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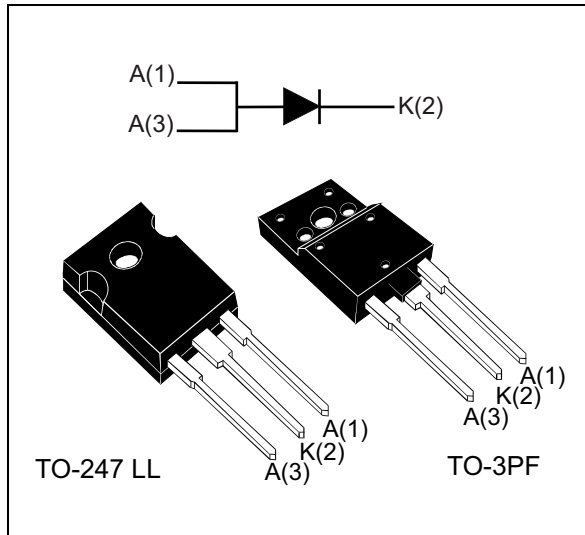
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## Turbo 2 ultrasoft high voltage rectifier

Datasheet - production data



### Description

The STTH31AC06S, implementing a new technology with very high softness during the reverse commutation, is suitable as a boost diode in PFC. This device is highly recommended in air conditioning equipment for continuous mode interleaved power factor correction.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	30 A
$V_{RRM}$	600 V
$t_{rr}$ (typ.)	45 ns
$V_F$ (typ.)	1.35 V
$T_j$ (max.)	175 °C

### Features

- Ultrafast switching
- Low reverse recovery current
- High thermal resistance
- Reduces switching losses
- ECOPACK®2 compliant component

# 1 Characteristics

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

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms current		45	A
$I_{F(AV)}$	Average forward current		30	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	150	A
$T_{stg}$	Storage temperature range		-40 to +175	°C
$T_j$	Maximum operating junction temperature		175	°C

**Table 3. Thermal parameters**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-247 LL	1.25	°C/W
		TO-3PF	2.9	

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25$ °C	$V_R = V_{RRM}$			10	μA
		$T_j = 150$ °C			20	200	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25$ °C	$I_F = 30$ A		1.55	2.00	V
		$T_j = 150$ °C			1.35	1.75	

1. Pulse test:  $t_p = 5$  ms,  $\delta < 2\%$

2. Pulse test:  $t_p = 380$  μs,  $\delta < 2\%$

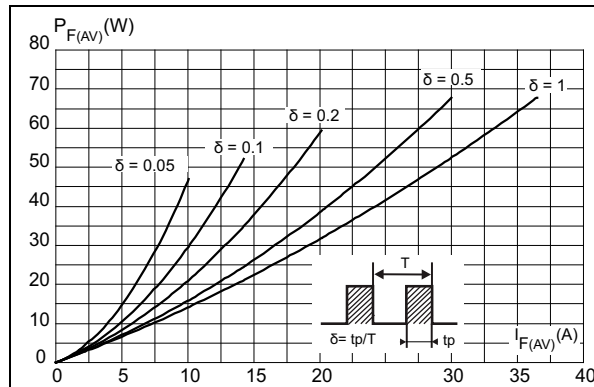
To evaluate the conduction losses use the following equation:

$$P = 1.24 \times I_{F(AV)} + 0.017 I_{F(RMS)}^2$$

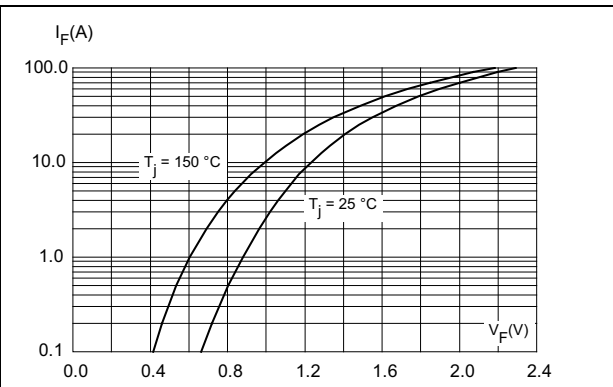
Table 5. Recovery characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}$ , $V_R = 30\text{ A}$ , $di_F/dt = -100\text{ A/}\mu\text{s}$		45	65	ns
$I_{RM}$	Reverse recovery current	$T_j = 150\text{ °C}$	$I_F = 30\text{ A}$ , $V_R = 400\text{ V}$ , $di_F/dt = -1000\text{ A/}\mu\text{s}$		36		A
$Q_{RR}$	Reverse recovery charges				2.5		$\mu\text{C}$
$S_{factor}$	Softness factor				2.2		
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$ , $V_{FR} = 2.5\text{ V}$ , $di_F/dt = 500\text{ A/}\mu\text{s}$			150	ns
$V_{FP}$	Forward recovery voltage				5.5		V

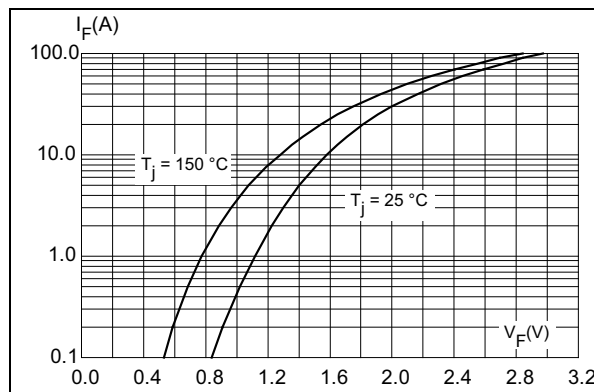
**Figure 1. Average forward power dissipation versus average forward current**



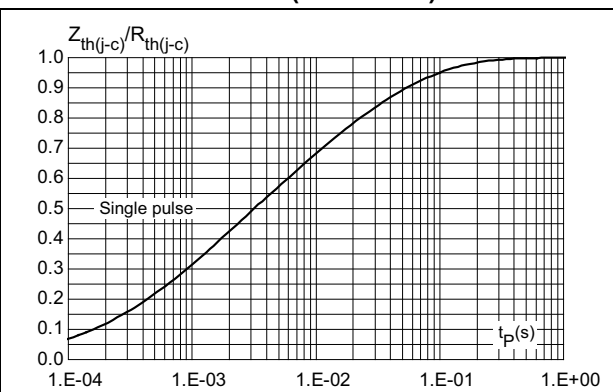
**Figure 2. Forward voltage drop versus forward current (typical values)**



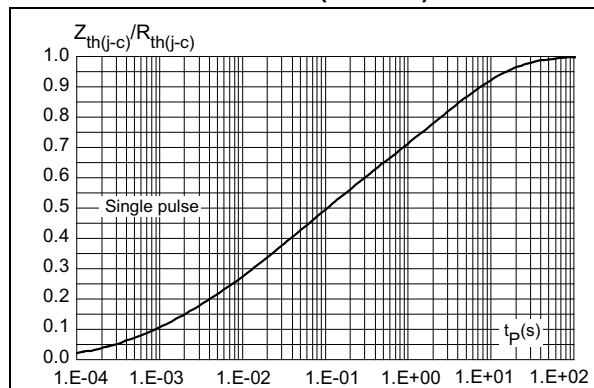
**Figure 3. Forward voltage drop versus forward current (maximum values)**



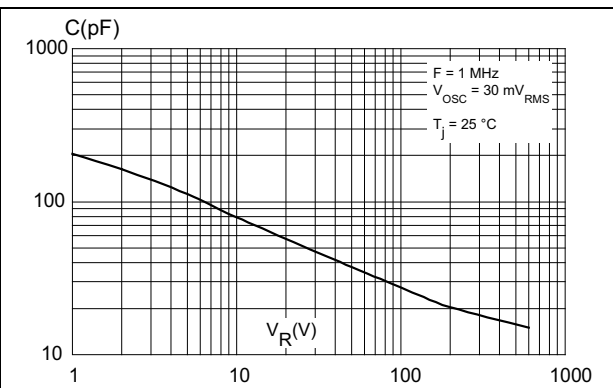
**Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-247 LL)**



**Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)**



**Figure 6. Junction capacitance versus reverse voltage applied (typical values)**





## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1.0 N·m

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### 2.1 TO-247 LL package information

Figure 7. TO-247 LL package outline

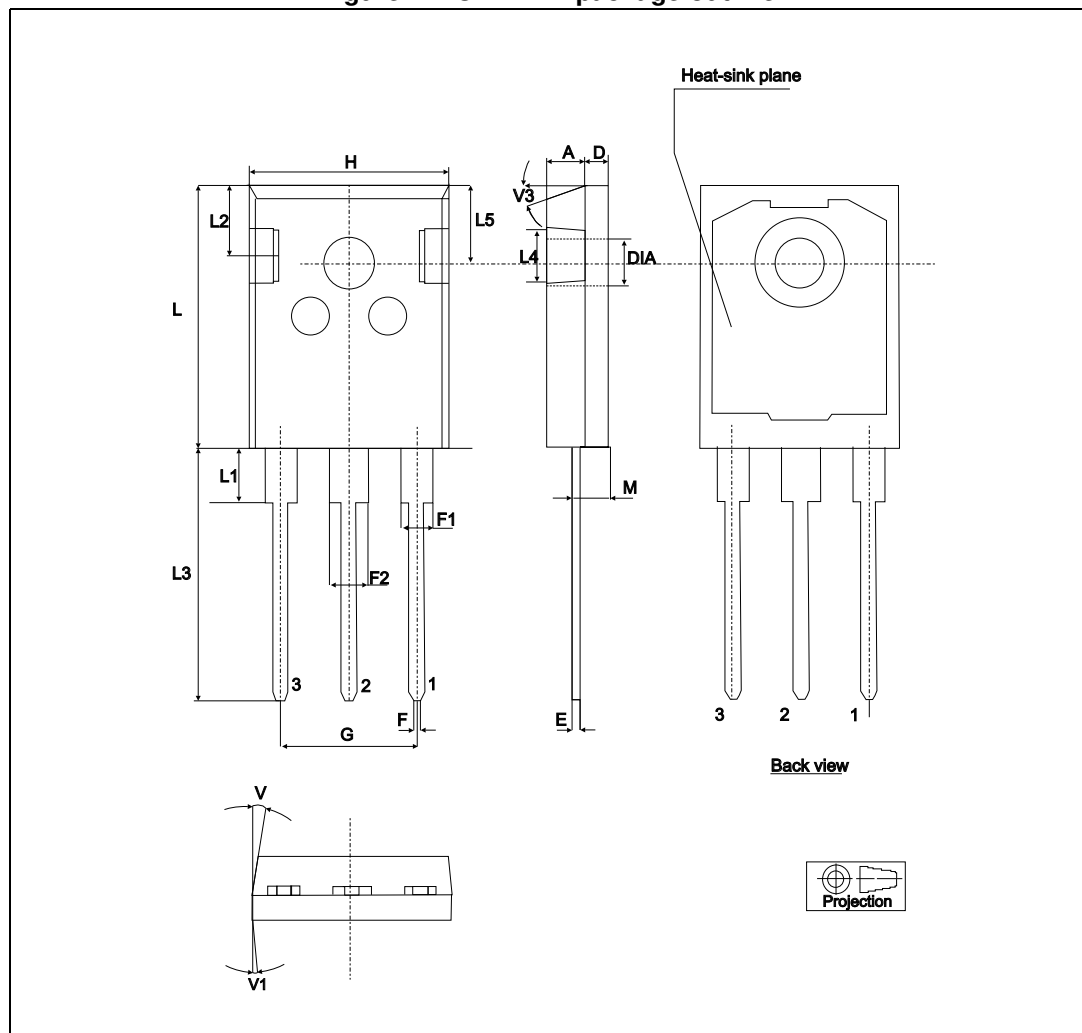


Table 6. TO-247 LL package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ	Max.
A	4.90		5.15	0.192		0.202
D	1.85		2.10	0.072		0.082
E	0.55		0.67	0.021		0.026
F	1.07		1.32	0.042		0.051
F1	1.90		2.38	0.074		0.093
F2	2.87		3.38	0.11		0.133
G	10.90 BSC			0.429 BSC		
H	15.77		16.02	0.62		0.63
L	20.82		21.07	0.81		0.82
L1	4.16		4.47	0.163		0.175
L2	5.49		5.74	0.216		0.225
L3	20.05		20.30	0.789		0.799
L4	3.68		3.93	0.144		0.154
L5	6.04		6.29	0.237		0.247
M	2.25		2.55	0.088		0.10
V		10°			10°	
V1		3°			3°	
V3		20°			20°	
Ø	3.55		3.66	0.139		0.143

## 2.2 TO-3PF package information

Figure 8. TO-3PF package outline

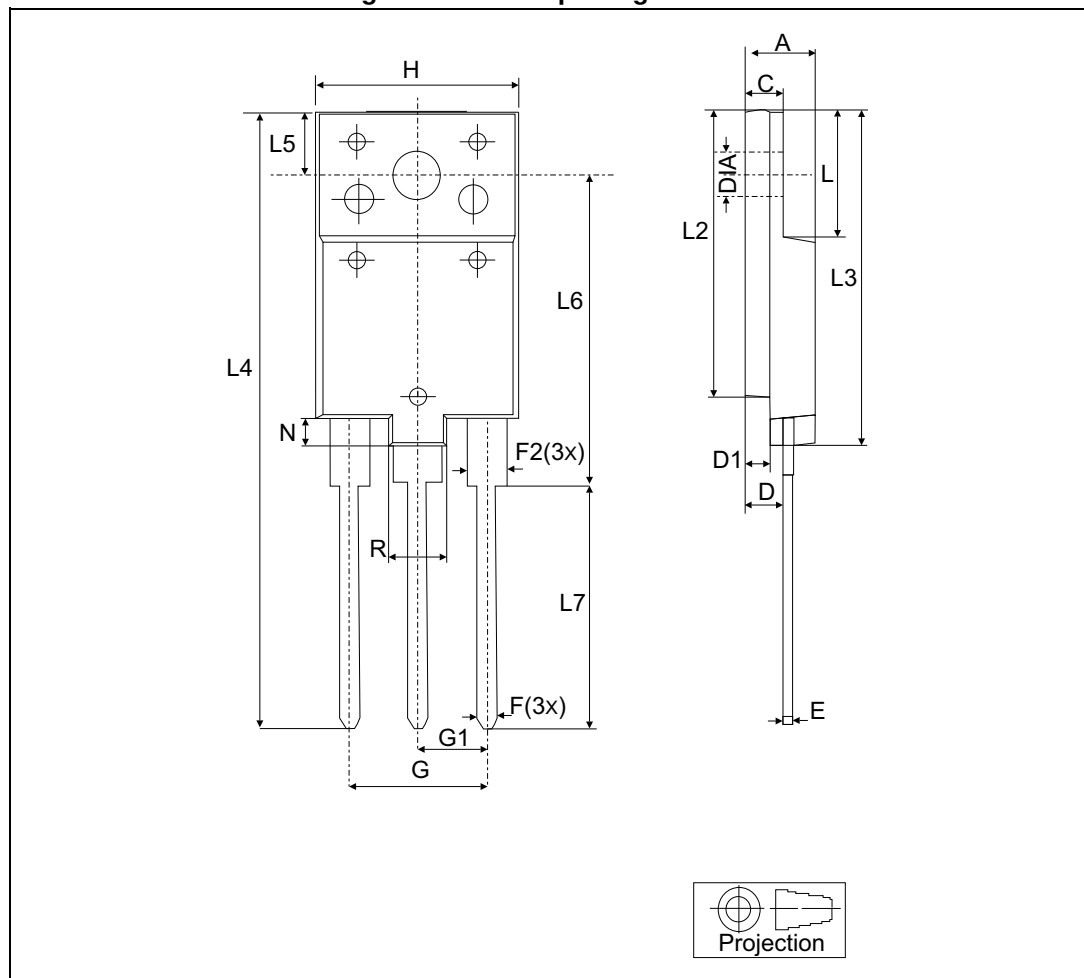




Table 7. TO-3PF package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	5.30		5.70	0.2		0.22
C	2.80		3.20	0.11		0.12
D	3.10		3.50	0.12		0.13
D1	1.80		2.20	0.07		0.08
E	0.80		1.10	0.03		0.04
F	0.65		0.95	0.025		0.037
F2	1.80		2.20	0.07		0.08
G	10.30		11.50	0.40		0.45
G1		5.45			0.21	
H	15.30		15.70	0.60		0.61
L	9.80	10	10.20	0.38	0.39	0.40
L2	22.20		22.80	0.87		0.90
L3	26.30		26.70	1.03		1.05
L4	43.20		44.40	1.70		1.74
L5	4.30		4.70	0.16		1.18
L6	24.30		24.70	0.95		0.97
L7	14.60		15	0.57		0.59
N	1.80		2.20	0.07		0.08
R	3.80		4.20	0.14		0.16
Dia	3.40		3.80	0.13		0.15

### 3 Ordering information

**Table 8. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH31AC06SWL	STTH31AC06SWL	TO-247 LL	4.36 g	30	Tube
STTH31AC06SPF	TH31AC06	TO-3PF	5.6	30	Tube

### 4 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
30-Sep-2014	1	First release.
23-Mar-2016	2	Added TO-3PF package information.

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