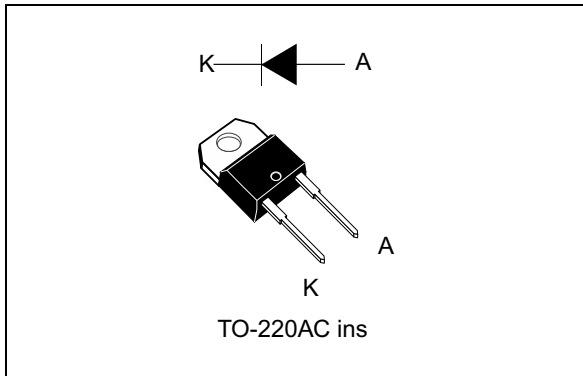


## 600 V tandem extra fast diode

Datasheet – production data


**Features**

- High voltage rectifier
- Tandem diodes in series
- Very low switching losses
- Insulated device with internal ceramic
- Equal thermal conditions for both 300 V diodes
- Static and dynamic equilibrium of internal diodes are warranted by design
- Insulated package:
  - Insulated voltage: 2500 V<sub>RMS</sub> sine

**Description**

This device is part of ST's second generation of 600 V tandem diodes. It has ultralow switching-losses with a minimized  $Q_{RR}$  that makes it perfect for use in circuits working in hard-switching mode. In particular the  $V_F/Q_{RR}$  trade-off positions this device between standard ultrafast diodes and silicon-carbide Schottky rectifiers in terms of price/performance ratio.

The device offers a new positioning giving more flexibility to power-circuit designers looking for good performance while still respecting cost constraints.

Featuring ST's Turbo 2 600 V technology, the device is particularly suited as a boost diode in continuous conduction mode power factor correction circuits.

**Table 1. Device summary**

| Symbol         | Value  |
|----------------|--------|
| $I_{F(AV)}$    | 8 A    |
| $V_{RRM}$      | 600 V  |
| $t_{rr}$ (typ) | 13 ns  |
| $I_{RM}$ (typ) | 2 A    |
| $V_F$ (typ)    | 2.5 V  |
| $I_{FRM}$      | 40 A   |
| $T_j$ (max)    | 175 °C |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at  $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol       | Parameter   |                                       | Value       | Unit |
|--------------|---|---------------------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage                       | $T_j$ from 25 to 150 °C               | 600         | V    |
|              |   | $T_j = -40\text{ °C}$                 | 550         |      |
| $I_{F(RMS)}$ | Forward rms current                                   |                                       | 14          | A    |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$ , square wave | $T_c = 80\text{ °C}$                  | 8           | A    |
| $I_{FSM}$    | Surge non repetitive forward current                  | $t_p = 10\text{ ms}$ sinusoidal       | 55          | A    |
| $I_{FRM}$    | Repetitive peak forward current                       | $T_c = 80\text{ °C}$ , $\delta = 0.1$ | 40          | A    |
| $T_{stg}$    | Storage temperature range                             |                                       | -65 to +175 | °C   |
| $T_j$        | Operating junction temperature range                  |                                       | -40 to +175 | °C   |

**Table 3. Thermal parameters**

| Symbol        | Parameter        | Value | Unit |
|---------------|------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case | 2.9   | °C/W |

**Table 4. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       | Min.               | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|--------------------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$    | -    | 6    | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                    | -    | 20   |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 8\text{ A}$ | -    | 3.4  | V             |
|             |                         | $T_j = 150\text{ °C}$ |                    | -    | 2.5  |               |

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 conduction losses use the following equation:

$$P = 2.2 \times I_{F(AV)} + 0.113 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

| Symbol   | Parameter                | Test conditions                   |  | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------------------|--|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ }^\circ\text{C}$  | $I_F = 1\text{ A}, V_R = 30\text{ V},$<br>$di_F/dt = -50\text{ A}/\mu\text{s}$   | -    | 20   | 26   | ns   |
|          |                          |                                   | $I_F = 8\text{ A}, V_R = 400\text{ V},$<br>$di_F/dt = -200\text{ A}/\mu\text{s}$ | -    | 13   | 17   |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 8\text{ A}, V_R = 400\text{ V},$<br>$di_F/dt = -200\text{ A}/\mu\text{s}$ | -    | 2    | 2.6  | A    |
| S        | Softness factor          |                                   |  | -    | 0.9  | -    | -    |
| $Q_{RR}$ | Reverse recovery charge  | $T_j = 25\text{ }^\circ\text{C}$  | $di_F/dt = -200\text{ A}/\mu\text{s}$  | -    | 4    | -    | nC   |
|          |                          | $T_j = 125\text{ }^\circ\text{C}$ |  | -    | 20   | -    |      |

Figure 1. Average forward power dissipation versus average forward current

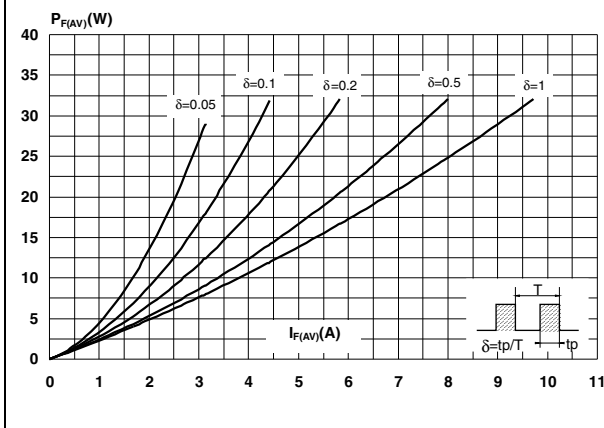


Figure 2. Forward voltage drop versus forward current (typical values)

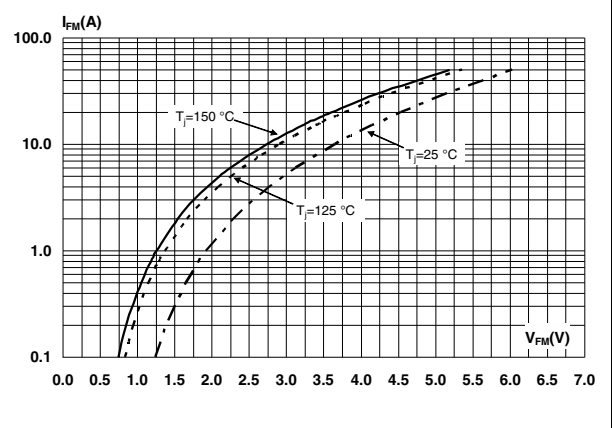


Figure 3. Relative variation of thermal impedance, junction to case, versus pulse duration

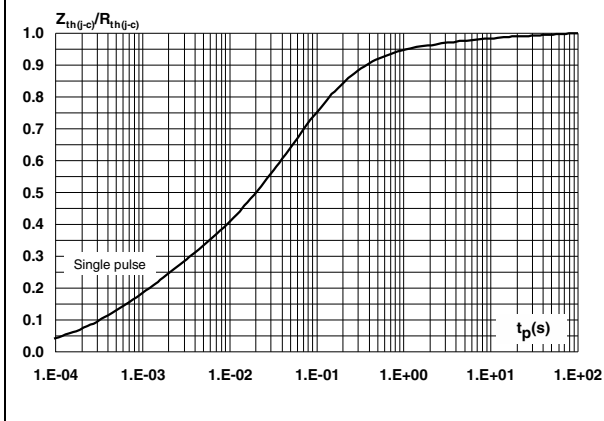
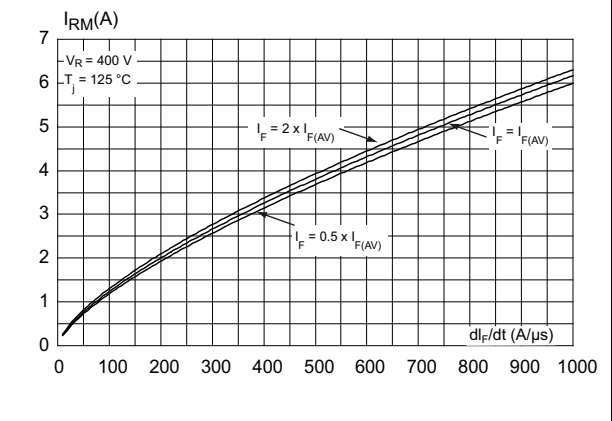
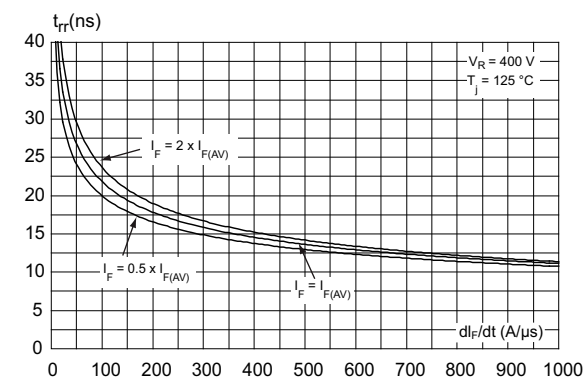


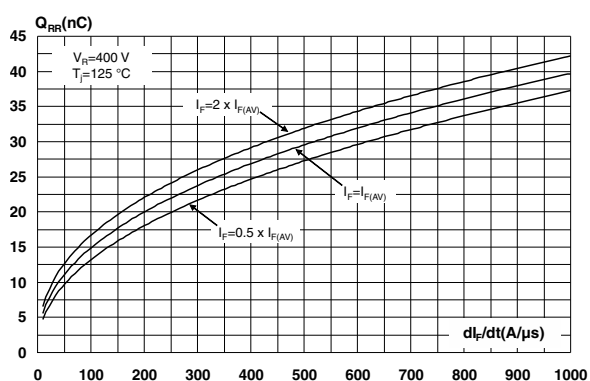
Figure 4. Peak reverse recovery current versus di\_F/dt (typical values)



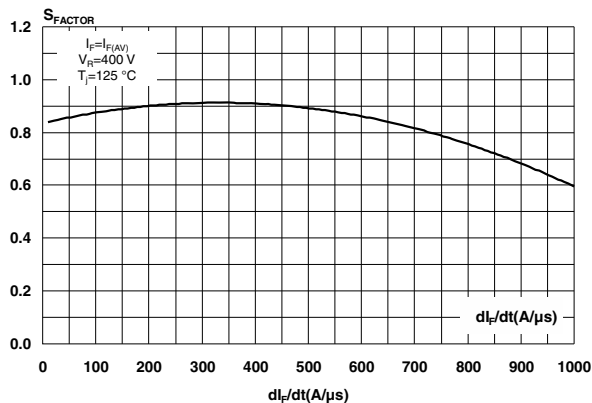
**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)**



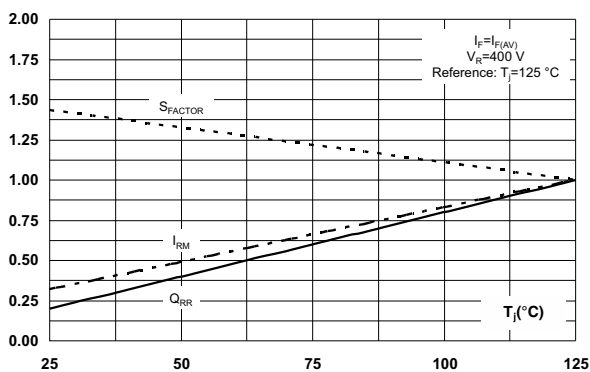
**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



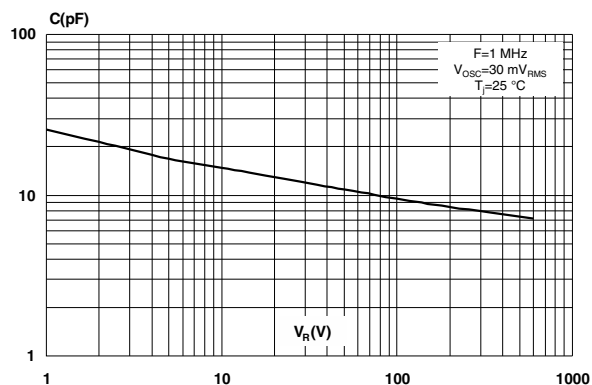
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



**Figure 8. Relative variations of dynamic parameters versus junction temperature**



**Figure 9. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 10. Relative variation of non-repetitive peak surge forward current versus pulse duration**

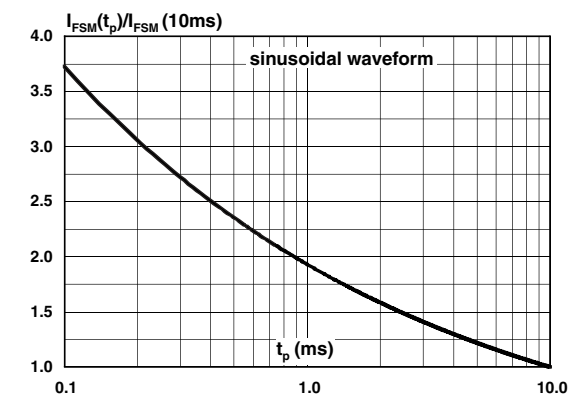
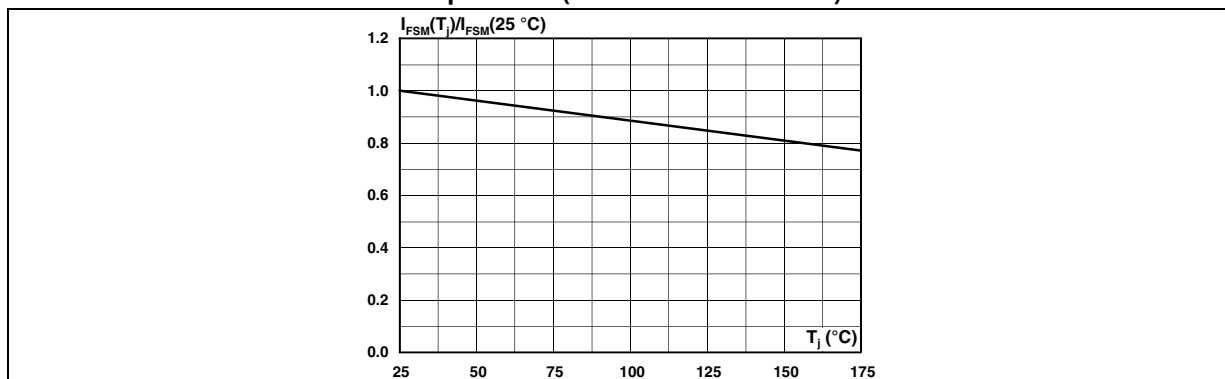


Figure 11. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque: 0.55 N·m
- Maximum torque: 0.7 N·m

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 TO-220AC ins. package information

Figure 12. TO-220AC ins. package outline

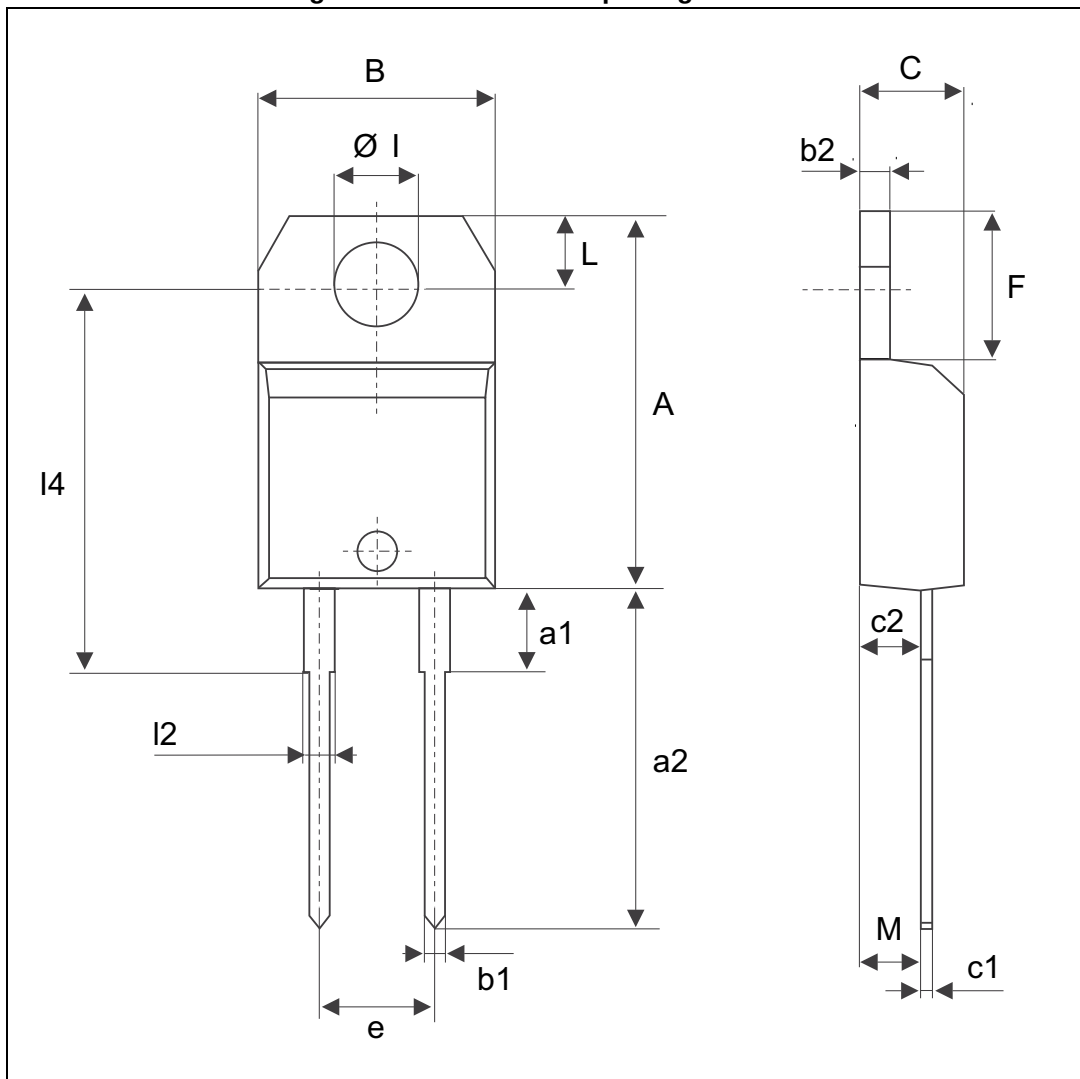


Table 6. T0-220AC ins. package mechanical data

| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 15.20       |       | 15.90 | 0.598  |       | 0.625 |
| a1   |             | 3.75  |       |        | 0.147 |       |
| a2   | 13.00       |       | 14.00 | 0.511  |       | 0.551 |
| B    | 10.00       |       | 10.40 | 0.393  |       | 0.409 |
| b1   | 0.61        |       | 0.88  | 0.024  |       | 0.034 |
| b2   | 1.23        |       | 1.32  | 0.048  |       | 0.051 |
| C    | 4.40        |       | 4.60  | 0.173  |       | 0.181 |
| c1   | 0.49        |       | 0.70  | 0.019  |       | 0.027 |
| c2   | 2.40        |       | 2.72  | 0.094  |       | 0.107 |
| e    | 4.80        |       | 5.40  | 0.189  |       | 0.212 |
| F    | 6.20        |       | 6.60  | 0.244  |       | 0.259 |
| ØI   | 3.75        |       | 3.85  | 0.147  |       | 0.151 |
| l4   | 15.80       | 16.40 | 16.80 | 0.622  | 0.646 | 0.661 |
| L    | 2.65        |       | 2.95  | 0.104  |       | 0.116 |
| l2   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| M    |             | 2.60  |       |        | 0.102 |       |

### 3 Ordering information

**Table 7. Ordering information**

| Order code  | Marking     | Package      | Weight | Base qty | Delivery mode |
|-------------|-------------|--------------|--------|----------|---------------|
| STTH8ST06DI | STTH8ST06DI | TO-220AC ins | 2.3 g  | 50       | Tube          |

### 4 Revision history

**Table 8. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 14-May-2013 | 1        | Initial release   |
| 27-Jul-2015 | 2        | Updated <a href="#">Features</a> , <a href="#">Table 2</a> , <a href="#">Table 7</a> , <a href="#">Figure 4</a> and torque value. |



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