

Turbo 2 ultrafast high voltage rectifier

Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- Package insulation voltage:
 - DOP3I : 2500 V_{RMS}

Description

The STTH3006 uses ST Turbo 2 600 V technology and is especially suited for use in switching power supplies, and industrial applications, such as rectification and continuous mode PFC boost diode.

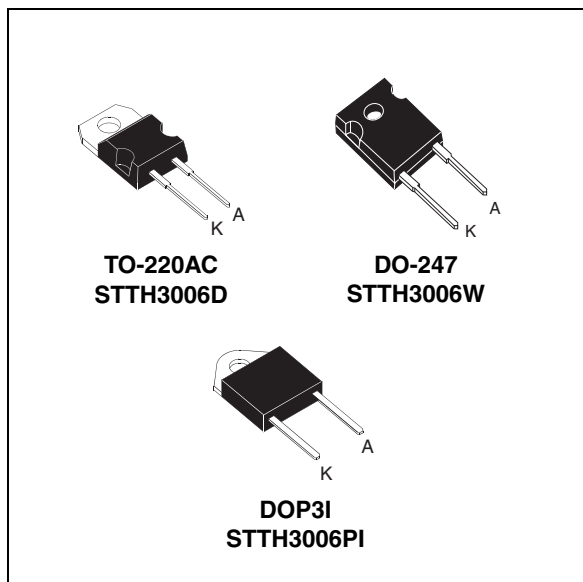


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	30 A
V_{RRM}	600 V
T_j	175 °C
V_F (typ)	1.10 V
t_{rr} (max)	50 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	TO-220AC / DO-247	T _c = 115 °C δ = 0.5	30	A
		DOP3I	T _c = 85 °C δ = 0.5		
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 resistance

Symbol	Parameter		Value (max)	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / DO-247	1.1	°C/W
		DOP3I	1.7	

Table 4. Static electrical characteristic

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	$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$			1.85	V
		$T_j = 150\text{ °C}$			1.10	1.40	

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:

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

Table 5. Dynamic characteristics

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

Figure 1. Conduction losses versus average forward current

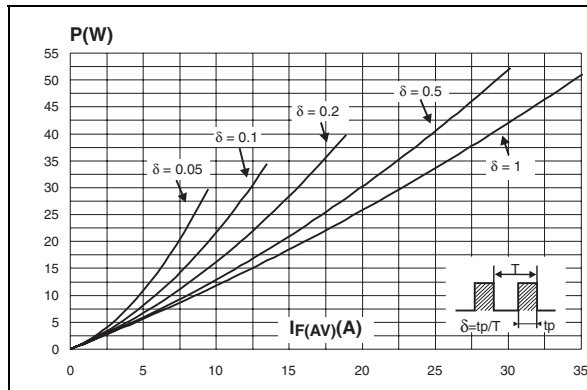


Figure 2. Forward voltage drop versus forward current

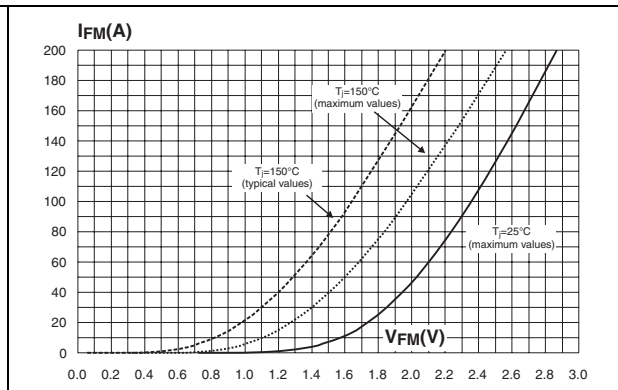


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

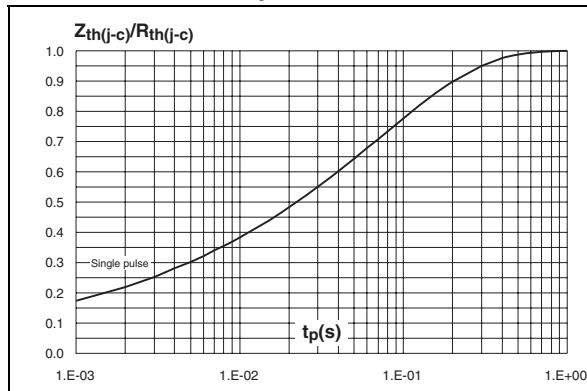


Figure 4. Peak reverse recovery current versus di_F/dt (typical values)

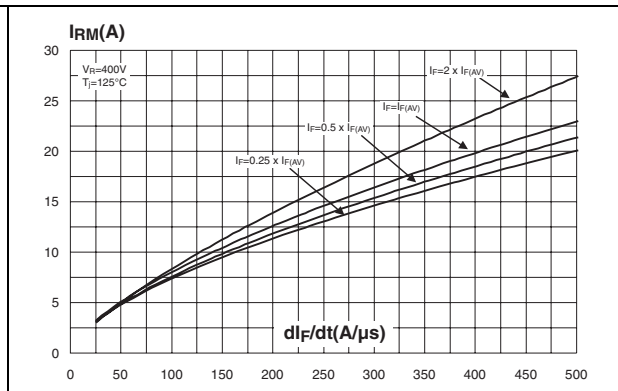


Figure 5. Reverse recovery time versus di_F/dt (typical values)

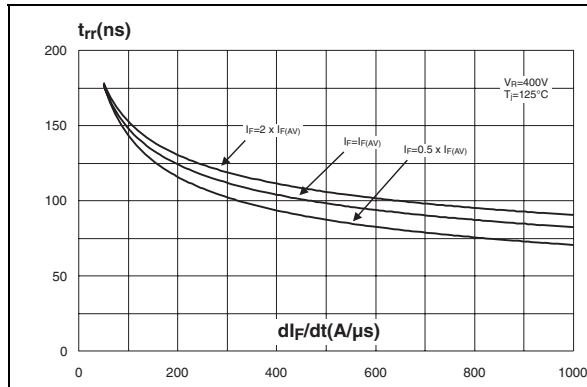


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

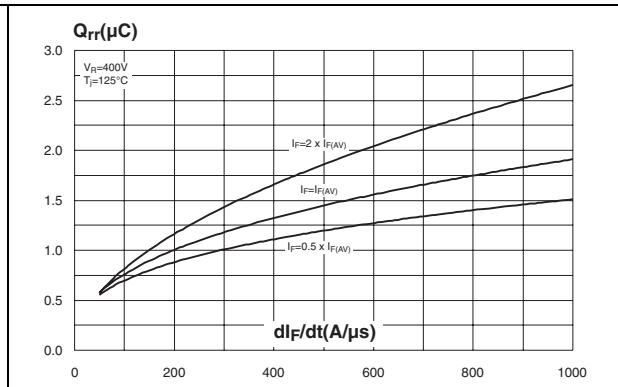


Figure 7. Softness factor versus dl_F/dt (typical values)

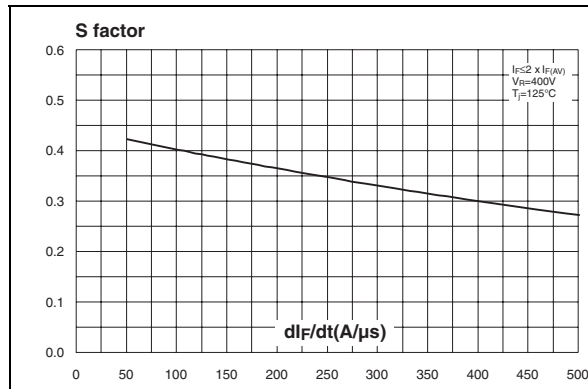


Figure 8. Relative variations of dynamic parameters versus junction temperature

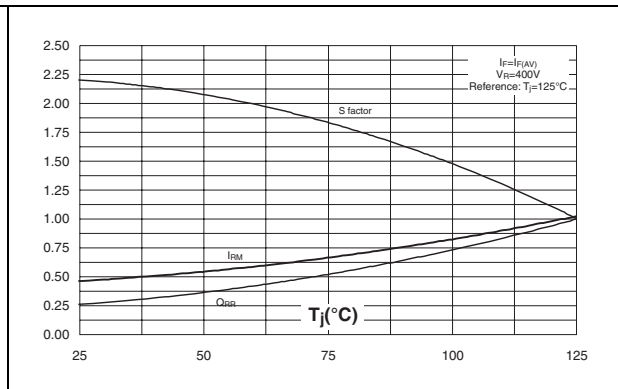


Figure 9. Transient peak forward voltage versus dl_F/dt (typical values)

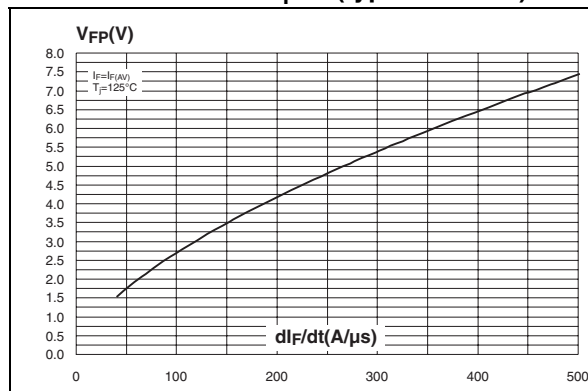


Figure 10. Forward recovery time versus dl_F/dt (typical values)

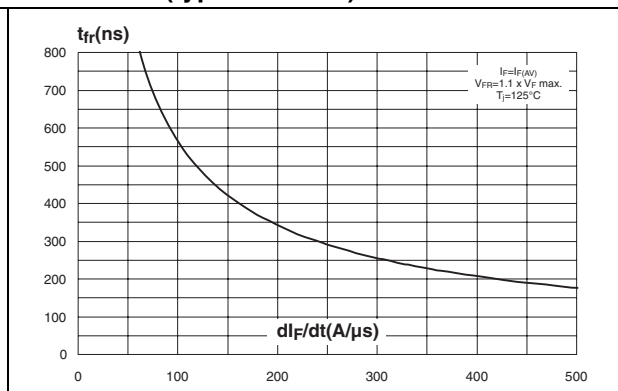
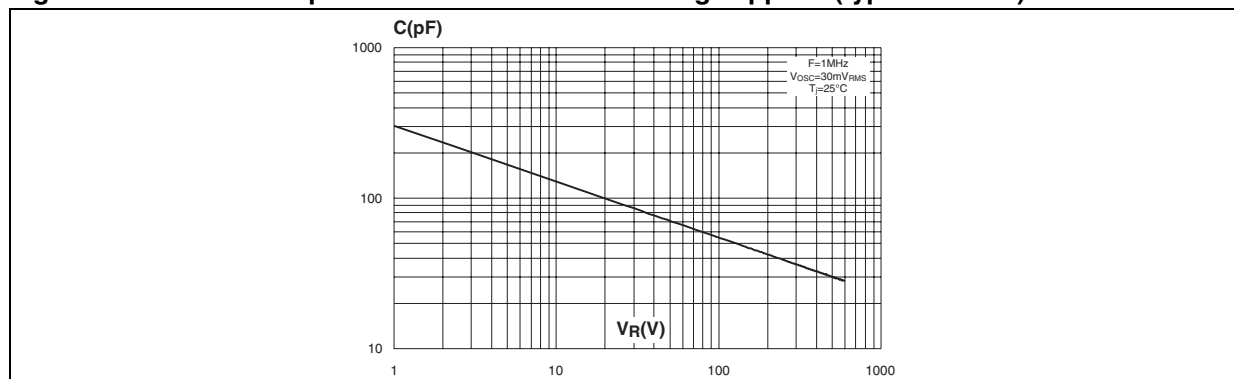


Figure 11. Junction capacitance versus reverse voltage applied (typical values)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m (TO-220AC)

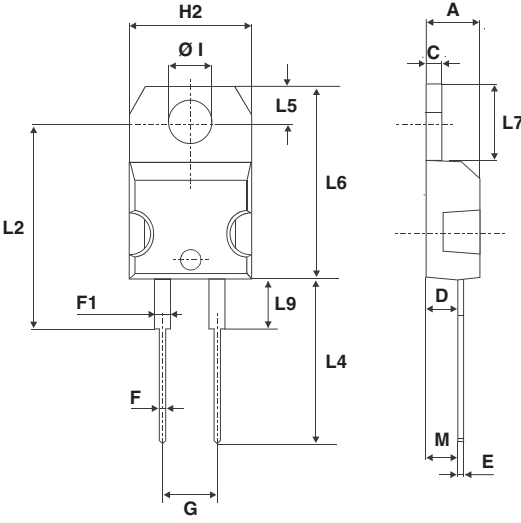
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Table 6. DO247 dimensions

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

Table 7. TO-220AC dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Dia. I	3.75	3.85	0.147	0.151



The technical drawing shows two views of a TO-220AC package. The top view (left) shows a rectangular body with a central circular feature of diameter I. Dimensions include H2 (total width), L2 (total length), L5 (height from top to mounting tab), L6 (height from mounting tab to base), L9 (height from base to lead), L4 (height from mounting tab to lead), F1 (width of mounting tab), F (width of lead), and G (width of lead). The side view (right) shows the profile of the package with dimensions A (total height), C (height of mounting tab), L7 (height from mounting tab to base), D (height from base to lead), M (height of lead), and E (width of lead).

Table 8. DOP3I dimensions

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 typ.		0.181 typ.	
Y	15.80	16.50	0.622	0.650

3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH3006D	STTH3006D	TO-220AC	1.90 g	50	Tube
STTH3006W	STTH3006W	DO-247	4.40 g	30	Tube
STTH3006PI	STTH3006PI	DOP3I	4.46 g	30	Tube

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
22-May-2006	1	Initial release.
10-Aug-2006	2	Added Package insulation voltage on page 1 for DOP3I.
06-Sep-2011	3	Updated I_{FSM} from 160 A to 300 A.

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