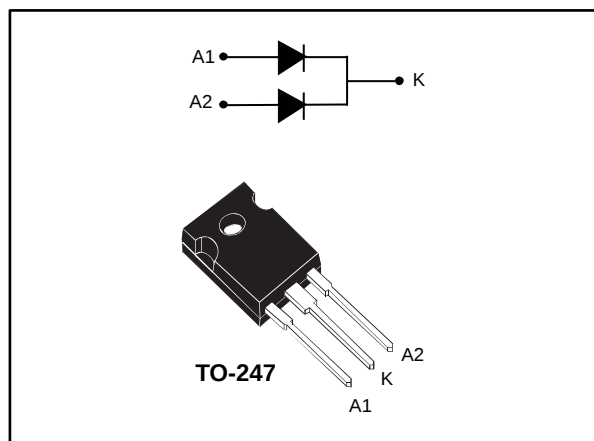


Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduced switching and conduction losses

Description

This device using ST Turbo 2 600 V technology, is specially suited as boost diode in continuous mode power factor corrections and hard switching conditions.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	600 V
I_{RM} (typ.)	8 A
T_J (max.)	175 °C
V_F (typ.)	1.8 V
t_{rr} (max.)	50 ns

1 Characteristics

Table 2: Absolute ratings (limiting values, per diode)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms current		30	A
$I_{F(AV)}$	Average forward current	$T_c = 115\text{ °C}$, $\delta = 0.5$, per diode	15	A
		$T_c = 100\text{ °C}$, $\delta = 0.5$, per device	30	
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	120	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature		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	1.0	
$R_{th(c)}$	Coupling		0.5	

Table 4: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		60	μA
		$T_j = 125\text{ °C}$		-	70	800	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$	-		2.9	V
		$T_j = 125\text{ °C}$		-	1.4	1.8	

Notes:

⁽¹⁾Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

⁽²⁾Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 1.16 \times I_{F(AV)} + 0.043 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$, $I_R = 1\text{ A}$	-		30	ns
			$I_F = 1\text{ A}$, $dI_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-		50	
I_{RM}	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 15\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 400\text{ V}$	-	7.5	9.0	A
S factor	Softness factor			-	0.15		
Q_{rr}	Reverse recovery charges			-	220		nC
t_{fr}	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$, $dI_F/dt = 120\text{ A}/\mu\text{s}$, $V_{FR} = 1.1 \times V_{Fmax}$	-		200	ns
V_{FP}	Forward recovery voltage			-		6	V

1.1 Characteristics (curves)

Figure 1: Conduction losses versus average current (per leg)

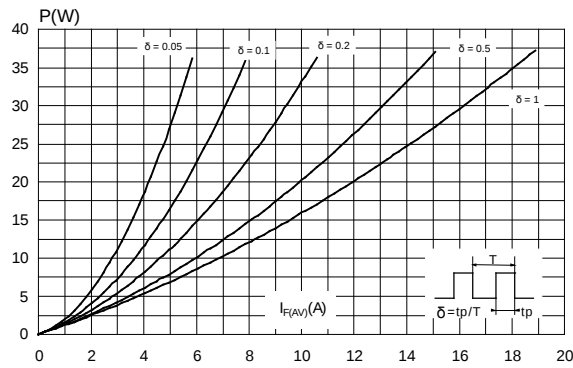


Figure 2: Forward voltage drop versus forward current (per leg)

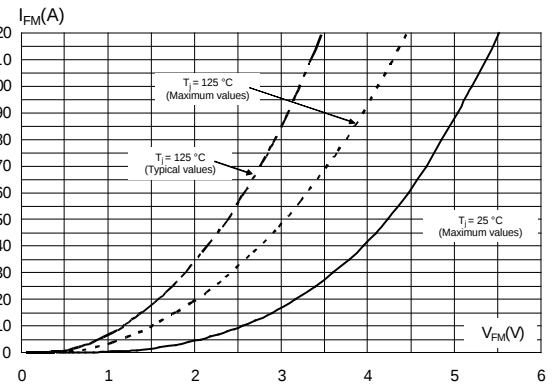


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

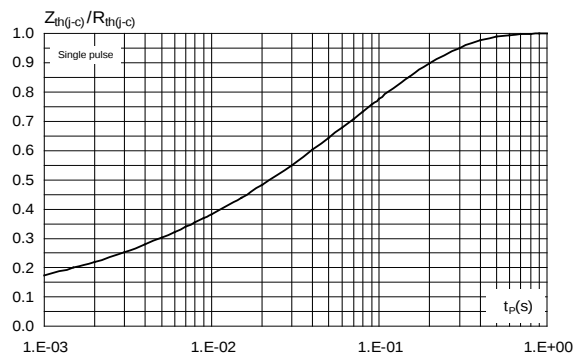


Figure 4: Peak reverse recovery current versus di/dt (typical values, per leg)

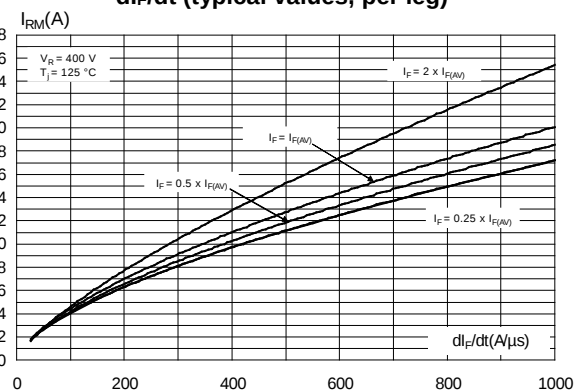


Figure 5: Reverse recovery time versus di/dt (typical values, per leg)

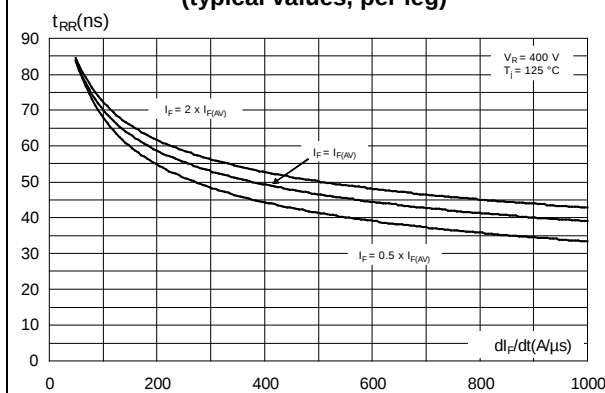


Figure 6: Reverse recovery charges versus di/dt (typical values, per leg)

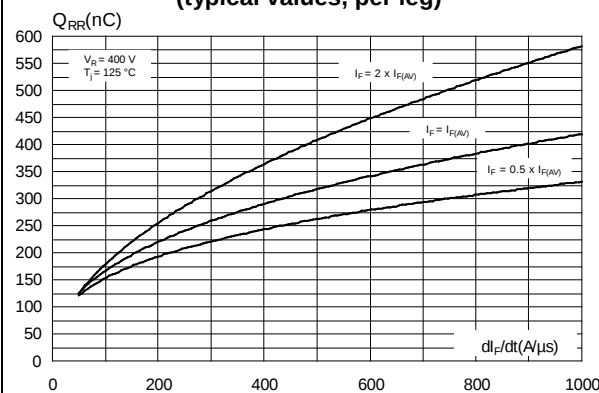


Figure 7: Softness factor versus di_F/dt (typical values, per leg)

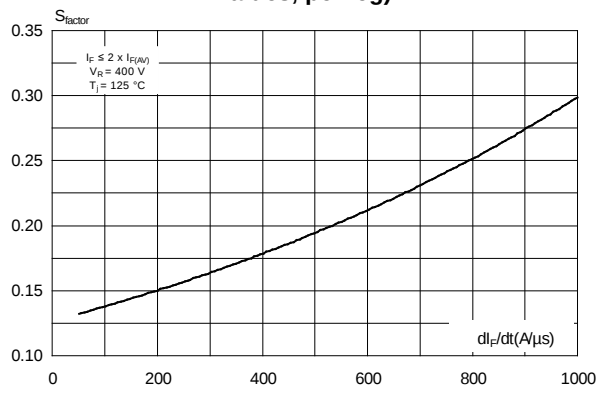


Figure 8: Relative variation of dynamic parameters versus junction temperature

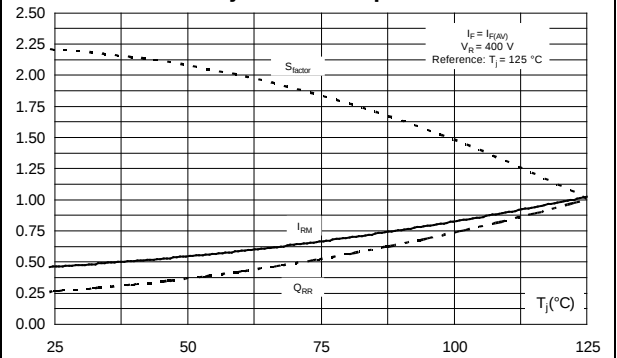


Figure 9: Transient peak forward voltage versus di_F/dt (typical values, per leg)

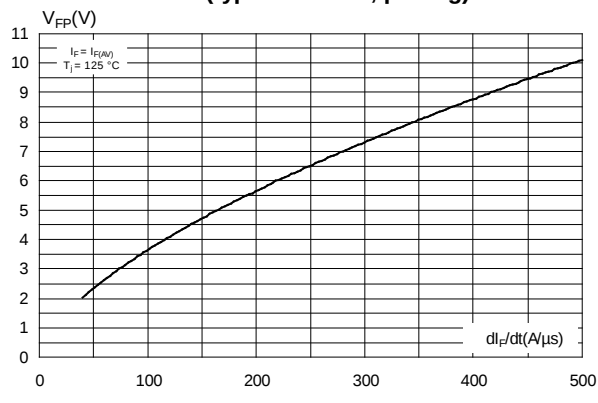


Figure 10: Forward recovery time versus di_F/dt (typical values, per leg)

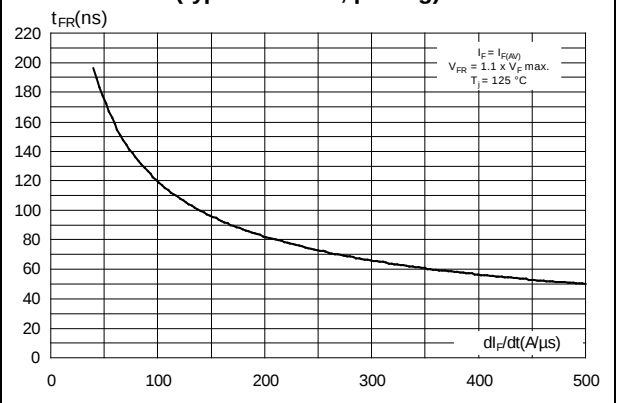
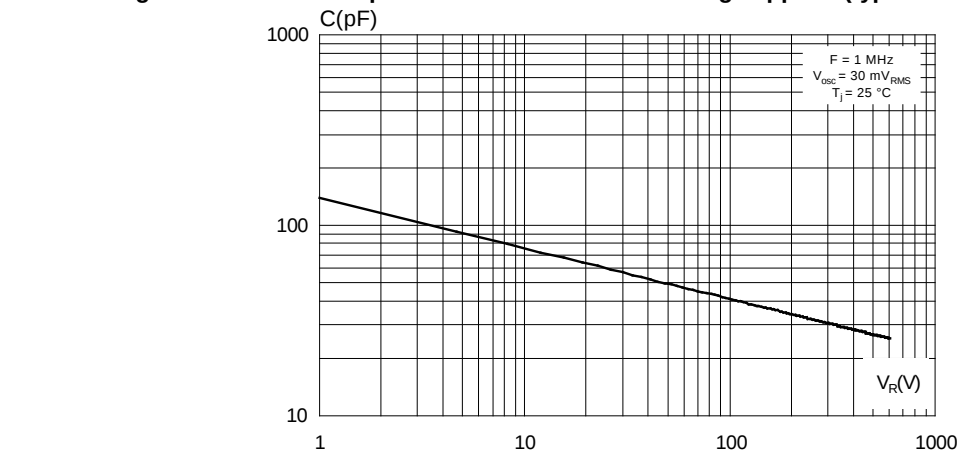


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per leg)



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 values: 0.8 N·m
- Maximum torque value: 1.0 N·m

2.1 TO-247 package information

Figure 12: TO-247 package outline

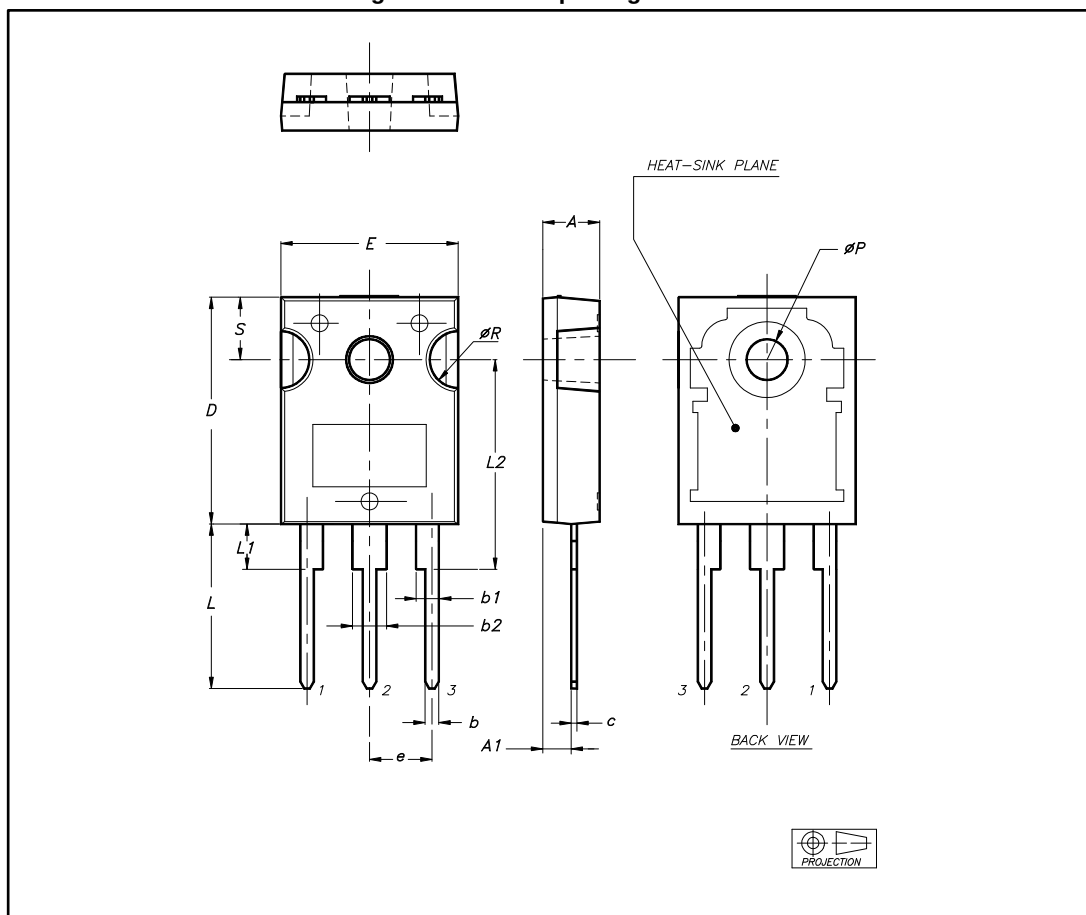


Table 6: TO-247 package mechanical data

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
STTH30R06CW	STTH30R06CW	TO-247	4.36 g	30	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
July-2001	1	Last issue.
18-Jun-2014	2	Updated title. ECOPACK statement updated.
16-Feb-18	3	Updated Section 1.1: "Characteristics (curves)" .

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