

Automotive Turbo 2 ultrafast high voltage rectifier

Datasheet — production data

Features

- AEC-Q101 qualified
- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- ECOPACK®2 compliant component (DO-247)

Description

The STTH30L06 uses ST Turbo 2 600 V technology and is especially suited for use in rectification and discontinuous mode PFC boost diode for automotive applications.

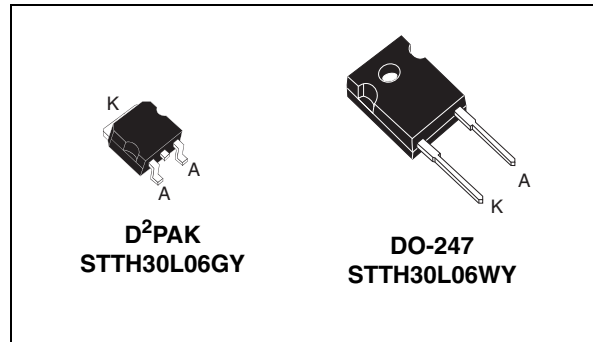


Table 1. Device summary

$I_{F(AV)}$	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	Operating junction temperature range		-40 to +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:

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

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

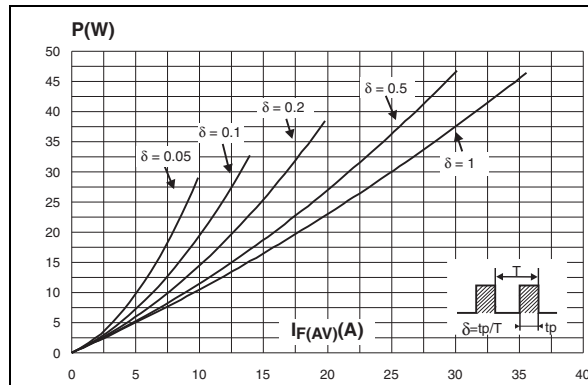


Figure 2. Forward voltage drop versus forward current

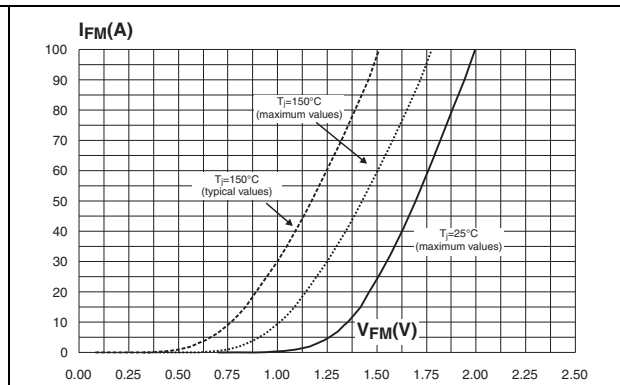


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

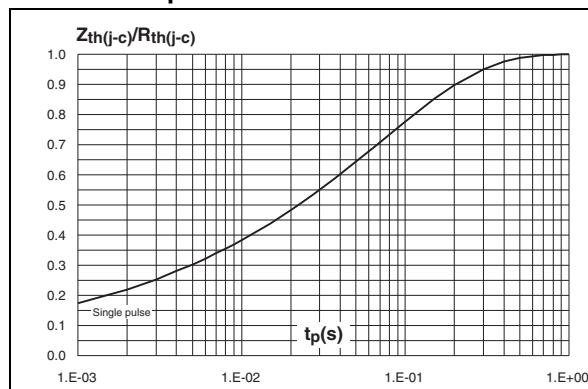
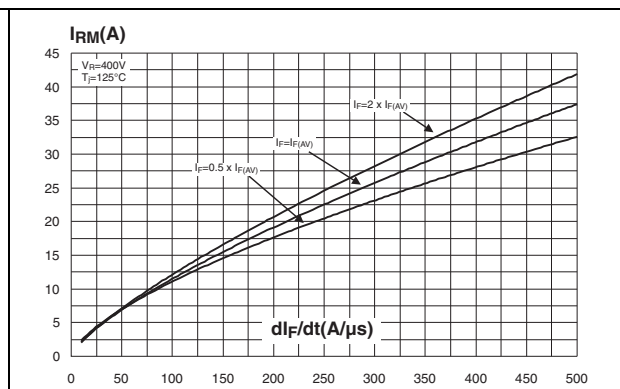
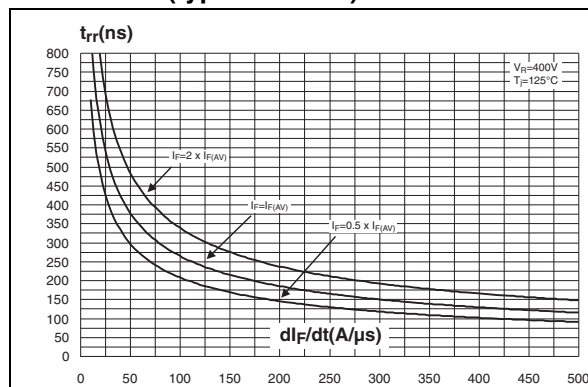
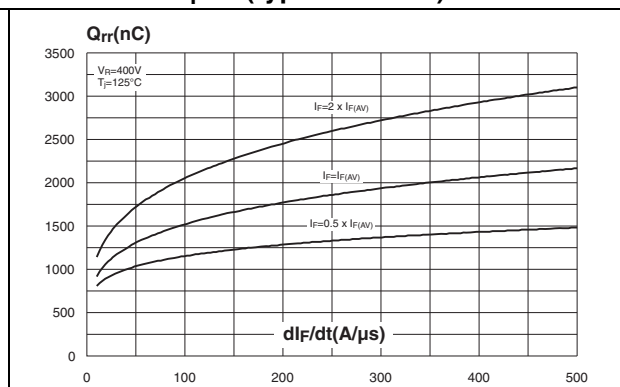
Figure 4. Peak reverse recovery current versus di_F/dt (typical values)Figure 5. Reverse recovery time versus di_F/dt (typical values)Figure 6. Reverse recovery charges versus di_F/dt (typical values)

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

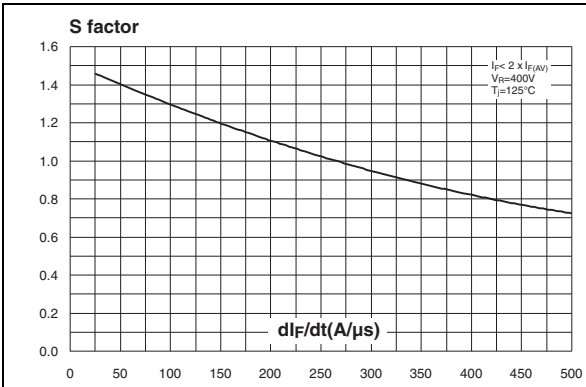


Figure 8. Relative variations of dynamic parameters versus junction temperature

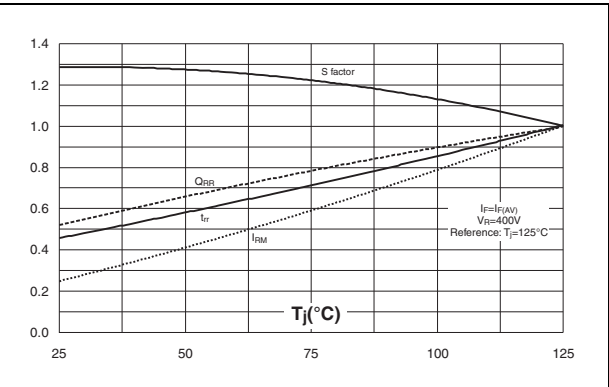


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

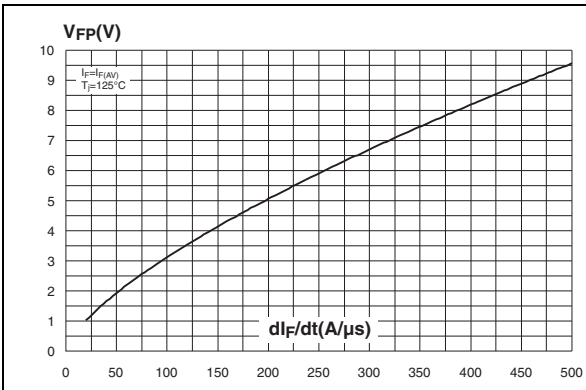


Figure 10. Forward recovery time versus di_F/dt (typical values)

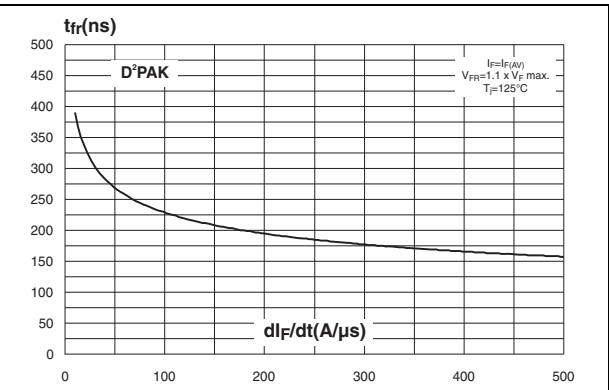


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

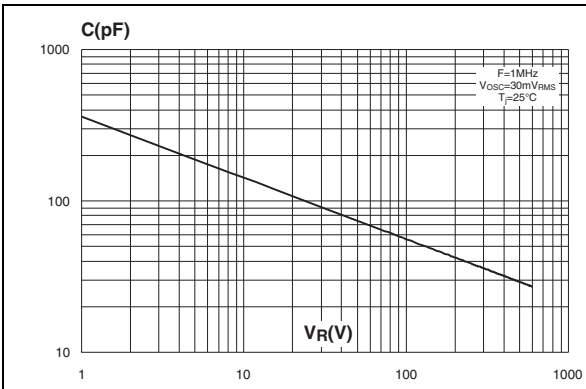
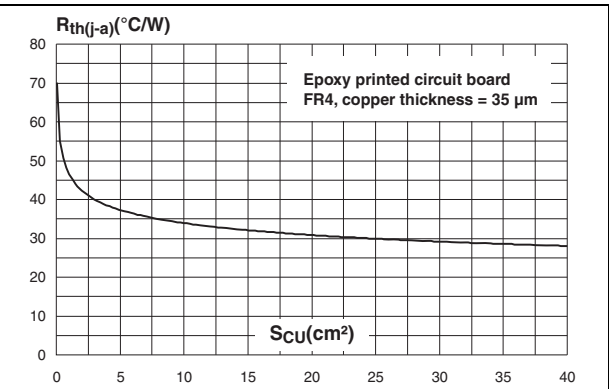


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



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

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)

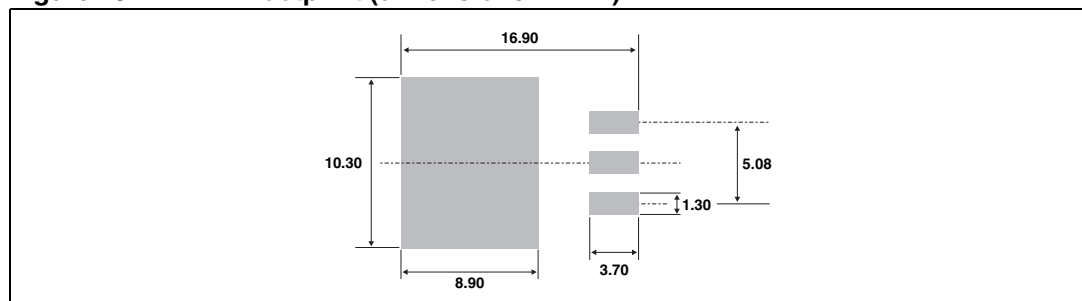


Table 7. DO-247 dimensions

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
STTH30L06GY-TR	STTH30L06GY	D ² PAK	1.48 g	1000	Tape and reel
STTH30L06WY	STTH30L06WY	DO-247	4.40 g	30	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
24-Oct-2012	1	First issue.

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