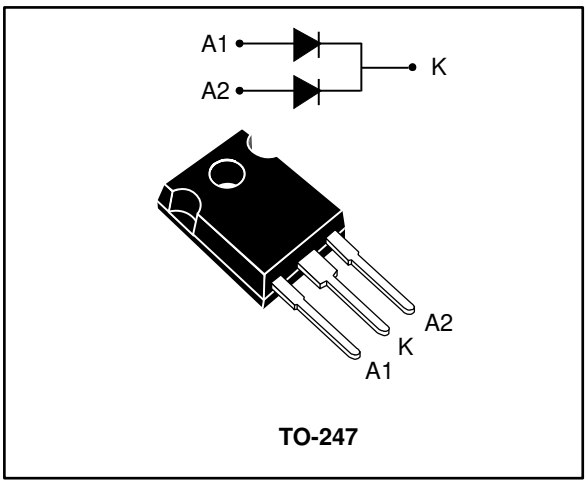
STTH60W03C

High efficiency rectifier

Datasheet - production data



TO-247

Features

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

Description

The STTH60W03C uses ST 300 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.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 30 A
V_{RRM}	300 V
T_j	175 °C
V_F (typ.)	0.94 V
t_{rr} (typ.)	25 ns

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			300	V
$I_{F(RMS)}$	Forward rms current			50	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_c = 110 °C	Per diode	30	A
		T_c = 95 °C	Per device	60	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		280	A
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature range			+175	°C

Table 3: Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.5	°C/W
		Total	0.9	°C/W
$R_{th(c)}$	Coupling		0.3	°C/W

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

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	$V_R = V_{RRM}$	-		20	µA
		T_j = 125 °C		-	20	200	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A	-		1.45	V
		T_j = 150 °C		-	0.94	1.15	
		T_j = 25 °C	I_F = 60 A	-		1.7	
		T_j = 150 °C		-	1.18	1.45	

Notes:

(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:

$P = 0.85 \times I_{F(AV)} + 0.010 \times I_{F}^{2}{}_{(RMS)}$

Table 5: Dynamic electrical characteristics (per diode)

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 30 A, V_R = 200 V, dI_F/dt = -200 A/µs	-	7	9	A
Q_{RR}	Reverse recovery charge	T_j = 125 °C	I_F = 30 A, V_R = 200 V, dI_F/dt = -200 A/µs	-	180		nC
S_{factor}	Softness factor	T_j = 125 °C	I_F = 30 A, V_R = 200 V, dI_F/dt = -200 A/µs	-	0.3		
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V	-	25	35	ns
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 30 A, dI_F/dt = 200 A/µs, V_{FR} = 1.5 V	-		180	ns
V_{FP}	Forward recovery voltage			-	2.0	3.0	V

1.1 Characteristics (curves)

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

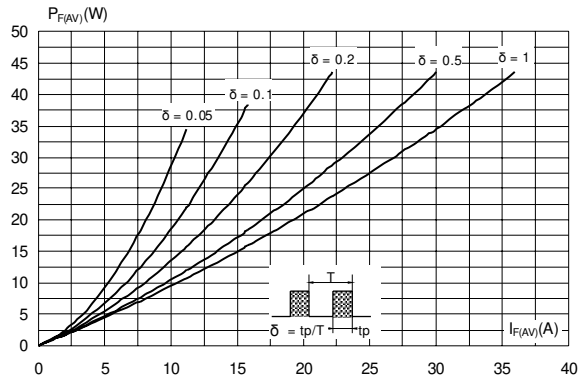


Figure 2: Forward voltage drop versus forward current (per diode)

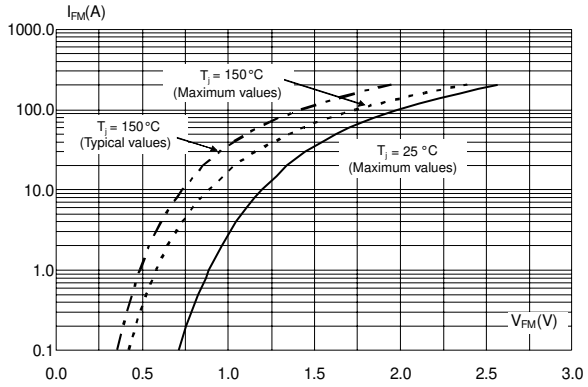


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

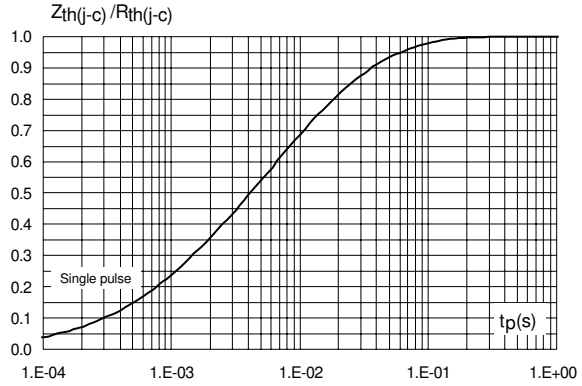


Figure 4: Peak reverse recovery current versus dIF/dt (typical values, per diode)

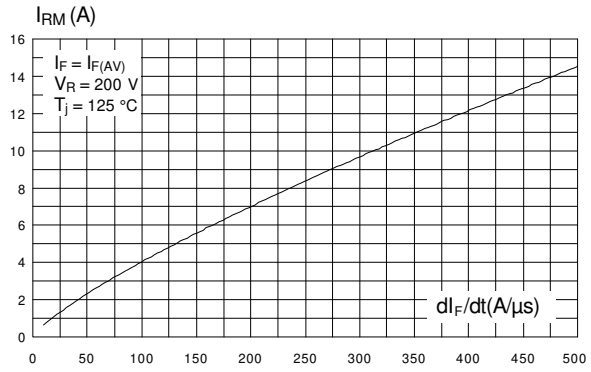


Figure 5: Reverse recovery time versus dIF/dt (typical values, per diode)

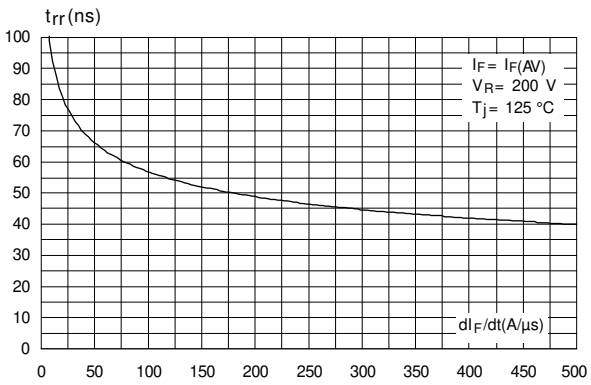


Figure 6: Reverse recovery charges versus dIF/dt (typical values, per diode)

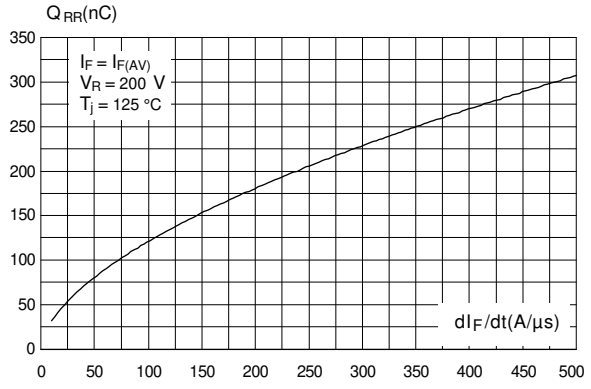


Figure 7: Relative variation of dynamic parameters versus junction temperature

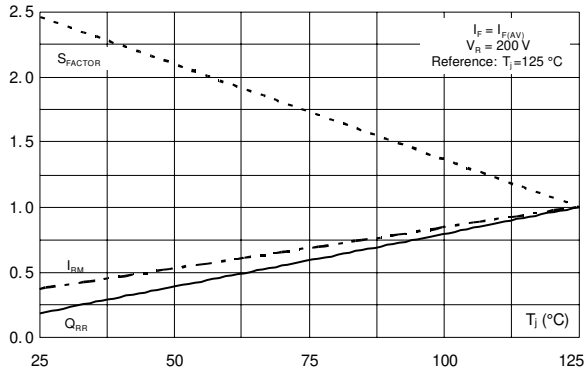


Figure 8: Reverse recovery softness factor versus dIF/dt (typical values, per diode)

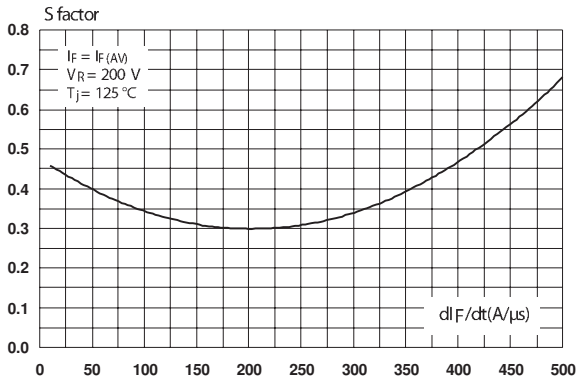


Figure 9: Transient peak forward voltage versus dIF/dt (typical values, per diode)

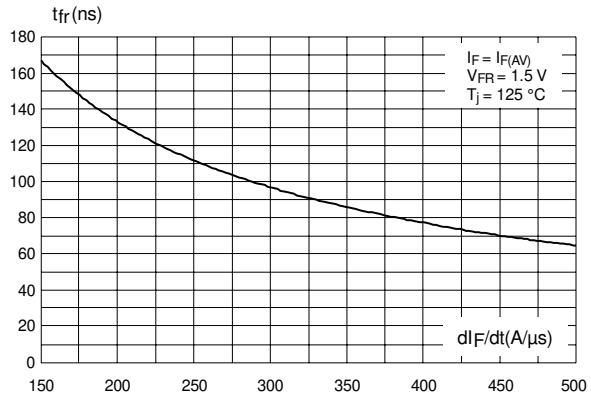


Figure 10: Transient peak forward voltage versus dIF/dt (typical values, per diode)

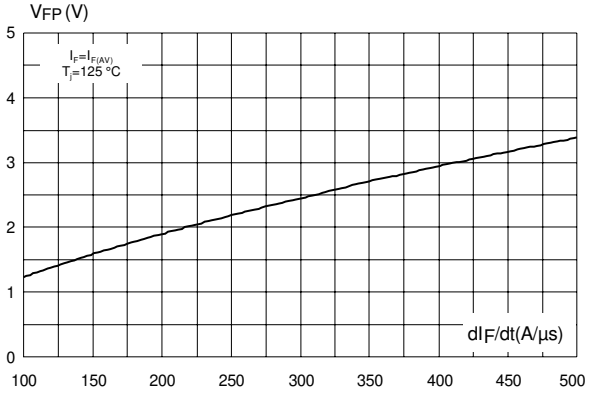
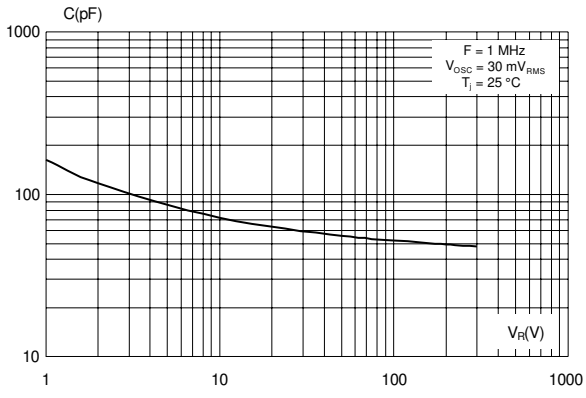


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)



2 Package information

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.

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m (TO-247)
- Maximum torque value: 1.0 N·m (TO-247)

2.1 TO-247 with Inches package information

Figure 12: TO-247 package outline

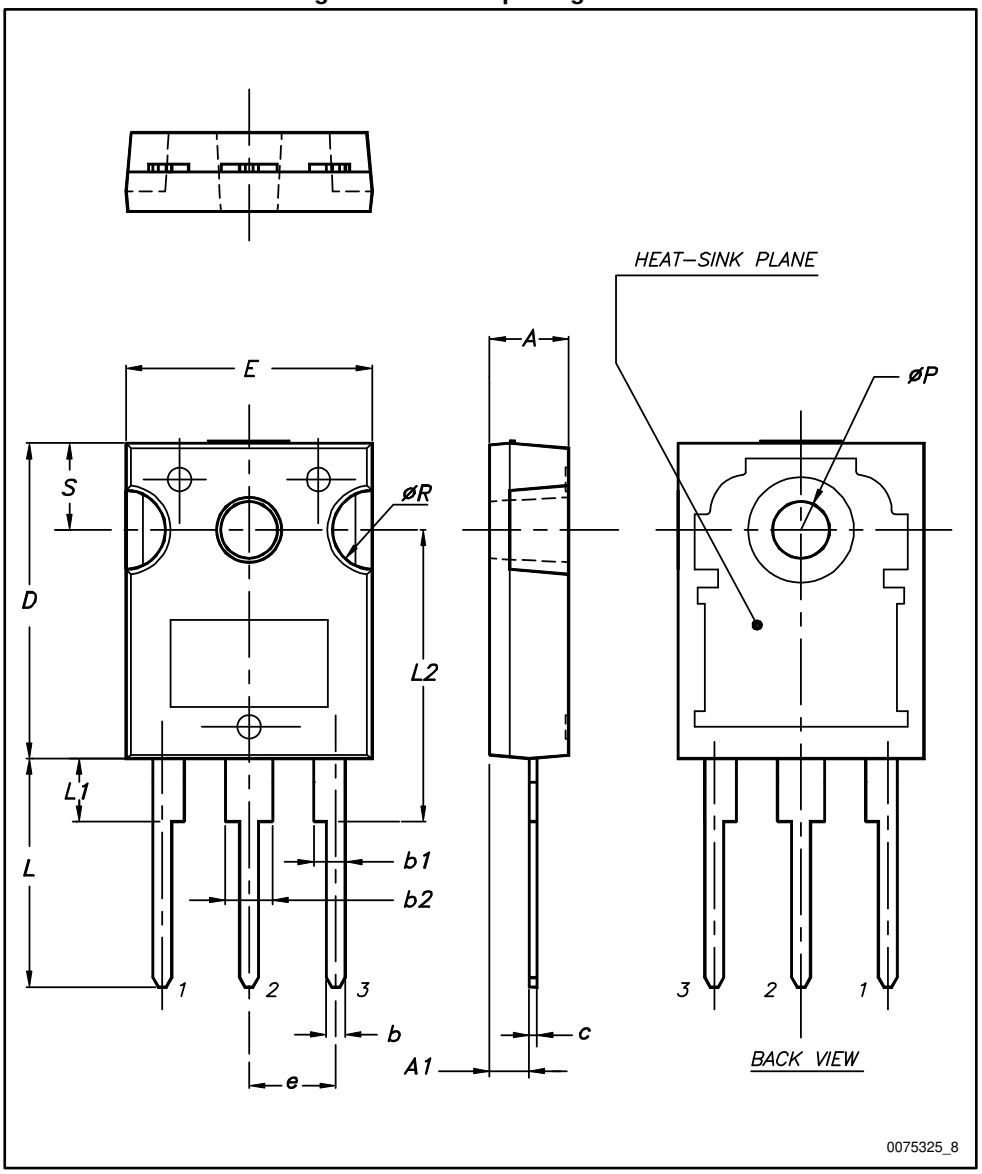


Table 6: TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D(1)	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP(2)	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

Notes:

(1)Dimension D plus gate protusion does not exceed 20.5 mm

(2)Resin thickness around the mounting hole is not less than 0.9 mm.

3 Ordering information

Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH60W03CW	STTH60W03CW	TO-247	4.43 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
07-Sep-2004	1	First issue.
08-Feb-2018	2	Updated Description and package information.

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