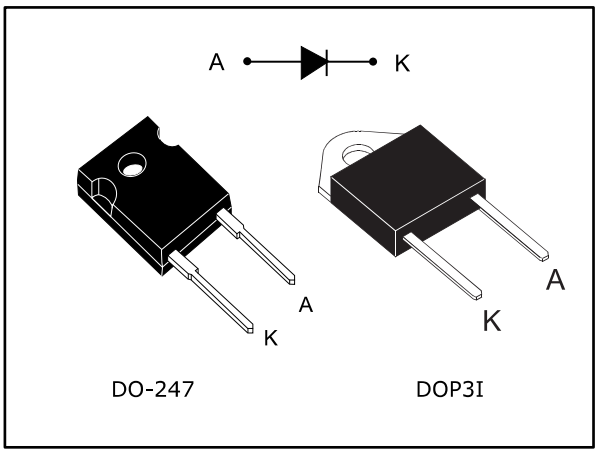
STTH3006

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: DOP3I
  - Insulating voltage = 2500 V_{RMS} sine

Description

The device is developed using ST's Turbo 2 600 V technology. It is well-suited as a boost diode, especially for use in continuous mode power factor corrections and hard switching conditions.

This 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
$I_{F(AV)}$	30 A
V_{RRM}	600 V
V_F (typ.)	1.10 V
T_j	175 °C
t_{rr} (max)	50 ns

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	Forward rms current			50	A
$I_{F(AV)}$	Average forward current, δ = 0.5 square wave	DO-247	T_C = 115 °C	30	A
		DOP3I	T_C = 85 °C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		300	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	DO-247	1.1	°C/W
		DOP3I	1.7	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		25	µA
		T_j = 150 °C		-	80	800	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A	-		1.85	V
		T_j = 150 °C		-	1.10	1.40	

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:

$P = 1.07 \times I_{F(AV)} + 0.011 \times I_F{}^2{}_{(RMS)}$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5 A I_{rr} = 0.25 A I_R = 1 A	-		50	ns
			I_F = 1 A V_R = 30 V dI_F/dt = -50 A/µs	-	50	70	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 30 A V_R = 400 V dI_F/dt = -100 A/µs	-	8	11	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 30 A V_{FR} = 1.1 x V_F max dI_F/dt = 100 A/µs	-		500	ns
V_{FP}	Forward recovery voltage			-	2.5		V

1.1 Characteristics (curves)

Figure 1: Conduction losses versus average forward current

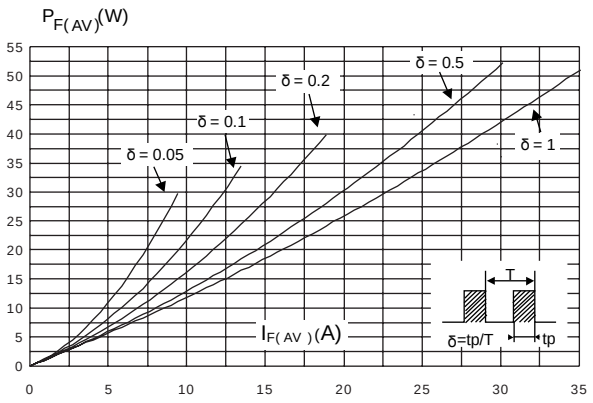


Figure 2: Forward voltage drop versus forward current

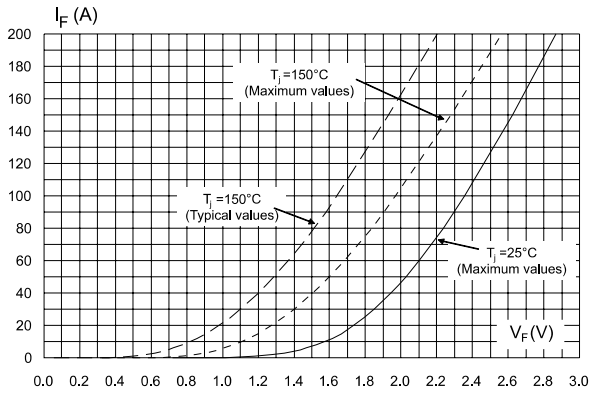


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

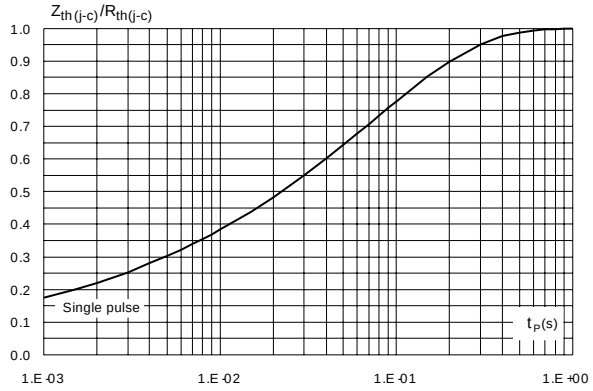


Figure 4: Peak reverse recovery current versus dI_F/dt (typical values)

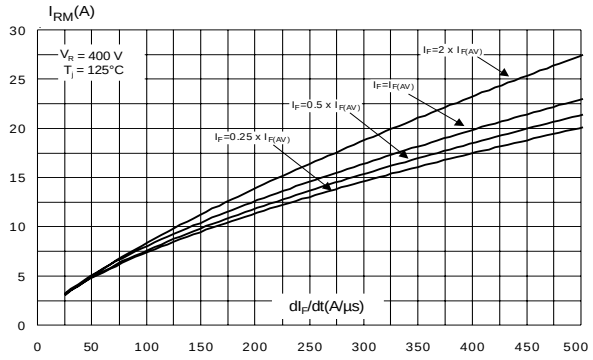


Figure 5: Reverse recovery time versus dI_F/dt (typical values)

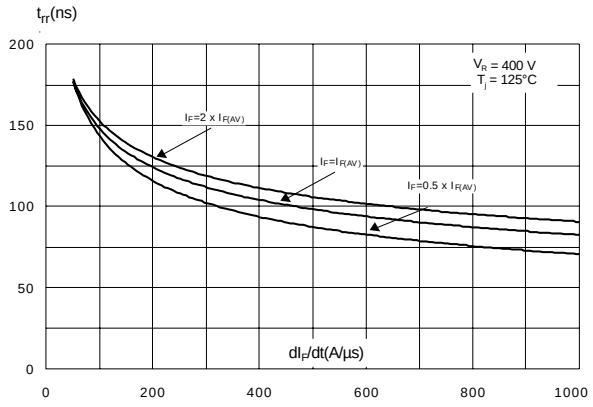


Figure 6: Reverse recovery charges versus dI_F/dt (typical values)

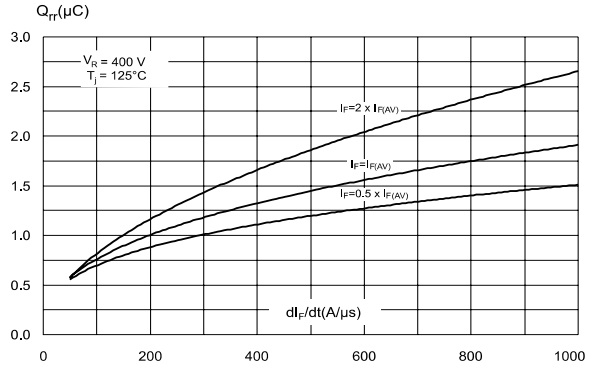


Figure 7: Softness factor versus dI_F/dt (typical values)

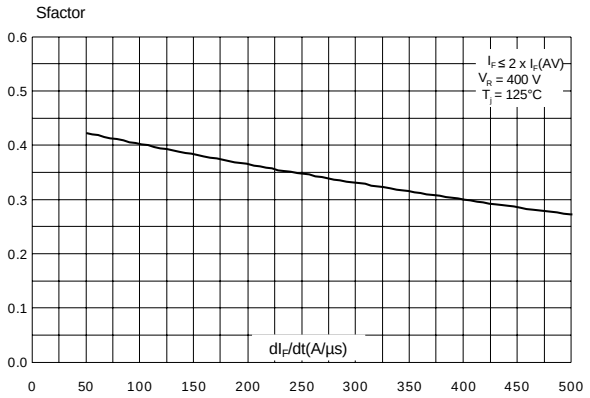


Figure 8: Relative variations of dynamic parameters versus junction temperature

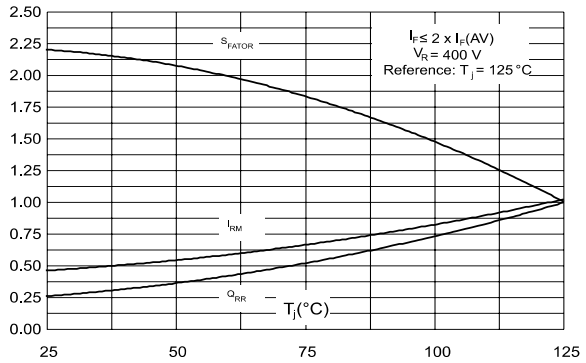


Figure 9: Transient peak forward voltage versus dI_F/dt (typical values)

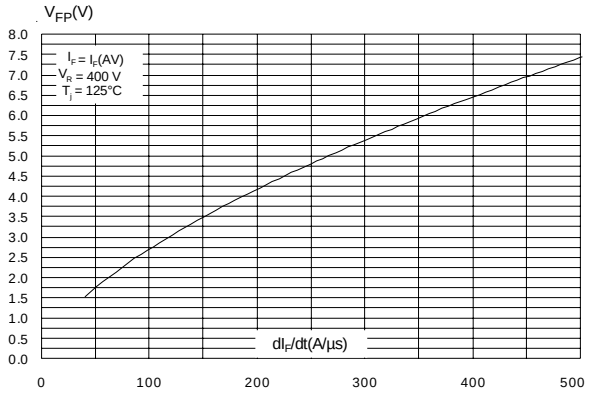


Figure 10: Forward recovery time versus dI_F/dt (typical values)

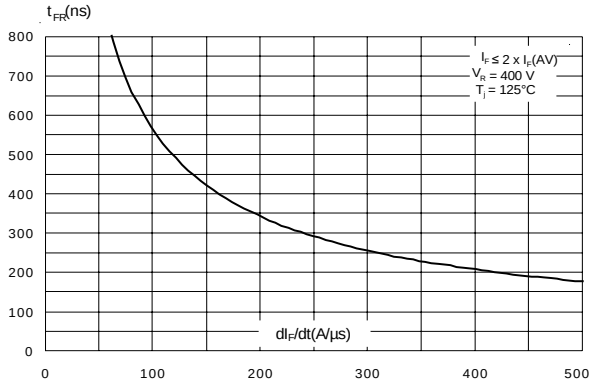
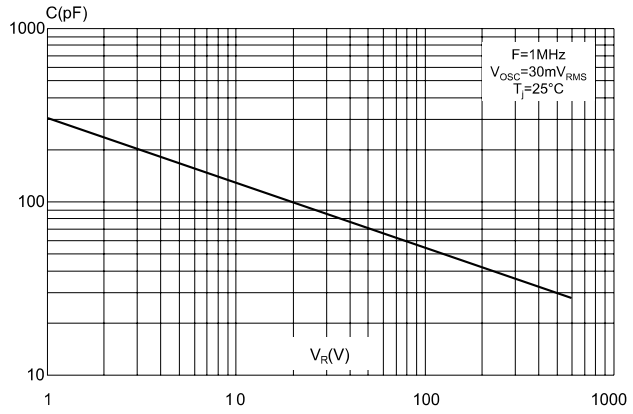


Figure 11: Junction capacitance versus reverse voltage applied (typical values)



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: 0.55 N·m (DO-247)
- Recommended torque value: 0.9 to 1.2 N·m (DOP3I)
- Maximum torque value: 1.0 N·m (DO-247)

2.1 DO247 package information

Figure 12: DO-247 package outline

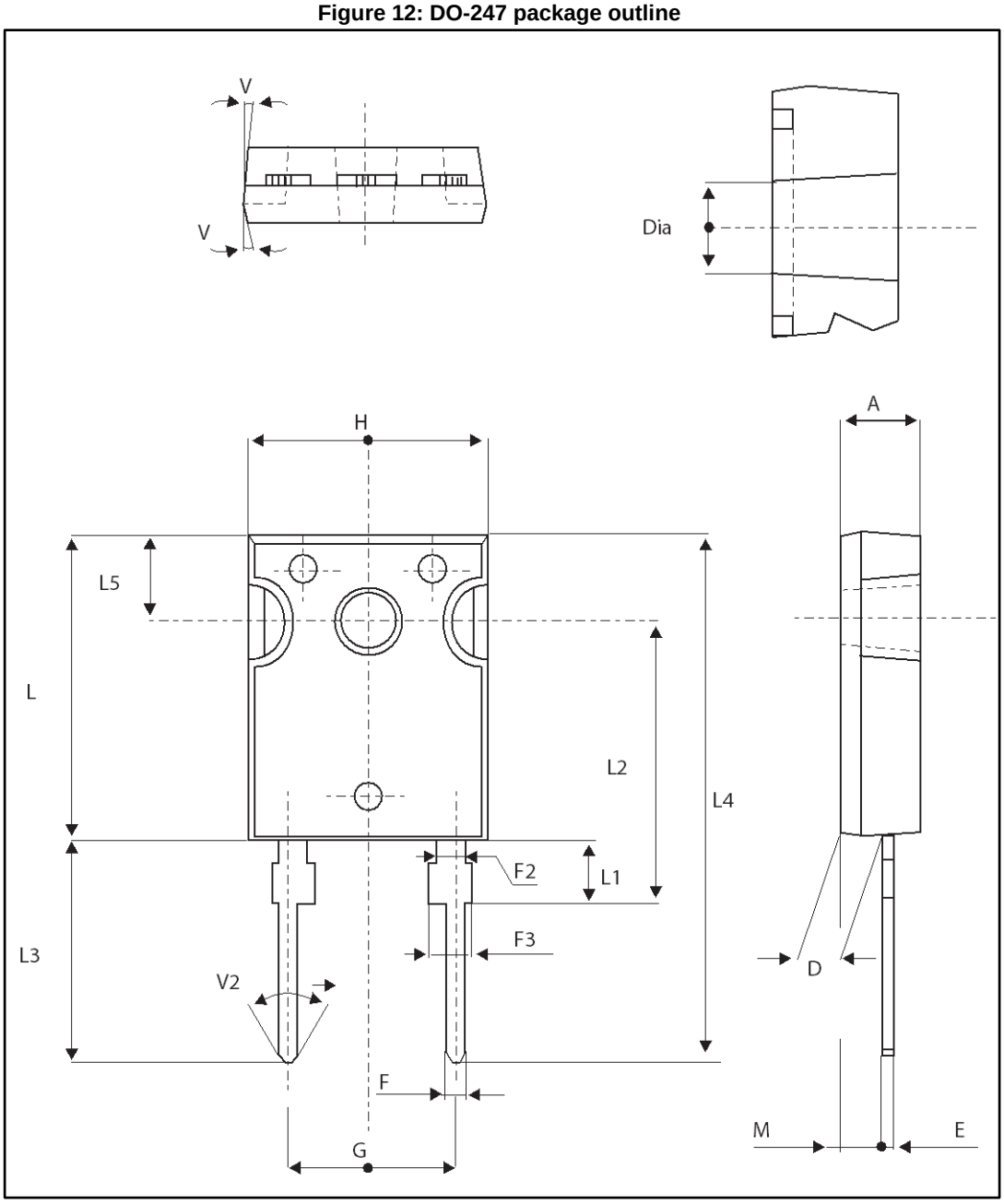


Table 6: DO-247 package mechanical data

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
F2	2.00 typ.		0.078 typ.	
F3	2.00	2.40	0.078	0.094
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°		5°	
V2	60°		60°	
Dia.	3.55	3.65	0.139	0.143

2.2 DOP3I package information

Figure 13: DOP3I package outline

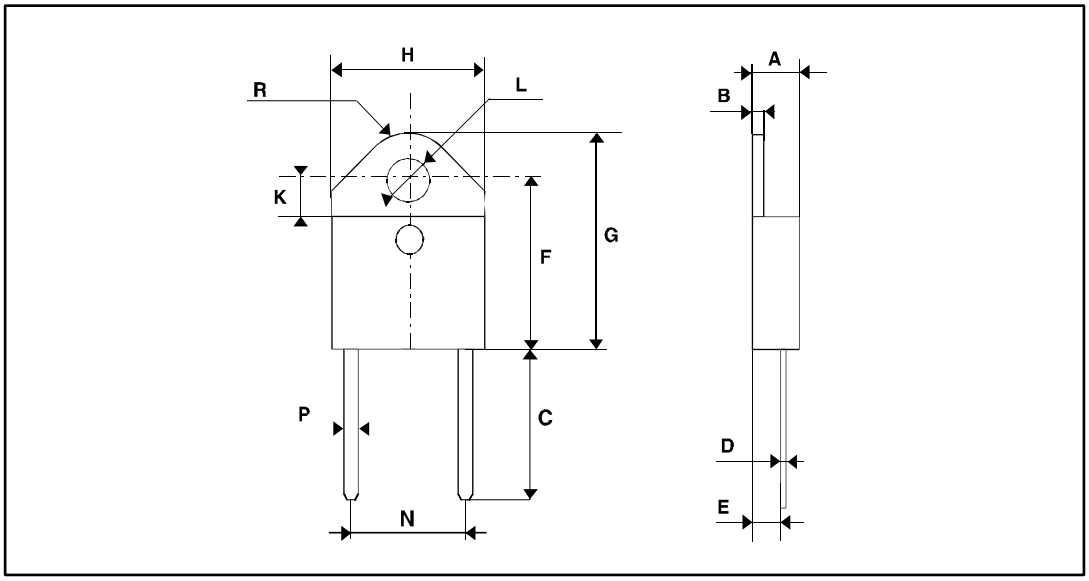


Table 7: DOP3I package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	1.20	1.40	0.047	0.055
c	1.45	1.55	0.057	0.061
c1	0.50	0.70	0.020	0.028
D	12.15	13.10	0.474	0.516
E	15.10	15.50	0.594	0.610
E1	7.55	7.75	0.297	0.305
e	10.80	11.30	0.425	0.445
G	20.4	21.10	0.815	0.831
L	14.35	15.60	0.565	0.614
P	4.08	4.17	0.161	0.164
Q	2.70	2.90	0.106	0.114
R	4.60		0.181	
Y	15.80	16.50	0.622	0.650

3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH3006W	STTH3006W	DO-247	4.40 g	30	Tube
STTH3006PI	STTH3006P	DOP3I	4.46 g	30	Tube

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
17-May-2017	1	First issue.

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