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Ultrafast high voltage rectifier

Main product characteristics

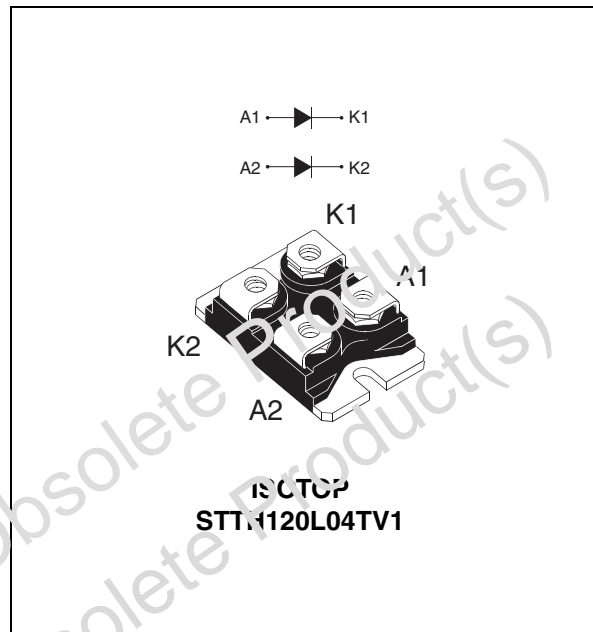
$I_{F(AV)}$	2 x 60 A
V_{RRM}	400 V
T_j (max)	150° C
V_F (typ)	0.83 V
t_{rr} (max)	50 ns

Features and benefits

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Package insulation voltage: 2500 V_{RMS}

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	$t_p = 10$ ms sinusoidal		600	A
T_{stg}	Storage temperature range			-55 to + 150	° C
T_j	Maximum operating junction temperature			150	° C

1 Characteristics

Table 2. Thermal resistance

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

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 _R ⁽¹⁾	Reverse leakage current	T _j = 25° C	V _R = V _{RRM}		50	µA
		T _j = 125° C		50	500	
V _F ⁽²⁾	Forward voltage drop	T _j = 25° C	I _F = 60 A		1.2	V
		T _j = 150° C		0.83	1.0	

1. Pulse test: t_p = 5 ms, δ < 2%

2. Pulse test: t_p = 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 _{rr}	Reverse recovery time	T _j = 25° C	I _F = 1 A dI _F /dt = 50 A/µs V _R = 30 V		66	90	ns
			I _F = 1 A dI _F /dt = 200 A/µs V _R = 30 V		36	50	
I _{RM}	Reverse recovery current	T _j = 125° C	I _F = 60 A V _R = 200 V dI _F /dt = 100 A/µs			15	A
S _{factor}	Softness factor	T _j = 125° C	I _F = 60 A V _R = 200 V dI _F /dt = 100 A/µs		0.4		
t _{fr}	Forward recovery time	T _j = 25° C	I _F = 60 A dI _F /dt = 200 A/µs V _{FR} = 1.1 x V _{Fmax}			600	ns
V _{FP}	Forward recovery voltage	T _j = 25° C	I _F = 60 A dI _F /dt = 200 A/µs V _{FR} = 1.1 x V _{Fmax}		2.6		V

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

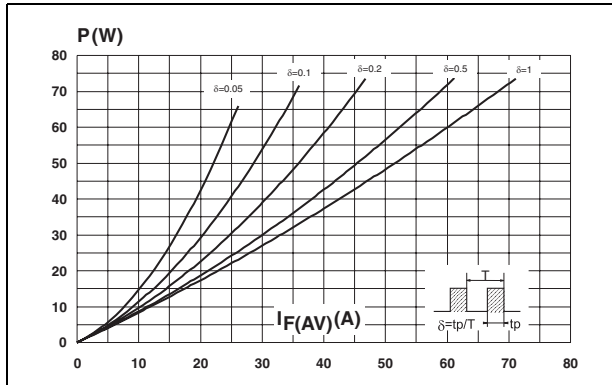


Figure 2. Forward voltage drop versus forward current (per diode)

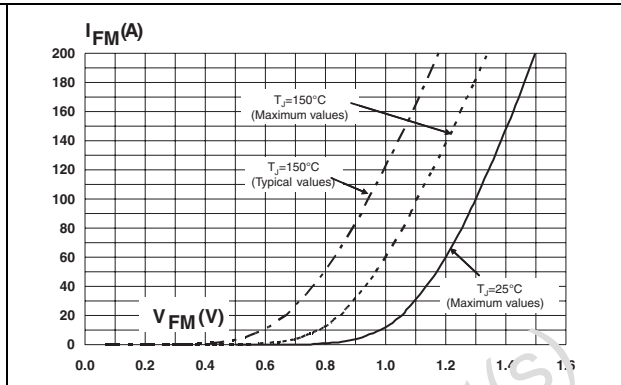


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

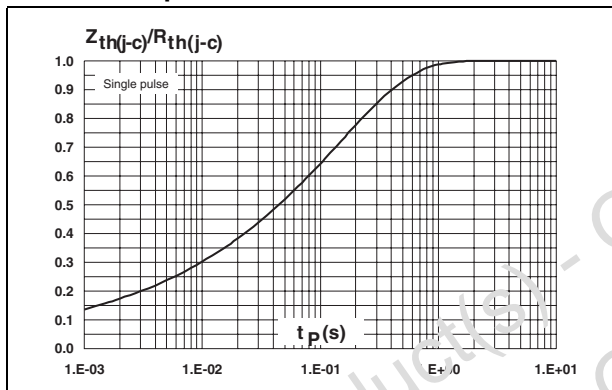


Figure 4. Peak reverse recovery current versus di/dt (typical values, per diode)

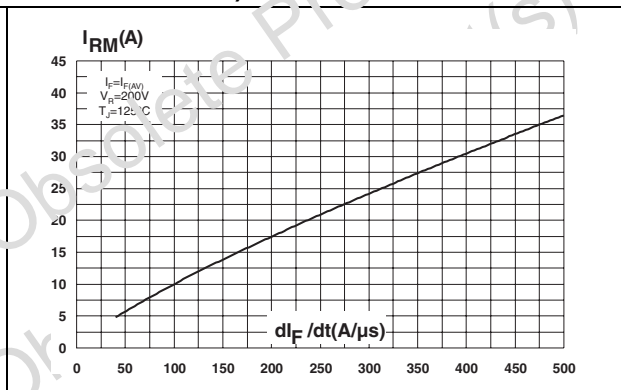


Figure 5. Reverse recovery time versus di/dt (typical values, per diode)

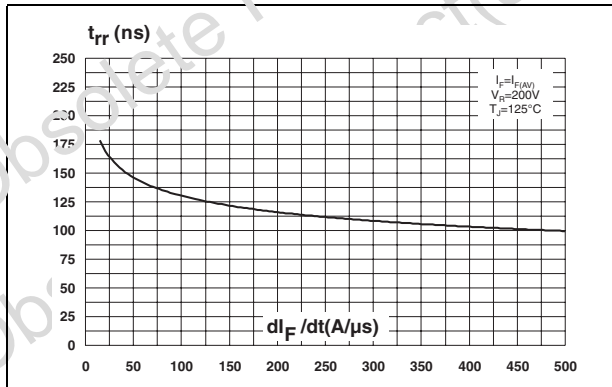


Figure 6. Reverse recovery charges versus di/dt (typical values, per diode)

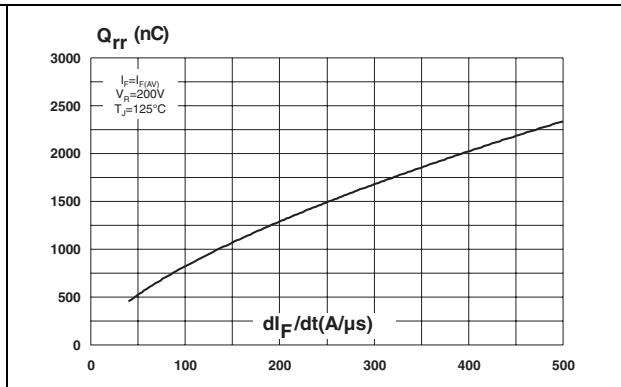


Figure 7. Reverse recovery softness factor versus di_F/dt (typical values, per diode)

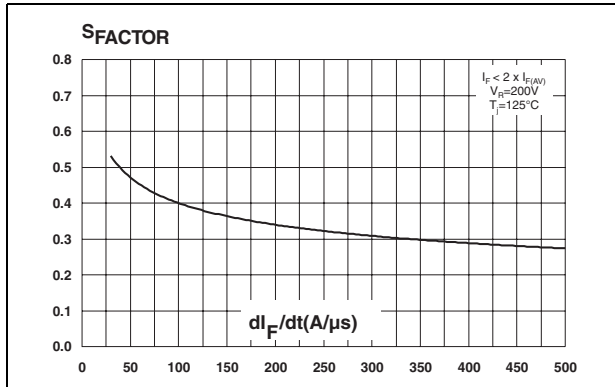


Figure 8. Relative variations of dynamic parameters versus junction temperature

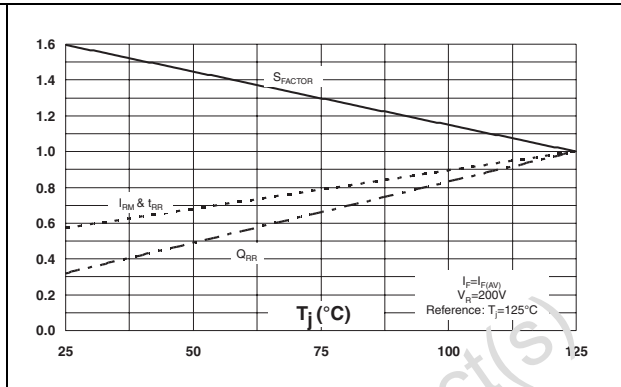


Figure 9. Transient peak forward voltage versus di_F/dt (typical values, per diode)

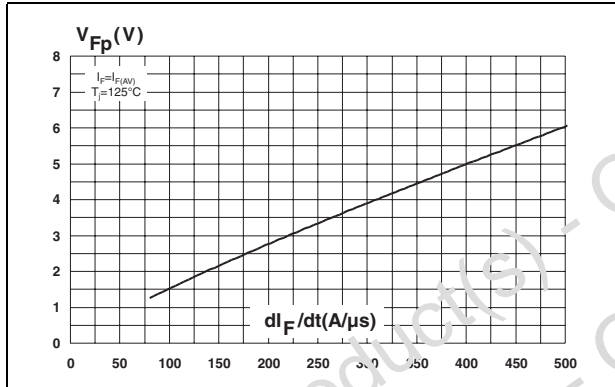


Figure 10. Forward recovery time versus di_F/dt (typical values, per diode)

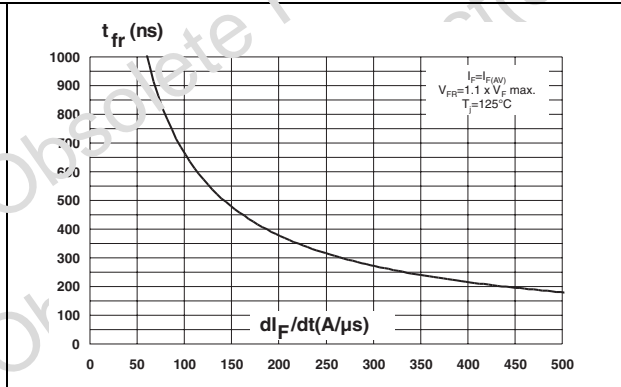
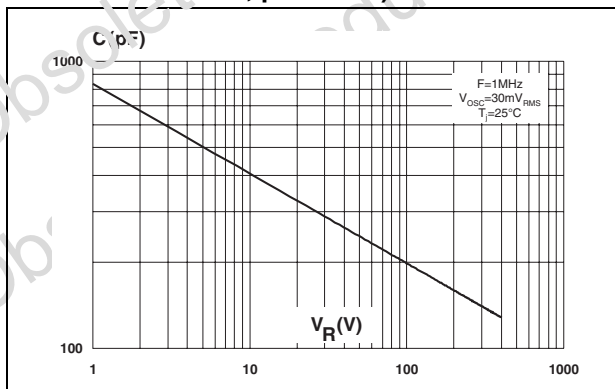


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



2 Package 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	0.85	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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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

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