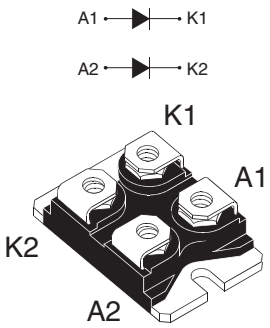
STTH20003TV

Ultrafast high voltage rectifier

Mian product characteristics

$I_{F(AV)}$	up to 2 x 100 A
V_{RRM}	300 V
T_j (max)	150° C
V_F (typ)	0.95 V
t_{rr} (max)	90 ns



ISOTOP
STTH20003TV

Features and benefits

- Combines highest recovery and reverse voltage performance
- Ultrafast, soft and noise-free recovery
- Package insulation voltage 2500 V_{rms}
- low inductance and low capacitance allow simpler layout

Description

Dual rectifiers suited for Switch Mode Power Supply and high frequency DC to DC converters.

Packaged in ISOTOP™, this device is intended for use in low voltage, high frequency inverters, free wheeling operation, welding equipment and telecom power supplies.

Order codes

Part number	Marking
STTH20003TV	STTH20003TV

Table 1. Absolute ratings (limiting values, per diode, T_c = 25° C unless otherwise stated)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			300	V
$I_{F(RMS)}$	RMS forward current			180	A
$I_{F(AV)}$	Average forward current	T_c = 85° C δ = 0.5	Per diode	100	A
			Per device	200	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		100	A
T_{stg}	Storage temperature range			-55 to + 150	° C
T_j	Maximum operating junction temperature			150	° C

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1 Characteristics

Table 2. Thermal resistance

Symbol	Parameter		Value (max).	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.55	°C/W
		Total	0.35	
$R_{th(c)}$	Coupling		0.1	

When diodes 1 and 2 are used simultaneously:
Δ Tj(diode 1) = P(diode 1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

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 = 300 V			200	µA
		T_j = 125° C			0.2	2	mA
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 100 A			1.20	V
		T_j = 150° C			0.8	0.95	

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 = 0.75 x $I_{F(AV)}$ + 0.0020 $I_F{}^2{}_{(RMS)}$

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 = 0.5 A I_{rr} = 0.25 A I_R = 1 A		55		ns
			I_F = 1 A dI_F/dt = -50 A/µs V_R = 30 V			90	
I_{RM}	Reverse recovery current	T_j = 125° C	I_F = 100 A V_R = 200 V dI_F/dt = -200 A/µs			18	A
S_{factor}	Softness factor	T_j = 125° C	I_F = 100 A V_R = 200 V dI_F/dt = -200 A/µs		0.3		
t_{fr}	Forward recovery time	T_j = 25° C	I_F = 100 A dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}			1400	ns
V_{FP}	Forward recovery voltage	T_j = 25° C	I_F = 100 A dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}			5	V

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

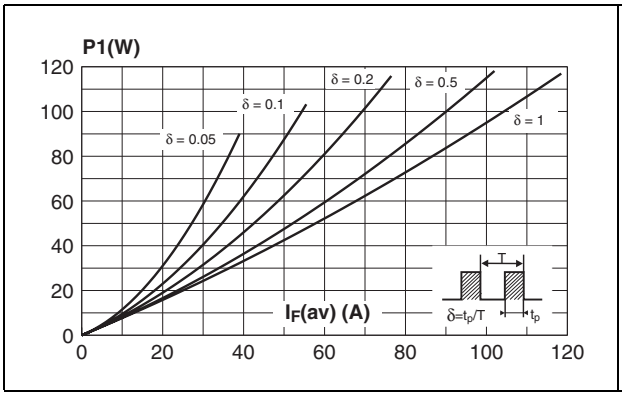


Figure 2. Forward voltage drop versus forward current (per diode)

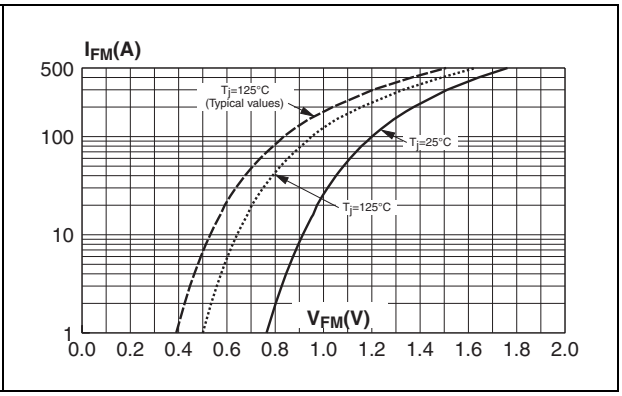


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

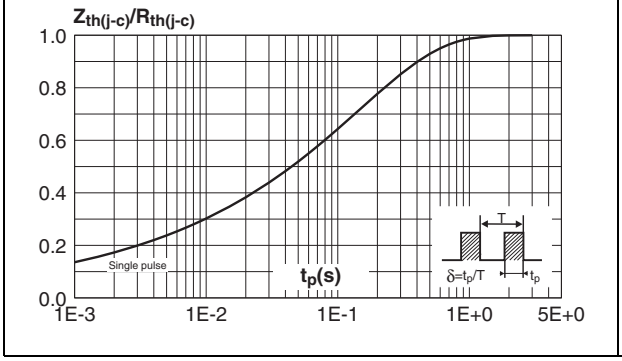


Figure 4. Peak reverse recovery current versus dI_F/dt (90% confidence, per diode)

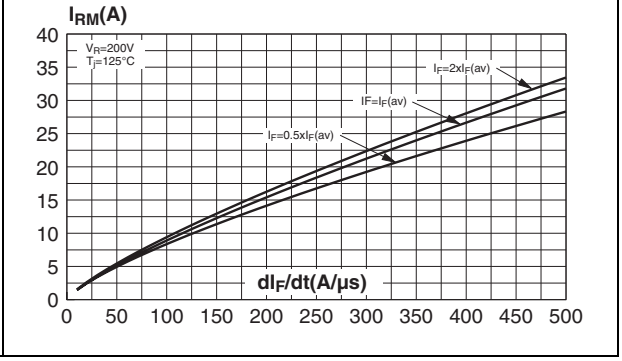


Figure 5. Reverse recovery time versus dI_F/dt (90% confidence, per diode)

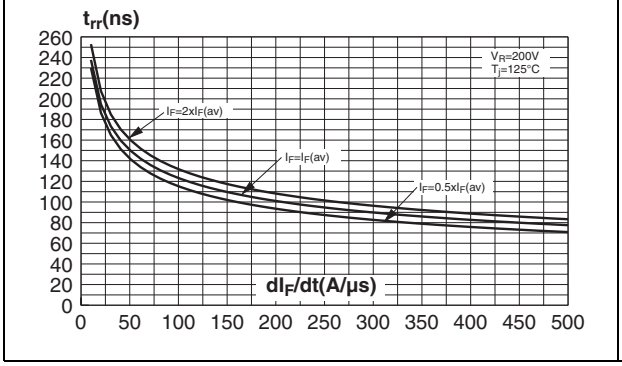


Figure 6. Softness factor (t_b/t_a) versus dI_F/dt (typical values, per diode)

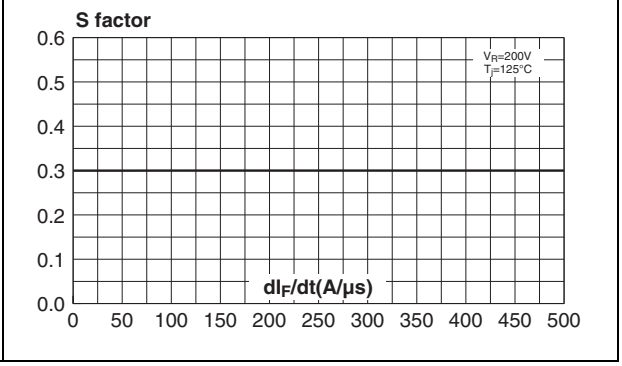


Figure 7. Relative variations of dynamic parameters versus junction temperature (reference: T_j = 125° C)

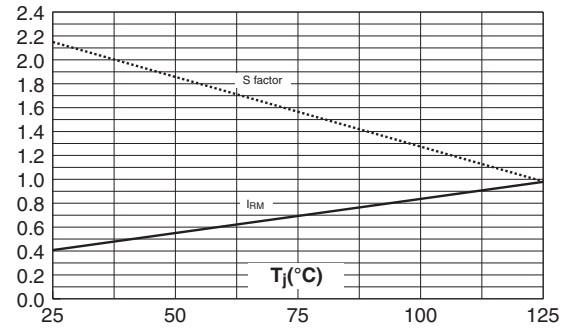


Figure 8. Transient peak forward voltage versus dI_F/dt (90% confidence, per diode)

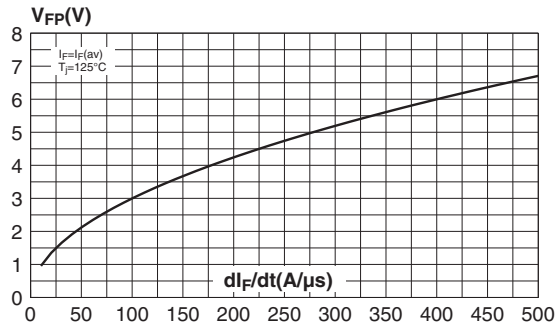
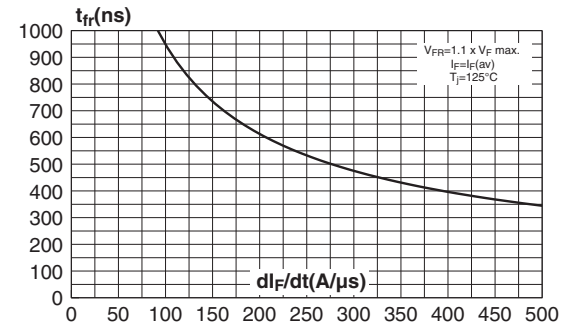


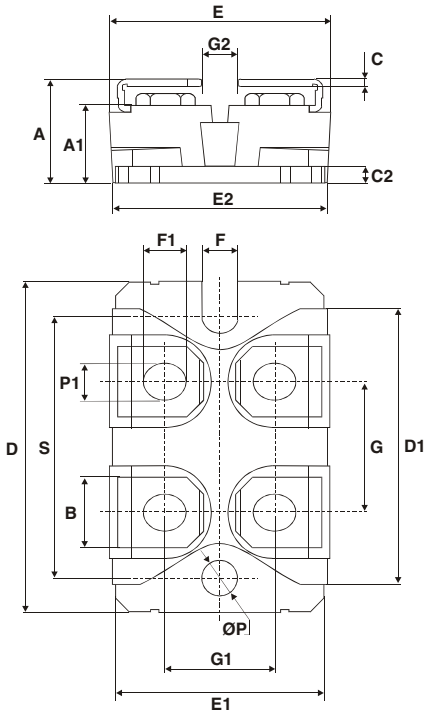
Figure 9. Forward recovery time versus dI_F/dt (90% confidence, per diode)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.3 Nm
- Maximum torque value: 1.5 Nm

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.

3 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH20003TV	STTH20003TV	ISOTOP	27 g (without screws)	10 (with screws)	Tube

4 Revision history

Date	Revision	Description of Changes
1999	2C	First issue
5-Sep-2006	2	Reformatted to current standards. Thermal resistance updated in Table 2.

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