

## Turbo 2 ultrafast - high voltage rectifier

### Main product characteristics

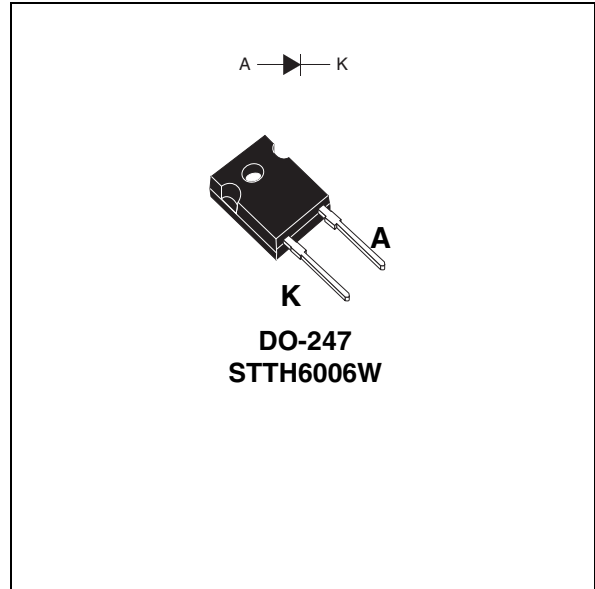
$I_{F(AV)}$	60 A
$V_{RRM}$	600 V
$T_j$	175° C
$V_F$ (typ)	1.1 V
$t_{rr}$ (max)	60 ns

### Features and benefits

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

### Description

The STTH6006W uses ST Turbo2 600V 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.



### Order codes

Part Number	Marking
STTH6006W	STTH6006W

**Table 1. 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, $\delta = 0.5$	60	A
$I_{FSM}$	Surge non repetitive forward current	400	A
$T_{stg}$	Storage temperature range	-65 to + 175	°C
$T_j$	Maximum operating junction temperature <sup>(1)</sup>	175	°C

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

# 1 Characteristics

**Table 2. Thermal parameters**

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

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ \text{C}$			50	$\mu\text{A}$
		$T_j = 125^\circ \text{C}$			160	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ \text{C}$			1.85	V
		$T_j = 150^\circ \text{C}$			1.40	

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

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

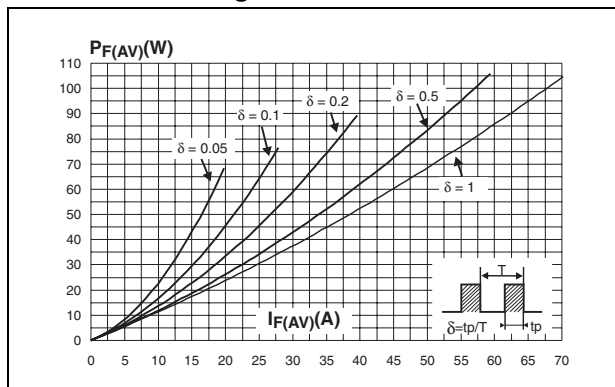
To evaluate the conduction losses use the following equation:

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

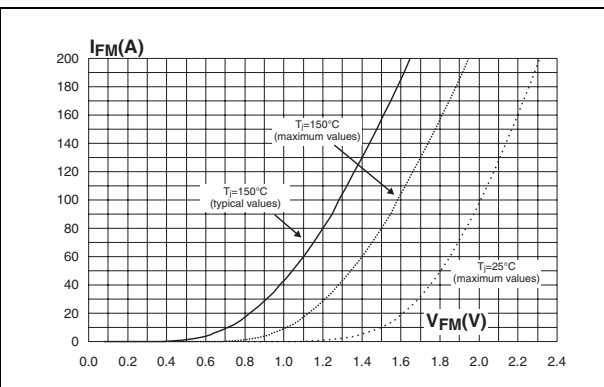
**Table 4. Dynamic characteristics**

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

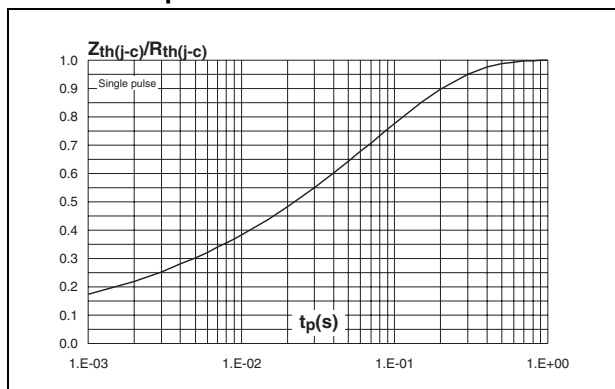
**Figure 1. Conduction losses versus average current**



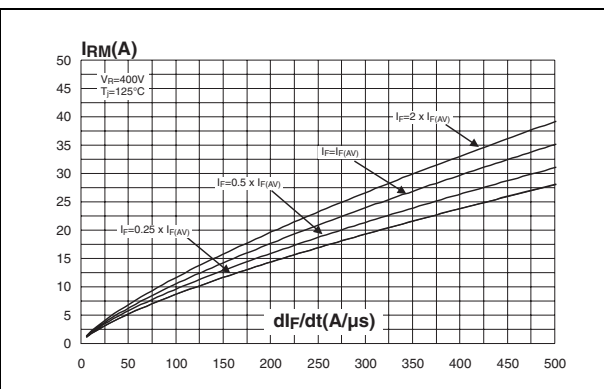
**Figure 2. Forward voltage drop versus forward current**



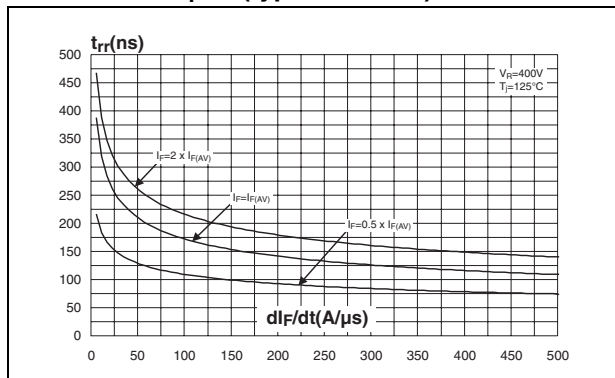
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



**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)**

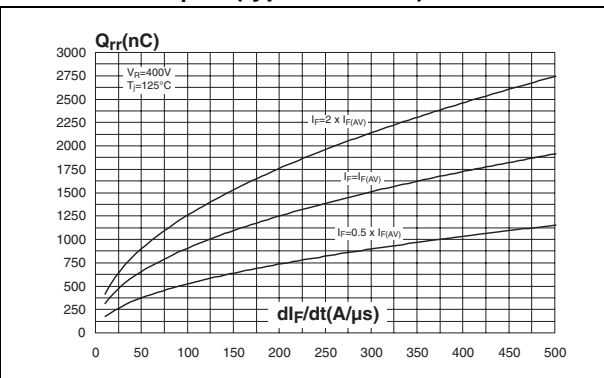


Figure 7. Softness factor versus  $dl_F/dt$  (typical values)

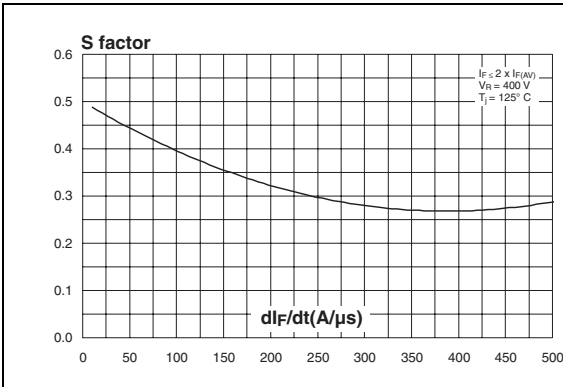


Figure 8. Relative variations of dynamic parameters versus junction temperature

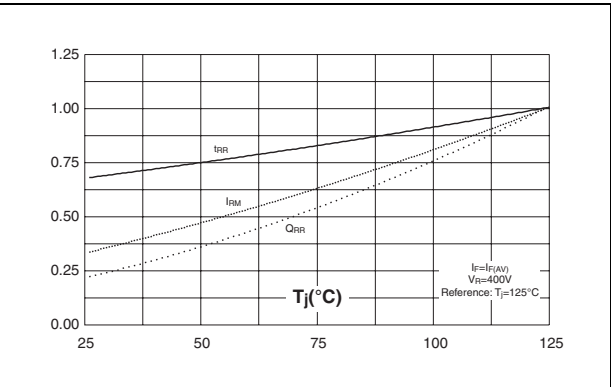


Figure 9. Transient peak forward voltage versus  $dl_F/dt$  (typical values)

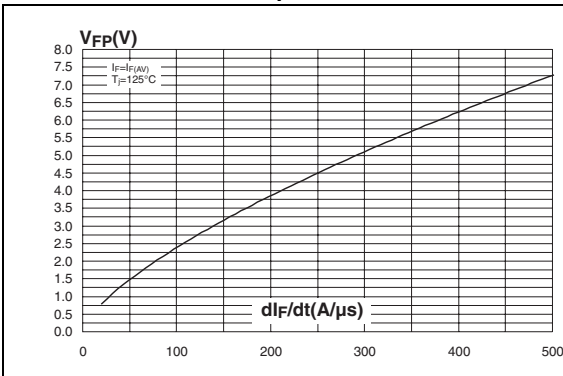


Figure 10. Forward recovery time versus  $dl_F/dt$  (typical values)

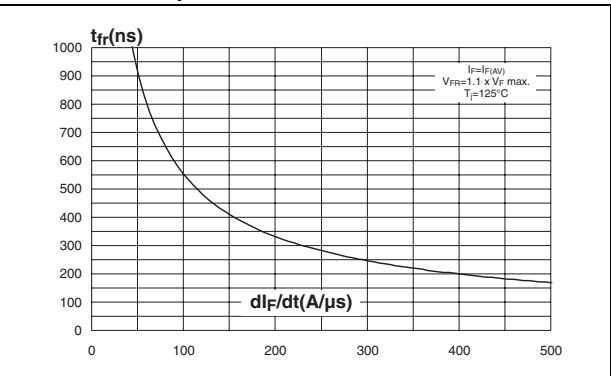
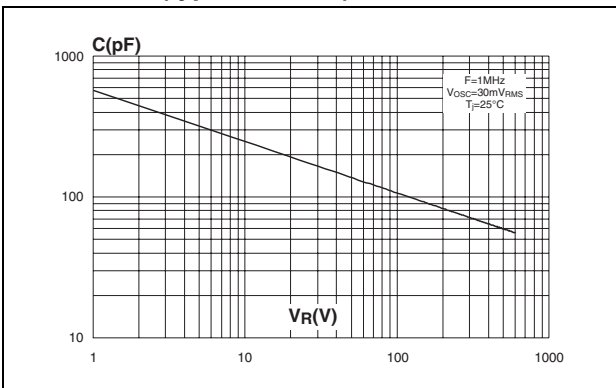


Figure 11. Junction capacitance versus reverse voltage applied (typical values)



## 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 5. DO-247 dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

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

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

### 4 Revision history

Date	Revision	Description of Changes
18-May-2006	1	First issue.

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