

## Turbo 2 ultrafast high voltage rectifier

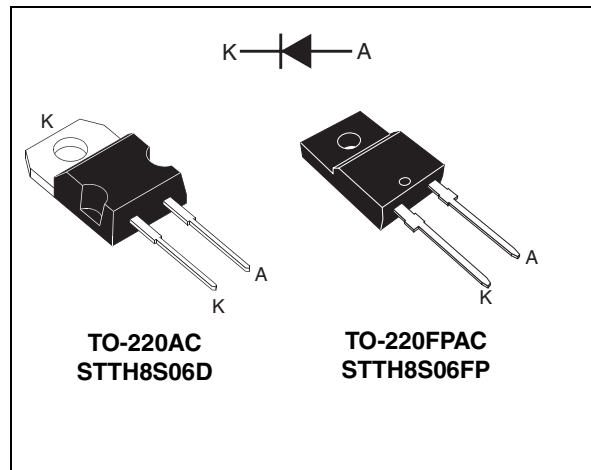
### Features

- Ultrafast recovery
- Low reverse recovery current
- Reduces losses in diode and switching transistor
- Low thermal resistance
- Higher frequency operation
- Insulated TO-220FPAC version
  - Insulation voltage = 1500 V rms
  - Package capacitance = 12 pF

### Description

ST's **STTH8S06** is a state of the art ultrafast recovery diode. By the use of **600 V Pt doping planar technology**, this diode will out-perform the power factor corrections circuits operating in hardswitching conditions. The extremely low reverse recovery current of the **STTH8S06**, reduces significantly the switching power losses of the MOSFET and thus increases the efficiency of the application. This leads designers to reduce the size of their heatsinks.

This device is also intended for applications in power supplies and power conversions systems, motor drive, and other power switching applications.



**Table 1. Device summary**

$I_{F(AV)}$	8 A
$V_{RRM}$	600 V
$I_{RM}(typ.)$	4.4 A
$T_j(max)$	175 °C
$V_F(typ)$	1.5 V
$t_{rr}(typ)$	12 ns

# 1 Characteristics

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

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	600	V
$I_{F(AV)}$	Average forward current	8	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10 \text{ ms}$	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	3.0
		TO220FPAC	5.5

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$I_R$	Reverse leakage current	$T_j = 25 \text{ °C}$	$V_R = 600 \text{ V}$		20	$\mu\text{A}$
		$T_j = 125 \text{ °C}$		25	200	
$V_F$	Forward voltage drop	$T_j = 25 \text{ °C}$	$I_F = 8 \text{ A}$		3.4	V
		$T_j = 125 \text{ °C}$		1.5	1.9	

To evaluate the maximum conduction losses use the following equation:  
 $P = 1.20 \times I_{F(AV)} + 0.087 I_{F(RMS)}^2$

**Table 5. Dynamic electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1 \text{ A}, di_F/dt = - 200 \text{ A}/\mu\text{s}, V_R = 30 \text{ V}$		12	18	ns
$I_{RM}$	Reverse current	$T_j = 25 \text{ °C}$ $I_F = 8 \text{ A}, di_F/dt = - 200 \text{ A}/\mu\text{s}, V_R = 200 \text{ V}$		1.6	2.2	A
$S_{factor}$	Softness factor			1		-
$Q_{rr}$	Reverse recovery charges			17		nC
$I_{RM}$	Reverse current	$T_j = 125 \text{ °C}$ $I_F = 8 \text{ A}, di_F/dt = - 200 \text{ A}/\mu\text{s}, V_R = 200 \text{ V}$		4.4	6.0	A
$S_{factor}$	Softness factor			0.3		-
$Q_{rr}$	Reverse recovery charges			90		nC

Figure 1. Forward voltage drop versus forward current

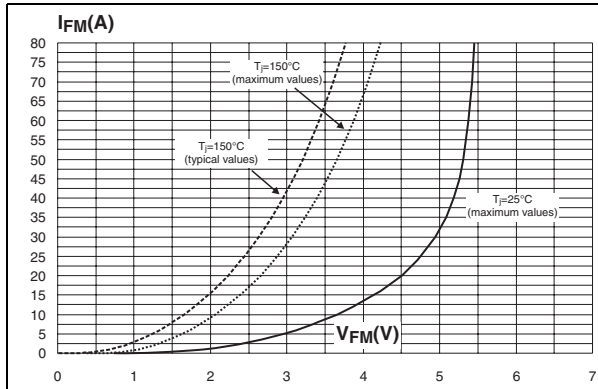


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC)

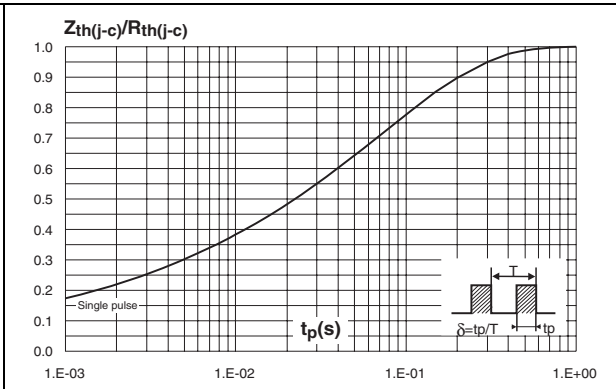


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

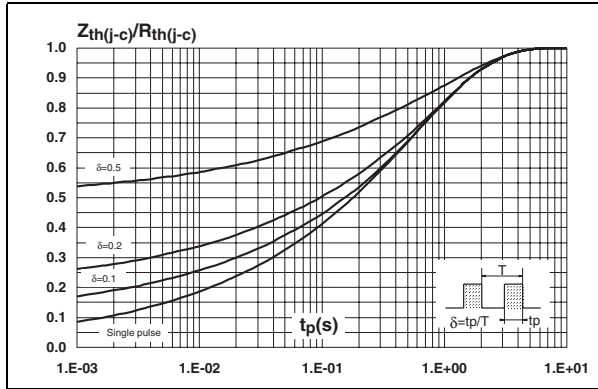
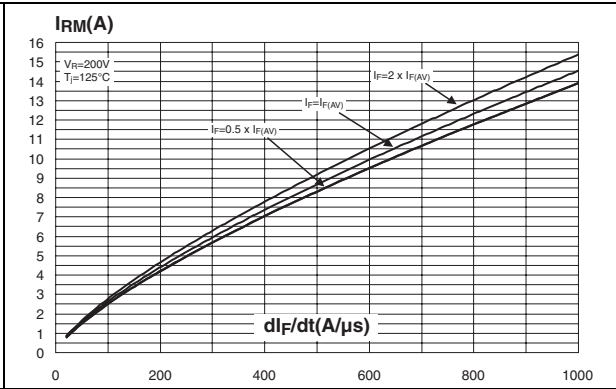
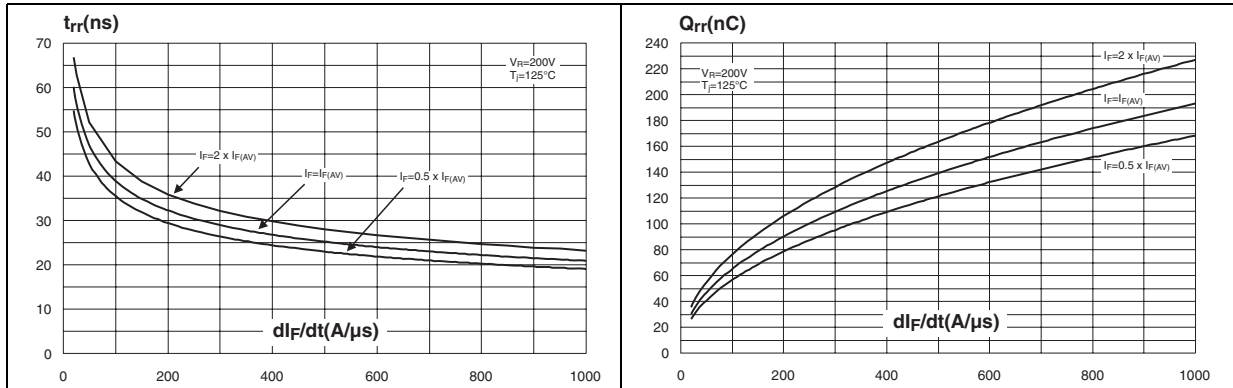


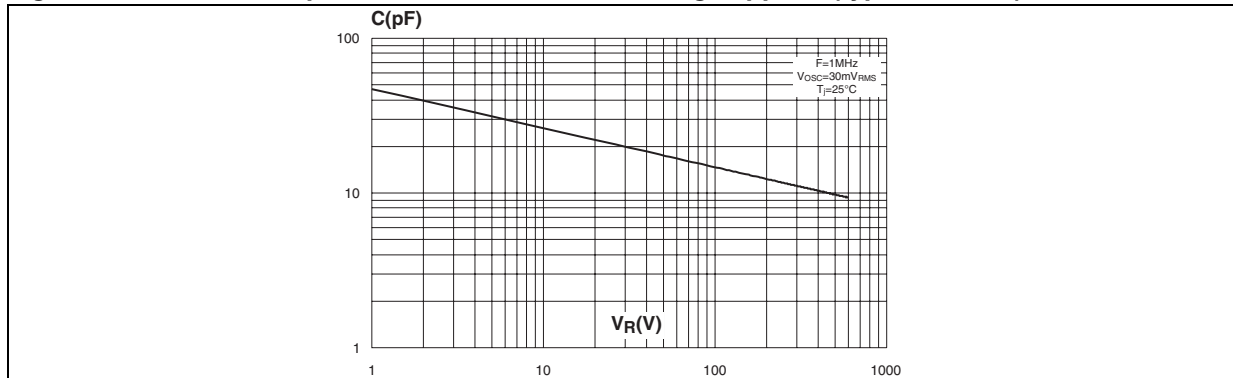
Figure 4. Peak reverse recovery current versus diF/dt (typical values)



**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)** **Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



**Figure 7. 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

In order to meet environmental requirements, ST (also) offers these devices in ECOPACK® packages. ECOPACK® packages are Lead-free. The category of second level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label.

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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

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
STTH8S06D	STTH8S06D	TO-220AC	1.9 g	50	Tube
STTH8S06FP	STTH8S06FP	TO-220FPAC	1.64 g	50	Tube

### 4 Revision history

Table 9. Document revision history

Date	Revision	Description of changes
18-Dec-2007	1	First issue.

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