

Turbo 2 ultrafast high voltage rectifier

Features

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

Description

The STTH30L06, which is using ST Turbo 2 600 V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.

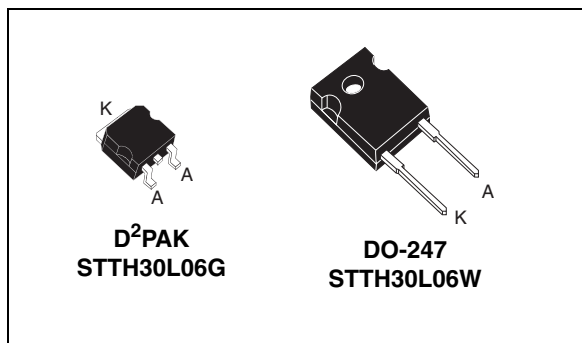


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	30 A
V_{RRM}	600 V
T_j	175 °C
V_F (typ)	1.10 V
t_{rr} (max)	65 ns

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms voltage		50	A
$I_{F(AV)}$	Average forward current	$T_c = 125\text{ °C}, \delta = 0.5$	30	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	300	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 (max)	Unit
$R_{th(j-c)}$	Junction to case	1.1	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			25	μA
		$T_j = 150\text{ °C}$			80	800	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$			1.55	V
		$T_j = 150\text{ °C}$			1.0	1.25	

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: $P = 0.95 \times I_{F(AV)} + 0.010 I_F^2 (RMS)$

Table 5. Dynamic Characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$			65	ns
			$I_F = 1\text{ A}, dl_F/dt = 50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$		65	90	
I_{RM}	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 30\text{ A}, V_R = 400\text{ V}, dl_F/dt = 100\text{ A}/\mu\text{s}$		11.5	16	A
t_{fr}	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 30\text{ A}, dl_F/dt = 100\text{ A}/\mu\text{s}, V_{FR} = 1.1 \times V_{Fmax}$			500	ns
V_{FP}	Forward recovery voltage	$T_j = 25\text{ °C}$	$I_F = 30\text{ A}, dl_F/dt = 100\text{ A}/\mu\text{s}, V_{FR} = 1.1 \times V_{Fmax}$		2.5		V

Figure 1. Conduction losses versus average forward current

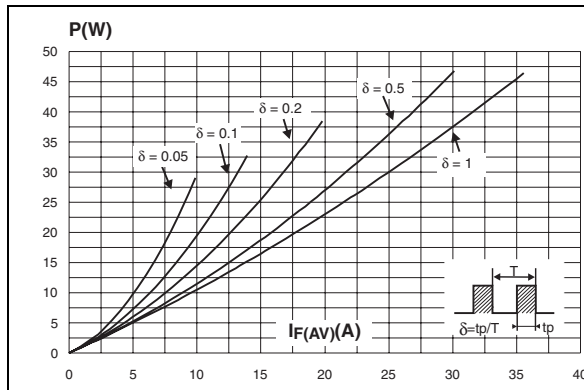


Figure 2. Forward voltage drop versus forward current

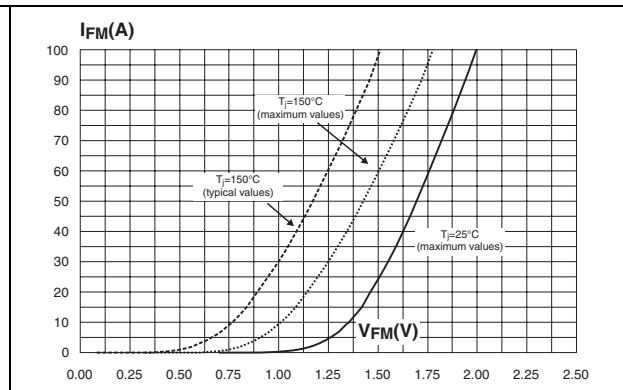


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

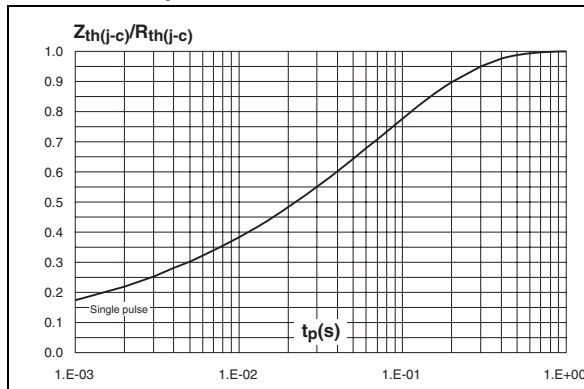
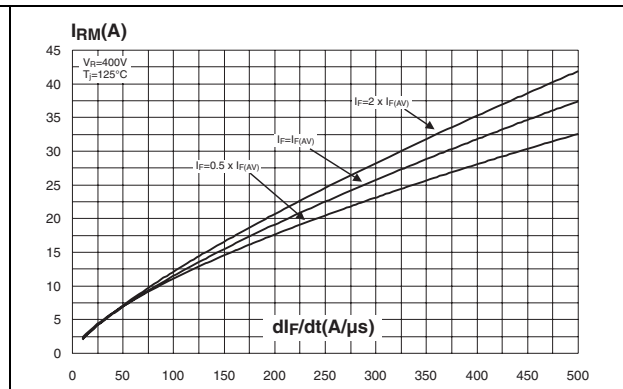
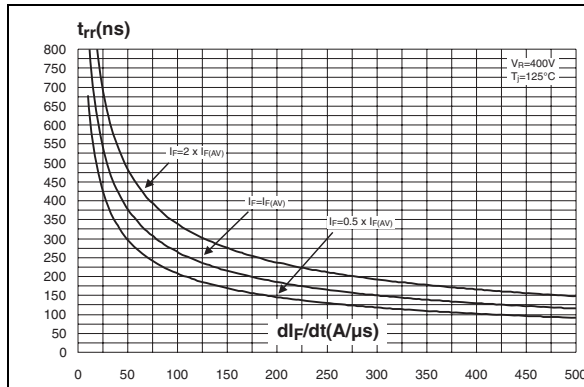
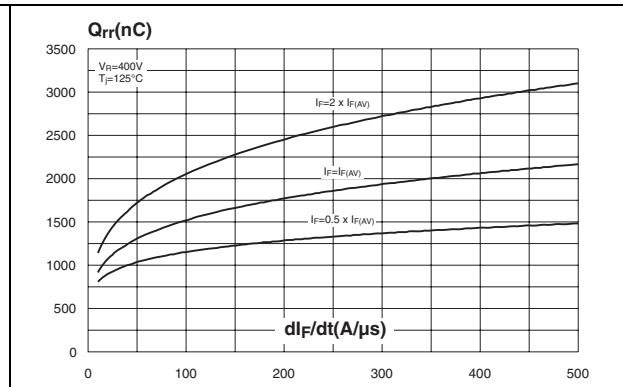
Figure 4. Peak reverse recovery current versus di_F/dt (typical values)Figure 5. Reverse recovery time versus di_F/dt (typical values)Figure 6. Reverse recovery charges versus di_F/dt (typical values)

Figure 7. Reverse recovery softness factor versus di_F/dt (typical values)

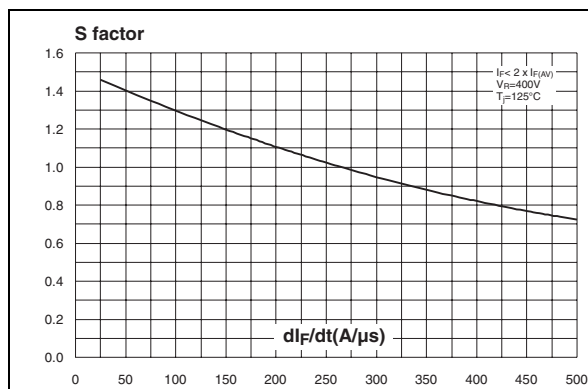


Figure 8. Relative variations of dynamic parameters versus junction temperature

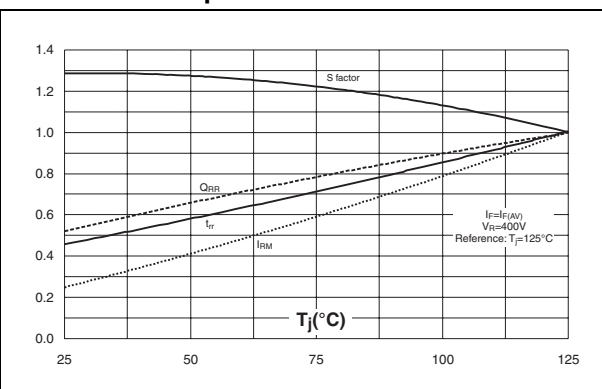


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

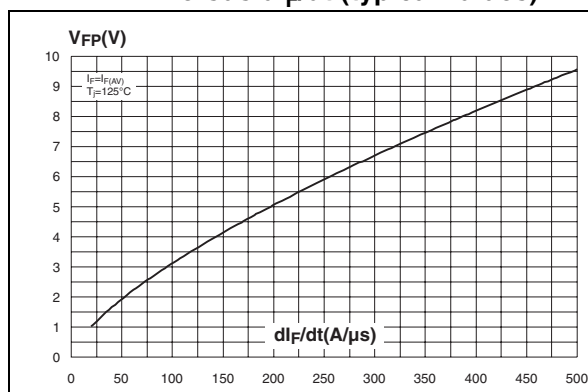


Figure 10. Forward recovery time versus di_F/dt (typical values)

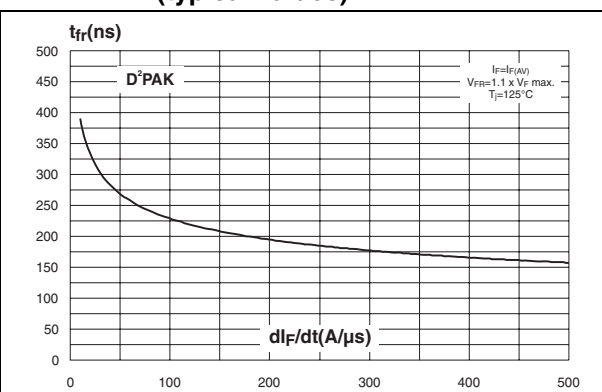


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

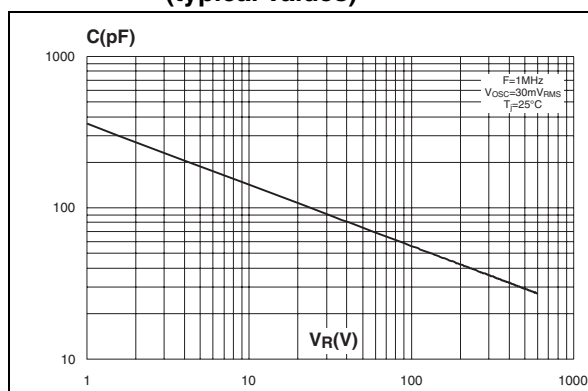
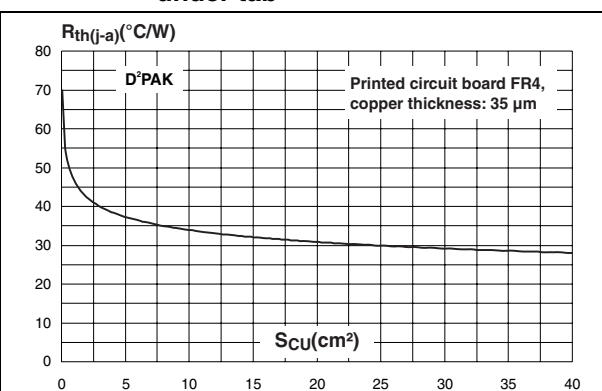


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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. D²PAK dimensions

Technical drawing of a 100mm x 100mm x 10mm metal plate. The drawing includes a top view, a front view, and a side view. Dimensions are labeled as follows:

- Top View:** L (Length), L2 (Distance from top edge to center of hole), L3 (Distance from bottom edge to center of hole), E (Width), B (Distance from center of hole to bottom edge), B2 (Distance from center of hole to bottom edge of plate).
- Front View:** A (Distance from top edge to center of hole), C2 (Distance from top edge to center of hole), C (Distance from center of hole to bottom edge), R (Radius of hole), A1 (Distance from top edge to center of hole), A2 (Distance from top edge to center of hole).
- Side View:** M (Distance from top edge to center of hole), V2 (Distance from top edge to center of hole).

* FLAT ZONE NO LESS THAN 2mi

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. D²PAK footprint (dimensions in mm)

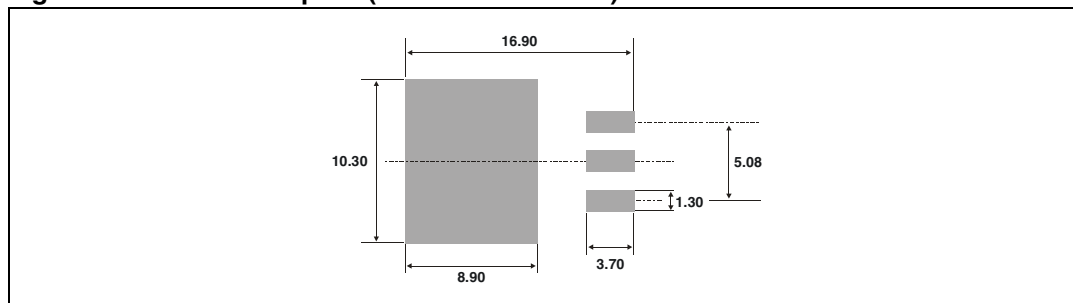
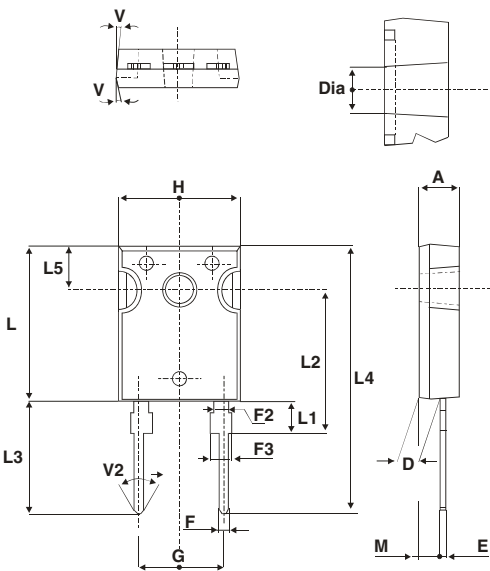


Table 7. DO247 dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
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			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143



3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH30L06G	STTH30L06G	D ² PAK	1.48 g	50	Tube
STTH30L06G-TR	STTH30L06G	D ² PAK	1.48 g	1000	Tape and reel
STTH30L06W	STTH30L06W	DO-247	4.40 g	30	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
07-Sep-2004	1	First issue.
21-Oct-2004	2	DOP3I package added.
11-Jan-06	3	On page 2: – $I_{F(RMS)}$ corrected from 30 A to 50 A – $I_{F(AV)}$ corrected from 50 A to 30 A
10-Aug-2006	4	Reformatted to current standards. SOD-93 package removed.
06-Sep-2011	5	Updated I_{FSM} from 160 A to 300 A. Removed TO-220 and DOP3I.

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