

## Turbo 2 ultrafast high voltage rectifier

### Main product characteristics

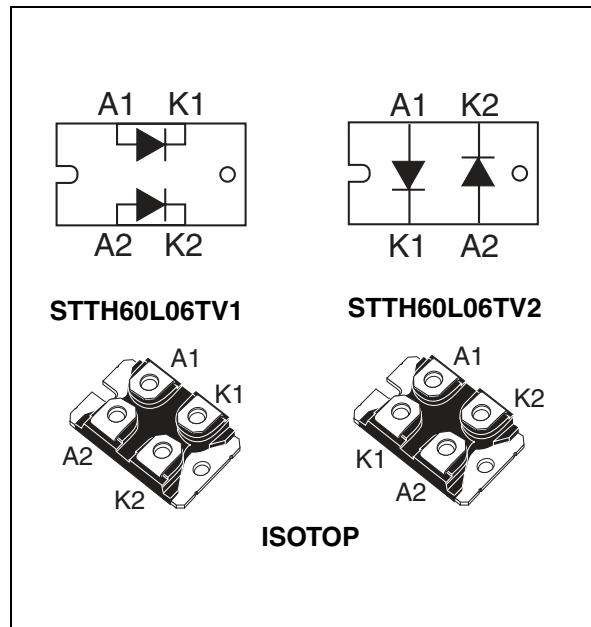
$I_{F(AV)}$	2 x 40 A
$V_{RRM}$	600 V
$T_j$	150° C
$V_F$ (typ)	1.30 V
$t_{rr}$ (typ)	50 ns

### Features and benefits

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching & conduction losses
- Insulated package:  
Electrical insulation = 2500 V<sub>RMS</sub>  
Capacitance = 45 pF

### Description

The STTH60L06TV, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, and industrial applications (such as welding), as rectification diode.



### Order codes

Part Number	Marking
STTH60L06TV1	STTH60L06TV1
STTH60L06TV2	STTH60L06TV2

**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	100	A	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 75^\circ \text{C}$ per diode	30	A
		$T_c = 70^\circ \text{C}$ per diode	40	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10 \text{ ms}$ Sinusoidal	210	A
$T_{stg}$	Storage temperature range	-55 to + 150	° C	
$T_j$	Maximum operating junction temperature	150	° C	

# 1 Characteristics

**Table 2. Thermal parameters**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.60	°C/W
		Total	0.85	
$R_{th(c)}$	Coupling thermal resistance		0.1	

When the diodes are used simultaneously:

$$\Delta T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)} \text{ (per diode)} + P_{(diode2)} \times R_{th(c)}$$

**Table 3. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$			25	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$			25	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 60\text{ A}$		1.55	V
		$T_j = 150^\circ\text{C}$			1.0	

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:

$$P = 0.95 \times I_{F(AV)} + 0.010 I_{F(RMS)}^2$$

**Table 4. Dynamic characteristics (per diode)**

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ $I_R = 1\text{ A}$ , $T_j = 25^\circ\text{C}$			65	ns
		$I_F = 1\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ , $T_j = 25^\circ\text{C}$		65	90	
$I_{RM}$	Reverse recovery current	$I_F = 30\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 400\text{ V}$ , $T_j = 125^\circ\text{C}$		11.5	16	A
$t_{fr}$	Forward recovery time	$I_F = 30\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ , $T_j = 25^\circ\text{C}$			500	ns
$V_{FP}$	Forward recovery voltage	$I_F = 30\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_{FR} = 1.1 \times V_{Fmax}$ , $T_j = 25^\circ\text{C}$		2.5		V

Figure 1. Conduction losses versus average current (per diode)

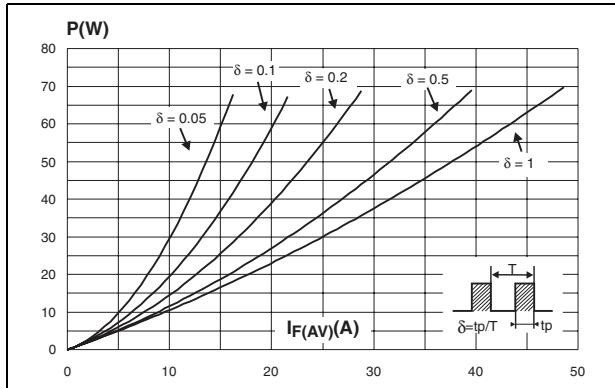


Figure 2. Forward voltage drop versus forward current (per diode)

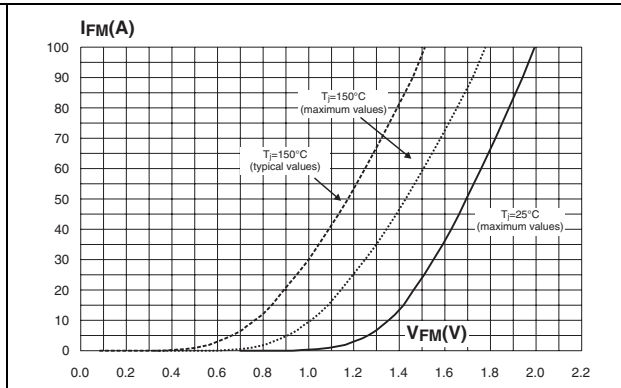


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

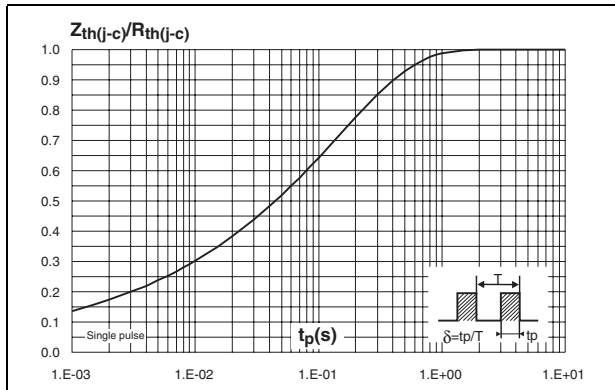


Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)

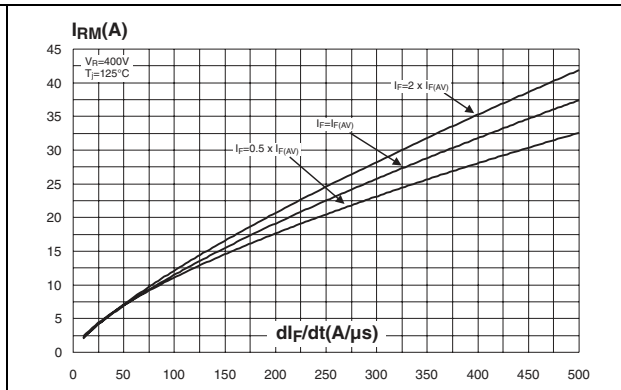


Figure 5. Reverse recovery time versus di/dt (typical values, per diode)

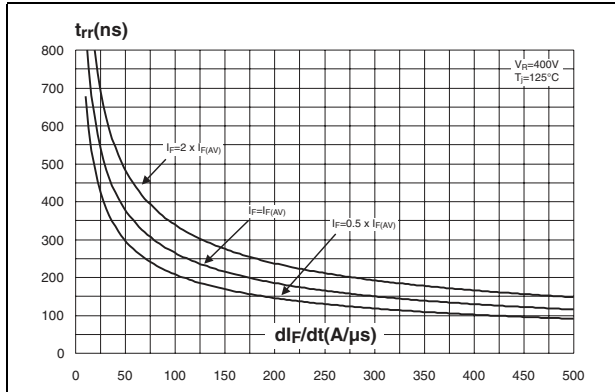
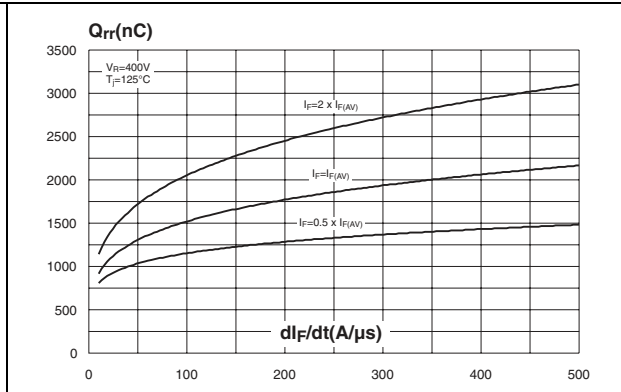
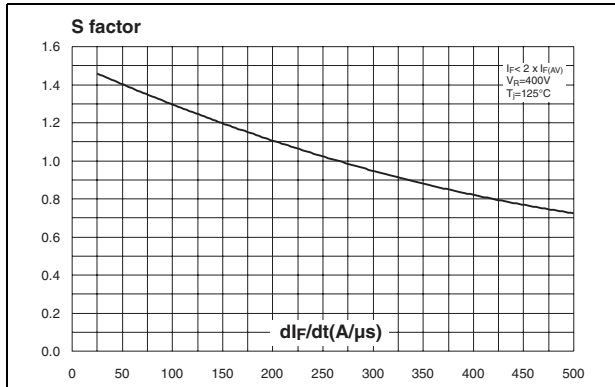


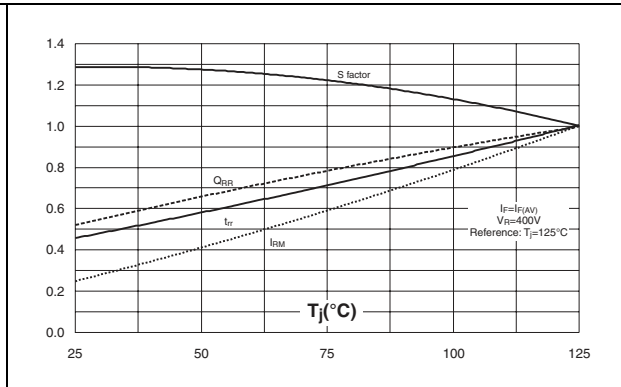
Figure 6. Reverse recovery charges versus di/dt (typical values, per diode)



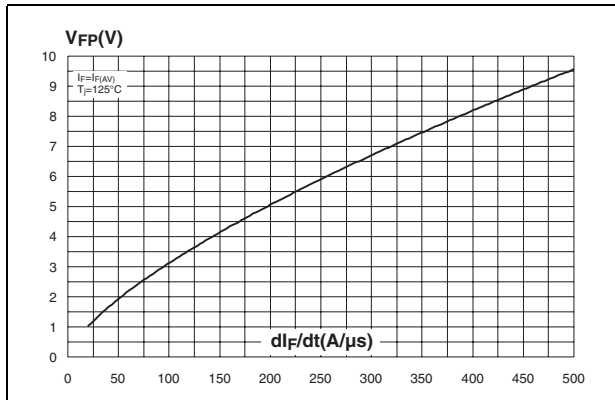
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



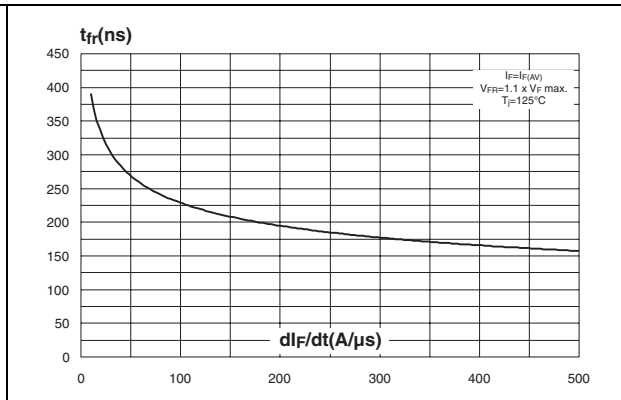
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



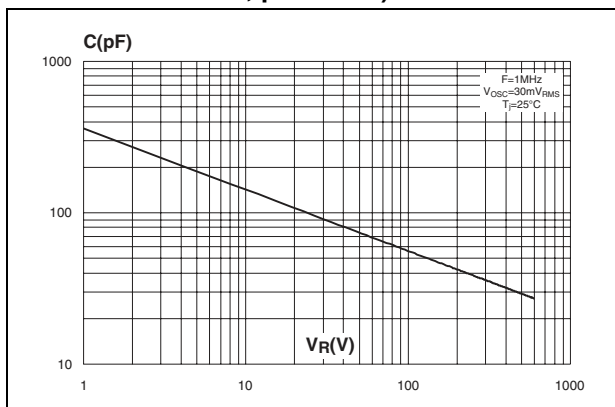
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**Figure 10. Forward recovery time versus  $di_F/dt$  (typical values, per diode)**



**Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)**



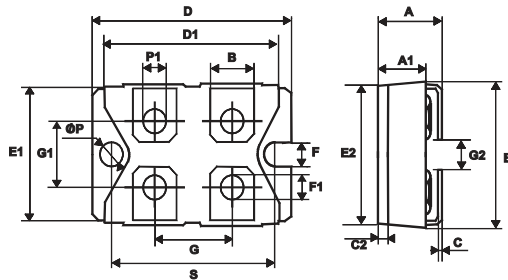
## 2 Package mechanical data

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Table 5. ISOTOP dimensions

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.465	0.480
A1	8.90	9.10	0.350	0.358
B	7.8	8.20	0.307	0.323
C	0.75	0.85	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.80	38.20	1.488	1.504
D1	31.50	31.70	1.240	1.248
E	25.15	25.50	0.990	1.004
E1	23.85	24.15	0.939	0.951
E2	24.80 typ.		0.976 typ.	
G	14.90	15.10	0.587	0.594
G1	12.60	12.80	0.496	0.504
G2	3.50	4.30	0.138	0.169
F	4.10	4.30	0.161	0.169
F1	4.60	5.00	0.181	0.197
P	4.00	4.30	0.157	0.69
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193



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
STTH60L06TV1	STTH60L06TV1	ISOTOP	27 g (without screws)	10 (with screws)	Tube
STTH60L06TV2	STTH60L06TV2	ISOTOP	27 g (without screws)	10 (with screws)	Tube

### 4 Revision history

Date	Revision	Description of Changes
07-Sep-2004	1	First issue
10-Sep-2004	2	Average forward current (page 1) and Junction to case (page 2) values changed
13-Oct-2006	3	Reformatted to current standard. Added part number STTH60L06TV2.

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