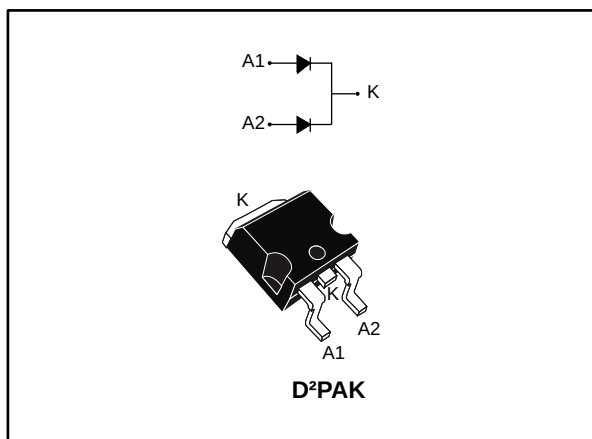


## Automotive high efficiency ultrafast diode

Datasheet - production data



### Description

Dual center tap rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in D<sup>2</sup>PAK, this device is especially intended for use in low voltage, high frequency inverters, freewheeling and polarity protection applications for automotive applications.

Table 1: Device summary

| Symbol          | Value   |
|-----------------|---------|
| $I_{F(AV)}$     | 2 x 8 A |
| $V_{RRM}$       | 200 V   |
| $T_j$ (max.)    | 175 °C  |
| $V_F$ (typ.)    | 0.78 V  |
| $t_{rr}$ (typ.) | 21 ns   |

### Features

- AEC-Q101 qualified
- Low losses
- Low forward and reverse recovery time
- Low leakage current
- High junction temperature
- $V_{RRM}$  guaranteed from -40 to +175 °C
- PPAP capable



# 1 Characteristics

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

| Symbol              | Parameter                                                         |                                   |            | Value       | Unit |
|---------------------|-------------------------------------------------------------------|-----------------------------------|------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage (T <sub>j</sub> = -40 to +175 °C) |                                   |            | 200         | V    |
| I <sub>F(RMS)</sub> | Forward rms current                                               |                                   |            | 26          | A    |
| I <sub>F(AV)</sub>  | Average forward current δ = 0.5, square wave                      | T <sub>C</sub> = 150 °C           | Per diode  | 8           | A    |
|                     |                                                                   | T <sub>C</sub> = 140 °C           | Per device | 16          |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current                              | t <sub>p</sub> = 10 ms sinusoidal |            | 100         | A    |
| T <sub>stg</sub>    | Storage temperature range                                         |                                   |            | -65 to +175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature range                      |                                   |            | -40 to +175 | °C   |

**Table 3: Thermal parameter**

| Symbol        | Parameter        |            | Max. value | Unit |
|---------------|------------------|------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode  | 2.7        | °C/W |
|               |                  | Per device | 1.6        |      |
| $R_{th(c)}$   | Coupling         |            | 0.5        | °C/W |

When the diodes 1 and 2 are used simultaneously:

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

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

| Symbol      | Parameter               | Test conditions |                 | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------|-----------------|------|------|------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_J = 25$ °C   | $V_R = V_{RRM}$ | -    |      | 6    | μA   |
|             |                         | $T_J = 125$ °C  |                 | -    | 4    | 60   |      |
| $V_F^{(2)}$ | Forward voltage drop    | $T_J = 25$ °C   | $I_F = 8$ A     | -    |      | 1.10 | V    |
|             |                         | $T_J = 150$ °C  |                 | -    | 0.78 | 0.90 |      |
|             |                         | $T_J = 25$ °C   | $I_F = 16$ A    | -    |      | 1.25 |      |
|             |                         | $T_J = 150$ °C  |                 | -    |      | 1.05 |      |

**Notes:**

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

<sup>(2)</sup>Pulse test:  $t_p = 380$  μs,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

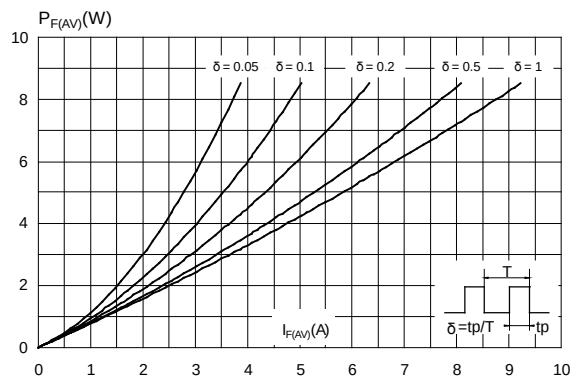
$$P = 0.75 \times I_{F(AV)} + 0.01875 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics (per diode)

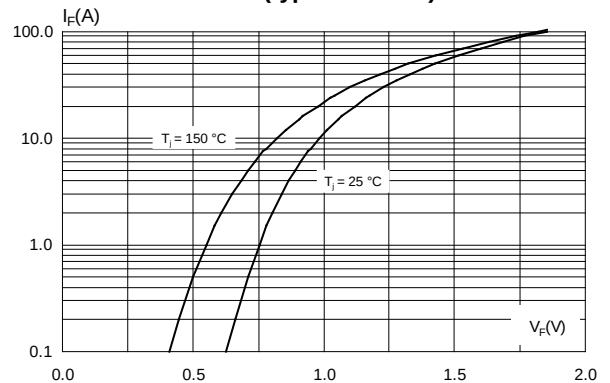
| Symbol   | Parameter                | Test conditions       |                                                                                        | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|----------------------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ °C}$  | $I_F = 1\text{ A}$ ,<br>$V_R = 30\text{ V}$ ,<br>$di_F/dt = 100\text{ A/}\mu\text{s}$  | -    | 21   | 26   | ns   |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 8\text{ A}$ ,<br>$V_R = 160\text{ V}$ ,<br>$di_F/dt = 200\text{ A/}\mu\text{s}$ | -    | 8    | 10   | A    |

## 1.1 Characteristics (curves)

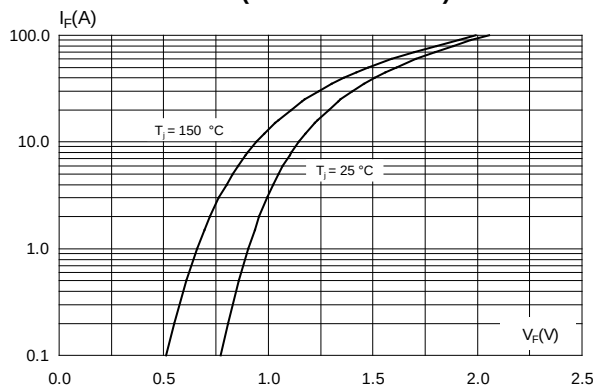
**Figure 1: Average forward power dissipation versus average forward current (square waveform)**



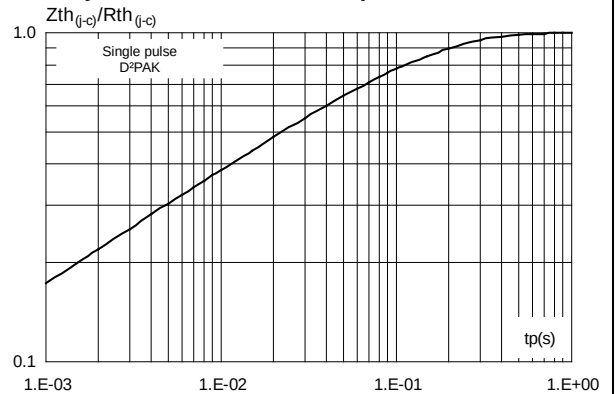
**Figure 2: Forward voltage drop versus forward current (typical values)**



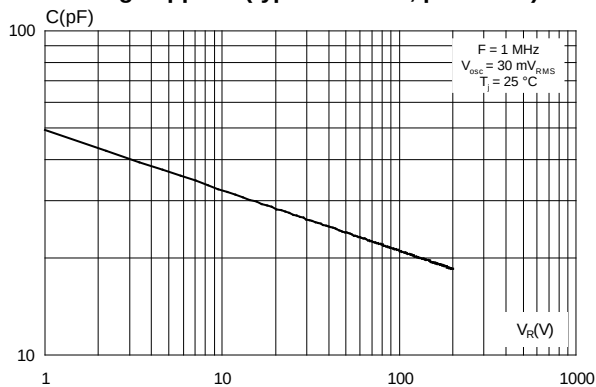
**Figure 3: Forward voltage drop versus forward current (maximum values)**



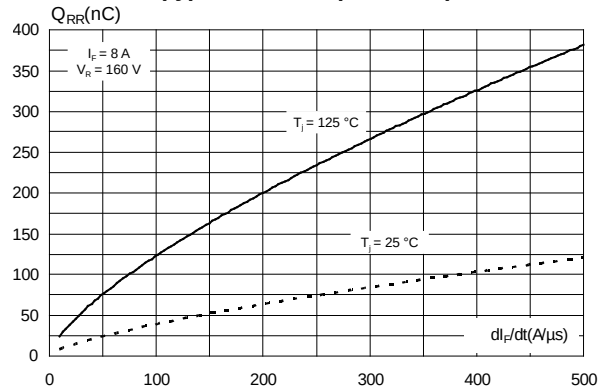
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration**



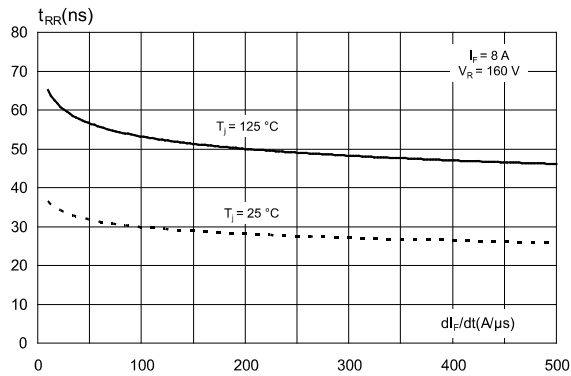
**Figure 5: Junction capacitance versus reverse voltage applied (typical values, per diode)**



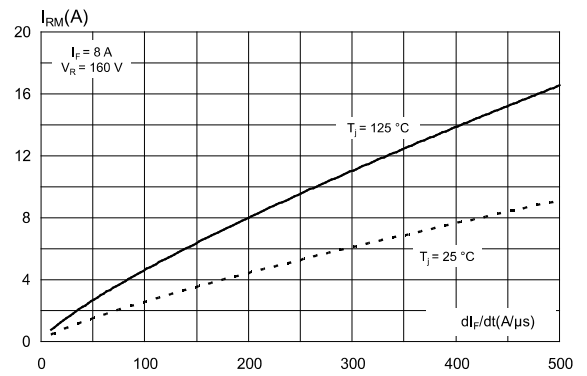
**Figure 6: Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)**



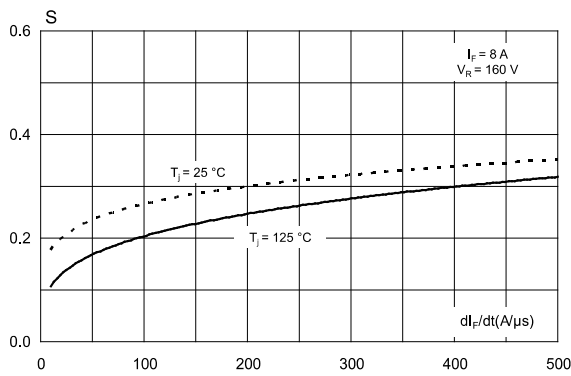
**Figure 7: Reverse recovery time versus  $di_F/dt$  (typical values, per diode)**



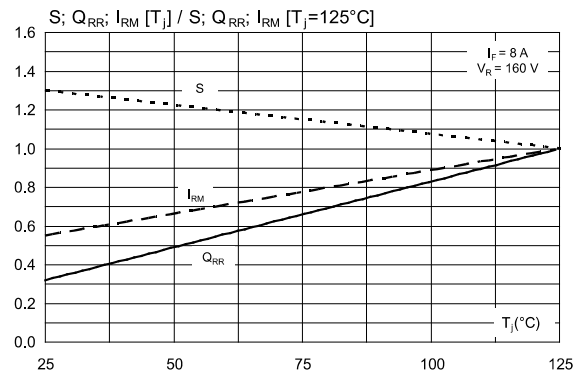
**Figure 8: Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode)**



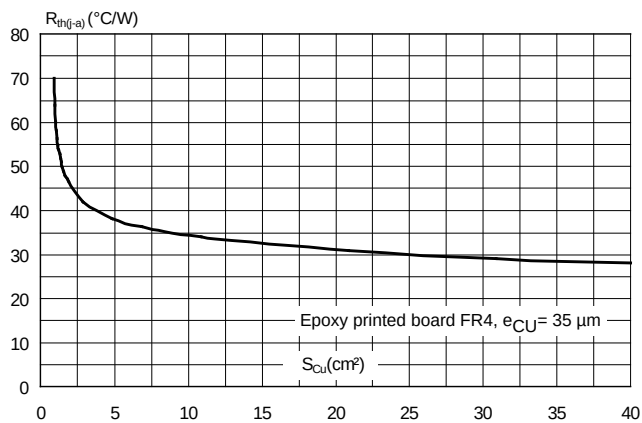
**Figure 9: Softness factor versus  $di_F/dt$  (typical values, per diode)**



**Figure 10: Dynamic parameters versus junction temperature**



**Figure 11: Thermal resistance junction to ambient versus copper surface under tab**

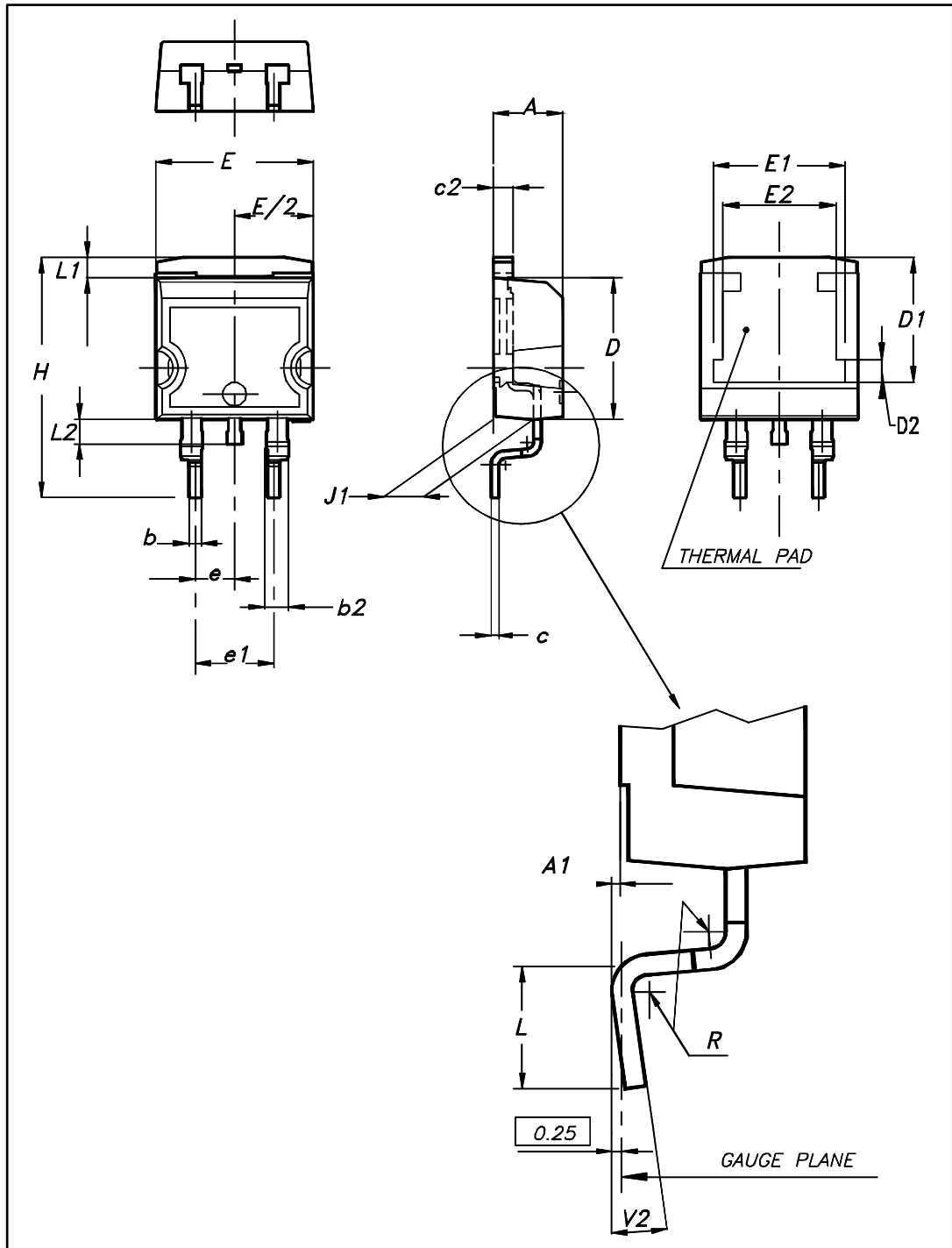


## 2 Package information

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 UL94,V0

## 2.1 D<sup>2</sup>PAK package information

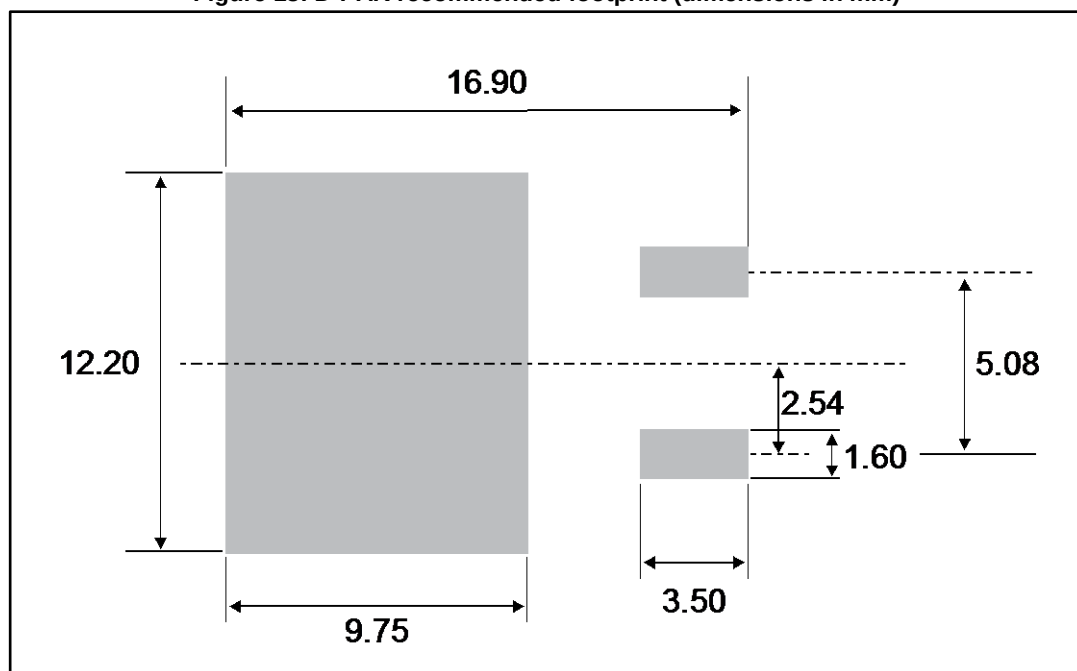
Figure 12: D<sup>2</sup>PAK package outline

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

Table 6: D<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 4.36        | 4.60  | 0.172  | 0.181 |
| A1   | 0.00        | 0.25  | 0.000  | 0.010 |
| b    | 0.70        | 0.93  | 0.028  | 0.037 |
| b2   | 1.14        | 1.70  | 0.045  | 0.067 |
| c    | 0.38        | 0.69  | 0.015  | 0.027 |
| c2   | 1.19        | 1.36  | 0.047  | 0.053 |
| D    | 8.60        | 9.35  | 0.339  | 0.368 |
| D1   | 6.90        | 8.00  | 0.272  | 0.311 |
| D2   | 1.10        | 1.50  | 0.043  | 0.060 |
| E    | 10.00       | 10.55 | 0.394  | 0.415 |
| E1   | 8.10        | 8.90  | 0.319  | 0.346 |
| E2   | 6.85        | 7.25  | 0.266  | 0.282 |
| e    | 2.54 typ.   |       | 0.100  |       |
| e1   | 4.88        | 5.28  | 0.190  | 0.205 |
| H    | 15.00       | 15.85 | 0.591  | 0.624 |
| J1   | 2.49        | 2.90  | 0.097  | 0.112 |
| L    | 1.90        | 2.79  | 0.075  | 0.110 |
| L1   | 1.27        | 1.65  | 0.049  | 0.065 |
| L2   | 1.30        | 1.78  | 0.050  | 0.070 |
| R    | 0.4 typ.    |       | 0.015  |       |
| V2   | 0°          | 8°    | 0°     | 8°    |



Figure 13: D<sup>2</sup>PAK recommended footprint (dimensions in mm)

### 3 Ordering information

Table 7: Ordering information

| Order code     | Marking     | Package            | Weight | Base qty. | Delivery mode |
|----------------|-------------|--------------------|--------|-----------|---------------|
| STTH1602CGY-TR | STTH1602CGY | D <sup>2</sup> PAK | 1.48 g | 1000      | Tape and reel |

### 4 Revision history

Table 8: Document revision history

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 04-Dec-2017 | 1        | Initial release. |

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