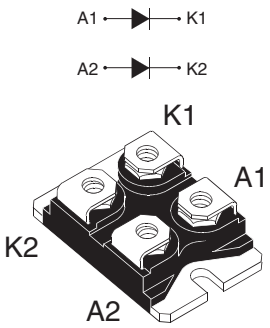
STTH200W04TV1

Turbo 2 ultrafast high voltage rectifier

Datasheet – production data

Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Insulated package:
  - Electrical = 2500 V_{RMS}
  - Capacitance = 45 pF



ISOTOP
STTH200W04TV1

Description

The STTH200W04TV1, which uses ST turbo 2, 400 V technology, is especially suited for use in DC/DC and DC/AC converters in secondary stage of MIG/MMA/TIG welding machine.

Packaged in ST's ISOTOP, this device offers high power integration for all welding machines and industrial applications.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 100 A
V_{RRM}	400 V
T_j (max)	150 °C
V_F (typ)	1.05 V
t_{rr} (typ)	40 ns

1 Characteristics

Table 2. Absolute ratings (limiting values, at 25 °C, unless otherwise specified, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			400	V
$I_{F(RMS)}$	Forward rms current			200	A
$I_{F(Peak)}$	Peak forward current, $\delta = 0.2$	T_c = 90 °C	Per diode	200	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		800	A
T_{stg}	Storage temperature range			-65 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	0.9	°C/W
		Total	0.5	
$R_{th(c)}$	Coupling		0.10	°C/W

When diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode 1) x $R_{th(j-c)}$(per diode) + P(diode 2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			40	µA
		T_j = 125 °C			40	400	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 100 A			1.55	V
		T_j = 150 °C			1.05	1.30	
		T_j = 25 °C	I_F = 200 A			1.9	
		T_j = 150 °C			1.35	1.65	

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:
$P = 0.95 \times I_{F(AV)} + 0.0035\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
Q_{RR}	Reverse recovery charge	T_j = 125 °C	I_F = 100 A, V_R = 320 V dI_F/dt = -200 A/µs		0.9		µC
S_{factor}	Softness factor				0.3		
I_{RM}	Reverse recovery current				17	23	A
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, V_R = 30 V dI_F/dt = -100 A/µs		40	55	ns
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 100 A, dI_F/dt = 100 A/µs V_{FR} = 2 V			2	µs
V_{FP}	Forward recovery voltage				3.0	4.5	V

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

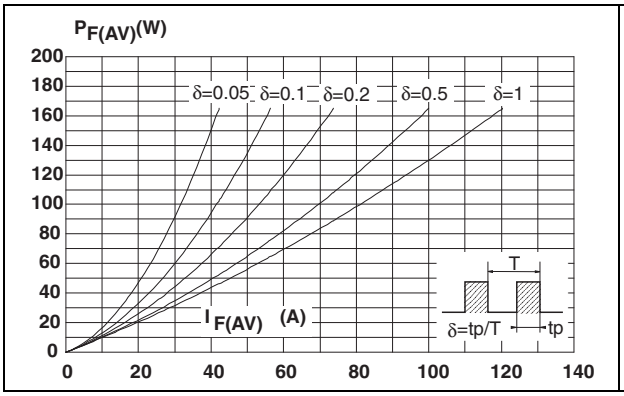


Figure 2. Forward voltage drop versus forward current (per diode)

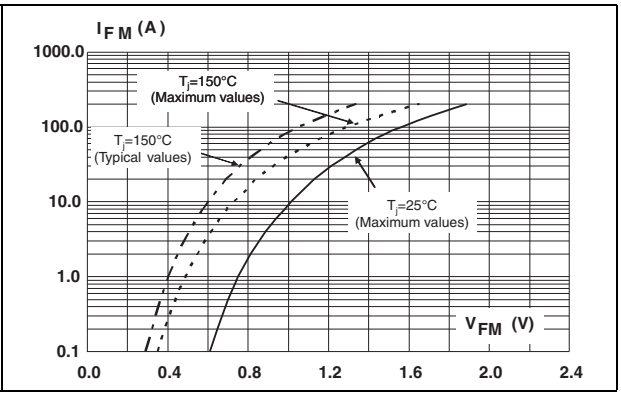


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

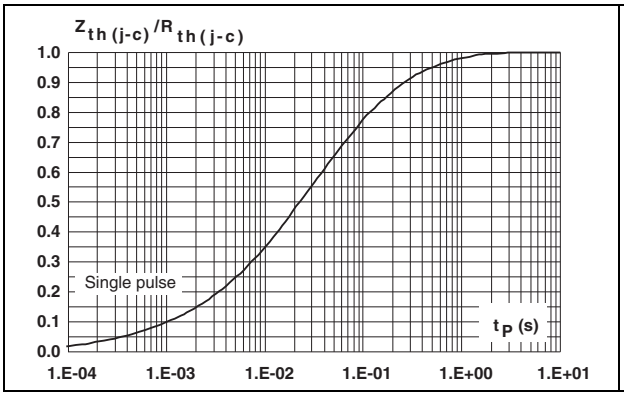


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

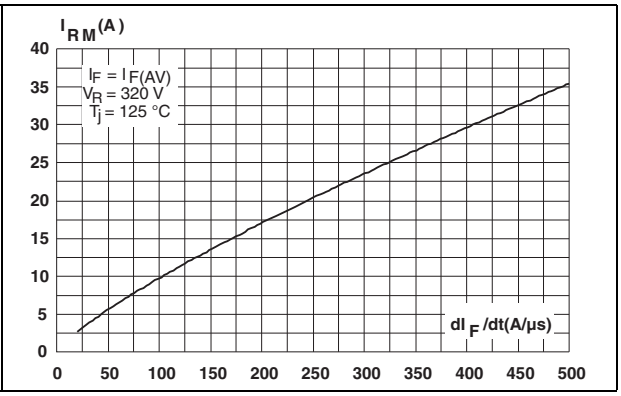


Figure 5. Reverse recovery time versus dI_F/dt (typical values, per diode)

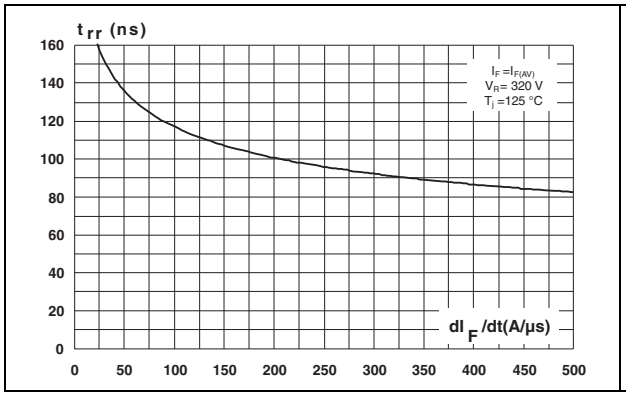


Figure 6. Reverse recovery charges versus dI_F/dt (typical values, per diode)

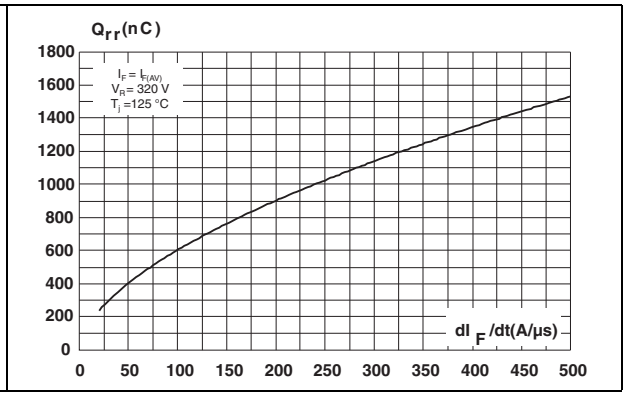


Figure 7. Reverse recovery softness factor versus dI_F/dt (typical values, per diode)

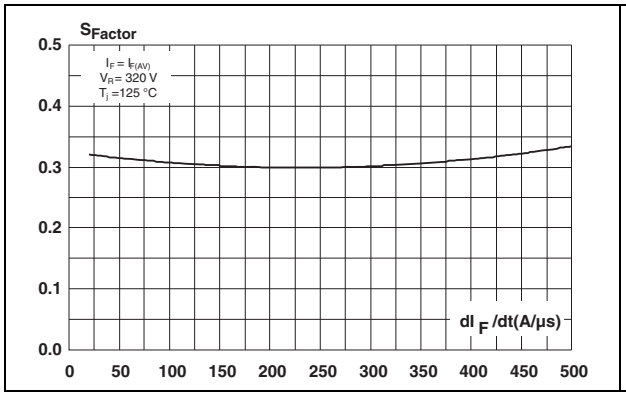


Figure 8. Relative variations of dynamic parameters versus junction temperature

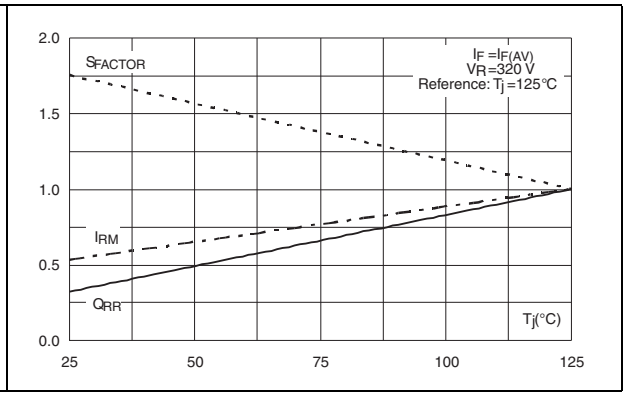


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values, per diode)

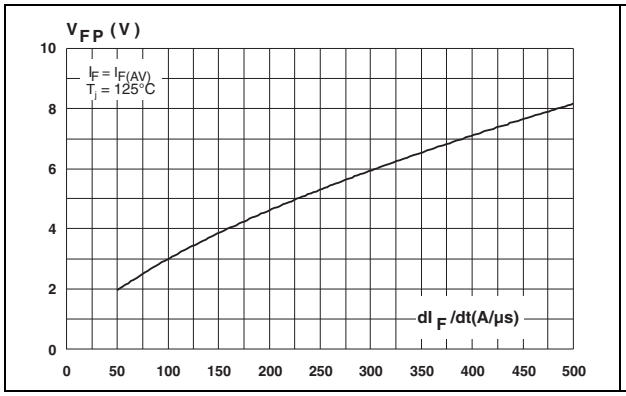


Figure 10. Forward recovery time versus dI_F/dt (typical values, per diode)

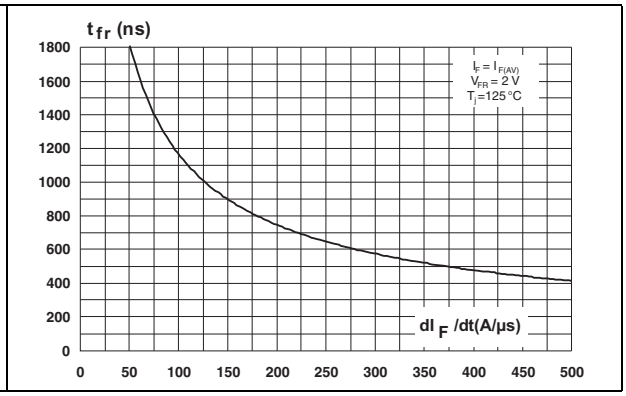
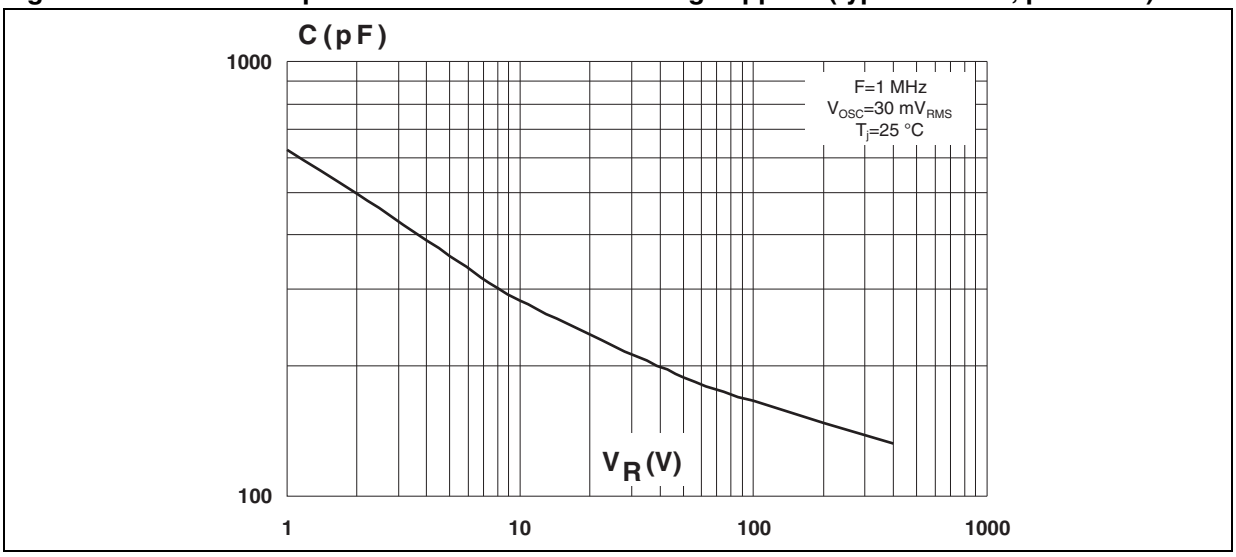


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



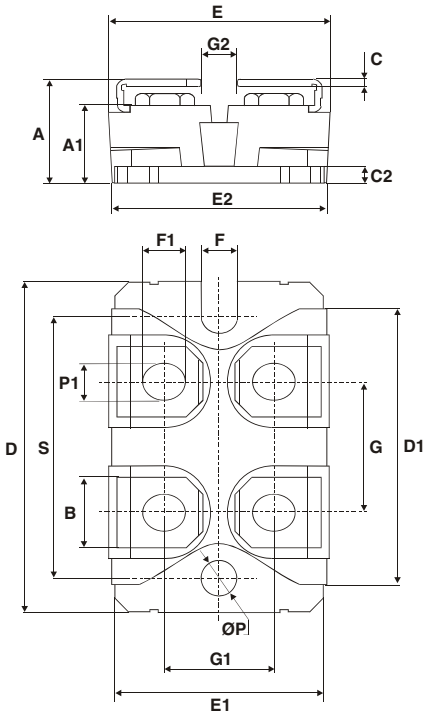
2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.5 N·m
- Maximum torque value: 1.5 N·m

STMicroelectronics strongly recommend the uses of the screws delivered with this product.The use of another screw is entirely at the user's own risk and will invalidate the warranty.

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com.* ECOPACK® is an ST trademark.

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[1]	Delivery mode
STTH200W04TV1	STTH200W04TV1	ISOTOP	27 g without screws	10 with screws	Tube

1. This product is supplied with 40 terminal screws and washers for each tube. The screws and washers are supplied in a separate pack with the order.

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
19-Jun-2012	1	First issue.
02-Oct-2012	2	Updated *Table 1* and *Table 5*

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