

Turbo 2 ultrafast high voltage rectifier

Technical Literature

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Version	Release Date	Change Qualifier
Rev 3.1		Properties Changes
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DOCUMENT APPROVAL

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STTH60L06

Turbo 2 ultrafast high voltage rectifier

Features and benefits

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

Description

The STTH60L06, 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. Thanks to its low V_F characteristics, this device exhibits high performances in free-wheeling applications.

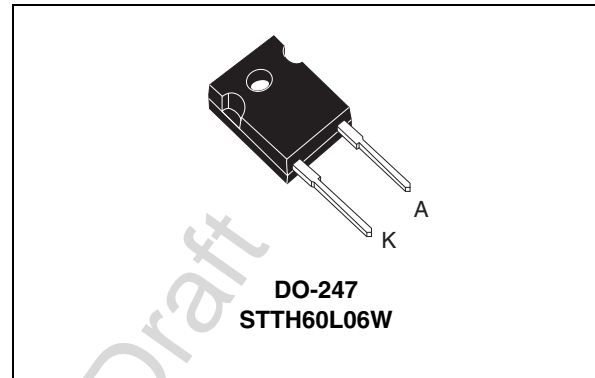


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	60 A
V_{RRM}	600 V
T_j (max)	175 °C
V_F (typ)	0.95 V
t_{rr} (max)	70 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 current	90	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	$T_c = 110\text{ }^\circ\text{C}$	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	A
T_{stg}	Storage temperature range	-65 to + 175	$^\circ\text{C}$
T_j	Maximum operating junction temperature	175	$^\circ\text{C}$

Table 3. Thermal parameter

Symbol	Parameter	Value (max)	Unit
$R_{th(j-c)}$	Junction to case	0.75	$^\circ\text{C/W}$

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	$V_R = V_{RRM}$		50	μA
		$T_j = 150\text{ }^\circ\text{C}$		160	1600	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 60\text{ A}$		1.55	V
		$T_j = 150\text{ }^\circ\text{C}$		0.95	1.2	

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 maximum conduction losses use the following equation:

$$P = 0.93 \times I_{F(AV)} + 0.0045 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$ $I_R = 1\text{ A}$			70	ns
			$I_F = 1\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$ $V_R = 30\text{ V}$		75	105	
I_{RM}	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 60\text{ A}$, $V_R = 400\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$		14	19	A
t_{fr}	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 60\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			500	ns
V_{FP}	Forward recovery voltage	$T_j = 25\text{ °C}$	$I_F = 60\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$		3		V

Figure 1. Conduction losses versus average forward current

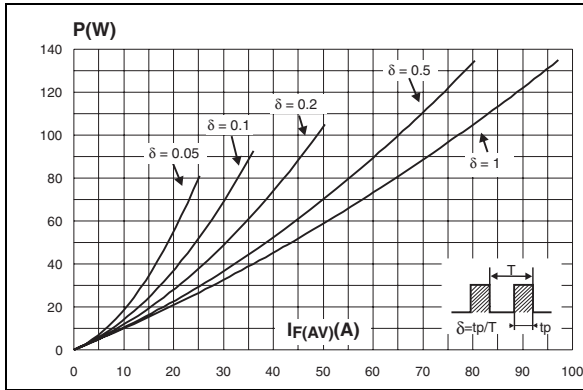


Figure 2. Forward voltage drop versus forward current

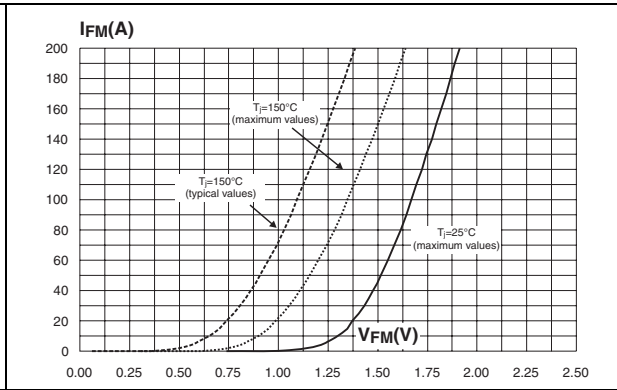


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

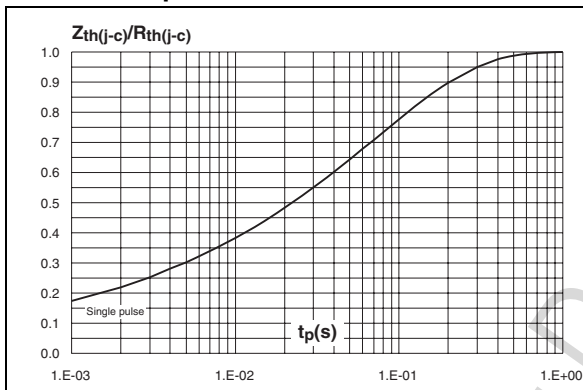


Figure 4. Peak reverse recovery current versus di_F/dt (typical values)

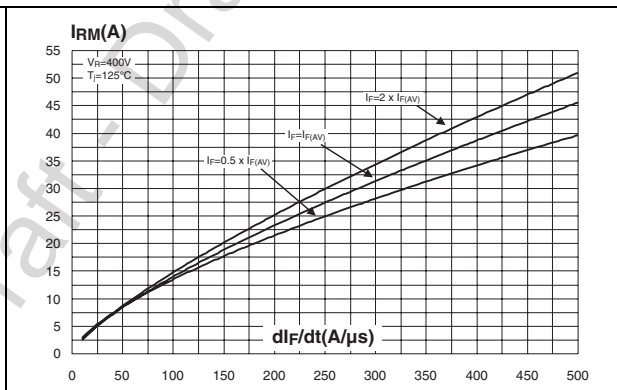


Figure 5. Reverse recovery time versus di_F/dt (typical values)

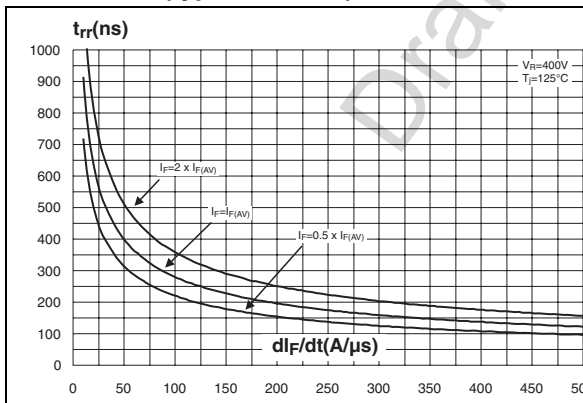


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

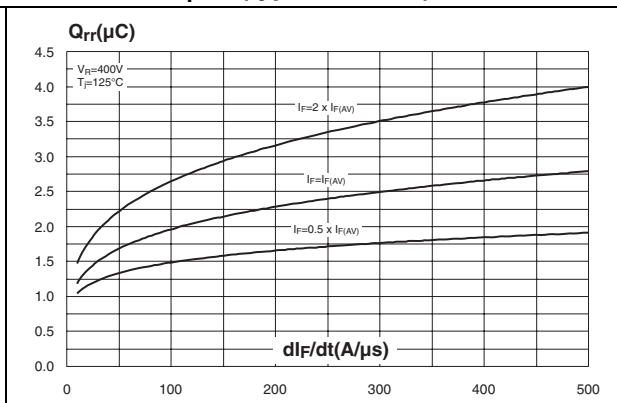


Figure 7. Reverse recovery softness factor versus di_F/dt (typical values)

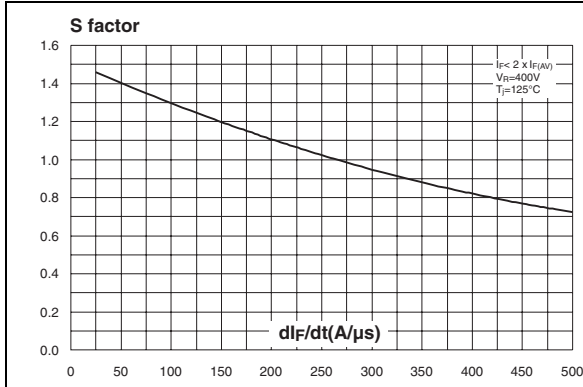


Figure 8. Relative variations of dynamic parameters versus junction temperature

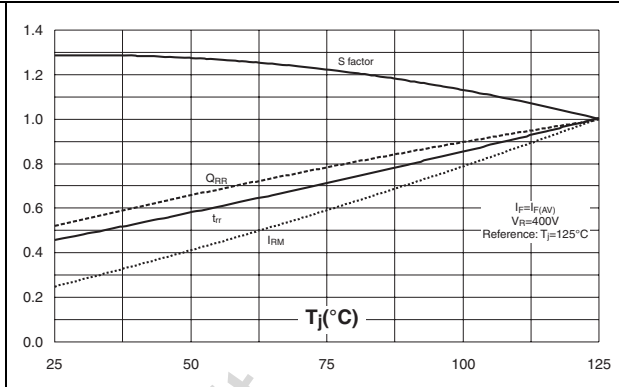


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

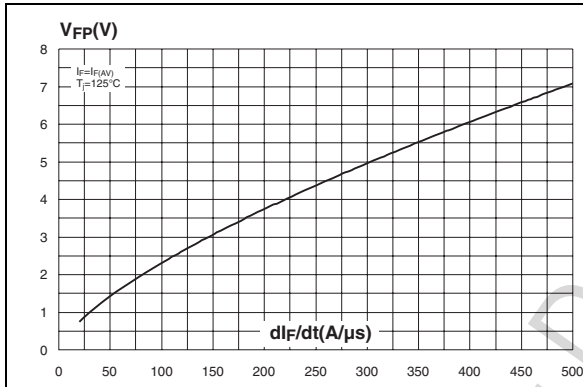


Figure 10. Forward recovery time versus di_F/dt (typical values)

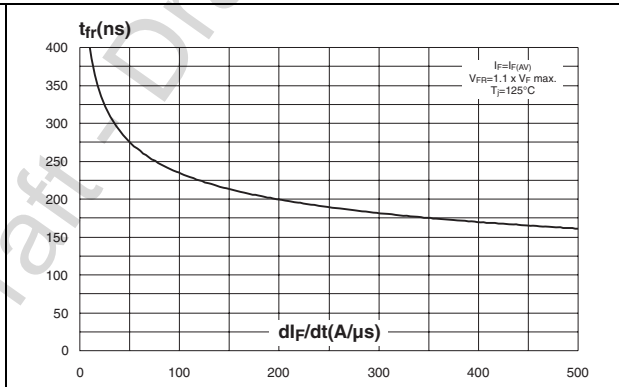
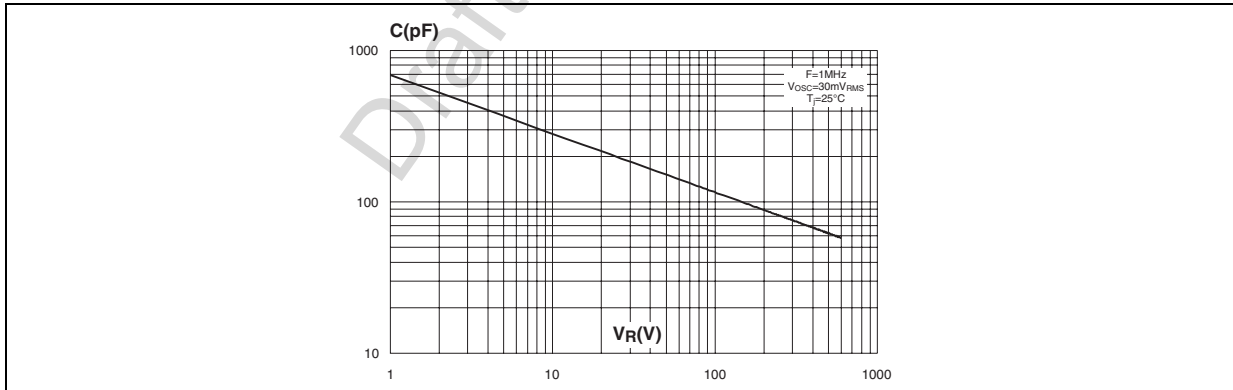


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

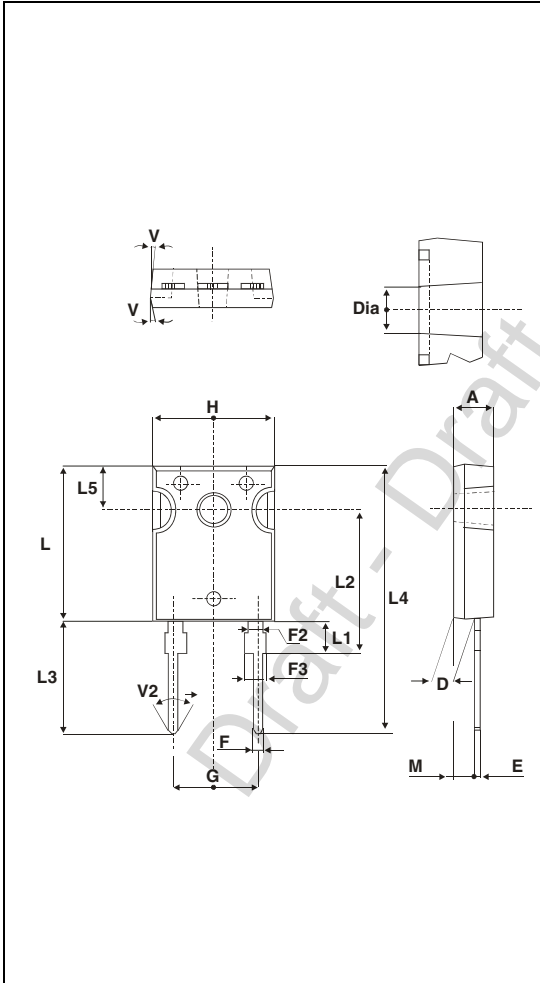


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 to 1.0 N-m

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. 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 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH60L06W	STTH60L06W	DO-247	4.40 g	30	Tube

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
07-Sep-2004	1	First issue
10-Sep-2004	2	Junction to case value (<i>Thermal parameter on page 2</i>) changed from 0.70 °C/W to 0.75 °C/W
07-Sep-2011	3	Updated I _{FSM} from 400 A to 600 A.

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