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# STTH120L04TV1

Ultrafast high voltage rectifier

## Main product characteristics

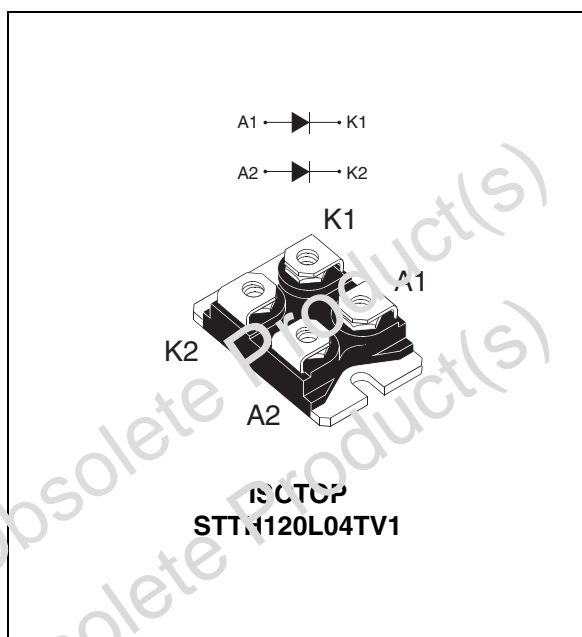
$I_{F(AV)}$	2 x 60 A
$V_{RRM}$	400 V
$T_j$ (max)	150° C
$V_F$ (typ)	0.83 V
$t_{rr}$ (max)	50 ns

## Features and benefits

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

## Description

The STTH120L04TV1 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.



## Order codes

Part number	Marking
STTH120L04TV1	STTH120L04TV1

Table 1. Absolute ratings (limiting values, per diode)

Symbol	Parameter	Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage	400	V	
$I_{F(RMS)}$	RMS forward current	120	A	
$I_{F(AV)}$	Average forward current	$T_c = 115^\circ\text{C } \delta = 0.5$ Per diode	60	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	600	A
$T_{stg}$	Storage temperature range	-55 to + 150	° C	
$T_j$	Maximum operating junction temperature	150	° C	

Characteristics

STTH120L04TV1

# 1 Characteristics

**Table 2. Thermal resistance**

Symbol	Parameter	Value (max).	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	0.74
		Total	0.42
R <sub>th(c)</sub>	Coupling	0.1	°C/W

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 3. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions	Min.	Typ	Max	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25° C	V <sub>R</sub> = V <sub>RRM</sub>		50	μA
		T <sub>j</sub> = 125° C		50	500	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25° C	I <sub>F</sub> = 60 A		1.2	V
		T <sub>j</sub> = 150° C		0.83	1.0	

1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation:

$$P = 0.8 \times I_{F(AV)} + 0.0033 I_{F(RMS)}^2$$

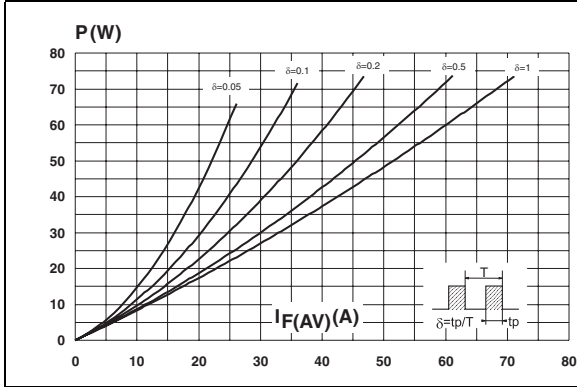
**Table 4. Dynamic characteristics (per diode)**

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
t <sub>rr</sub>	Reverse recovery time	T <sub>j</sub> = 25° C	I <sub>F</sub> = 1 A	66	90	ns
			di <sub>F</sub> /dt = 50 A/μs V <sub>R</sub> = 30 V			
			I <sub>F</sub> = 1 A	36	50	
			di <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 30 V			
I <sub>RM</sub>	Reverse recovery current	T <sub>j</sub> = 125° C	I <sub>F</sub> = 60 A		15	A
			V <sub>R</sub> = 200 V di <sub>F</sub> /dt = 100 A/μs			
S <sub>factor</sub>	Softness factor	T <sub>j</sub> = 125° C	I <sub>F</sub> = 60 A	0.4		
			V <sub>R</sub> = 200 V di <sub>F</sub> /dt = 100 A/μs			
t <sub>fr</sub>	Forward recovery time	T <sub>j</sub> = 25° C	I <sub>F</sub> = 60 A		600	ns
			di <sub>F</sub> /dt = 200 A/μs V <sub>FR</sub> = 1.1 x V <sub>Fmax</sub>			
V <sub>FP</sub>	Forward recovery voltage	T <sub>j</sub> = 25° C	I <sub>F</sub> = 60 A	2.6		V
			di <sub>F</sub> /dt = 200 A/μs V <sub>FR</sub> = 1.1 x V <sub>Fmax</sub>			

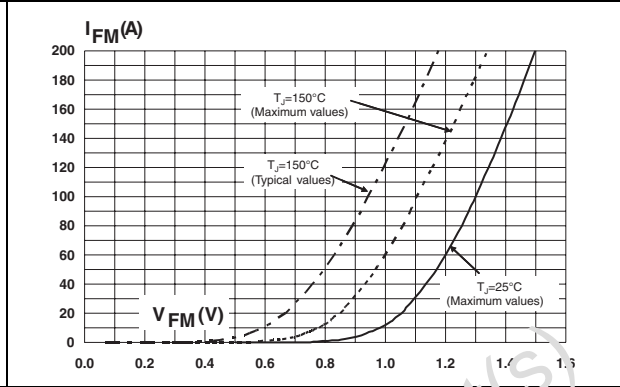
**STTH120L04TV1**

**Characteristics**

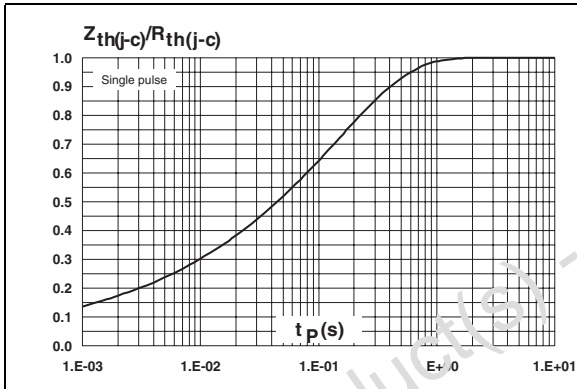
**Figure 1. Conduction losses versus average forward current (per diode)**



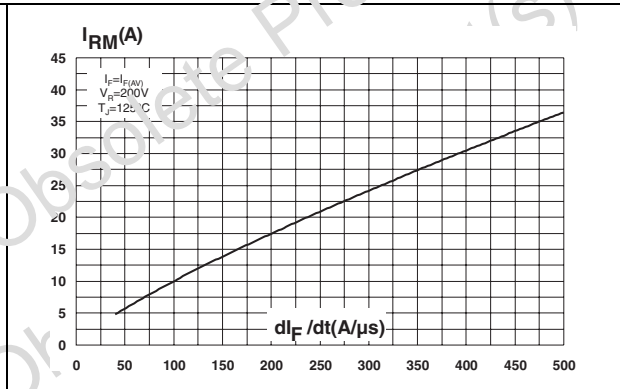
**Figure 2. Forward voltage drop versus forward current (per diode)**



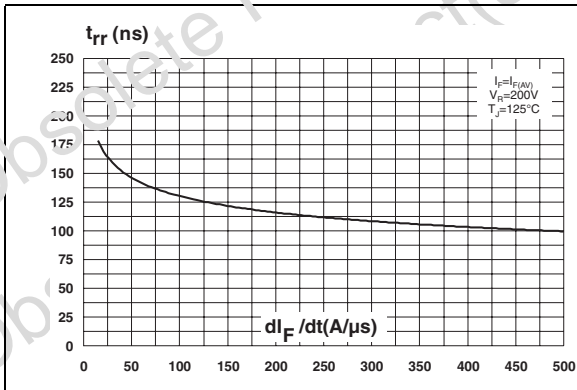
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



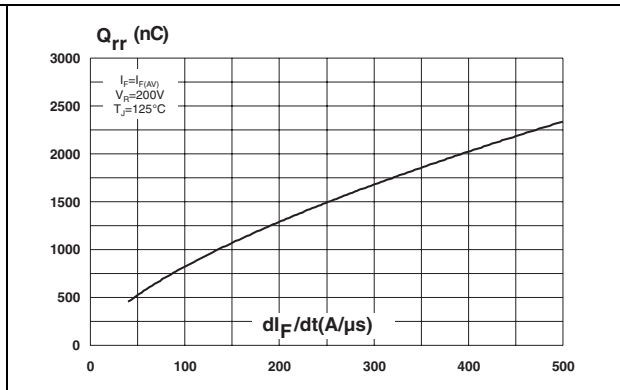
**Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)**



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



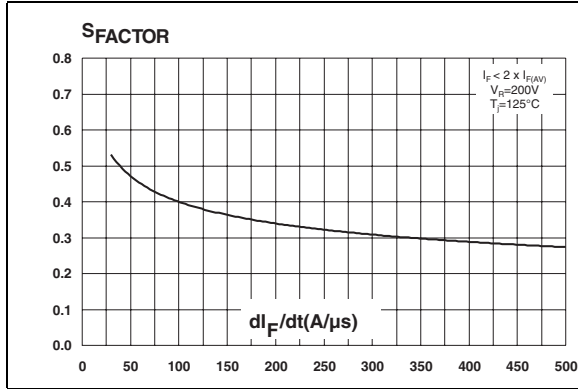
**Figure 6. Reverse recovery charges versus di/dt (typical values, per diode)**



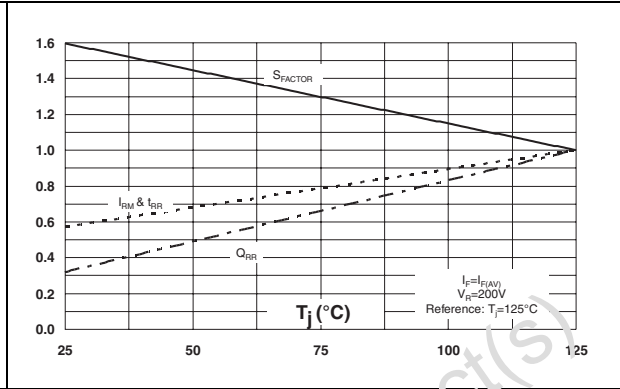
**Characteristics**

**STTH120L04TV1**

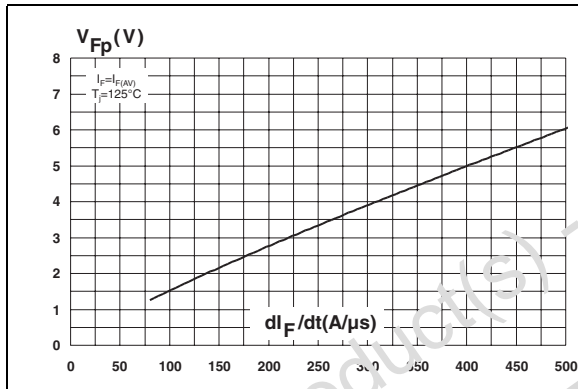
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



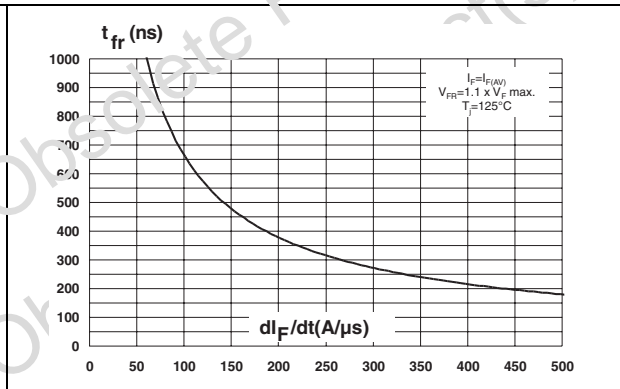
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



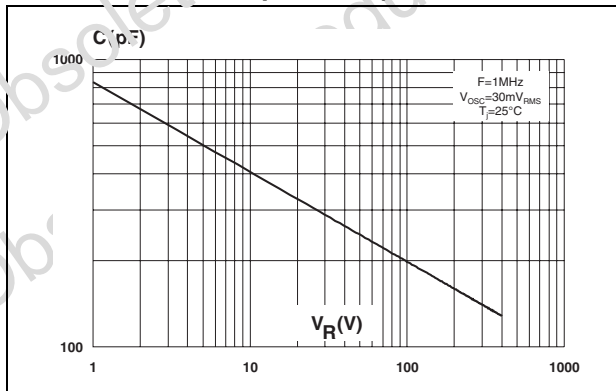
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**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)**



STTH120L04TV1

Package information

## 2 Package information

- 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	0.80	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.00	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

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Ordering information

STTH120L04TV1

### 3 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH120L04TV1	STTH120L04TV1	ISOTOP	27 g (without screws)	10 (with screws)	Tube

### 4 Revision history

Date	Revision	Description of Changes
11-Aug-2006	1	First issue

Obsolete Product(s) - Obsolete Product(s)  
 Obsolete Product(s) - Obsolete Product(s)

## STTH120L04TV1

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