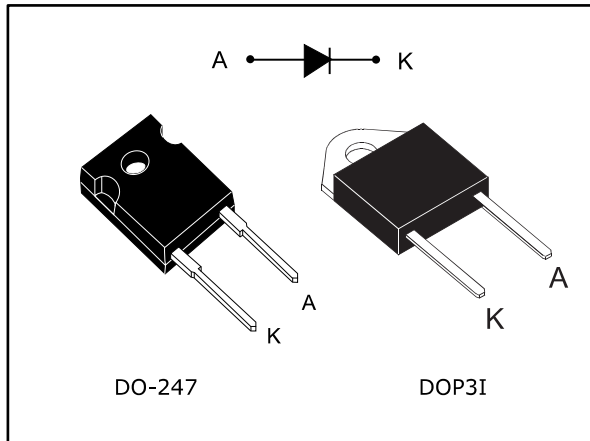


## Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



### Description

This device uses ST Turbo 2 600 V technology, and is particularly suited as boost diode in discontinuous or critical mode power factor corrections.

It is also intended for use as a freewheeling diode in power supplies and other power switching applications.

**Table 1: Device summary**

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

### Features

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

# 1 Characteristics

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

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage		600	V	
I <sub>F(RMS)</sub>	Forward rms current		50	A	
I <sub>F(AV)</sub>	Average forward current δ = 0.5, square wave	DO-247	T <sub>C</sub> = 115 °C	30	A
		DOP-3I	T <sub>C</sub> = 85 °C		
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	300	A	
T <sub>stg</sub>	Storage temperature range		-65 to +175	°C	
T <sub>j</sub>	Maximum operating junction temperature		175	°C	

**Table 3: Thermal parameters**

Symbol	Parameter	Max. value	Unit	
R <sub>th(j-c)</sub>	Junction to case	DO-247	1.1	°C/W
		DOP-3I	1.7	

**Table 4: Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		25	μA
		T <sub>j</sub> = 125 °C		-	80	800	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 30 A	-		1.85	V
		T <sub>j</sub> = 125 °C		-	1.10	1.40	

**Notes:**

(1)Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

(2)Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

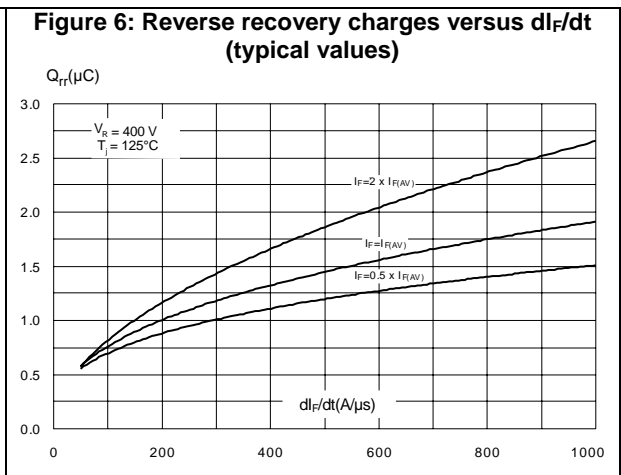
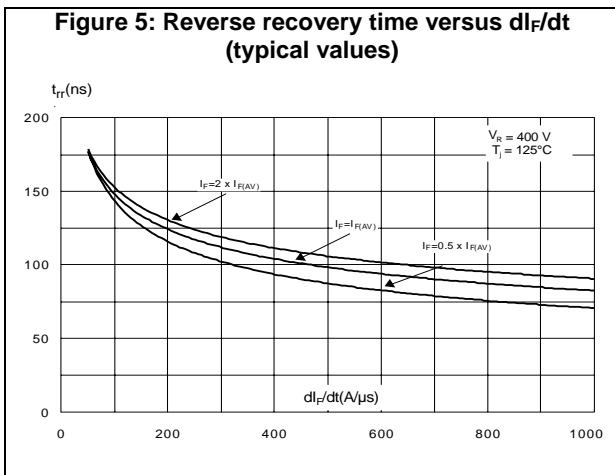
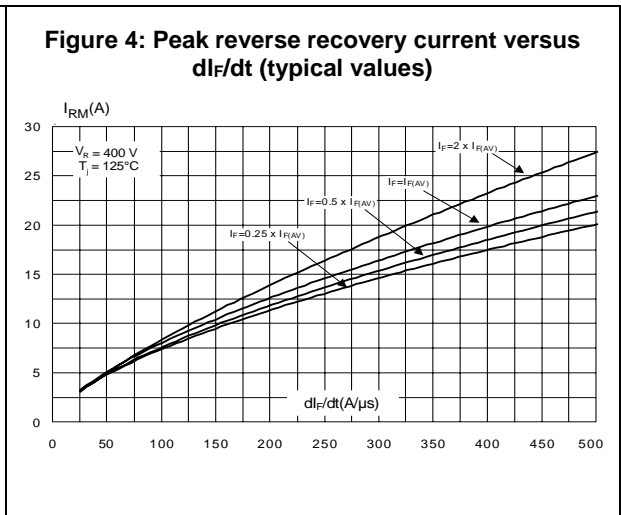
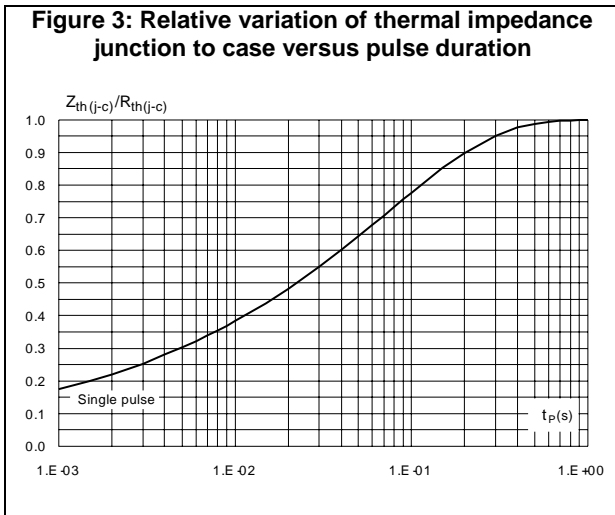
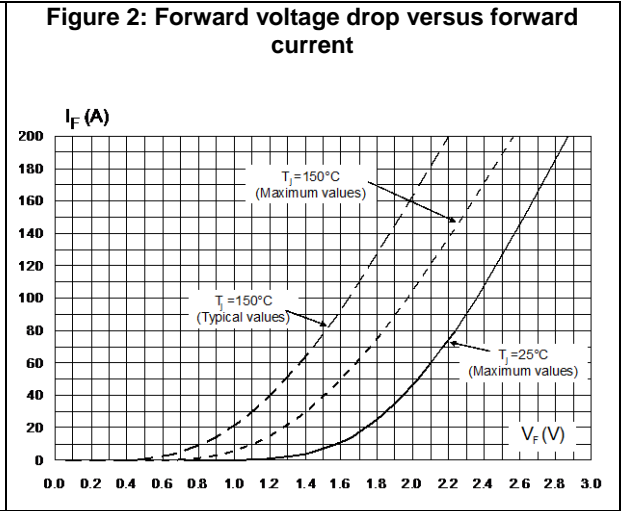
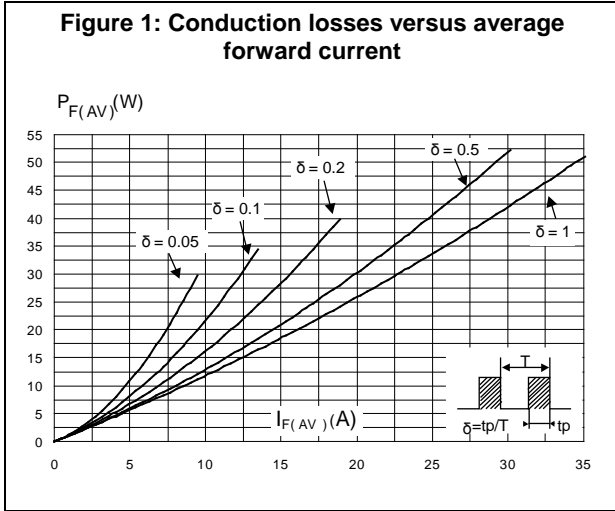
To evaluate the conduction losses, use the following equation:

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

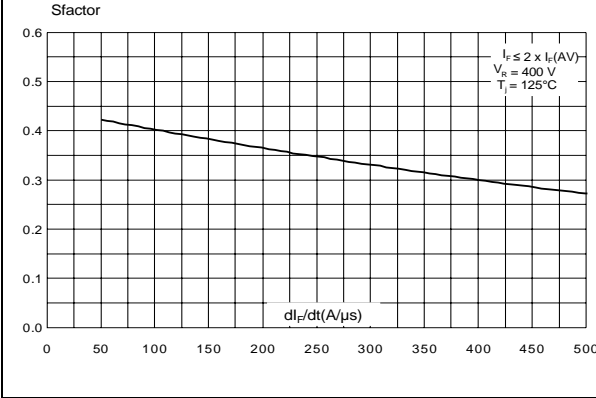
Table 5: Dynamic electrical characteristics

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

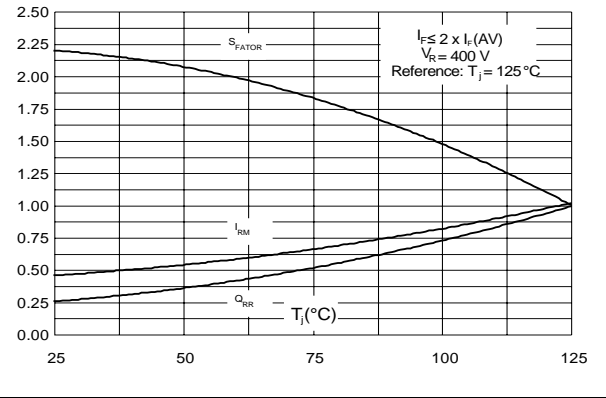
### 1.1 Characteristics (curves)



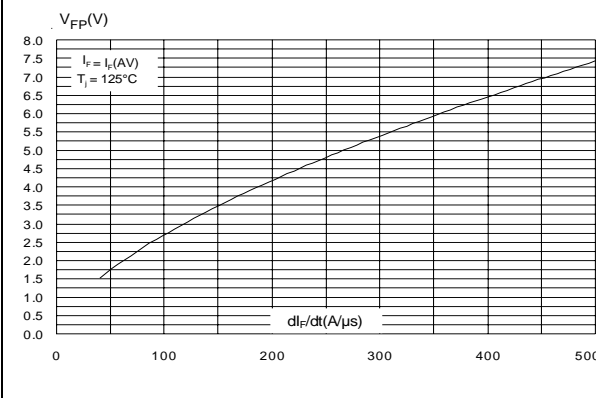
**Figure 7: Softness factor versus  $di_F/dt$  (typical values)**



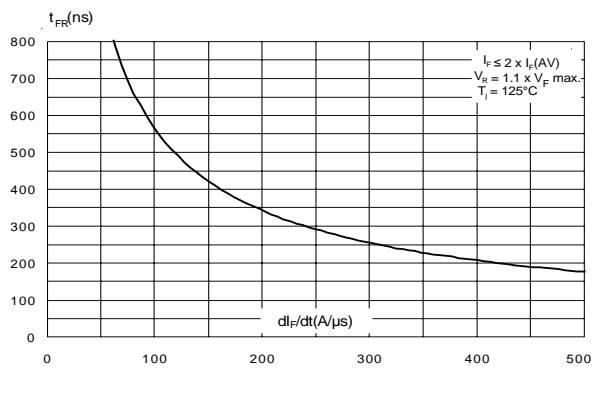
**Figure 8: Relative variation of dynamic parameters versus junction temperature**



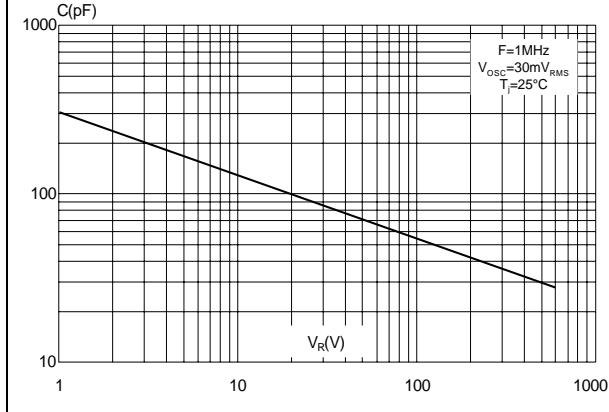
**Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**Figure 10: Forward recovery time versus  $di_F/dt$  (typical values)**



**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](http://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 DO-247 package information

Figure 12: DO-247 package outline

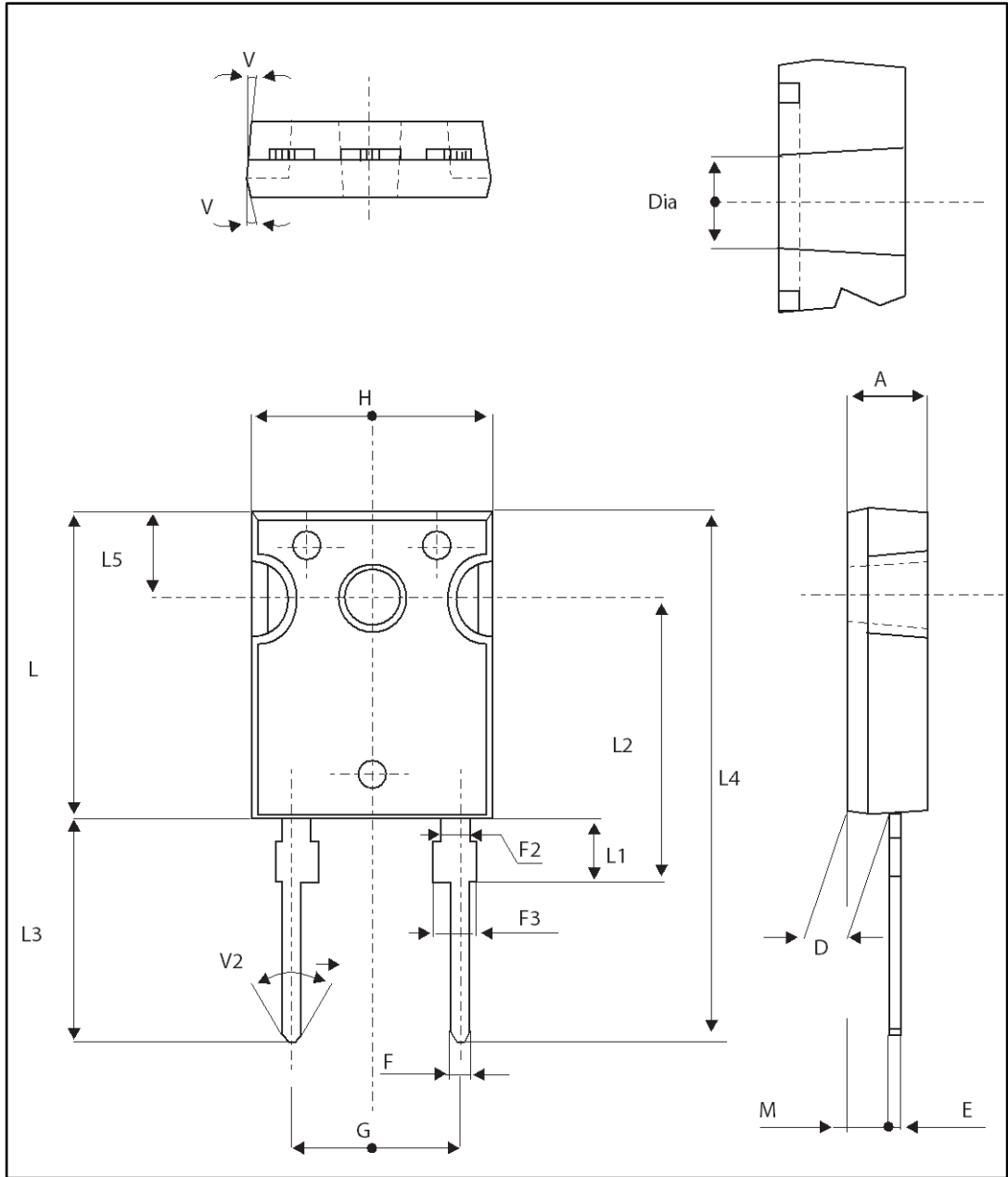


Table 6: DO-247 package mechanical data

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 DOP-3I package information

Figure 13: DOP-3I package outline

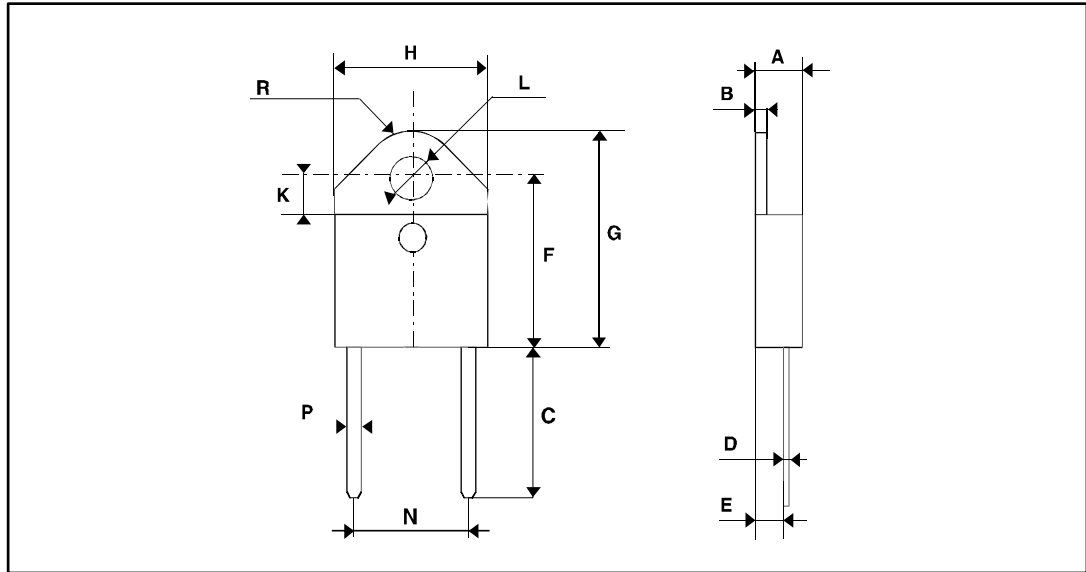


Table 7: DOP-3I package mechanical data

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
STTH30R06PI	STTH30R06PI	DOP-3I	4.46 g	30	Tube
STTH30R06W	STTH30R06W	DO-247	4.40 g	30	Tube

### 4 Revision history

Table 9: Document revision history

Date	Revision	Changes
18-Oct-2004	1	Initial release.
07-Sep-2011	2	Updated I <sub>FSM</sub> from 160 A to 300 A.
17-May-2017	3	Removed SOD-93 and TO-220AC package information.

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