STTH10002

Ultrafast recovery diode

Main product characteristics

$I_{F(AV)}$	2 x 50 A
V_{RRM}	200 V
T_j (max)	150° C
V_F (typ)	0.72 V
t_{rr} (typ)	30 ns

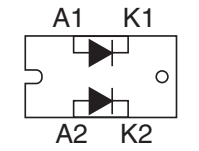
Features and benefits

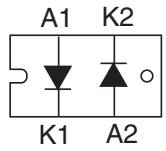
- Very low forward losses
- Low recovery time
- High surge current capability
- Insulated
  - Insulating voltage = 2500 V_{rms}
  - Capacitance = 45 pF

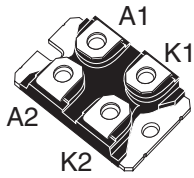
Description

The STTH10002 is a dual rectifier suited for welding equipment, and high power industrial applications.

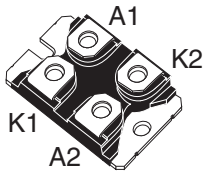
Packaged in ISOTOP, this device is intended for use in the secondary rectification of power converters.







ISOTOP
STTH10002TV1



ISOTOP
STTH10002TV2

Order codes

Part Number	Marking
STTH10002TV1	STTH10002TV1
STTH10002TV2	STTH10002TV2

1 Characteristics

Table 1. Absolute ratings (limiting values at T_j = 25° C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		200	V
$I_{F(RMS)}$	RMS forward current	Per diode	150	A
$I_{F(AV)}$	Average forward current, δ = 0.5	Per diode T_c = 100° C	50	A
		Per device T_c = 95° C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal	750	A
T_{stg}	Storage temperature range		-55 to + 175	° C
T_j	Maximum operating junction temperature		150	° C

Table 2. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1	° C/W
		Total	0.55	
$R_{th(c)}$	Coupling		0.1	

When the two diodes 1 and 2 are used simultaneously:

ΔTj(diode 1) = P (diode 1) X $R_{th(j-c)}$ (Per diode) + P (diode 2) x $R_{th(c)}$

Table 3. Static electrical characteristics

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 = 50 A			1	V
			I_F = 100 A			1.15	
		T_j = 125° C	I_F = 100 A		0.90	1.0	
		T_j = 150° C	I_F = 50 A		0.72	0.80	
			I_F = 100 A		0.86	0.97	

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:
$P = 0.63 \times I_{F(AV)} + 0.0034\ I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25 °C		53	65	ns
		I_F = 1 A, dI_F/dt = -200 A/µs, V_R = 30 V, T_j = 25 °C		30	37	
I_{RM}	Reverse recovery current	I_F = 50 A, dI_F/dt = 200 A/µs, V_R = 160 V, T_j = 125 °C		10	13	A
t_{fr}	Forward recovery time	I_F = 50 A, dI_F/dt = 200 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25 °C		180		ns
V_{FP}	Forward recovery voltage	I_F = 50 A, dI_F/dt = 200 A/µs, T_j = 25 °C		1.6		V

Figure 1. Peak current versus duty cycle

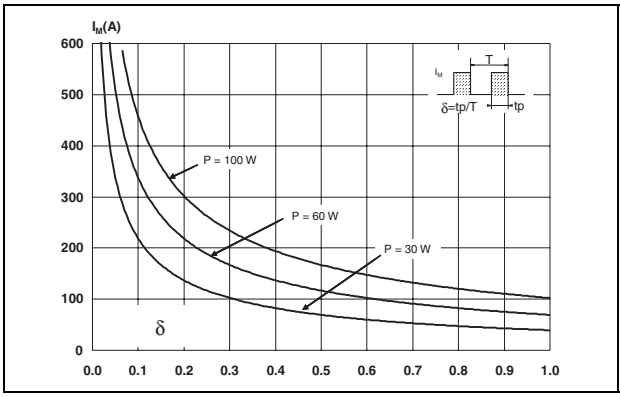


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

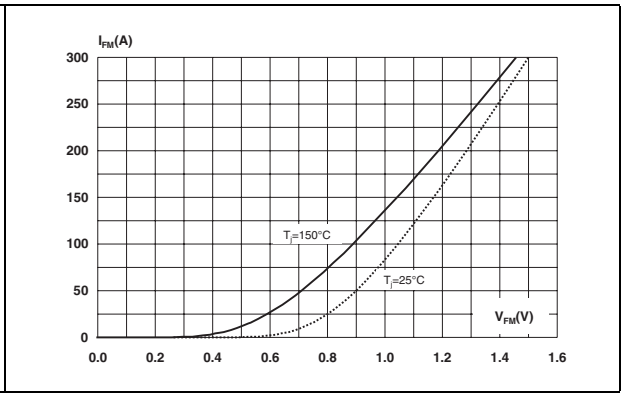


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

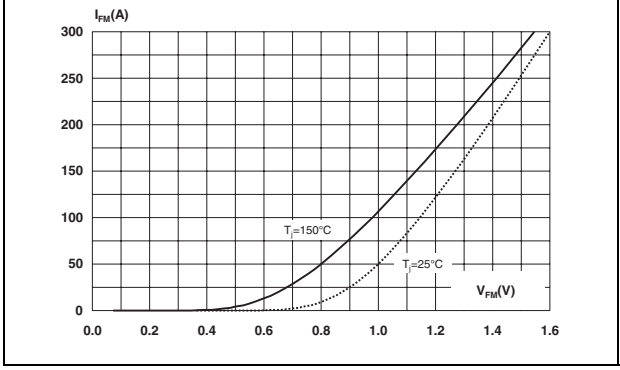


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

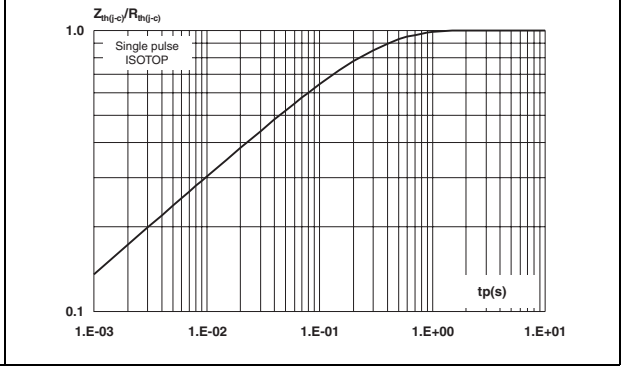


Figure 5. Junction capacitance versus reverse applied voltage (typical values)

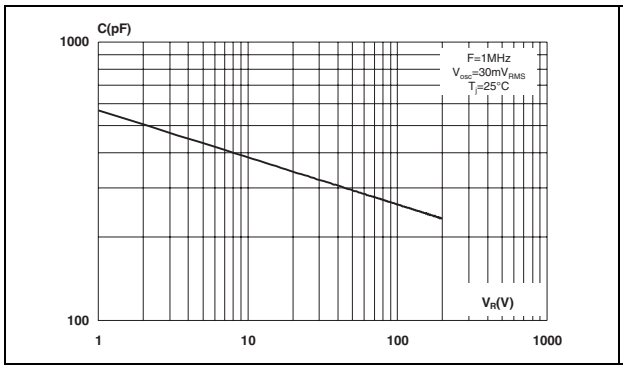


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

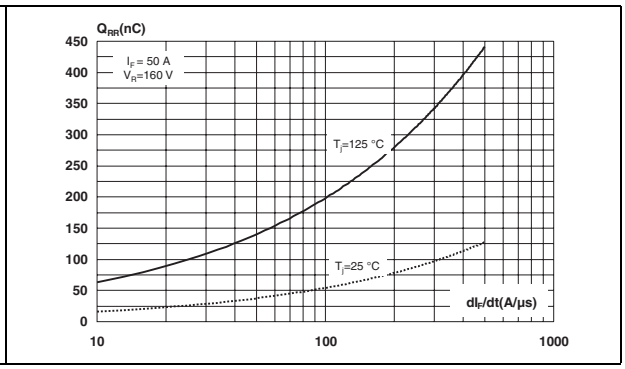


Figure 7. Reverse recovery time versus dI_F/dt (typical values)

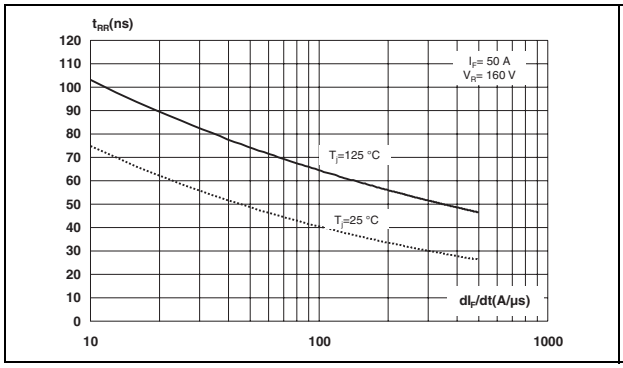


Figure 8. Peak reverse recovery current versus dI_F/dt (typical values)

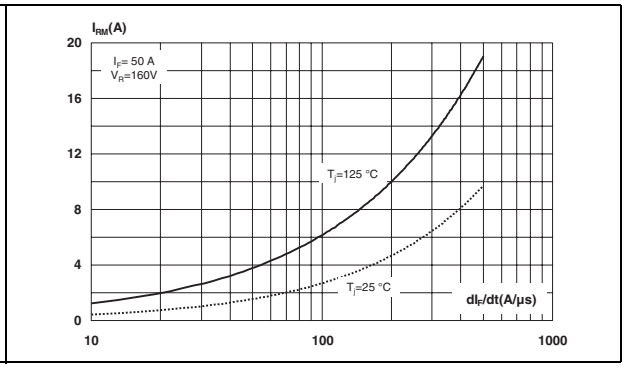
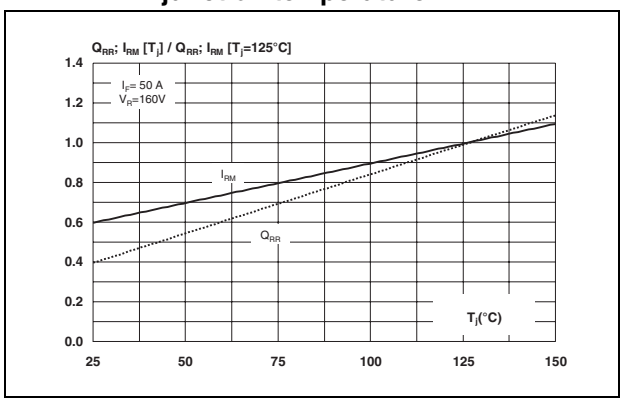
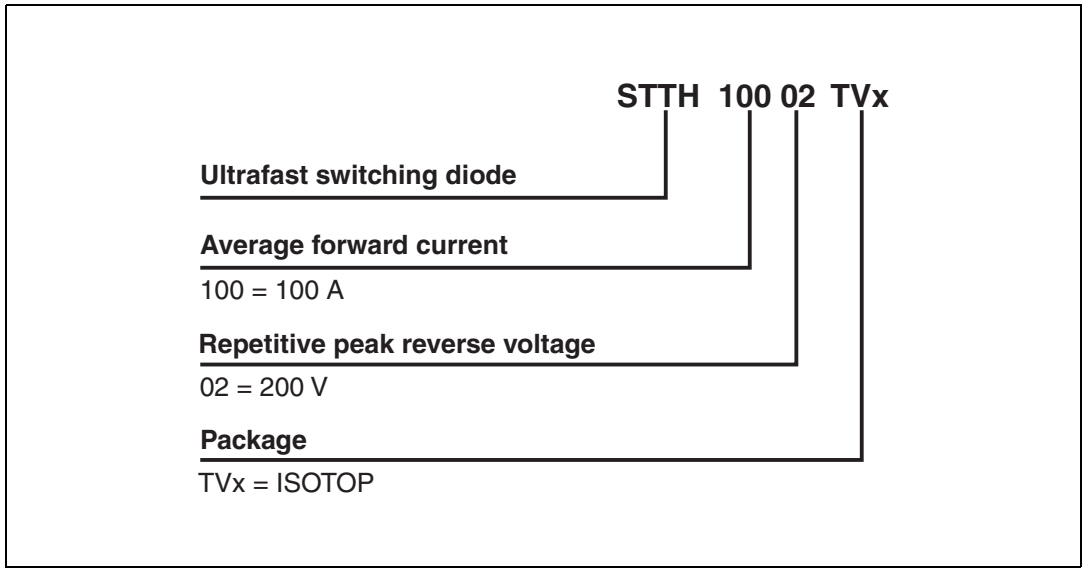


Figure 9. Dynamic parameters versus junction temperature

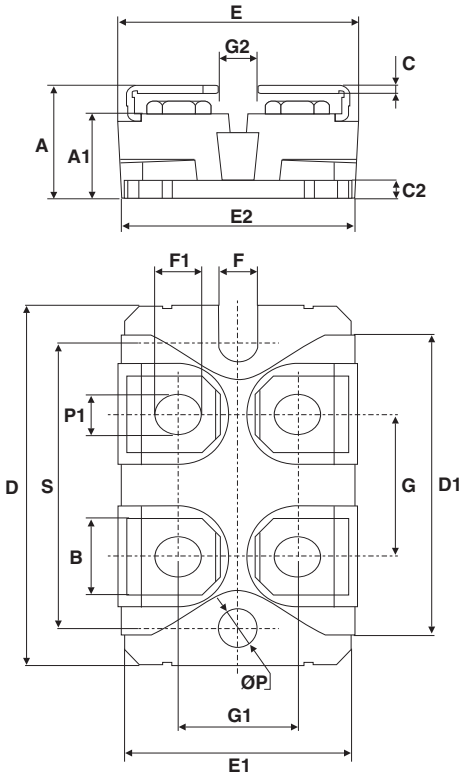


2 Ordering information scheme



3 Package information

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.

4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH10002TV1	STTH10002TV1	ISOTOP	27 g	10	Tube
STTH10002TV2	STTH10002TV2	ISOTOP	27 g	10	Tube

5 Revision history

Date	Revision	Description of Changes
05-Apr-2006	1	First issue