updated Features, Table 1. Absolute ratings (limiting values, per diode at $T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) and Table 2. Thermal resistance parameters. Removed conduction losses curves. Added Section 3 Mounting information. Minor text change. |

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