

## Turbo 2 ultrafast high voltage rectifier

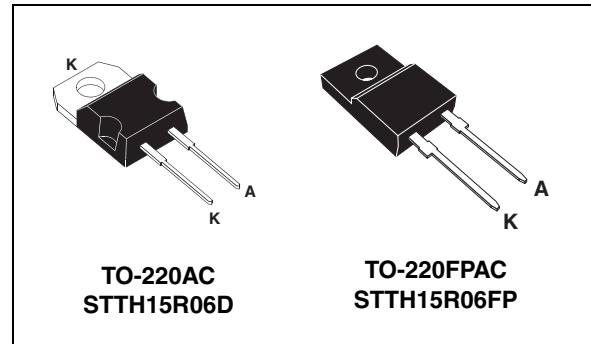
### Features

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

### Description

The STTH15R06D/FP, which is using ST Turbo 2 600 V 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.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	15 A
$V_{RRM}$	600 V
$I_{RM}(typ)$	8 A
$T_j (max)$	175 °C
$V_F (max)$	1.8 V
$t_{rr} (max)$	50 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter	Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage	600	V	
$I_{F(RMS)}$	Forward rms current	30	A	
$I_{F(AV)}$	Average forward current	15	A	
$I_{FSM}$	Surge non repetitive forward current	$T_p = 10$ ms sinusoidal	150	A
$T_{stg}$	Storage temperature range	-65 to + 175	°C	
$T_j$	Maximum operating junction temperature	175	°C	

**Table 3. Thermal parameter**

Symbol	Parameter	Maximum	Unit	
$R_{th(j-c)}$	Junction to case	TO-220AC	1.5	°C/W
		TO-220FPAC	4.0	

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_R$	Reverse leakage current	$T_j = 25$ °C	$V_R = 600$ V		60	$\mu$ A
		$T_j = 125$ °C		70	800	
$V_F$	Forward voltage drop	$T_j = 25$ °C	$I_F = 15$ A		2.9	V
		$T_j = 125$ °C		1.4	1.8	

To evaluate the maximum conduction losses use the following equation:

$$P = 1.16 \times I_{F(AV)} + 0.043 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A},$ $I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$			30	ns
			$I_F = 1\text{ A},$ $dI_F/dt = -50\text{ A}/\mu\text{s},$ $V_R = 30\text{ V}$			50	
$I_{RM}$		$T_j = 125\text{ °C}$	$I_F = 15\text{ A},$ $dI_F/dt = -200\text{ A}/\mu\text{s},$ $V_R = 400\text{ V}$		7.5	9.0	A
$S_{factor}$					0.15		-
$Q_{rr}$					220		nC
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A},$ $dI_F/dt = 120\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			200	ns
$V_{FP}$	Forward recovery voltage					6	V

Figure 1. Conduction losses versus average current

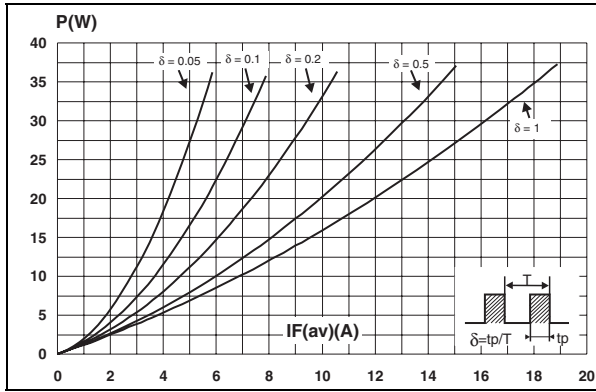


Figure 2. Forward voltage drop versus forward current

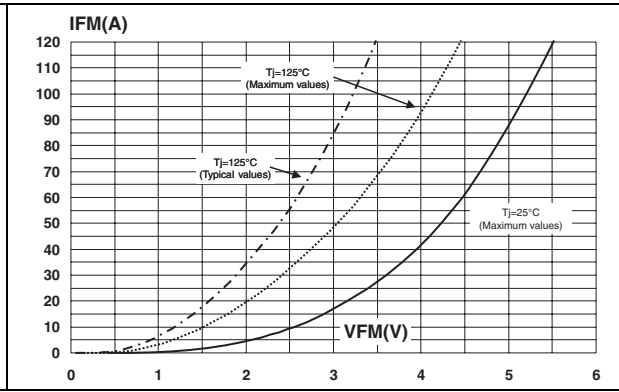


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC)

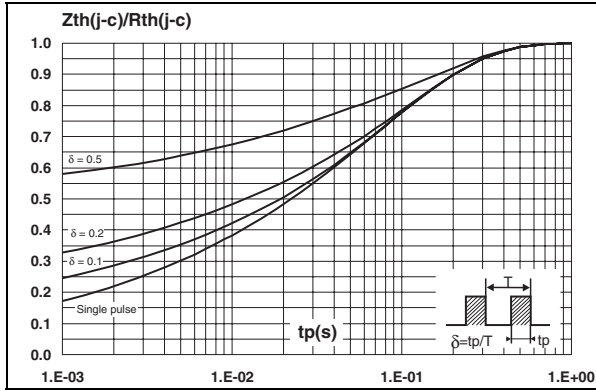


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

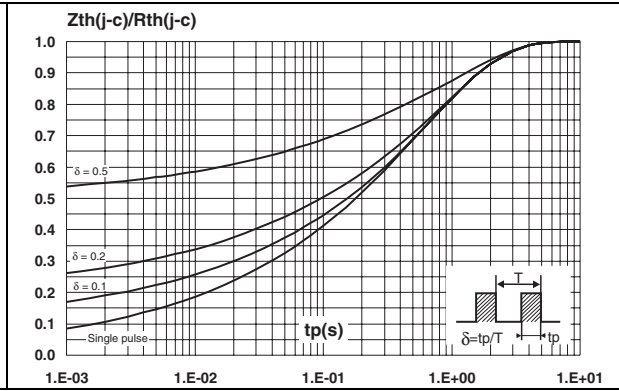


Figure 5. Peak reverse recovery current versus  $dI_F/dt$  (90% confidence)

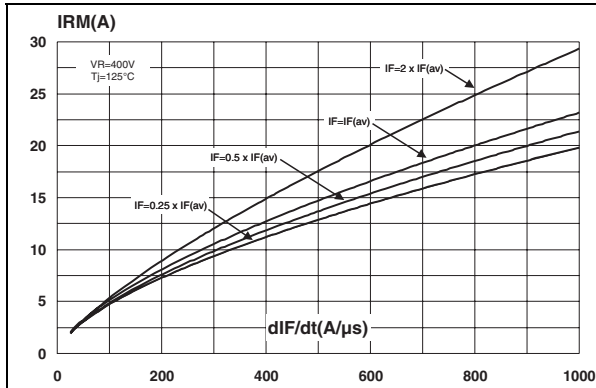
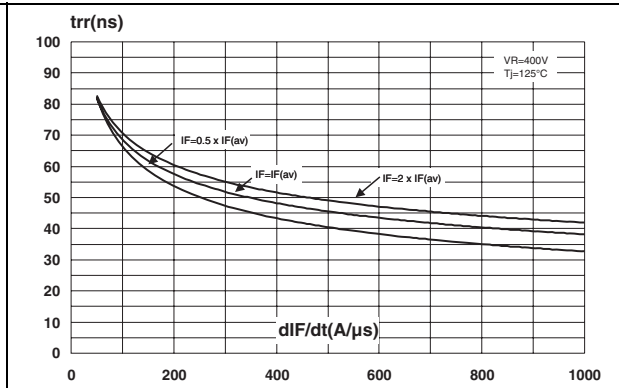
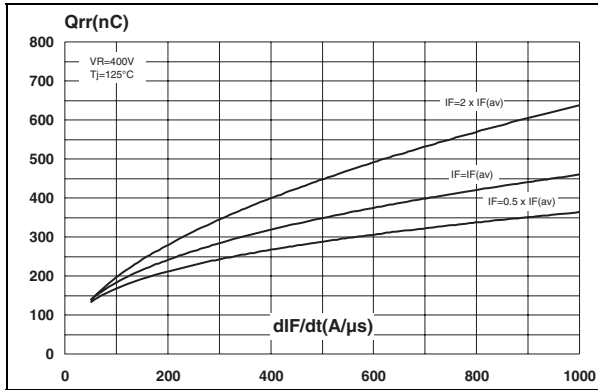


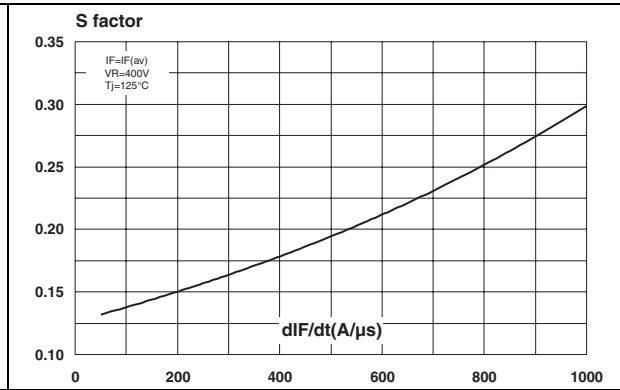
Figure 6. Reverse recovery time versus  $dI_F/dt$  (90% confidence)



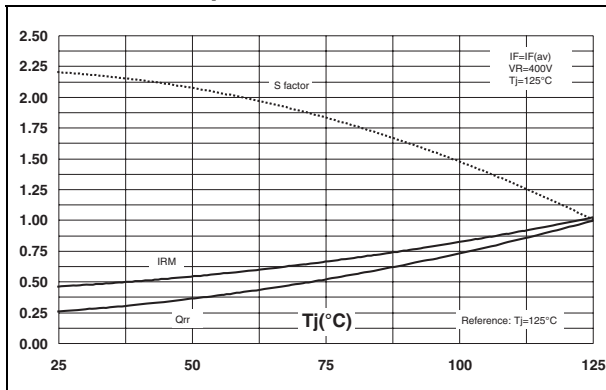
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (90% confidence)**



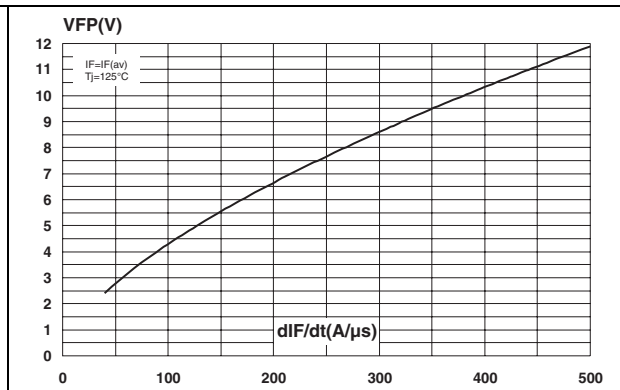
**Figure 8. Softness factor versus  $di_F/dt$  (typical values)**



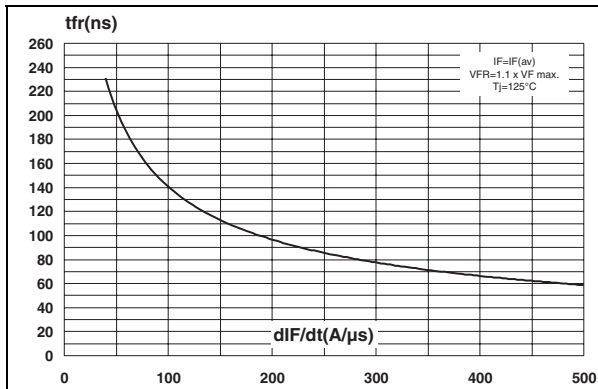
**Figure 9. Relative variation of dynamic parameters versus junction temperature**



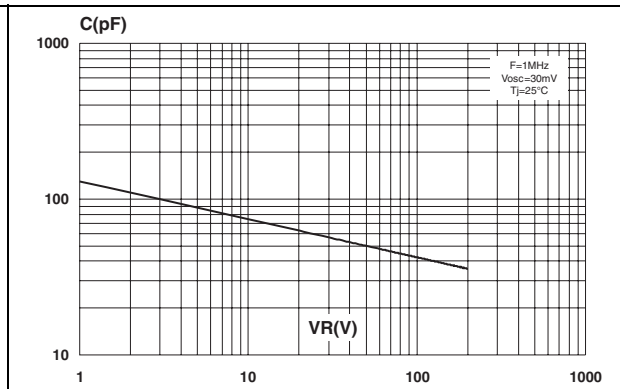
**Figure 10. Transient peak forward voltage versus  $di_F/dt$  (90% confidence)**



**Figure 11. Forward recovery time versus  $di_F/dt$  (90% confidence)**



**Figure 12. Junction capacitance versus reverse voltage applied (typical values)**



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

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**Table 6. TO-220AC dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

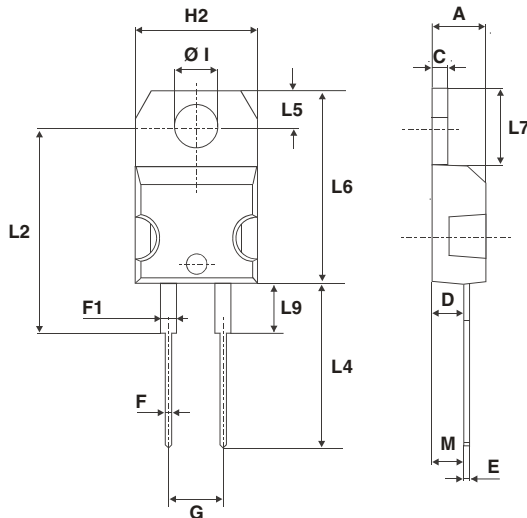


Table 7. TO-220FPAC dimensions

The technical drawing shows two views of the TO-220FPAC package. The left view is a front view showing dimensions L2, L3, L4, L5, L6, and H. The right view is a side view showing dimensions A, B, D, E, F1, G, and L7. A diameter dimension 'Dia.' is also indicated. The table to the right provides the numerical values for these dimensions in both millimeters and inches, with minimum and maximum values.

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

### 3 Ordering information

**Table 8. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH15R06D	STTH15R06D	TO-220AC	1.9 g	50	Tube
STTH15R06FP	STTH15R06FP	TO-220FPAC	1.7 g	50	Tube

### 4 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
Jan-2002	1B	Last issue.
18-Jul-2011	2	Updated $I_{FSM}$ from 120 A to 150 A.



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