

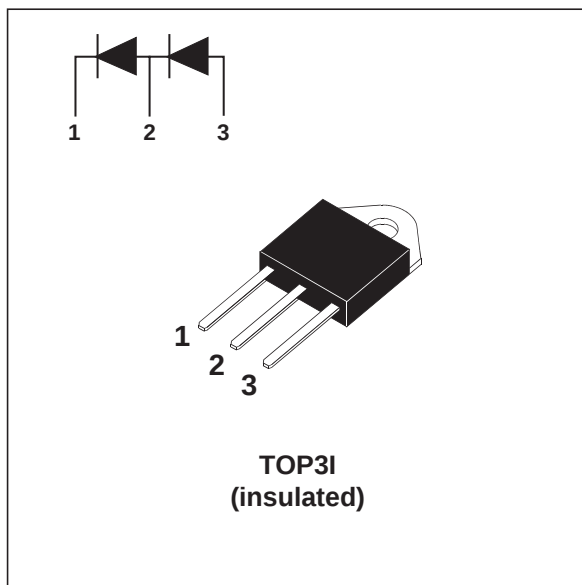
## Tandem 600V Hyperfast Rectifier

### MAJOR PRODUCTS CHARACTERISTICS

|                 |                   |
|-----------------|-------------------|
| $I_{F(AV)}$     | 15 A              |
| $V_{RRM}$       | 600 V (in series) |
| $T_j$ (max)     | 150 °C            |
| $V_F$ (max)     | 2.6 V             |
| $I_{RM}$ (typ.) | 4.8 A             |

### FEATURES AND BENEFITS

- Especially suited as boost diode in continuous mode power factor correctors and hard switching conditions.
- Designed for high  $di/dt$  operation. Hyperfast recovery current to compete with GaAs devices. Allows downsizing of mosfet and heatsinks.
- Internal ceramic insulated devices with equal thermal conditions for both 300V diodes.
- Insulation (2500V RMS) allows placement on same heatsink as mosfet and flexible heatsinking on common or separate heatsink.
- Matched diodes for typical PFC application without need for voltage balance network.
- $C = 7pF$



### DESCRIPTION

The TURBOSWITCH "H" is an ultra high performance diode composed of two 300V dice in series. TURBOSWITCH "H" family drastically cuts losses in the associated MOSFET when run at high  $dI_F/dt$ .

### ABSOLUTE RATINGS (limiting values for both diodes in series)

| Symbol       | Parameter                              |                                  | Value    | Unit |
|--------------|----------------------------------------|----------------------------------|----------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                                  | 600      | V    |
| $I_{F(RMS)}$ | RMS forward current                    |                                  | 26       | A    |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10 \text{ ms}$ sinusoidal | 130      | A    |
| $T_{stg}$    | Storage temperature range              |                                  | -65 +150 | °C   |
| $T_j$        | Maximum operating junction temperature |                                  | + 150    | °C   |

## THERMAL AND POWER DATA

| Symbol        | Parameter                                    | Test conditions                                                      | Value | Unit |
|---------------|----------------------------------------------|----------------------------------------------------------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case                             | Per diode                                                            | 2.9   | °C/W |
| $R_{th(c)}$   |                                              | Coupling                                                             | 0.3   |      |
| $R_{th(j-c)}$ | Junction to case                             | Total                                                                | 1.6   |      |
| $P_1$         | Conduction power dissipation for both diodes | $I_{F(AV)} = 15\text{ A}$ $\delta = 0.5$<br>$T_c = 70^\circ\text{C}$ | 50    | W    |

## STATIC ELECTRICAL CHARACTERISTICS (for both diodes)

| Symbol     | Parameter               | Tests Conditions    |                           | Min. | Typ. | Max. | Unit          |
|------------|-------------------------|---------------------|---------------------------|------|------|------|---------------|
| $I_R^*$    | Reverse leakage current | $V_R = V_{RRM}$     | $T_j = 25^\circ\text{C}$  |      |      | 20   | $\mu\text{A}$ |
|            |                         |                     | $T_j = 125^\circ\text{C}$ |      | 30   | 200  |               |
| $V_F^{**}$ | Forward voltage drop    | $I_F = 15\text{ A}$ | $T_j = 25^\circ\text{C}$  |      |      | 3.6  | V             |
|            |                         |                     | $T_j = 125^\circ\text{C}$ |      | 2.1  | 2.6  |               |

Pulse test: \*  $t_p = 5\text{ms}$ ,  $\delta < 2\%$

\*\*  $t_p = 380\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation:

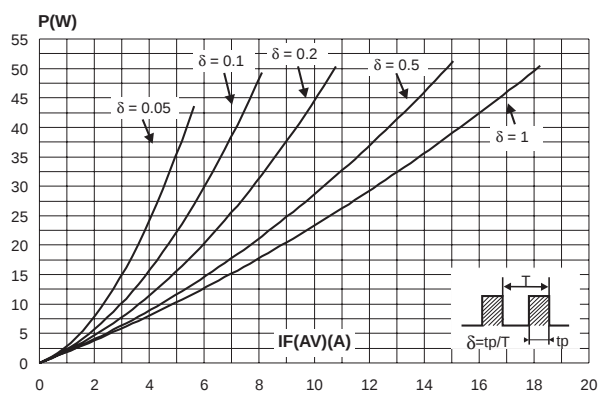
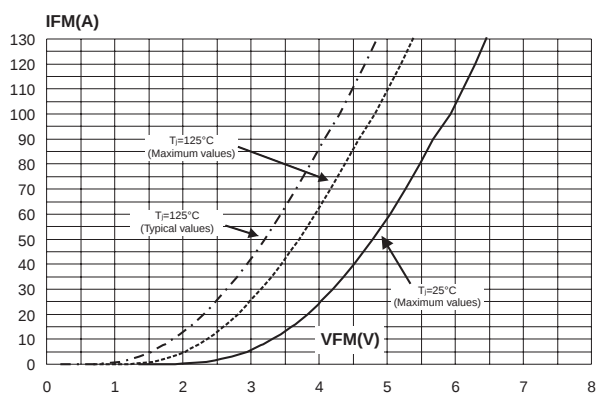
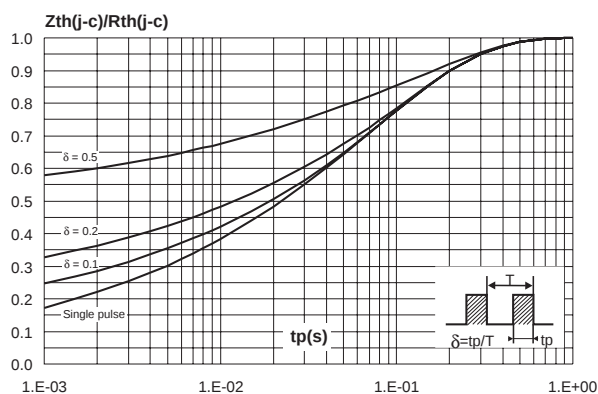
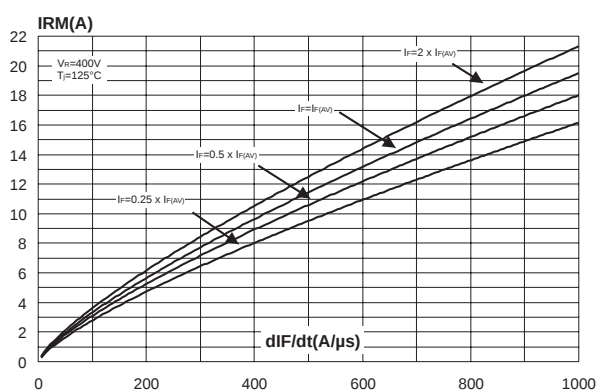
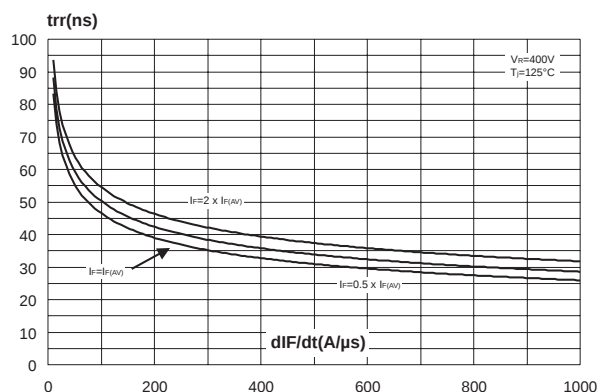
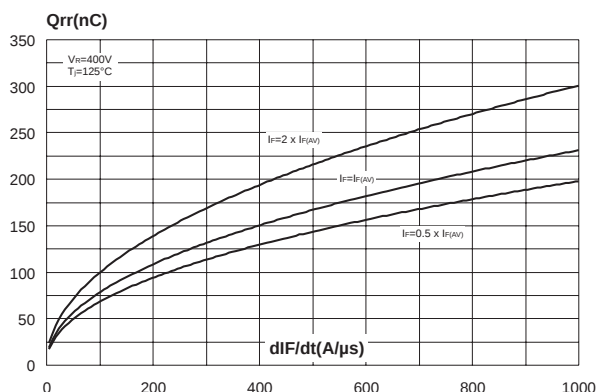
$$P = 1.8 \times I_{F(AV)} + 0.053 \times I_{F(RMS)}^2$$

## RECOVERY CHARACTERISTICS

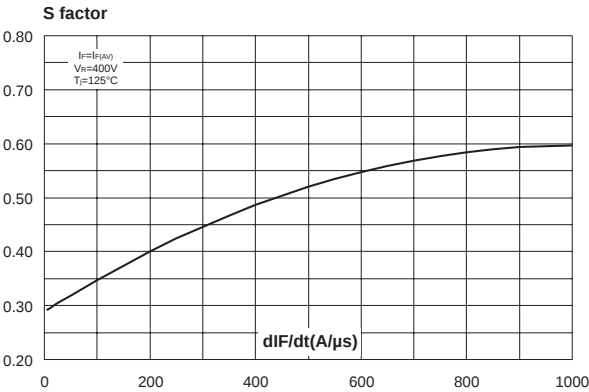
| Symbol       | Parameter                | Tests Conditions                                                                  |                           | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|-----------------------------------------------------------------------------------|---------------------------|------|------|------|------|
| $t_{rr}$     | Reverse recovery time    | $I_F = 0.5\text{ A}$ $I_{rr} = 0.25\text{ A}$<br>$I_R = 1\text{ A}$               | $T_j = 25^\circ\text{C}$  |      | 16   |      | ns   |
|              |                          | $I_F = 1\text{ A}$ $dI_F/dt = -50\text{ A}/\mu\text{s}$<br>$V_R = 30\text{ V}$    |                           |      |      | 35   |      |
| $I_{RM}$     | Reverse recovery current | $V_R = 400\text{ V}$ $I_F = 15\text{ A}$<br>$dI_F/dt = -200\text{ A}/\mu\text{s}$ | $T_j = 125^\circ\text{C}$ |      | 4.8  | 6.0  | A    |
| $S_{factor}$ |                          |                                                                                   |                           |      | 0.4  |      | -    |

## TURN-ON SWITCHING CHARACTERISTICS

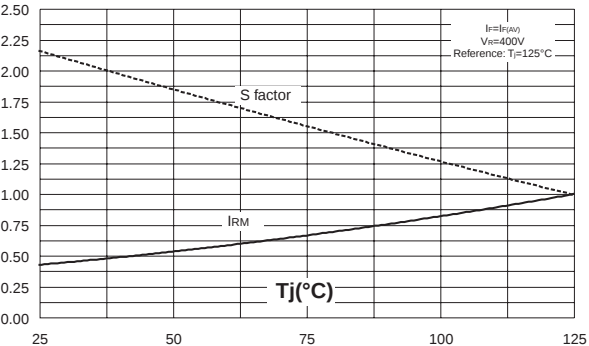
| Symbol   | Parameter                | Tests Conditions                                                                             |                          | Min. | Typ. | Max. | Unit |
|----------|--------------------------|----------------------------------------------------------------------------------------------|--------------------------|------|------|------|------|
| $t_{fr}$ | Forward recovery time    | $I_F = 15\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ ,<br>$V_{FR} = 1.1 \times V_{Fmax}$ | $T_j = 25^\circ\text{C}$ |      |      | 200  | ns   |
| $V_{FP}$ | Forward recovery voltage | $I_F = 15\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$                                     | $T_j = 25^\circ\text{C}$ |      |      | 6    | V    |

**Fig. 1:** Conduction losses versus average current.**Fig. 2:** Forward voltage drop versus forward current.**Fig. 3:** Relative variation of thermal impedance junction to case versus pulse duration.**Fig. 4:** Peak reverse recovery current versus  $di_F/dt$  (90% confidence).**Fig. 5:** Reverse recovery time versus  $di_F/dt$  (90% confidence).**Fig. 6:** Reverse recovery charges versus  $di_F/dt$  (90% confidence).

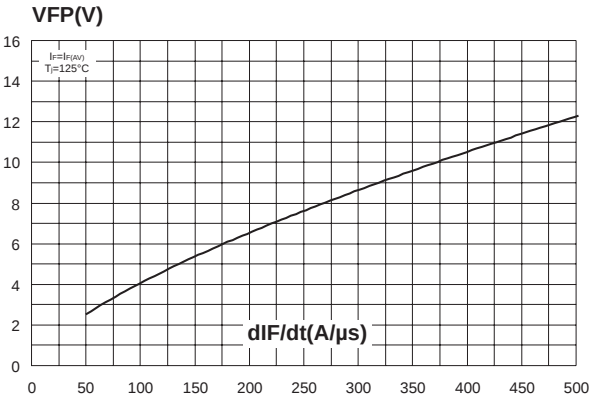
**Fig. 7:** Softness factor versus  $dI_F/dt$  (typical values).



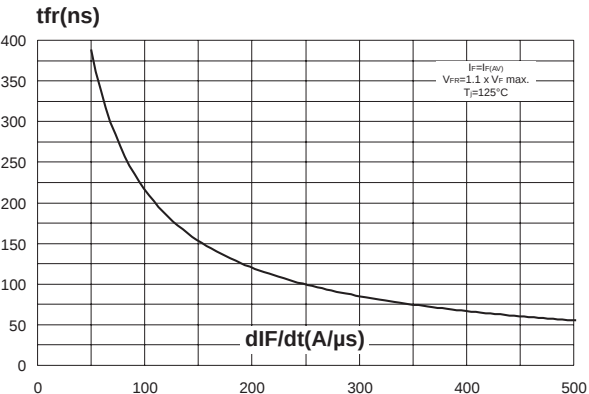
**Fig. 8:** Relative variations of dynamic parameters versus junction temperature.



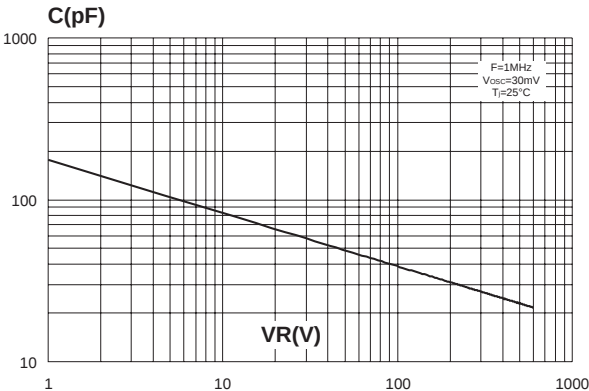
**Fig. 9:** Transient peak forward voltage versus  $dI_F/dt$  (90% confidence).



**Fig. 10:** Forward recovery time versus  $dI_F/dt$  (90% confidence).



**Fig. 11:** Junction capacitance versus reverse voltage applied (typical values).



**PACKAGE MECHANICAL DATA**  
**TOP3I**

| REF. | DIMENSIONS  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 4.4         |      | 4.6   | 0.173  |       | 0.181 |
| B    | 1.45        |      | 1.55  | 0.057  |       | 0.061 |
| C    | 14.35       |      | 15.60 | 0.565  |       | 0.614 |
| D    | 0.5         |      | 0.7   | 0.020  |       | 0.028 |
| E    | 2.7         |      | 2.9   | 0.106  |       | 0.114 |
| F    | 15.8        |      | 16.5  | 0.622  |       | 0.650 |
| G    | 20.4        |      | 21.1  | 0.815  |       | 0.831 |
| H    | 15.1        |      | 15.5  | 0.594  |       | 0.610 |
| J    | 5.4         |      | 5.65  | 0.213  |       | 0.222 |
| K    | 3.4         |      | 3.65  | 0.134  |       | 0.144 |
| L    | 4.08        |      | 4.17  | 0.161  |       | 0.164 |
| P    | 1.20        |      | 1.40  | 0.047  |       | 0.055 |
| R    |             | 4.60 |       |        | 0.181 |       |

| Ordering code | Marking     | Package | Weight  | Base qty | Delivery mode |
|---------------|-------------|---------|---------|----------|---------------|
| STTH1506TPI   | STTH1506TPI | TOP3I   | 4.46 g. | 30       | Tube          |

- Epoxy meets UL94,V0

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