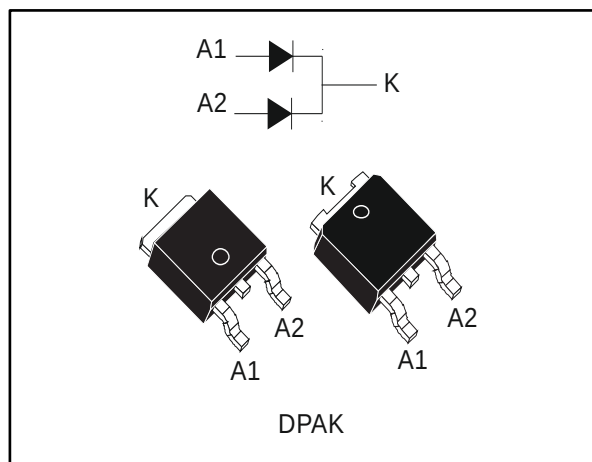


## Power Schottky rectifier

Datasheet - production data



### Description

This dual Schottky rectifier is designed for switch mode power supplies and other power converters.

This device is intended for use in low and medium voltage operation, and in particular high frequency circuits where low switching losses are required (free wheeling and polarity protection).

Table 1: Device summary

| Symbol      | Value   |
|-------------|---------|
| $I_{F(AV)}$ | 2 x 3 A |
| $V_{RRM}$   | 40 V    |
| $T_j$ (max) | 150 °C  |
| $V_F$ (typ) | 0.50 V  |

### Features

- Very small conduction losses
- Extremely fast switching
- Low thermal resistance
- Negligible switching losses
- Low forward voltage drop
- Low capacitance
- Avalanche specification
- ECOPACK®2 compliant component for DPAK on demand

# 1 Characteristics

**Table 2: Absolute ratings (limiting values at 25 °C, per diode, unless otherwise specified)**

| Symbol              | Parameter                                             |                                            | Value       | Unit |
|---------------------|-------------------------------------------------------|--------------------------------------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                            | 40          | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                            | 6           | A    |
| I <sub>F(AV)</sub>  | Average forward current $\delta = 0.5$ , square wave  | T <sub>C</sub> = 135 °C                    | 3           | A    |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | tp = 10 ms sinusoidal                      | 75          | A    |
| P <sub>ARM</sub>    | Repetitive peak avalanche power                       | tp = 10 $\mu$ s<br>T <sub>J</sub> = 125 °C | 90          | W    |
| T <sub>stg</sub>    | Storage temperature range                             |                                            | -65 to +150 | °C   |
| T <sub>J</sub>      | Maximum operating junction temperature <sup>(1)</sup> |                                            | 150         | °C   |

**Notes:**

<sup>(1)</sup>(dP<sub>tot</sub>/dT<sub>J</sub>) < (1/R<sub>th(j-a)</sub>) condition to avoid thermal runaway for a diode on its own heatsink.

**Table 3: Thermal parameters**

| Symbol               | Parameter        |            | Max. value | Unit |
|----------------------|------------------|------------|------------|------|
| R <sub>th(j-c)</sub> | Junction to case | Per diode  | 5.5        | °C/W |
|                      |                  | Per device | 3          |      |
| R <sub>th(c)</sub>   | Coupling         |            | 0.5        |      |

When the diodes 1 and 2 are used simultaneously:

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

**Table 4: Static electrical characteristics (per diode)**

| Symbol                        | Parameter               | Test conditions         |                                   | Min. | Typ. | Max. | Unit    |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|------|------|------|---------|
| I <sub>R</sub> <sup>(1)</sup> | Reverse leakage current | T <sub>J</sub> = 25 °C  | V <sub>R</sub> = V <sub>RRM</sub> | -    |      | 100  | $\mu$ A |
|                               |                         | T <sub>J</sub> = 125 °C |                                   | -    | 2    | 10   | mA      |
| V <sub>F</sub> <sup>(2)</sup> | Forward voltage drop    | T <sub>J</sub> = 25 °C  | I <sub>F</sub> = 3 A              | -    |      | 0.63 | V       |
|                               |                         | T <sub>J</sub> = 125 °C |                                   | -    | 0.50 | 0.57 |         |
|                               |                         | T <sub>J</sub> = 25 °C  | I <sub>F</sub> = 6 A              | -    |      | 0.84 |         |
|                               |                         | T <sub>J</sub> = 125 °C |                                   | -    | 0.67 | 0.72 |         |

**Notes:**

<sup>(1)</sup>Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$

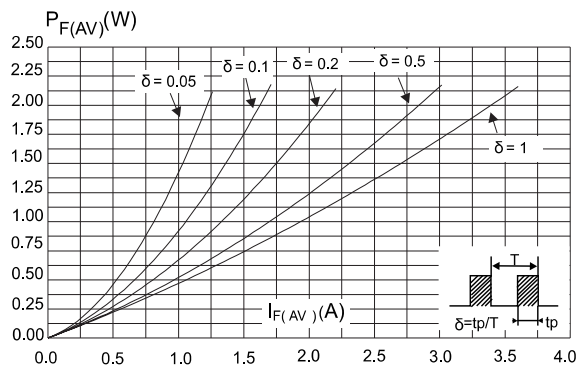
<sup>(2)</sup>Pulse test: t<sub>p</sub> = 380  $\mu$ s,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

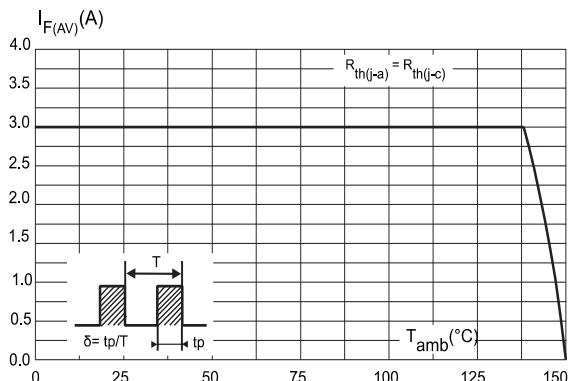
$$P = 0.42 \times I_{F(AV)} + 0.050 \times I_{F(RMS)}^2$$

## 1.1 Characteristics (curves)

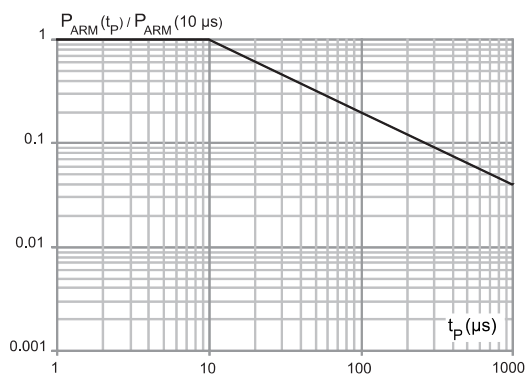
**Figure 1: Average forward power dissipation versus average forward current(per diode)**



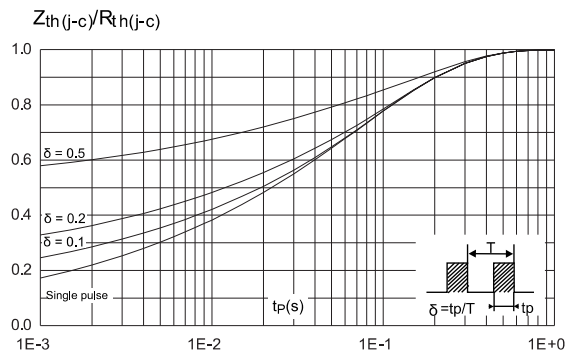
**Figure 2: Average forward current versus ambient temperature (per diode,  $\delta = 0.5$ )**



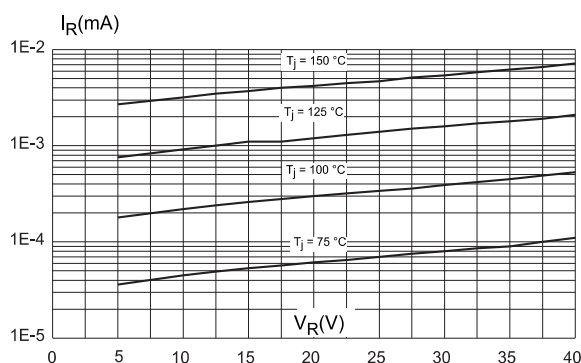
**Figure 3: Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



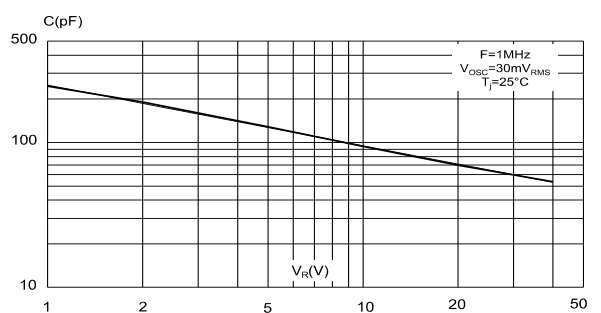
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration**

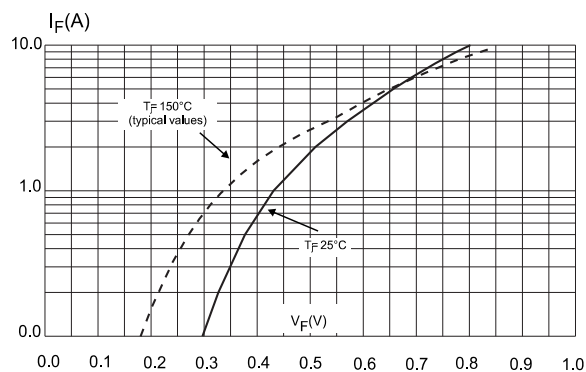
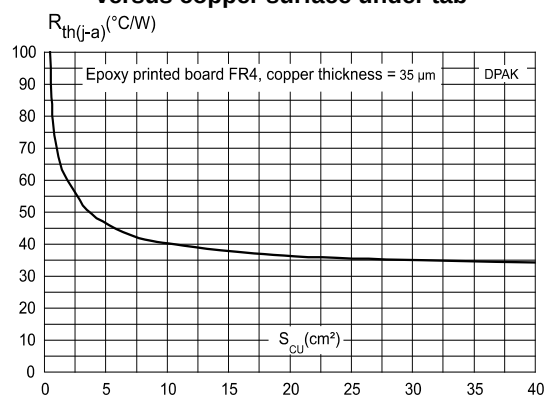


**Figure 5: Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 6: Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 7: Forward voltage drop versus forward current (maximum values, per diode)****Figure 8: Thermal resistance junction to ambient versus copper surface under tab**

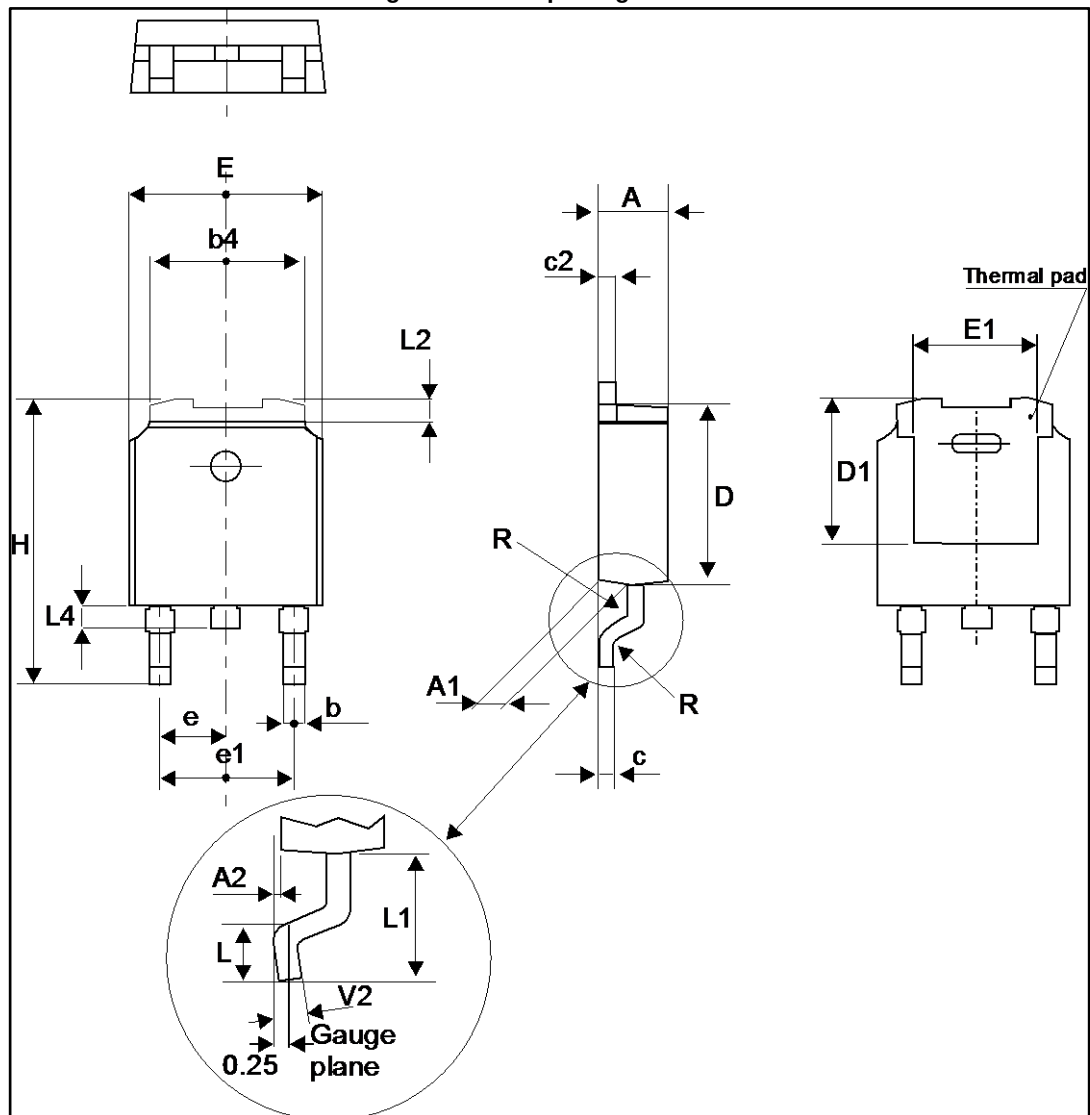
## 2 Package information

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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

### 2.1 DPAK package information

Figure 9: DPAK package outline

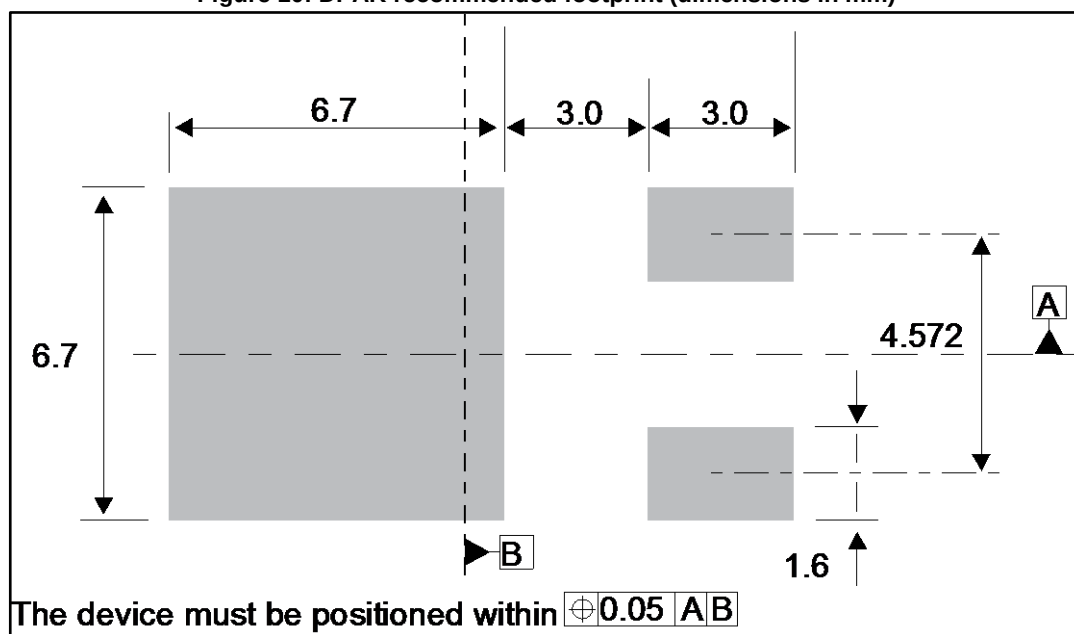


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5: DPAK package mechanical data

| Ref. | Dimensions  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 2.18        | 2.40  | 0.085      | 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 |
| b4   | 4.95        | 5.46  | 0.194      | 0.215 |
| c    | 0.46        | 0.61  | 0.018      | 0.024 |
| c2   | 0.46        | 0.60  | 0.018      | 0.023 |
| D    | 5.97        | 6.22  | 0.235      | 0.244 |
| D1   | 4.95        | 5.60  | 0.194      | 0.220 |
| E    | 6.35        | 6.73  | 0.250      | 0.265 |
| E1   | 4.32        | 5.50  | 0.170      | 0.216 |
| e    | 2.286 typ.  |       | 0.090 typ. |       |
| e1   | 4.40        | 4.70  | 0.173      | 0.185 |
| H    | 9.35        | 10.40 | 0.368      | 0.409 |
| L    | 1.0         | 1.78  | 0.039      | 0.070 |
| L2   |             | 1.27  |            | 0.050 |
| L4   | 0.60        | 1.02  | 0.023      | 0.040 |
| V2   | -8°         | +8°   | -8°        | +8°   |

Figure 10: DPAK recommended footprint (dimensions in mm)



### 3 Ordering information

Table 6: Ordering information

| Order code   | Marking | Package | Weight | Base qty | Delivery mode |
|--------------|---------|---------|--------|----------|---------------|
| STPS640CB    | S6 40C  | DPAK    | 0.32 g | 75       | Tube          |
| STPS640CB-TR | S6 40C  |         |        | 2500     | Tape and reel |

### 4 Revision history

Table 7: Document revision history

| Date        | Revision | Changes                                                                                               |
|-------------|----------|-------------------------------------------------------------------------------------------------------|
| Aug-2003    | 6B       | Last issue                                                                                            |
| 22-Mar-2007 | 7        | Updated <i>Figure 8</i> Updated ECOPACK statement.                                                    |
| 20-Nov-2014 | 8        | <i>Figure 3</i> . Removed PARM (T <sub>j</sub> = 25 °C), TO-220AB and TO-220FPAB package information. |
| 16-May-2017 | 9        | Updated DPAK package information and reformatted to current standard.                                 |

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