

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

### MAIN PRODUCT CHARACTERISTICS

|                 |        |
|-----------------|--------|
| $I_{F(AV)}$     | 12 A   |
| $V_{RRM}$       | 600 V  |
| $I_{RM}$ (typ.) | 7 A    |
| $T_j$ (max)     | 175 °C |
| $V_F$ (max)     | 1.8 V  |
| $t_{rr}$ (max)  | 45 ns  |

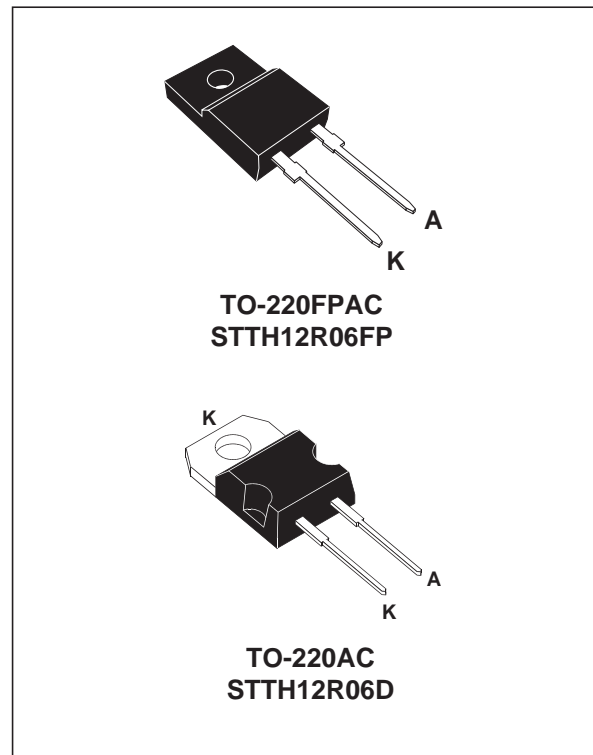
### FEATURES AND BENEFITS

- Ultrafast switching
- Low reverse recovery current
- Reduces switching losses
- Low thermal resistance

### DESCRIPTION

The STTH12R06D/FP, which is using ST Turbo 2 600V technology, is specially suited as boost diode in continuous mode power factor corrections and hard switching conditions.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.



### ABSOLUTE RATINGS (limiting values)

| Symbol       | Parameter                              |                          | Value      | Unit |
|--------------|--|--------------------------|------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                          | 600        | V    |
| $I_{F(RMS)}$ | RMS forward current                    |                          | 30         | A    |
| $I_{F(AV)}$  | Average forward current                |                          | 12         | A    |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10$ ms Sinusoidal | 100        | A    |
| $T_{stg}$    | Storage temperature range              |                          | - 65 + 175 | °C   |
| $T_j$        | Maximum operating junction temperature |                          | + 175      | °C   |

## STTH12R06D/FP

### THERMAL RESISTANCES

| Symbol               | Parameter        |            | Value | Unit |
|----------------------|------------------|------------|-------|------|
| R <sub>th(j-c)</sub> | Junction to case | TO-220AC   | 1.7   | °C/W |
|                      |                  | TO-220FPAC | 4.4   |      |

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol         | Parameter               | Tests conditions      |                        | Min. | Typ. | Max. | Unit |
|----------------|-------------------------|-----------------------|------------------------|------|------|------|------|
| I <sub>R</sub> | Reverse leakage current | V <sub>R</sub> = 600V | T <sub>j</sub> = 25°C  |      |      | 45   | μA   |
|                |                         |                       | T <sub>j</sub> = 125°C |      | 50   | 600  |      |
| V <sub>F</sub> | Forward voltage drop    | I <sub>F</sub> = 12 A | T <sub>j</sub> = 25°C  |      |      | 2.9  | V    |
|                |                         |                       | T <sub>j</sub> = 125°C |      | 1.4  | 1.8  |      |

To evaluate the maximum conduction losses use the following equation :  
 $P = 1.16 \times I_{F(AV)} + 0.053 I_{F(RMS)}^2$

### DYNAMIC ELECTRICAL CHARACTERISTICS

| Symbol          | Tests conditions   |  | Min.                   | Typ. | Max. | Unit |    |
|-----------------|--|--|------------------------|------|------|------|----|
| trr             | I <sub>F</sub> = 0.5 A I <sub>rr</sub> = 0.25 A I <sub>R</sub> = 1A          |  | T <sub>j</sub> = 25°C  |      | 25   | ns   |    |
|                 | I <sub>F</sub> = 1 A dI <sub>F</sub> /dt = - 50 A/μs<br>V <sub>R</sub> = 30V |  |                        |      | 45   |      |    |
| I <sub>RM</sub> | V <sub>R</sub> = 400 V I <sub>F</sub> = 12A                                  |  | T <sub>j</sub> = 125°C |      | 7.0  | 8.4  | A  |
| S factor        | dI <sub>F</sub> /dt = - 200A/μs  |  |                        |      | 0.2  |      |    |
| Qrr             |  |  |                        |      | 180  |      | nC |
| tfr             | I <sub>F</sub> = 12 A dI <sub>F</sub> /dt = 96 A/μs                          |  | T <sub>j</sub> = 25°C  |      |      | 200  | ns |
| V <sub>FP</sub> | V <sub>FR</sub> = 1.1 x V <sub>Fmax</sub>                                    |  |                        |      |      | 5.5  | V  |

Fig. 1: Conduction losses versus average current.

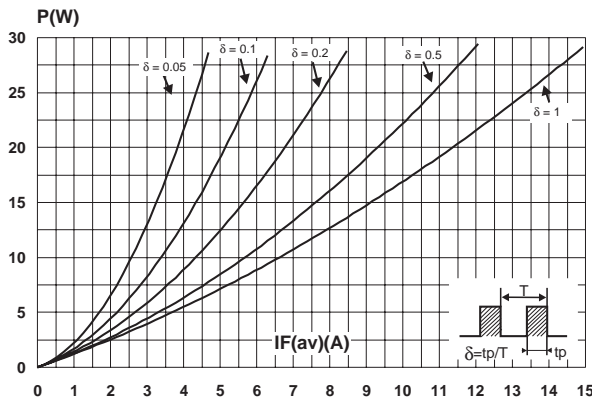


Fig. 2: Forward voltage drop versus forward current.

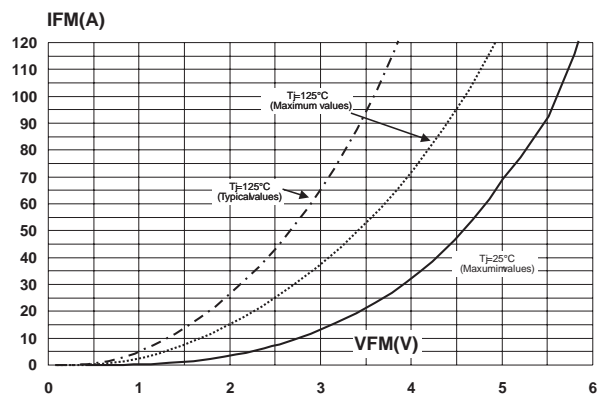


Fig. 3-1: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC).

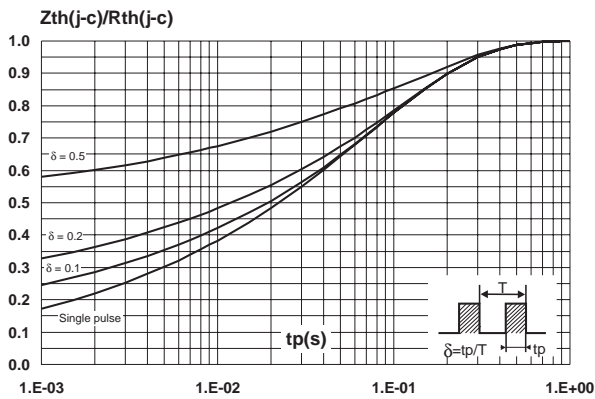


Fig. 3-2: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC).

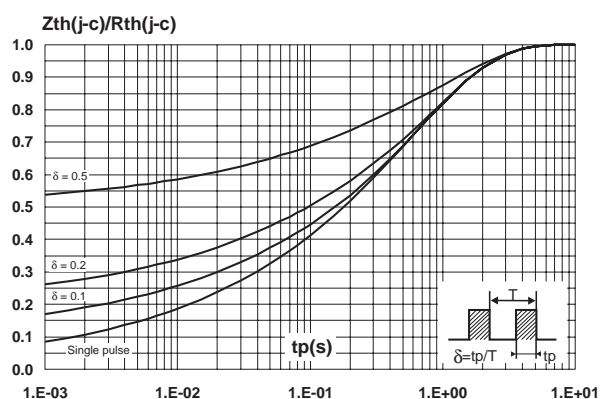


Fig. 4: Peak reverse recovery current versus  $dI_F/dt$  (90% confidence).

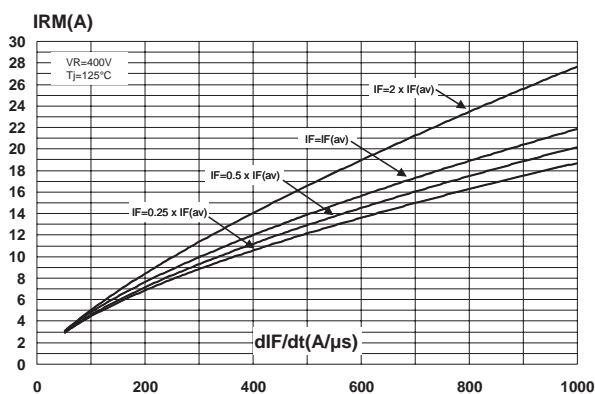
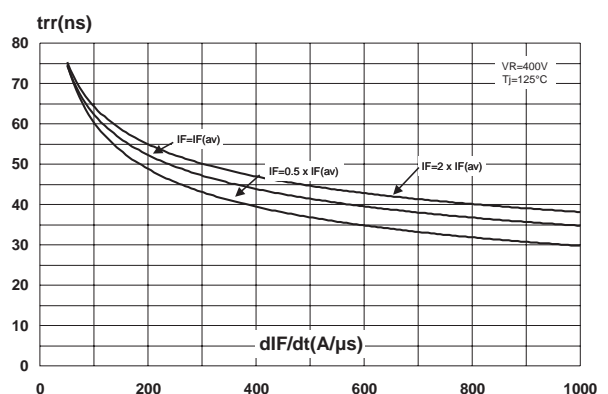
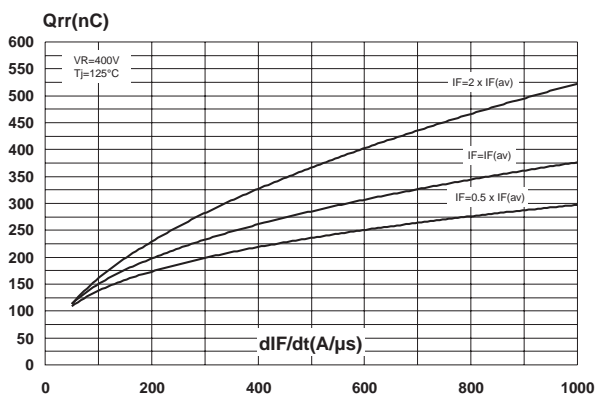


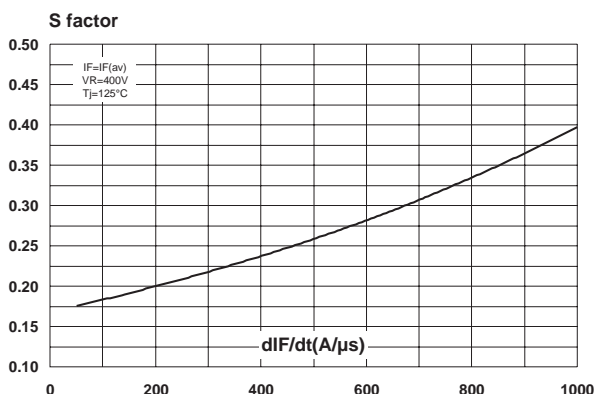
Fig. 5: Reverse recovery time versus  $dI_F/dt$  (90% confidence).



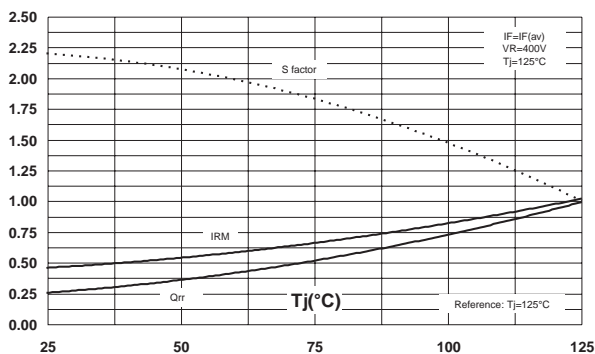
**Fig. 6:** Reverse recovery charges versus  $dI_F/dt$  (90% confidence).



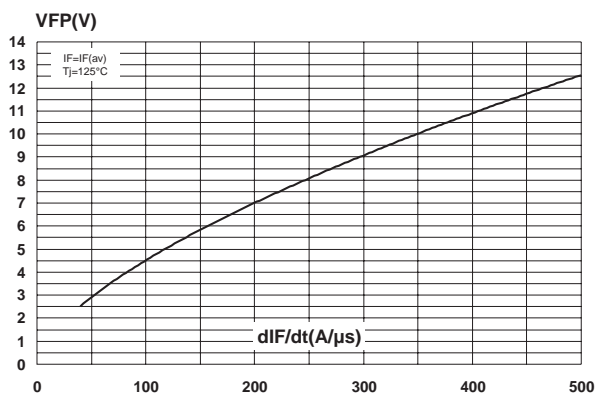
**Fig. 7:** Softness factor versus  $dI_F/dt$  (typical values).



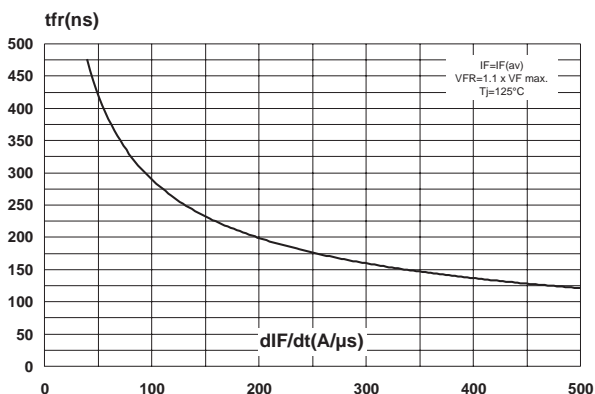
**Fig. 8:** Relative variation of dynamic parameters versus junction temperature.



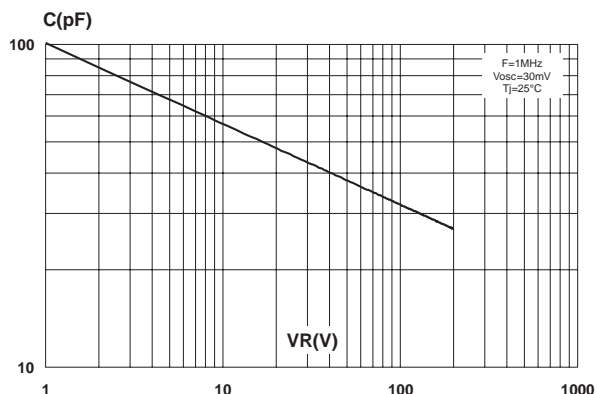
**Fig. 9:** Transient peak forward voltage versus  $dI_F/dt$  (90% confidence).



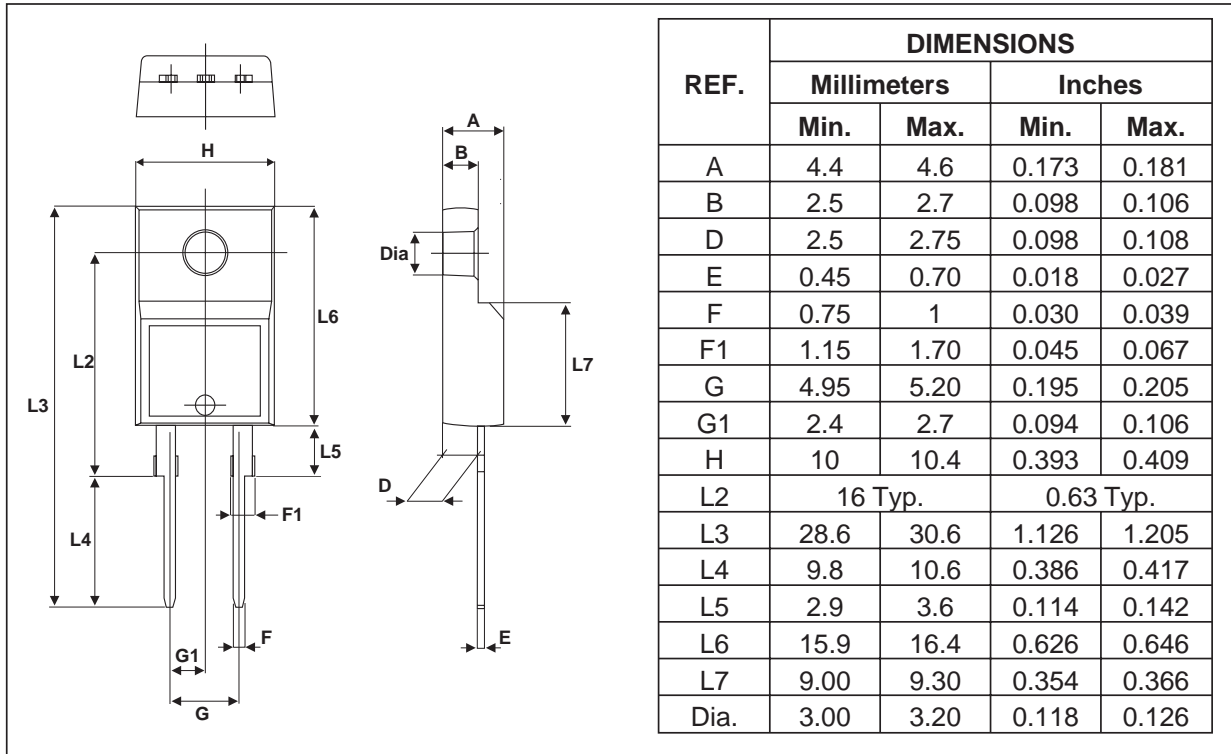
**Fig. 10:** Forward recovery time versus  $dI_F/dt$  (90% confidence).



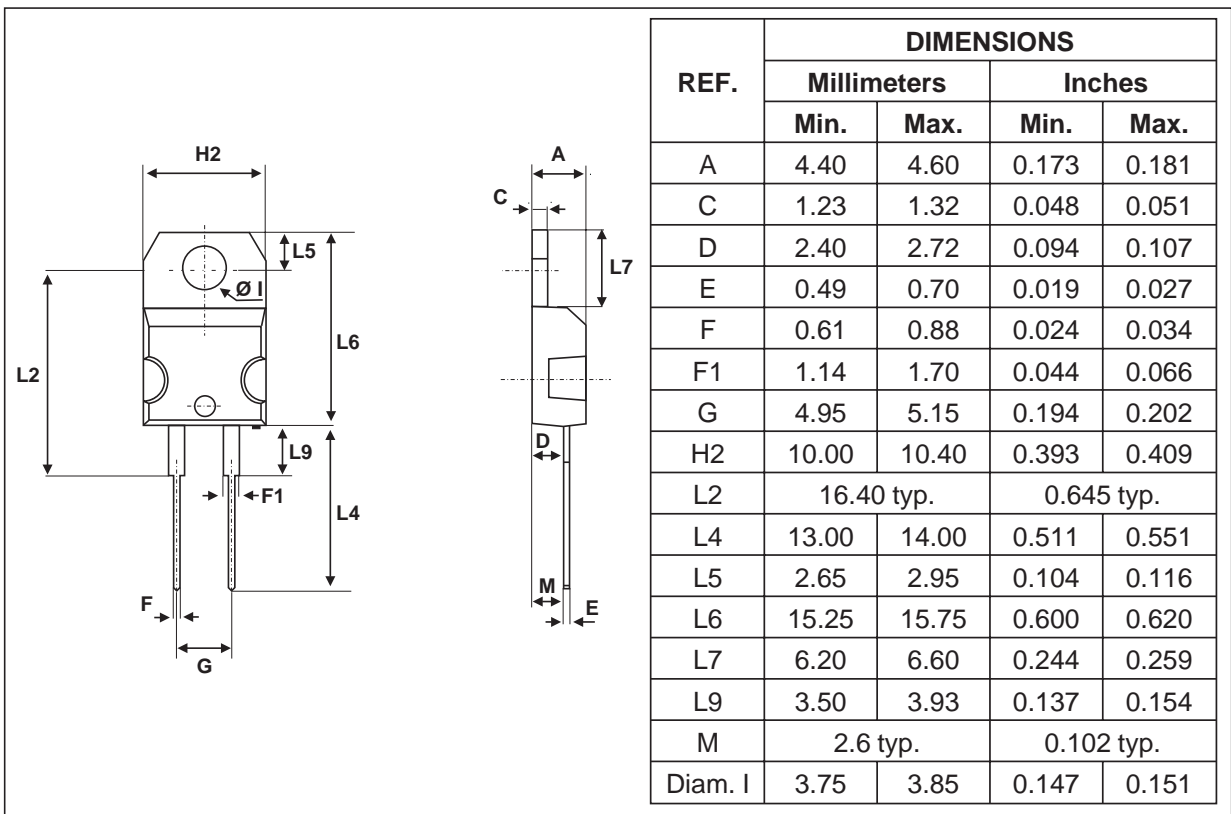
**Fig. 11:** Junction capacitance versus reverse voltage applied (typical values).



**PACKAGE MECHANICAL DATA**  
TO-220FPAC



**PACKAGE MECHANICAL DATA**  
TO-220AC



## STTH12R06D/FP

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| Ordering code | Marking     | Package    | Weight | Base qty | Delivery mode |
|---------------|-------------|------------|--------|----------|---------------|
| STTH12R06D    | STTH12R06D  | TO-220AC   | 1.9 g  | 50       | Tube          |
| STTH12R06FP   | STTH12R06FP | TO-220FPAC | 1.7 g  | 50       | Tube          |

- Cooling method: by conduction (C)
- Recommended torque value (TO-220AC): 0.55 Nm
- Maximum torque value (TO-220AC / TO-220FPAC): 0.7 Nm
- Epoxy meets UL 94,V0

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