STTH20W02C

Turbo 2 ultrafast high voltage rectifier

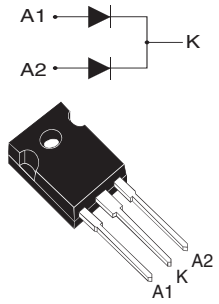
Datasheet – production data

Features

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses
- ECOPACK®2 compliant component

Description

The STTH20W02C uses ST Turbo 2 200 V technology. It is especially suited to be used for DC/DC and DC/AC converters in secondary stage of MIG/MMA/TIG welding machine. Housed in ST's TO-247, this device offers high power integration for all welding machines and industrial applications.



TO-247
STTH20W02CW

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
V_{RRM}	200 V
t_{rr} (typ)	20 ns
T_j	175 °C
V_F (typ)	0.89 V

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(RMS)}$	RMS forward current			20	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	T_c = 120 °C	Per diode	10	A
		T_c = 110 °C	Per device	20	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		80	A
T_{stg}	Storage temperature range			-65 to + 175	° C
T_j	Maximum operating junction temperature			+ 175	° C

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	4	°C / W
		Total	2.5	°C / W
$R_{th(c)}$	Coupling		1	°C / W

When diodes 1 and 2 are used simultaneously:

$Tj_{(diode\ 1)} = P_{(diode\ 1)} \times R_{th(j-c)}(\text{Per diode}) + P_{(diode\ 2)} \times R_{th}(c)$

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			5	µA
		T_j = 125° C			3	30	
V_F (2)	Forward voltage drop	T_j = 25° C	I_F = 10 A			1.20	V
		T_j = 150 °C			0.89	1.05	
		T_j = 25° C	I_F = 20 A			1.40	
		T_j = 150° C			1.10	1.30	

1. Pulse test: tp = 5 ms, δ < 2%
2. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.8 \times I_{F(AV)} + 0.025\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 10 A, V_R = 160 V dI_F/dt = -200 A/µs		7	9	A
Q_{RR}	Reverse recovery charge				150		nC
S_{factor}	Softness factor				0.4		
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, V_R = 30 V dI_F/dt = -100 A/µs		20	25	ns
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 10 A, V_{FR} = 1 V dI_F/dt = 100 A/µs			110	ns
V_{FP}	Forward recovery voltage				1.6	2.4	V

Figure 1. Average forward power dissipation versus average forward current (per diode)

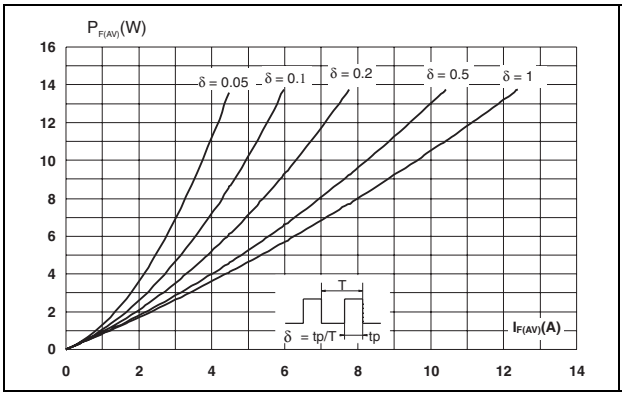


Figure 2. Forward voltage drop versus forward current (per diode)

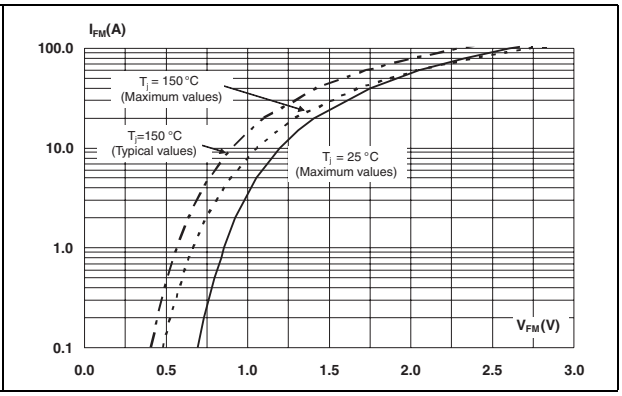


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

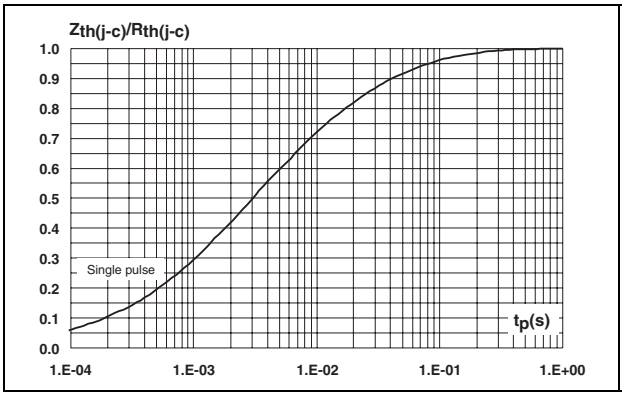


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

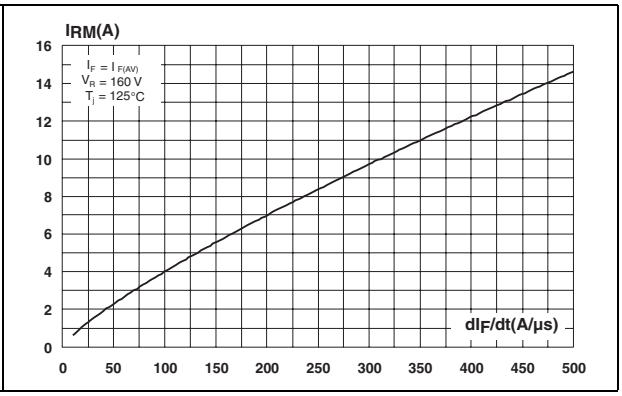


Figure 5. Reverse recovery time versus dI_F/dt (typical values, per diode)

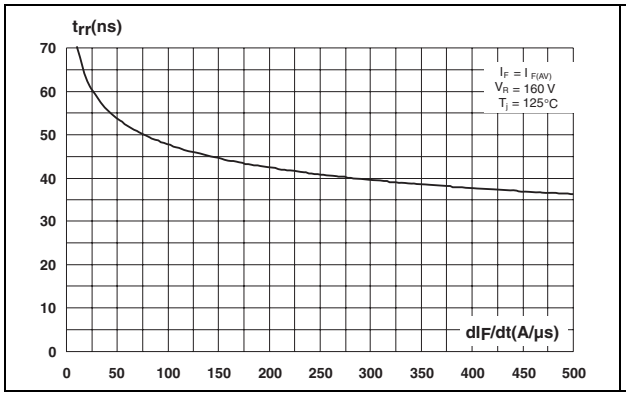


Figure 6. Reverse recovery charges versus dI_F/dt (typical values, per diode)

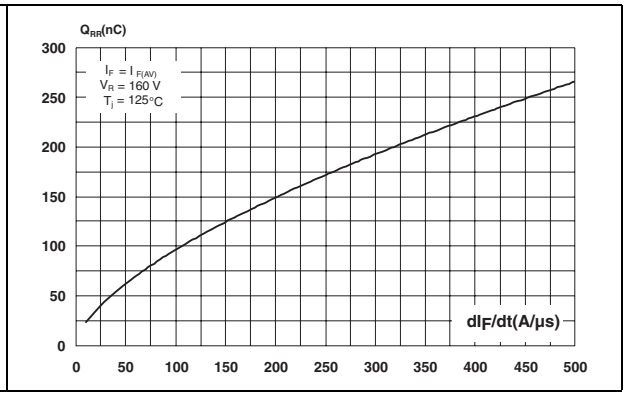


Figure 7. Relative variations of dynamic parameters versus junction temperature

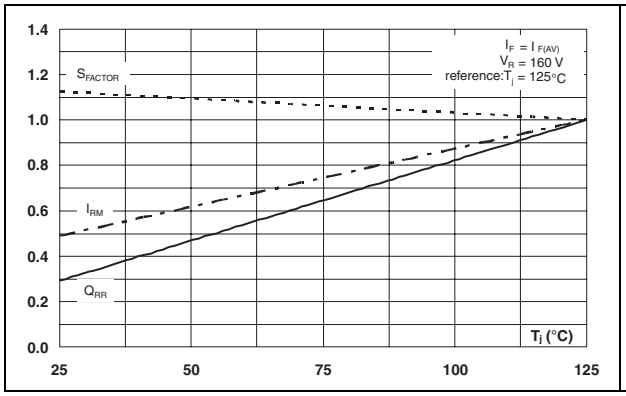


Figure 8. Reverse recovery softness factor versus dI_F/dt (typical values, per diode)

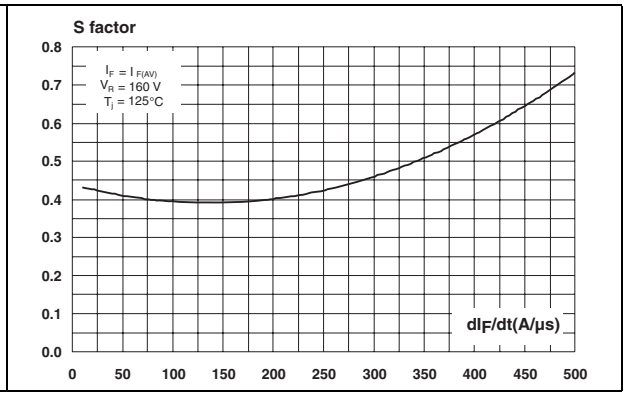


Figure 9. Forward recovery time versus dI_F/dt (typical values, per diode)

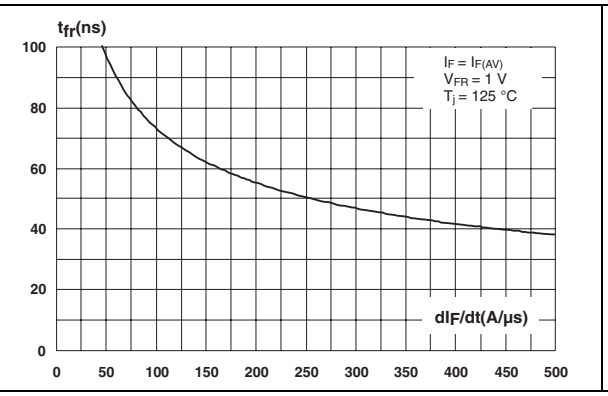


Figure 10. Transient peak forward voltage versus dI_F/dt (typical values, per diode)

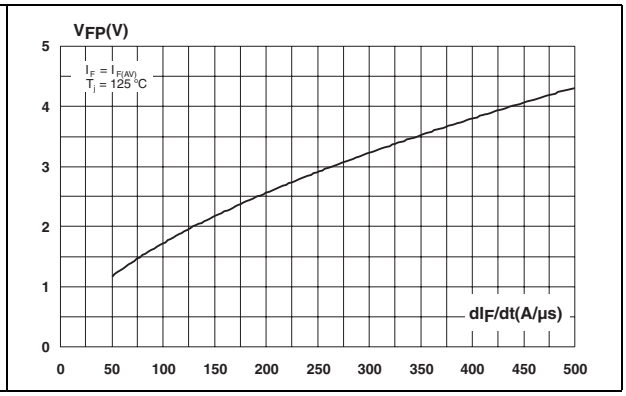
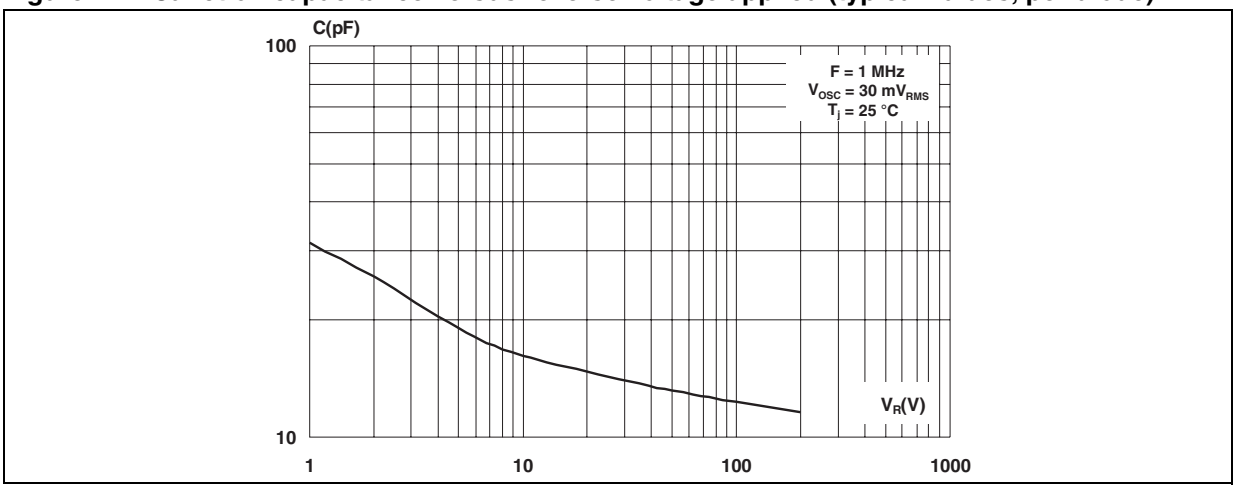


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)

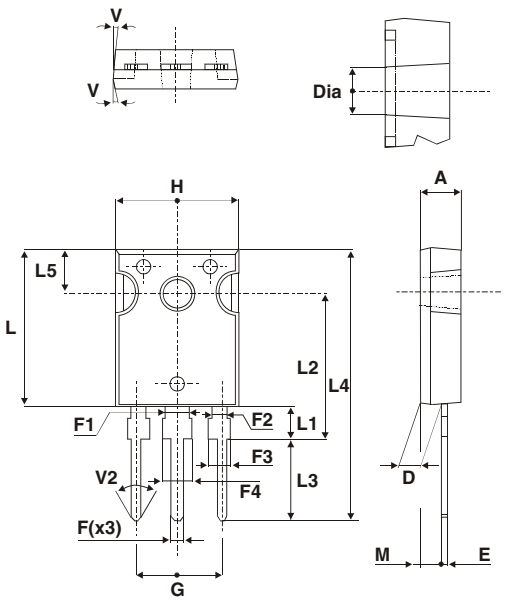


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (1.0 N·m maximum)

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. TO-247 dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.85	5.15	0.191	0.203
D	2.20	2.60	0.086	0.102
E	0.40	0.80	0.015	0.031
F	1.00	1.40	0.039	0.055
F1	3.00 typ.		0.118 typ.	
F2	2.00 typ.		0.078 typ.	
F3	2.00	2.40	0.078	0.094
F4	3.00	3.40	0.118	0.133
G	10.90 typ.		0.429 typ.	
H	15.45	15.75	0.608	0.620
L	19.85	20.15	0.781	0.793
L1	3.70	4.30	0.145	0.169
L2	18.50 typ.		0.728 typ.	
L3	14.20	14.80	0.559	0.582
L4	34.60 typ.		1.362 typ.	
L5	5.50 typ.		0.216 typ.	
M	2.00	3.00	0.078	0.118
V	5° typ.		5° typ.	
V2	60° typ.		60° typ.	
Dia.	3.55	3.65	0.139	0.143

3 Ordering information

Table 7. Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH20W02CW	STTH20W02CW	TO-247	4.46 g	50	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
18-May-2012	1	First issue.

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