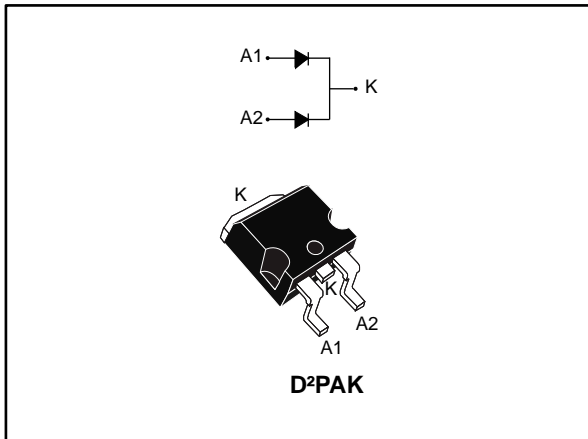


Automotive high efficiency ultrafast diode

Datasheet - production data



Description

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

Packaged in D²PAK, 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 _{RRM} | Repetitive peak reverse voltage (T _j = -40 to +175 °C) | | 200 | V | |
| I _{F(RMS)} | Forward rms current | | 26 | A | |
| I _{F(AV)} | Average forward current $\delta = 0.5$, square wave | T _C = 150 °C | Per diode | 8 | A |
| | | T _C = 140 °C | Per device | 16 | |
| I _{FSM} | Surge non repetitive forward current | t _p = 10 ms sinusoidal | | 100 | A |
| T _{stg} | Storage temperature range | | -65 to +175 | °C | |
| T _j | 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:

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

Table 4: Static electrical characteristics (per diode)

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|------|------|------|------|
| I _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:

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

⁽²⁾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 | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A},$ $V_R = 30\text{ V},$ $di_F/dt = 100\text{ A}/\mu\text{s}$ | - | 21 | 26 | ns |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 8\text{ A},$ $V_R = 160\text{ V},$ $di_F/dt = 200\text{ A}/\mu\text{s}$ | - | 8 | 10 | A |

1.1 Characteristics (curves)

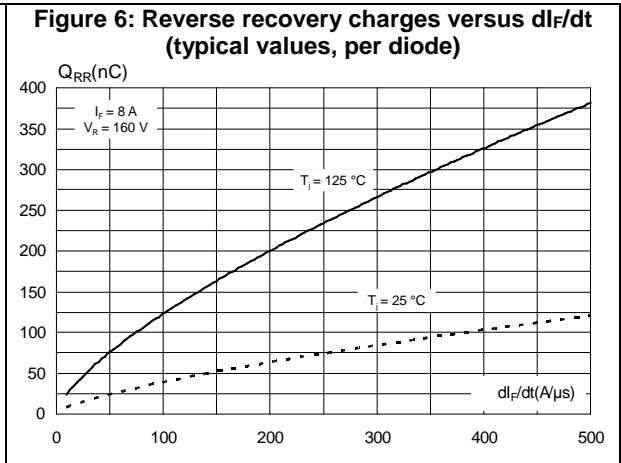
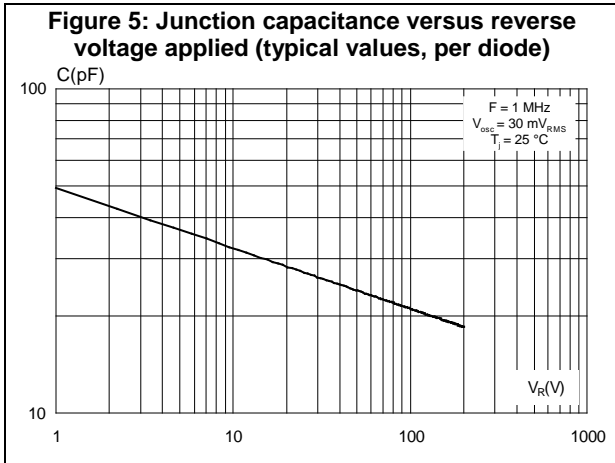
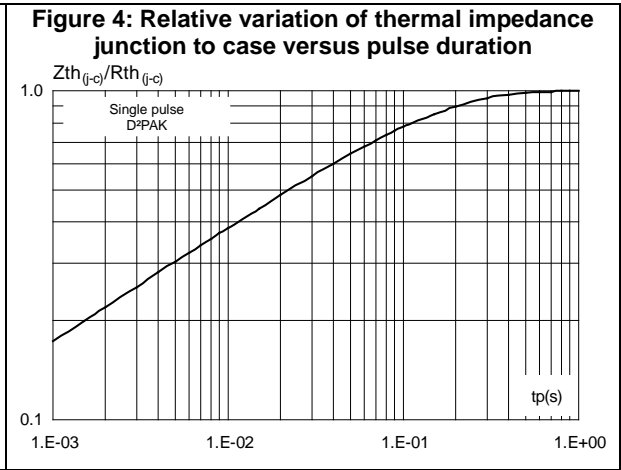
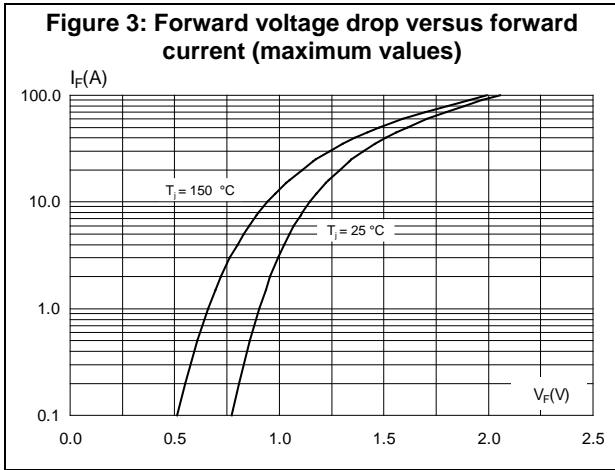
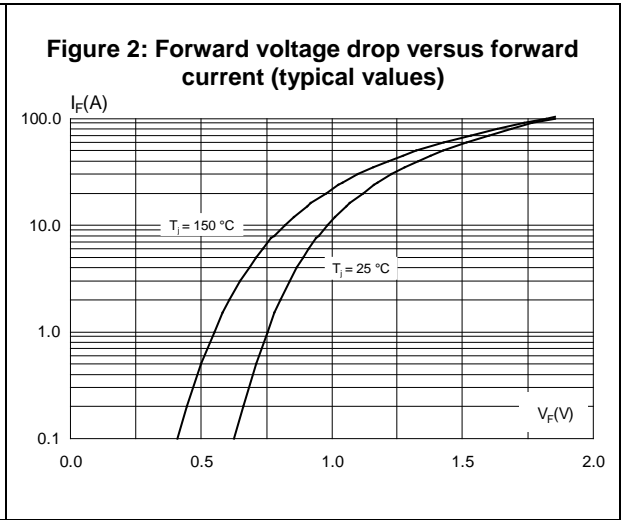
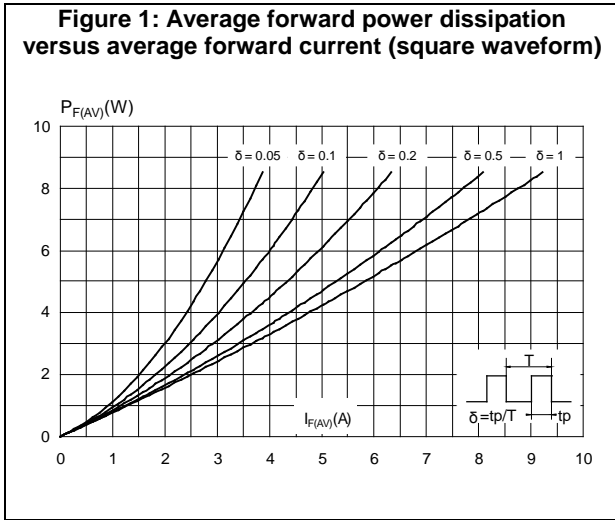


Figure 7: Reverse recovery time versus di_F/dt (typical values, per diode)

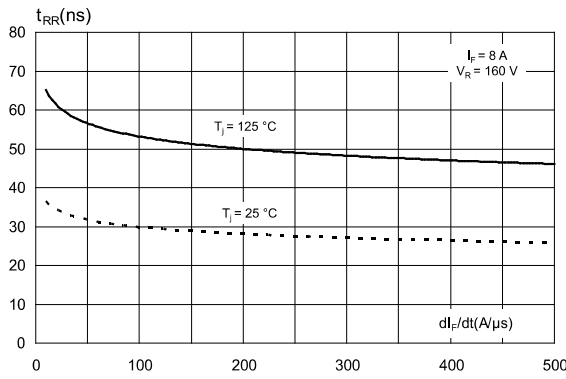


Figure 8: Peak reverse recovery current versus di_F/dt (typical values, per diode)

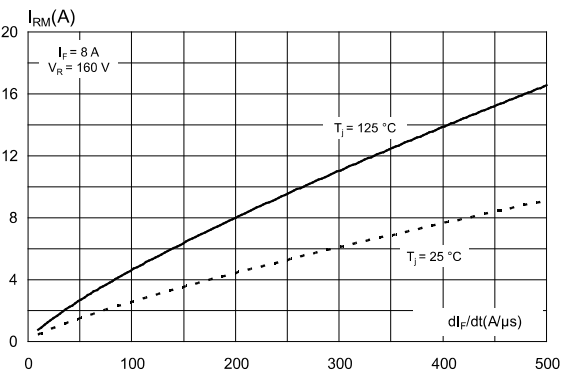


Figure 9: Softness factor versus di_F/dt (typical values, per diode)

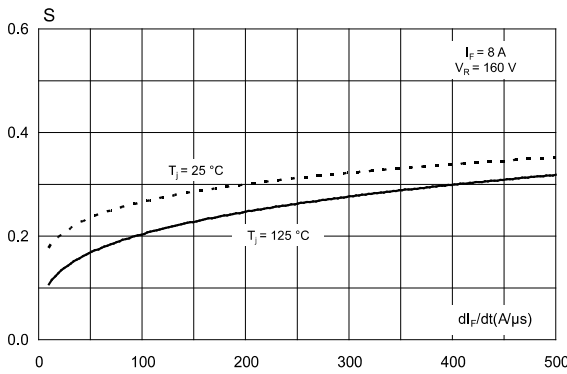


Figure 10: Dynamic parameters versus junction temperature

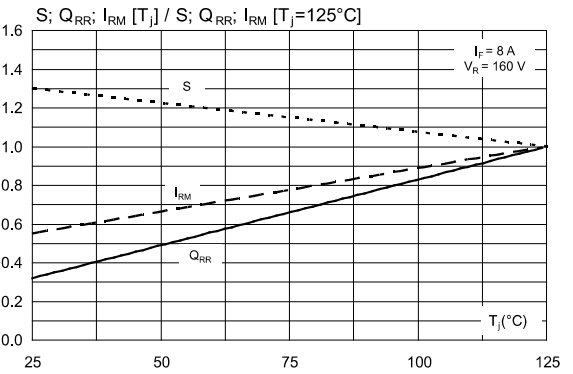
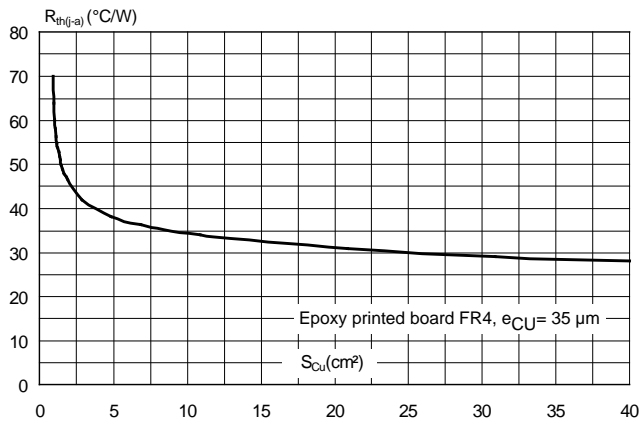


Figure 11: Thermal resistance junction to ambient versus copper surface under tab



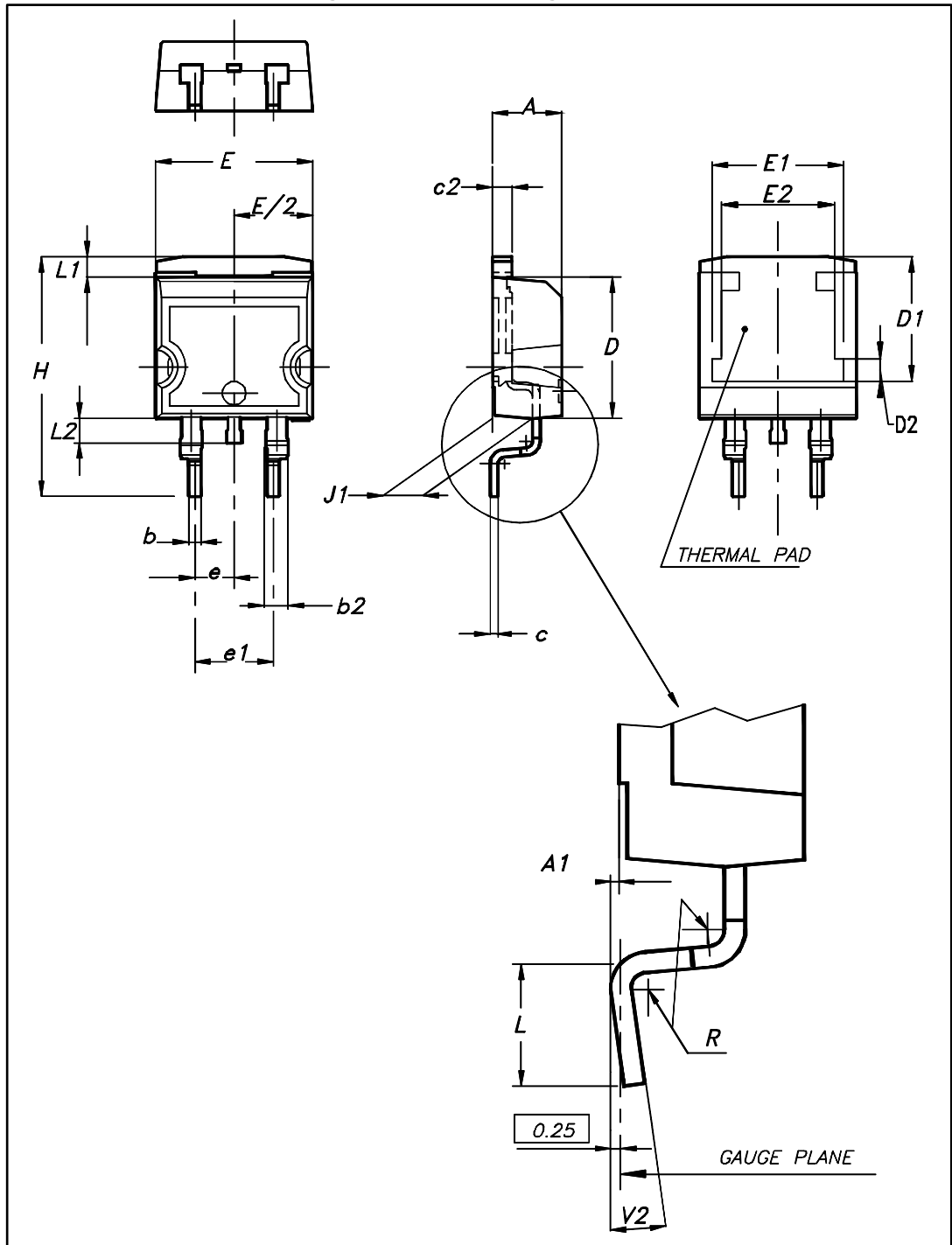
2 Package information

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. ECOPACK® is an ST trademark.

- Cooling method: by conduction (C)
- Epoxy meets UL94,V0

2.1 D²PAK package information

Figure 12: D²PAK package outline

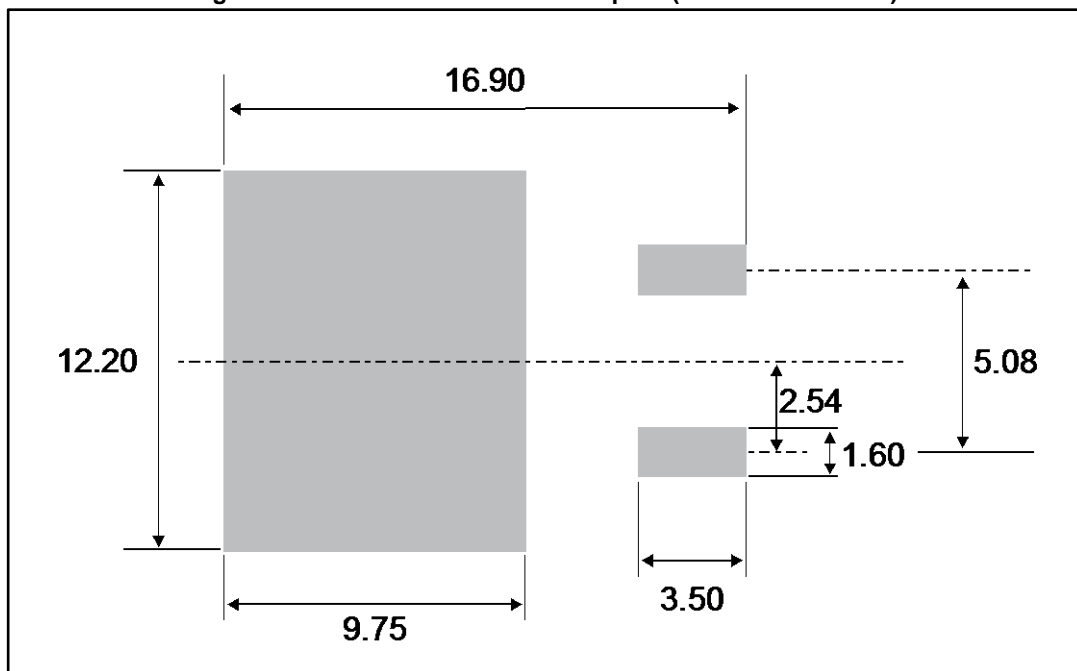


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: D²PAK 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: D²PAK 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 ² 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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