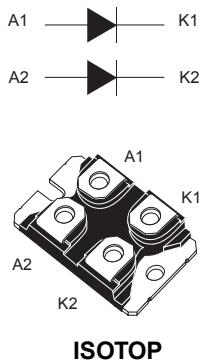


## Automotive 100 V, 2 x 120 A, power Schottky rectifier



### Features



- AEC-Q101 qualified
- PPAP capable
- Operating  $T_j$  from -40 °C to +175 °C
- Low thermal resistance
- Negligible switching losses
- Low  $C_{J0}$
- High forward surge capability
- Avalanche rated
- Insulated package ISOTOP:
  - Insulated voltage: 2500 V<sub>RMS</sub> sine
- ECOPACK2 compliant component
- Comply with UL1557 insulation: 2.5 kV
  - Reference file: E81734

### Applications

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

| Product status link             |           |
|---------------------------------|-----------|
| <a href="#">STPS240H100TV1Y</a> |           |
| Product summary                 |           |
| Symbol                          | Value     |
| Isolated diode                  |           |
| $I_{F(AV)}$                     | 2 x 120 A |
| $V_{RRM}$                       | 100 V     |
| $T_j$ (max.)                    | 175 °C    |
| $V_F$ (typ.)                    | 0.610 V   |

### Description

The **STPS240H100TV1Y** is an automotive Schottky diode suitable for high frequency switch mode power supply.

Especially suited for DC-DC applications, this isolated ISOTOP Schottky diode will improve the thermal management in harshest environments. Its high forward surge capability ensures a good robustness during transient phases or in case of short circuit event.

## 1 Characteristics

**Table 1. Absolute ratings (limiting values, per diode at  $T_{amb} = 25^{\circ}C$ , unless otherwise specified)**

| Symbol       | Parameter  | Value                                    | Unit        |
|--------------|--|--|-------------|
| $V_{RRM}$    | Repetitive peak reverse voltage, $T_j = -40^{\circ}C$ to $+175^{\circ}C$ | 100                                      | V           |
| $I_{F(RMS)}$ | Forward rms current  | 225                                      | A           |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$ , square wave                    | $T_C = 140^{\circ}C$ , per diode         | 120         |
|              |  | $T_C = 140^{\circ}C$ , per device        | 240         |
| $I_{FSM}$    | Surge non repetitive forward current                                     | $t_p = 10$ ms sinusoidal                 | 1150        |
| $P_{ARM}$    | Repetitive peak avalanche power  | $t_p = 10$ $\mu$ s, $T_j = 125^{\circ}C$ | 9300        |
| $T_{stg}$    | Storage temperature range  | -55 to $+175$                            | $^{\circ}C$ |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup>                    | -40 to $+175$                            | $^{\circ}C$ |

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        | Typ. value | Unit |
|---------------|------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode  | 0.24 |
|               |                  | Total      | 0.12 |

**Table 3. Static electrical characteristics (per diode)**

| Symbol               | Parameter               | Test conditions      |                 | Min. | Typ.  | Max.  | Unit    |
|----------------------|-------------------------|----------------------|-----------------|------|-------|-------|---------|
| $I_R$ <sup>(1)</sup> | Reverse leakage current | $T_j = 25^{\circ}C$  | $V_R = 15$ V    | -    |       | 40    | $\mu$ A |
|                      |                         | $T_j = 25^{\circ}C$  | $V_R = V_{RRM}$ | -    |       | 90    |         |
|                      |                         | $T_j = 125^{\circ}C$ |                 | -    | 26    | 65    | mA      |
| $V_F$ <sup>(2)</sup> | Forward voltage drop    | $T_j = 25^{\circ}C$  | $I_F = 60$ A    | -    |       | 0.700 | $V$     |
|                      |                         | $T_j = 150^{\circ}C$ |                 | -    | 0.505 | 0.570 |         |
|                      |                         | $T_j = 25^{\circ}C$  | $I_F = 80$ A    | -    |       | 0.750 |         |
|                      |                         | $T_j = 150^{\circ}C$ |                 | -    | 0.545 | 0.610 |         |
|                      |                         | $T_j = 25^{\circ}C$  | $I_F = 120$ A   | -    |       | 0.825 |         |
|                      |                         | $T_j = 150^{\circ}C$ |                 | -    | 0.610 | 0.680 |         |

1. Pulse test:  $t_p = 5$  ms,  $\delta < 2\%$

2. Pulse test:  $t_p = 380$   $\mu$ s,  $\delta < 2\%$

To evaluate the maximum conduction losses, use the following equation:

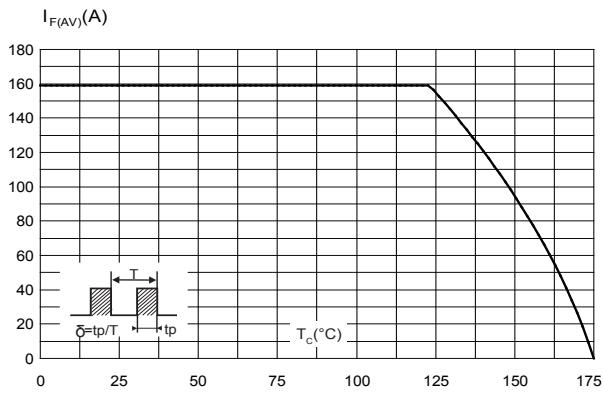
$$P = 0.46 \times I_{F(AV)} + 0.00183 \times I_F^2 \text{ (RMS)}$$

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

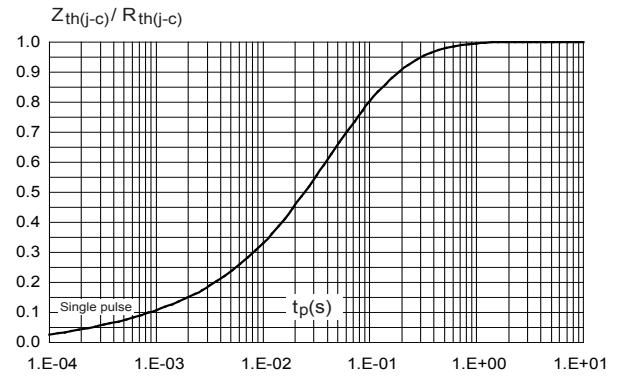
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

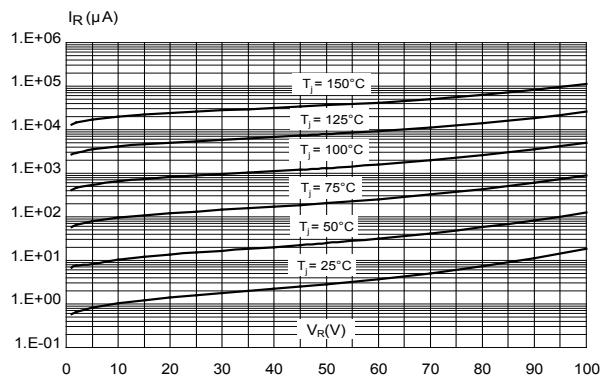
**Figure 1. Average forward current versus case temperature ( $\delta = 0.5$ , per diode)**



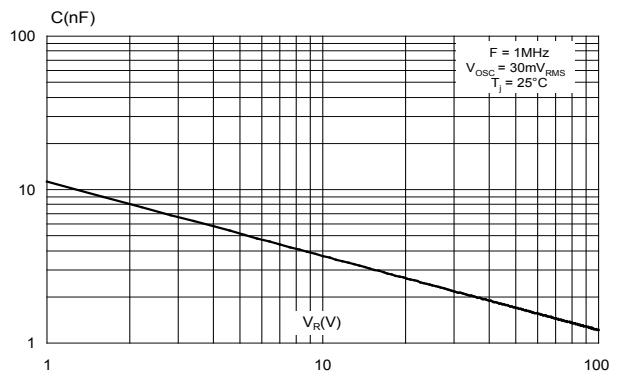
**Figure 2. Relative variation of thermal impedance junction to case versus pulse duration**



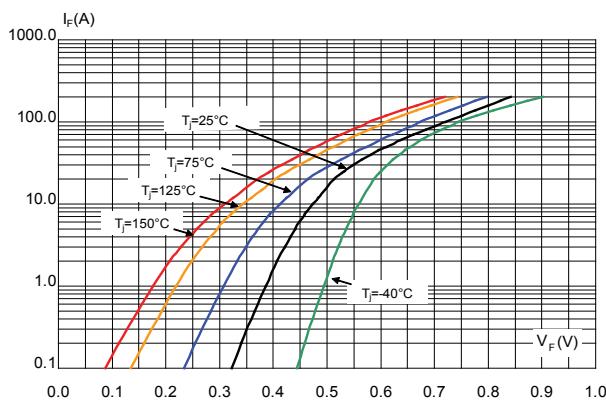
**Figure 3. Reverse leakage current versus reverse voltage applied (typical values per diode)**



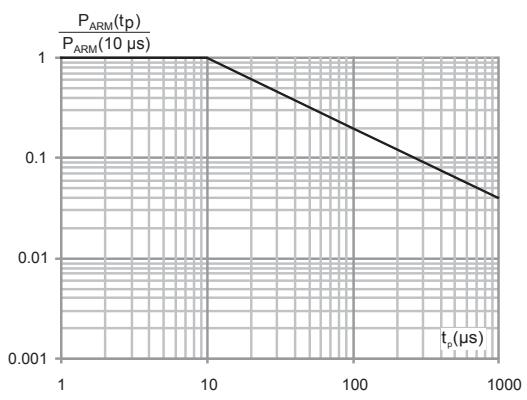
**Figure 4. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**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](http://www.st.com). ECOPACK is an ST trademark.

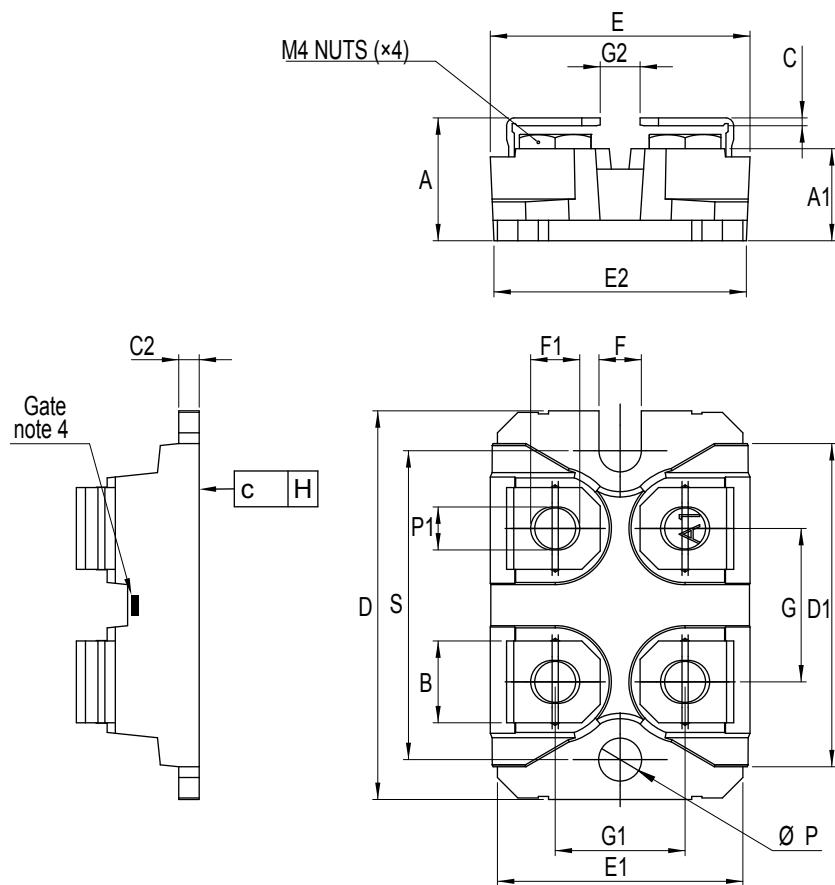
### 2.1 ISOTOP package information

- 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 <sup>(1)</sup> |       |
|        | 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*

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

- TN1331: Assembly recommendations for STMicroelectronics ISOTOP package

### 3 Ordering Information

**Table 5. Ordering information**

| Order code      | Marking          | Package | Weight              | Base qty.      | Delivery mode |
|-----------------|------------------|---------|---------------------|----------------|---------------|
| STPS240H100TV1Y | STPS 240H100TV1Y | ISOTOP  | 27 g without screws | 10 with screws | Tube          |

## Revision history

**Table 6. Document revision history**

| Date        | Version | Changes   |
|-------------|---------|---|
| 18-Feb-2020 | 1       | First issue.  |
| 05-May-2020 | 2       | Updated <a href="#">Table 1</a> . Added Mounting information.                             |
| 08-Jun-2020 | 3       | Updated Figure 3 and inserted TN1331 reference.   |
| 12-Jun-2020 | 4       | Removed section 3 Mounting information.<br>Minor text changes to improve the readability. |

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