

## Turbo 2 ultrafast high voltage rectifier

Datasheet – production data

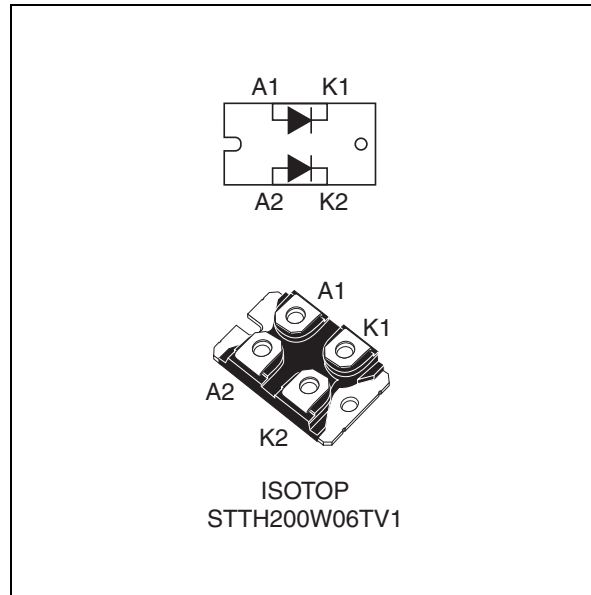
### Features

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching and conduction losses
- Insulated package
  - Insulating voltage = 2500 V rms
  - Capacitance = 45 pF
- Complies with UL standards (File ref: E81734)

### Description

The STTH200W06TV1, which uses ST Turbo 2, 600 V technology, is especially suited to be used for DC/AC and DC/AC converters in primary stage of MIG/MMA/TIG welding machine.

Packaged in ISOTOP, this device offers high power integration for all welding machines and industrial equipment.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	2 x 100 A
$V_{RRM}$	600 V
$T_j$ (max)	150 °C
$V_F$ (typ)	1.0 V
$t_{rr}$ (typ)	55 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at  $T_j = 25\text{ °C}$ , unless otherwise specified, per diode)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms current	Per diode	145	A
$I_{F(peak)}$	Average forward current, $\delta = 0.2$	Per diode $T_c = 105\text{ °C}$	200	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ Sinusoidal	800	A
$T_{stg}$	Storage temperature range		-65 to + 150	°C
$T_j$	Maximum operating junction temperature		150	°C

**Table 3. Thermal parameters**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.7	°C/W
		Total	0.4	
$R_{th(c)}$	Coupling		0.1	

When the two diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

**Table 4. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		30	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	30	300	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 100\text{ A}$			1.5	V
		$T_j = 150\text{ °C}$		-	1	1.3	
		$T_j = 25\text{ °C}$	$I_F = 200\text{ A}$	-		1.75	
		$T_j = 150\text{ °C}$		-	1.25	1.60	

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

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

To evaluate the conduction losses use the following equation:

$$P = 1.0 \times I_{F(AV)} + 0.003 \times I_{F(RMS)}^2$$

Table 5. Dynamic characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ }^\circ\text{C}$	$I_F = 100\text{ A}, V_R = 400\text{ V}$ $di_F/dt = -200\text{ A}/\mu\text{s}$	-	30	40	A
$Q_{RR}$	Reverse recovery charge				4600		nC
$S_{factor}$	Softness factor				0.4		
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 1\text{ A}, V_R = 30\text{ V}$ $di_F/dt = -100\text{ A}/\mu\text{s}$	-	55	75	ns
$t_{fr}$	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 100\text{ A}, V_{FR} = 2.5\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-		2000	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25\text{ }^\circ\text{C}$		-	3.3	5	V

Figure 1. Average forward power dissipation versus average forward current (per diode)

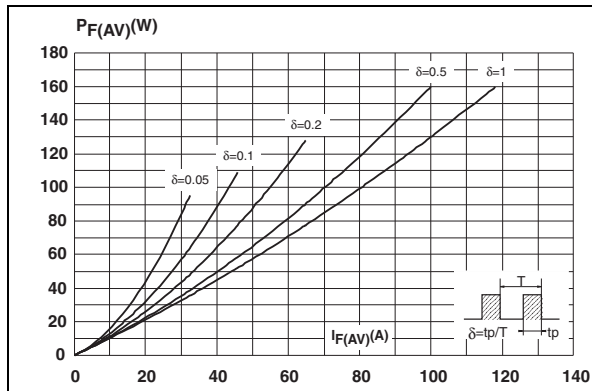


Figure 2. Forward voltage drop versus forward current (per diode)

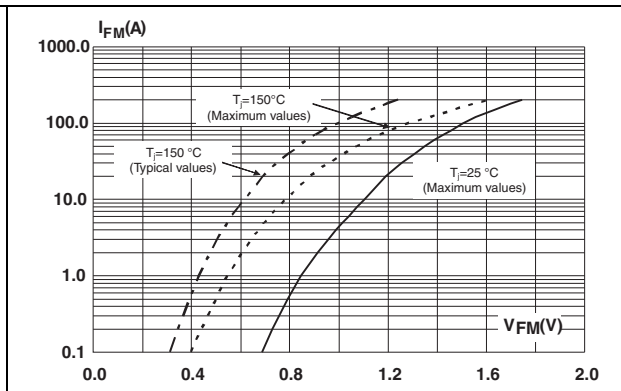


Figure 3. Relative variation of thermal impedance, junction to case, versus pulse duration

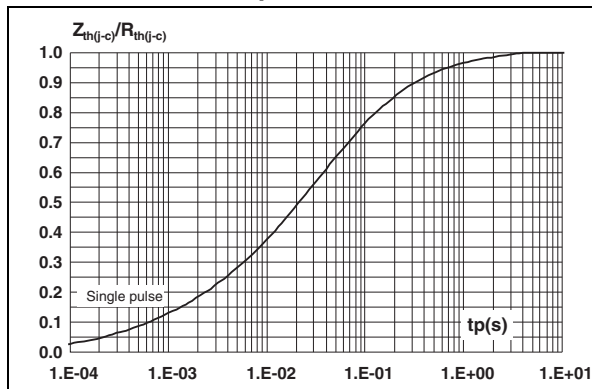


Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)

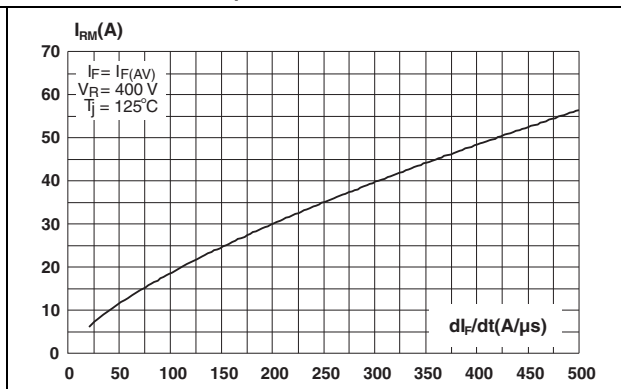


Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values, per diode)

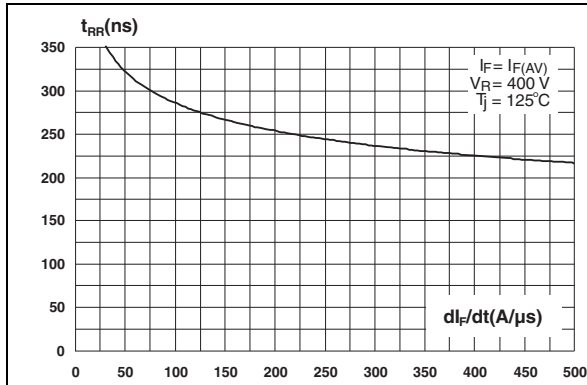


Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)

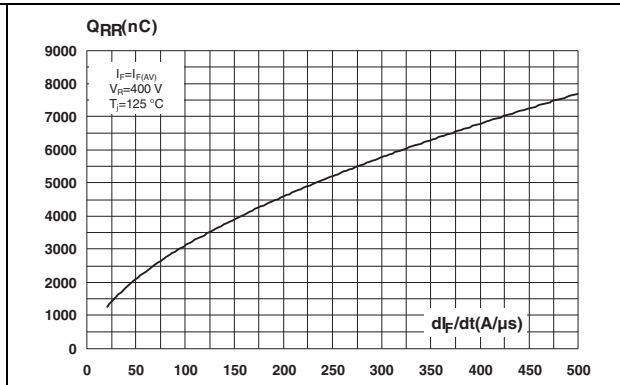


Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)

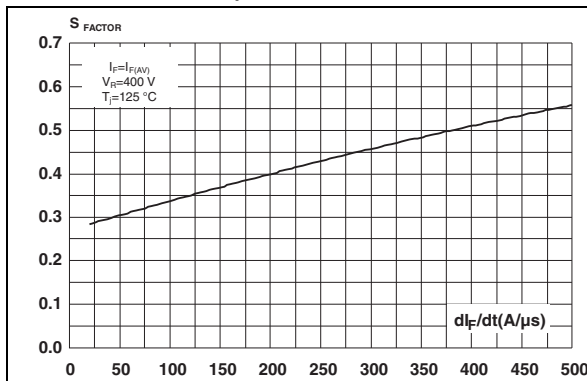


Figure 8. Relative variation of dynamic parameters versus junction temperature

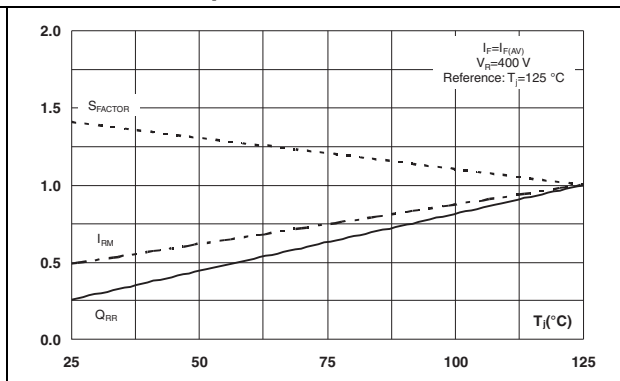


Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)

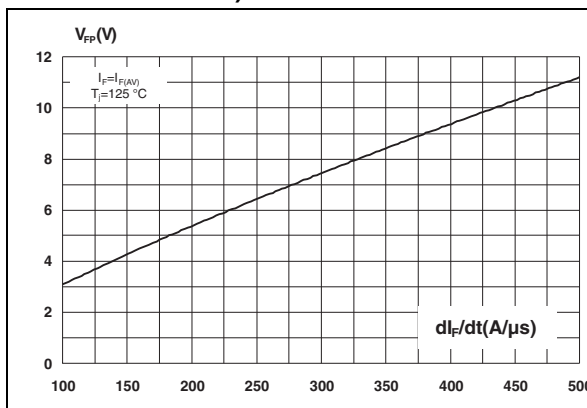


Figure 10. Forward recovery time versus  $di_F/dt$  (typical values, per diode)

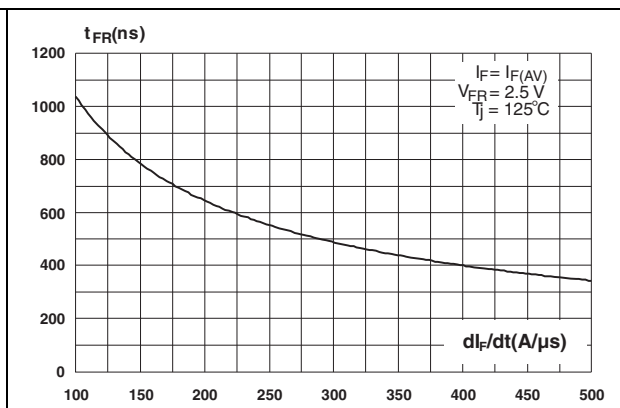
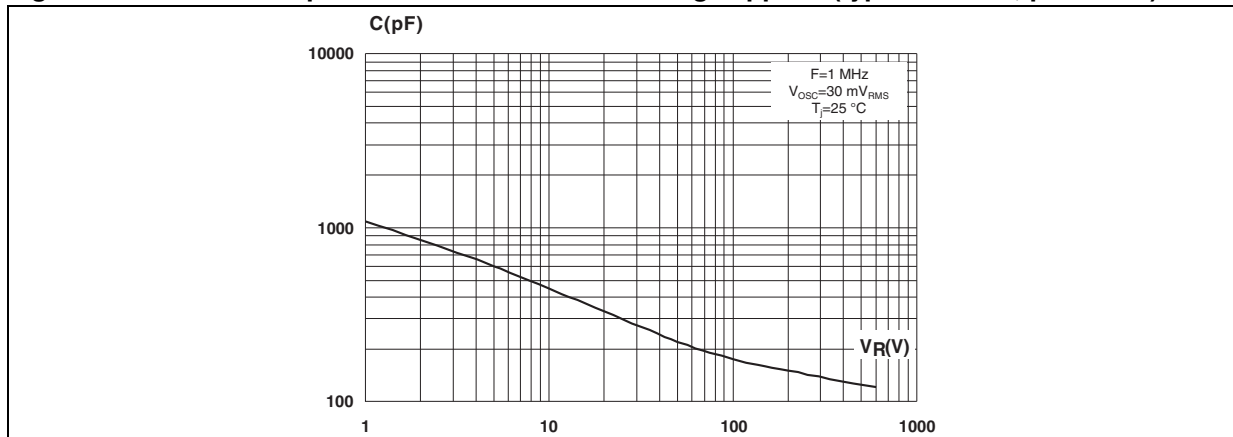
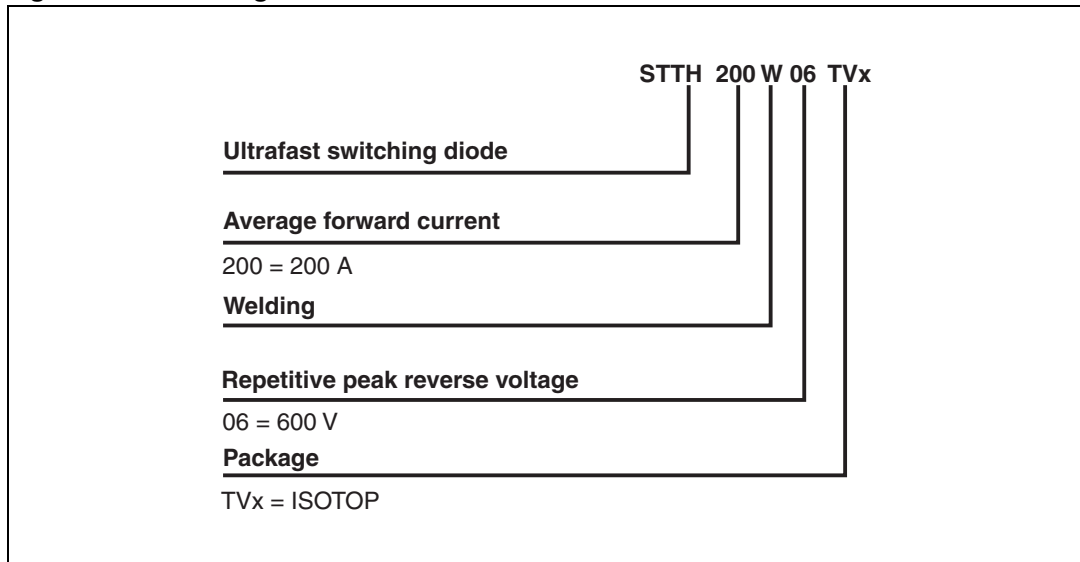


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



## 2 Ordering information scheme

Figure 12. Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.3 N·m (1.5 N·m maximum)

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**Table 6. 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

## 4 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty <sup>(1)</sup>	Delivery mode
STTH200W06TV1	STTH200W06TV1	ISOTOP	27 g	10 with screws	Tube

1. This product is supplied with 40 terminal screws and washers for each tube. The screws and washers are supplied in a separate pack with the order.

## 5 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
05-Oct-2012	1	First issue



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