

## Turbo 2 ultrafast - high voltage rectifier

**Table 1. Main product characteristics**

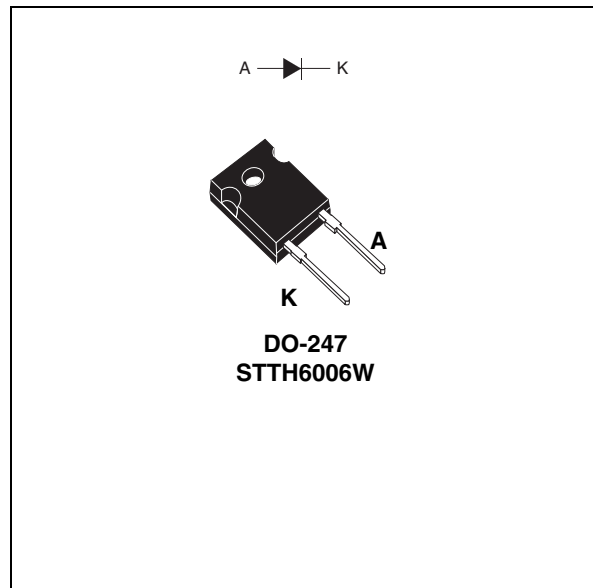
$I_{F(AV)}$	60 A
$V_{RRM}$	600 V
$T_j$	175° C
$V_F$ (typ)	1.1 V
$t_{rr}$ (max)	60 ns

### Features and benefits

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces conduction and switching losses

### Description

The STTH6006W uses ST Turbo 2 600 V technology. This device is specially suited for use in switching power supplies, and industrial applications. The  $V_F / T_{rr}$  trade-off has been specially established to increase the performance in welding applications.



**Table 2. Order code**

Part number	Marking
STTH6006W	STTH6006W

**Table 3. Absolute ratings (limiting values per diode at 25° C, unless otherwise specified)**

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	600	V
$I_{F(RMS)}$	RMS forward current	90	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 95^\circ \text{C}$ 60	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10 \text{ ms}$ Sinusoidal 400	A
$T_{stg}$	Storage temperature range	-65 to + 175	°C
$T_j$	Maximum operating junction temperature <sup>(1)</sup>	175	°C

1.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  to avoid thermal runaway for a diode on its own heatsink

# 1 Characteristics

**Table 4. Thermal parameters**

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	0.75	°C/W

**Table 5. Static electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$			50	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$				
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 60\text{ A}$		1.85	V
		$T_j = 150^\circ\text{C}$				
				1.10	1.40	

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

2. Pulse test:  $t_p = 380\ \mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1.07 \times I_{F(AV)} + 0.006 I_{F(RMS)}^2$$

**Table 6. Dynamic characteristics**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ , $I_R = 1\text{ A}$ , $T_j = 25^\circ\text{C}$			60	ns
		$I_F = 1\text{ A}$ , $di_F/dt = -50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ , $T_j = 25^\circ\text{C}$		60	85	
$I_{RM}$	Reverse recovery current	$I_F = 60\text{ A}$ , $di_F/dt = -100\text{ A}/\mu\text{s}$ , $V_R = 400\text{ V}$ , $T_j = 150^\circ\text{C}$		10.5	14	
$t_{fr}$	Forward recovery time	$I_F = 60\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ , $T_j = 25^\circ\text{C}$			500	ns
$V_{FP}$	Forward recovery voltage	$I_F = 60\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ , $T_j = 25^\circ\text{C}$		3		V

Figure 1. Conduction losses versus average current

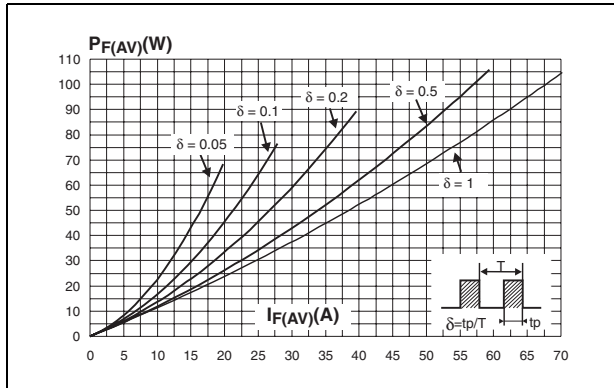


Figure 2. Forward voltage drop versus forward current

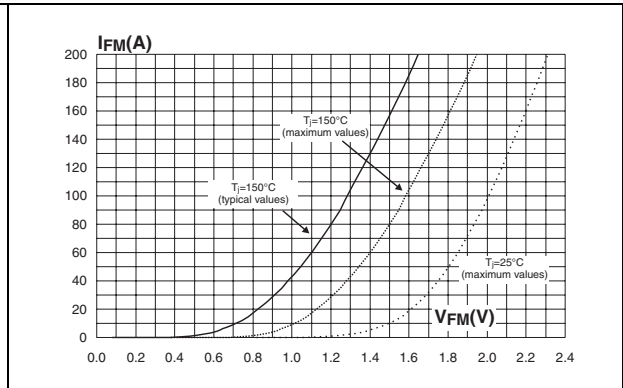


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

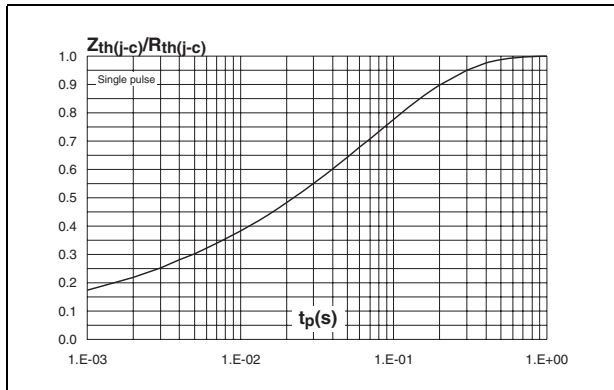


Figure 4. Peak reverse recovery current versus di\_F/dt (typical values)

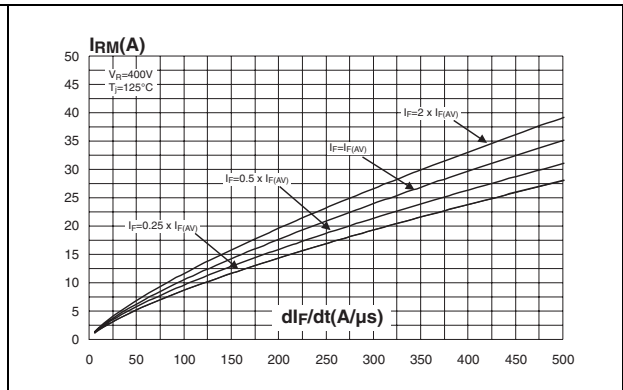


Figure 5. Reverse recovery time versus di\_F/dt (typical values)

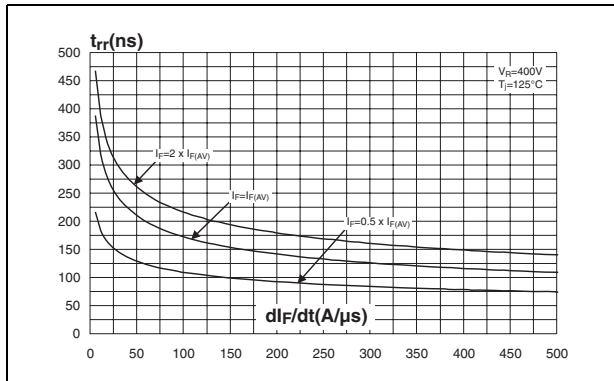


Figure 6. Reverse recovery charges versus di\_F/dt (typical values)

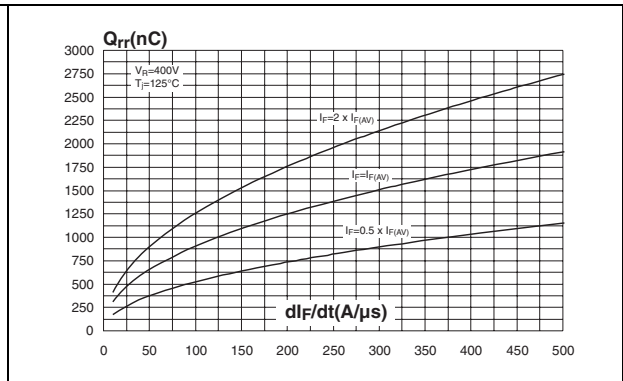


Figure 7. Softness factor versus  $di_F/dt$  (typical values)

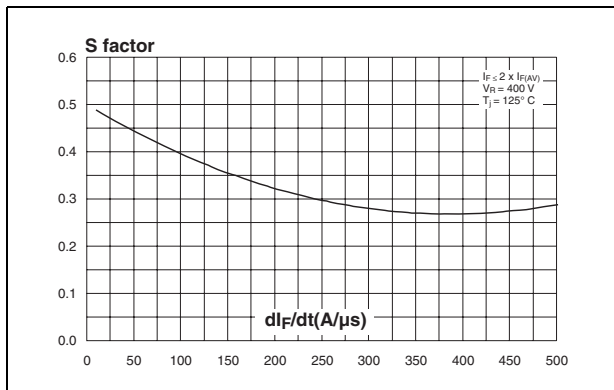


Figure 8. Relative variations of dynamic parameters versus junction temperature

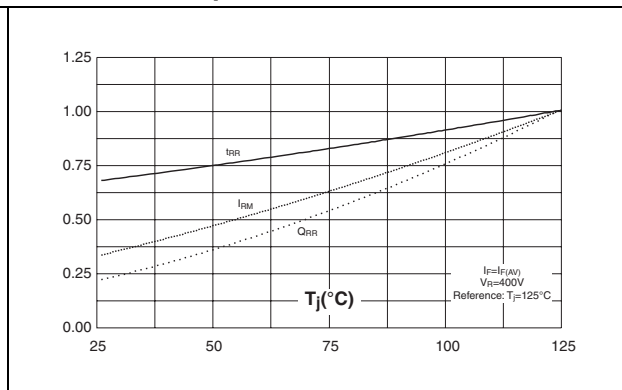


Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)

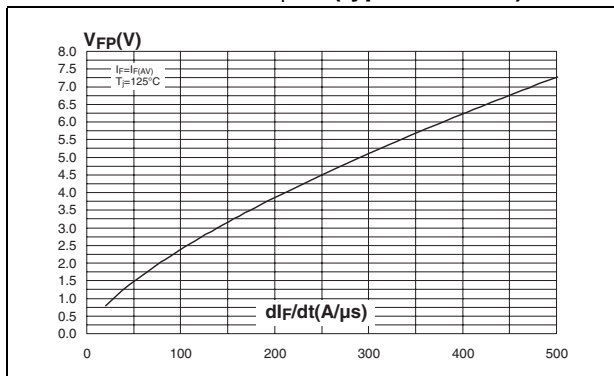


Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)

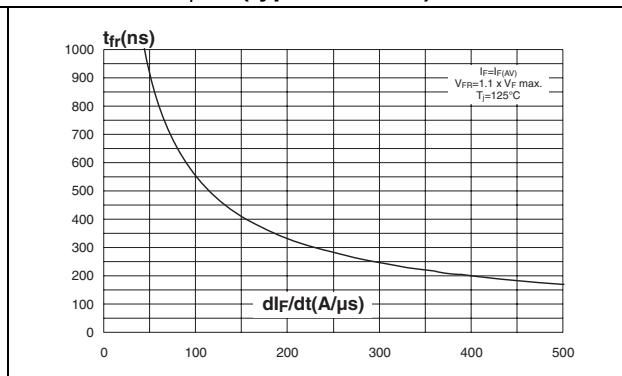
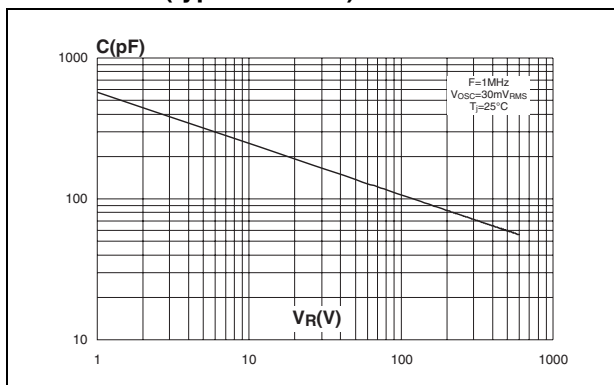


Figure 11. Junction capacitance versus reverse voltage applied (typical values)



## 2 Package mechanical data

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.80 Nm
- Maximum torque value: 1.0 Nm

Table 7. DO-247 dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. 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. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

### 3 Ordering information

Table 8. Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH6006W	STTH6006W	DO-247	4.40 g	30	Tube

### 4 Revision history

Table 9. Revision history

Date	Revision	Changes
18-May-2006	1	First issue.
11-Jul-2007	2	Reformatted to current standards. Updated <a href="#">Table 7</a> .

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