

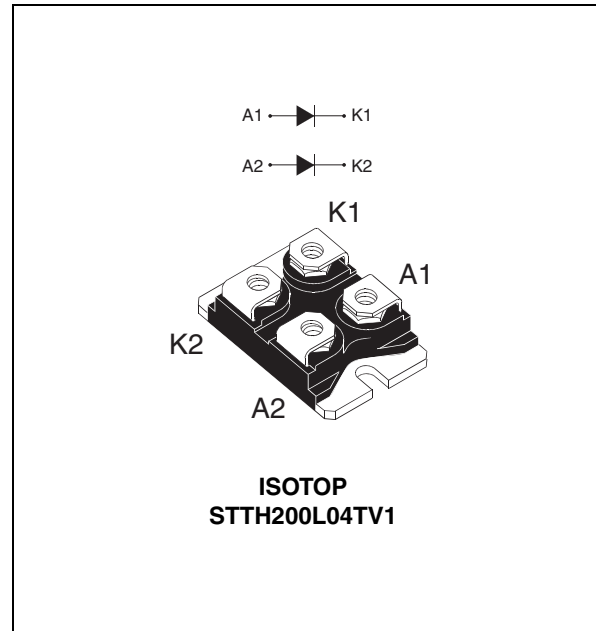
## Ultrafast high voltage rectifier

### Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Package insulation voltage: 2500 V<sub>RMS</sub>

### Description

The STTH200L04TV1 uses ST 400 V technology and is specially suited for use in switching power supplies, welding equipment, and industrial applications, as an output rectification diode.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	up to 2 x 120 A
$V_{RRM}$	400 V
$T_j$ (max)	150 °C
$V_F$ (typ)	0.83 V
$t_{rr}$ (max)	50 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode)**

Symbol	Parameter		Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage		400	V	
$I_{F(RMS)}$	Forward rms current		200	A	
$I_{F(AV)}$	Average forward current	$T_c = 90\text{ °C } \delta = 0.5$	Per diode	100	A
		$T_c = 73\text{ °C } \delta = 0.5$	Per diode	120	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	900	A	
$T_{stg}$	Storage temperature range		-55 to + 150	°C	
$T_j$	Maximum operating junction temperature		150	°C	

**Table 3. Thermal resistance**

Symbol	Parameter		Value (max).	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.50	°C/W
		Total	0.30	
$R_{th(c)}$	Coupling		0.10	

When 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	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			100	$\mu\text{A}$
		$T_j = 125\text{ °C}$			100	1000	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 100\text{ A}$			1.2	V
		$T_j = 150\text{ °C}$			0.83	1.0	

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

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

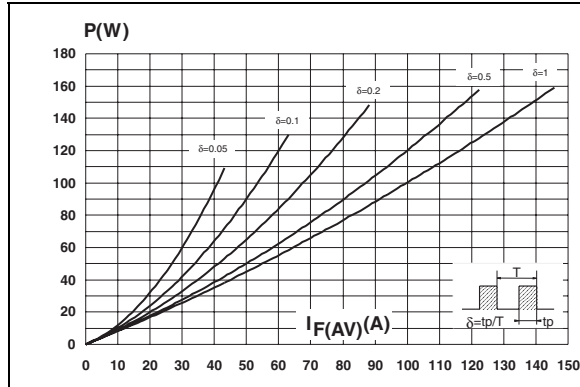
To evaluate the conduction losses use the following equation:

$$P = 0.8 \times I_{F(AV)} + 0.002 I_{F(RMS)}^2$$

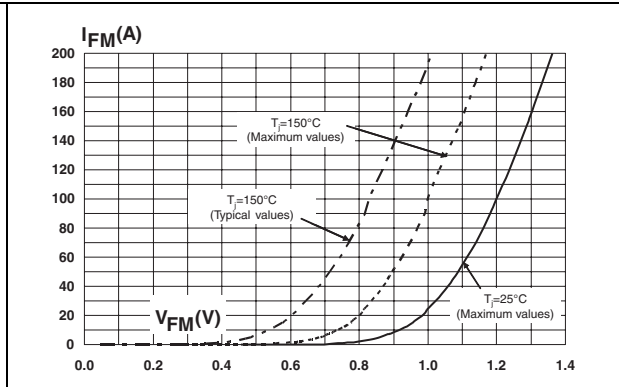
**Table 5. Dynamic characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 1\text{ A}$ $di_F/dt = 50\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$		75	100	ns
			$I_F = 1\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$		45	60	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ }^\circ\text{C}$	$I_F = 100\text{ A}$ $V_R = 200\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$			18	A
$S_{factor}$	Softness factor	$T_j = 125\text{ }^\circ\text{C}$	$I_F = 100\text{ A}$ $V_R = 200\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$		0.4		
$t_{fr}$	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 100\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			800	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 100\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$		2.6		V

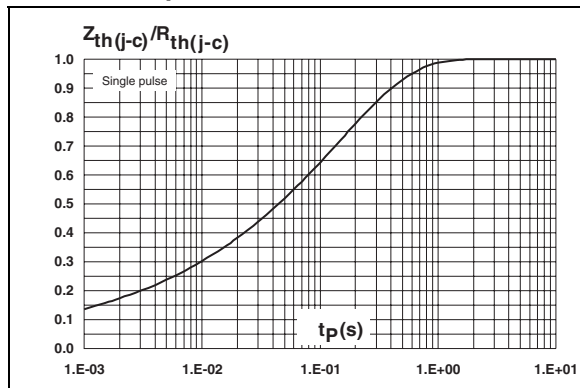
**Figure 1. Conduction losses versus average forward current (per diode)**



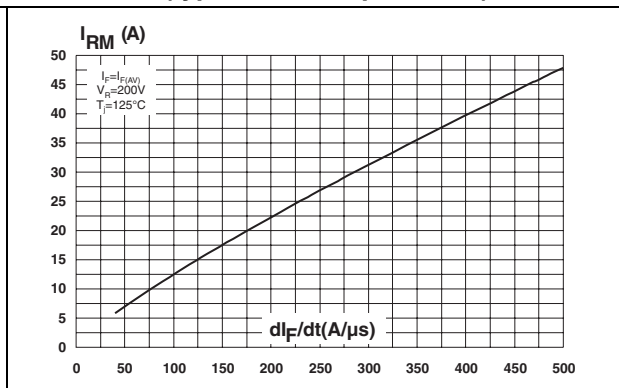
**Figure 2. Forward voltage drop versus forward current (per diode)**



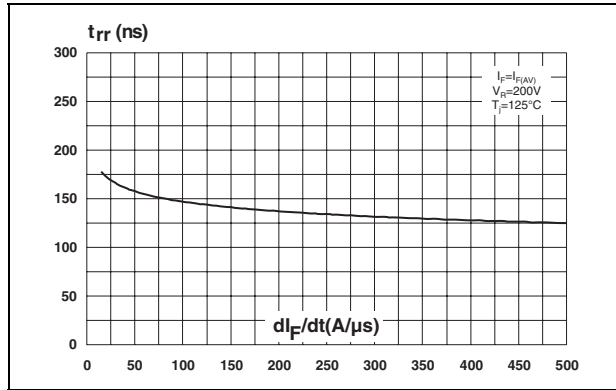
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



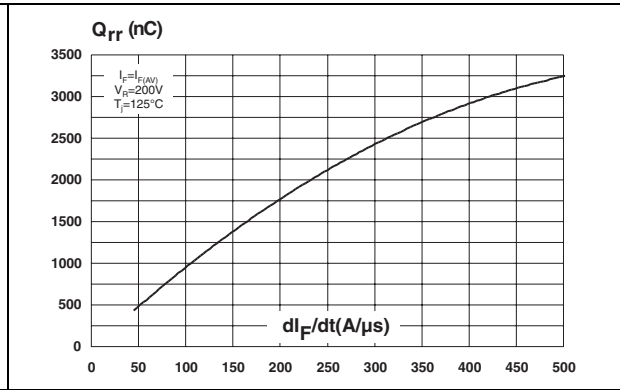
**Figure 4. Peak reverse recovery current versus di\_F/dt (typical values, per diode)**



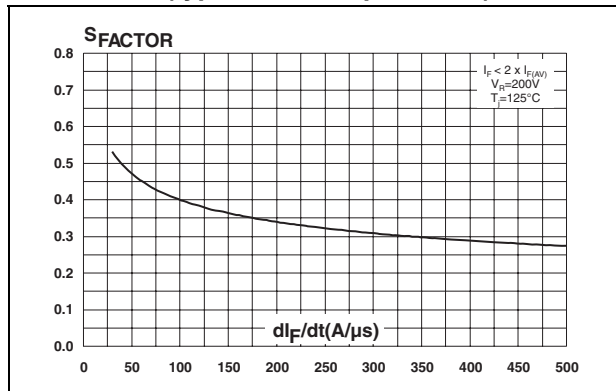
**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values, per diode)**



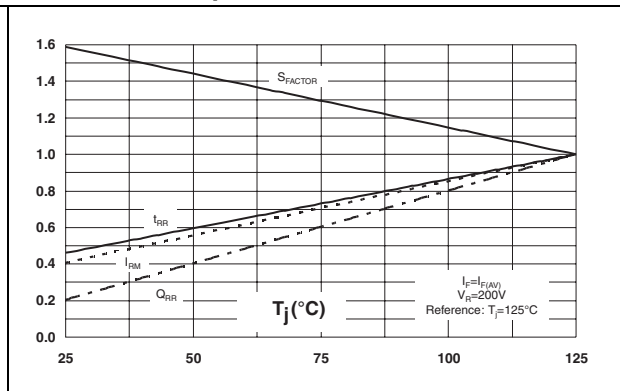
**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)**



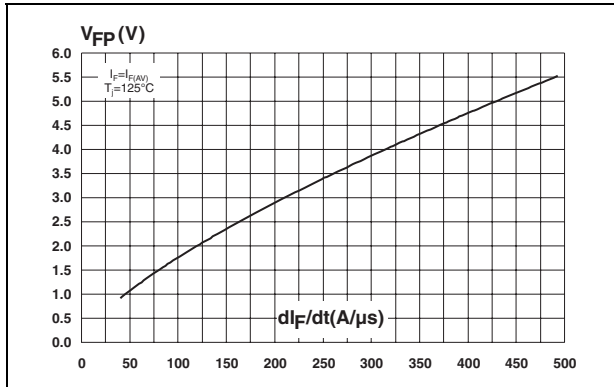
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



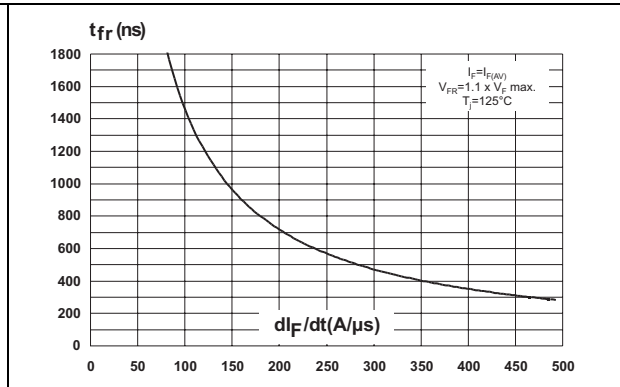
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



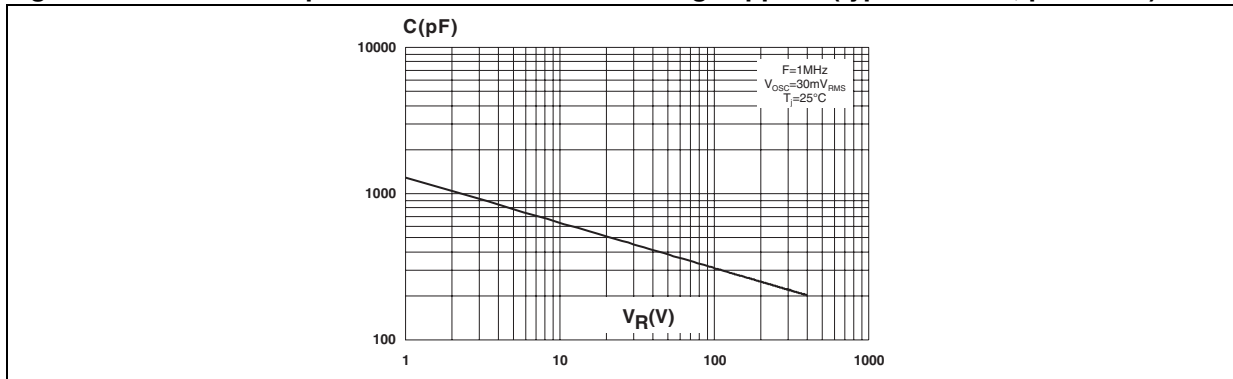
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**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)**



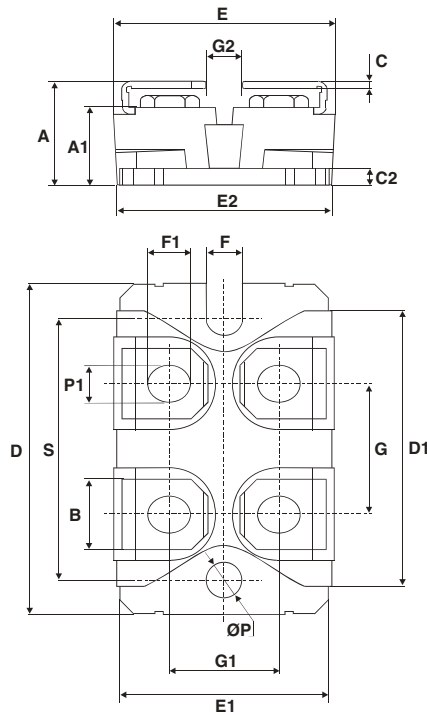
## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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**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



### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH200L04TV1	STTH200L04TV1	ISOTOP	27 g (without screws)	10 (with screws)	Tube

### 4 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
11-Aug-2006	1	First issue.
05-Sep-2011	2	Changed value of $R_d$ to 0.002 in the conduction losses equation above <a href="#">Table 4</a> . Reformatted to current standards.

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