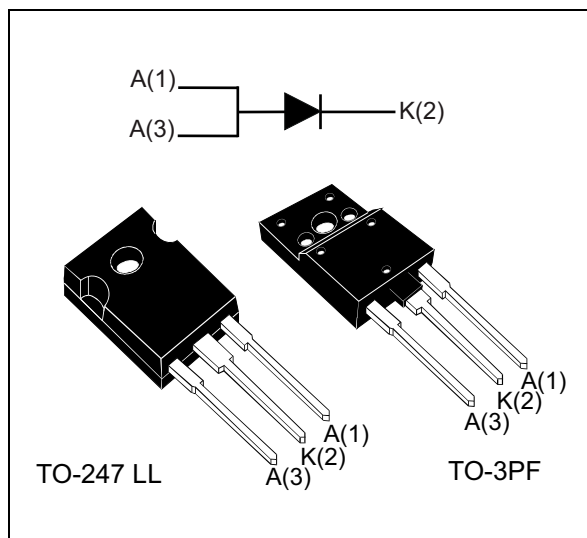


Turbo 2 ultrasoft high voltage rectifier

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	μ A
		$T_j = 150$ °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: $t_p = 380$ μ s, $\delta < 2\%$

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	$T_j = 25\text{ }^{\circ}\text{C}$	$I_F = 1\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = -100\text{ A}/\mu\text{s}$		45	65	ns
I_{RM}	Reverse recovery current	$T_j = 150\text{ }^{\circ}\text{C}$	$I_F = 30\text{ A}$, $V_R = 400\text{ V}$, $di_F/dt = -1000\text{ A}/\mu\text{s}$		36		A
Q_{RR}	Reverse recovery charges				2.5		μC
S_{factor}	Softness factor				2.2		
t_{fr}	Forward recovery time	$T_j = 25\text{ }^{\circ}\text{C}$	$I_F = 30\text{ A}$, $V_{FR} = 2.5\text{ V}$, $di_F/dt = 500\text{ A}/\mu\text{s}$			150	ns
V_{FP}	Forward recovery voltage				5.5		V

Figure 1. Average forward power dissipation versus average forward current

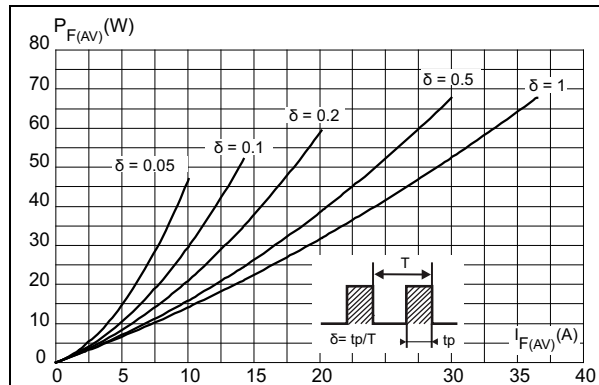


Figure 2. Forward voltage drop versus forward current (typical values)

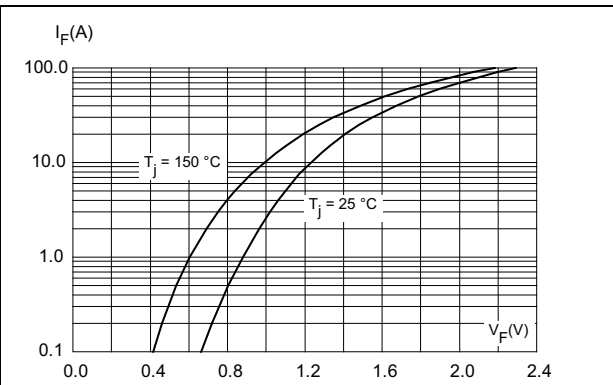


Figure 3. Forward voltage drop versus forward current (maximum values)

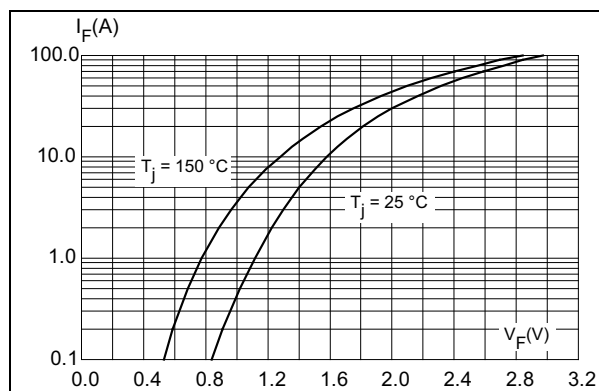


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-247 LL)

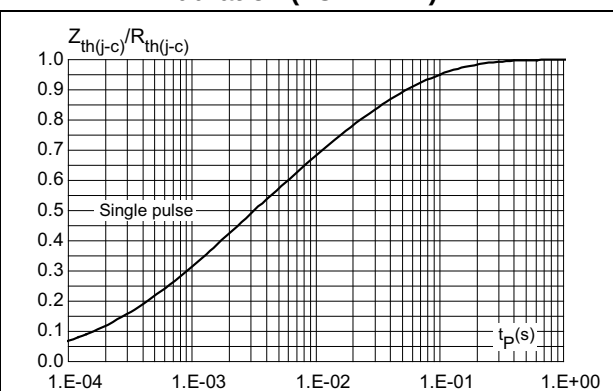


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)

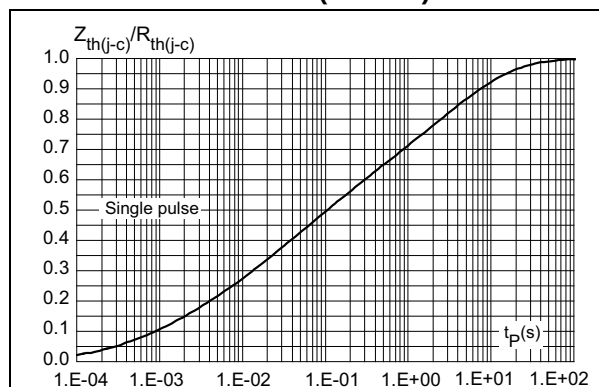
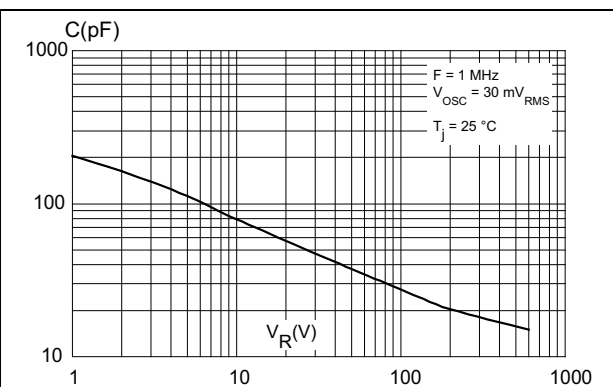


Figure 6. Junction capacitance versus reverse voltage applied (typical values)



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

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.

2.1 TO-247 LL package information

Figure 7. TO-247 LL package outline

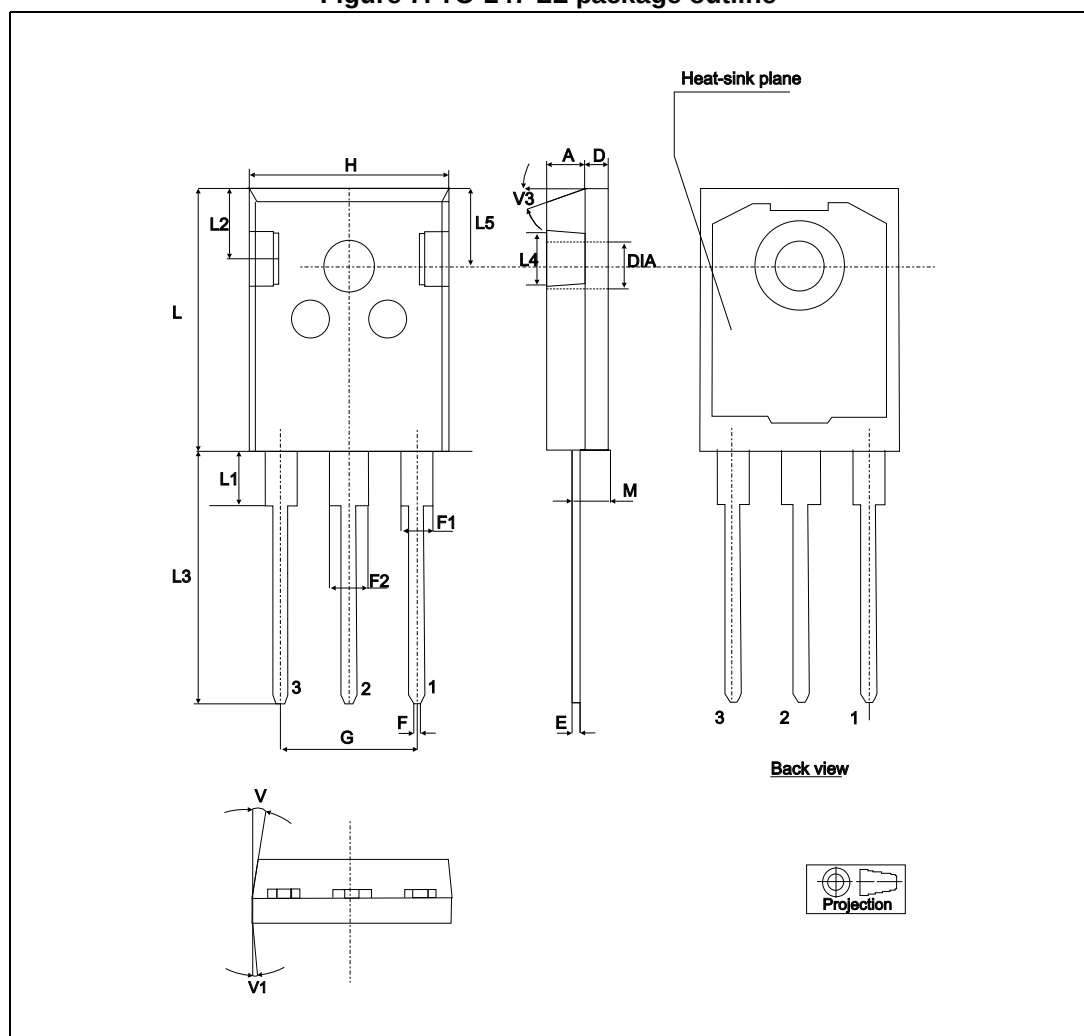


Table 6. TO-247 LL package mechanical data

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

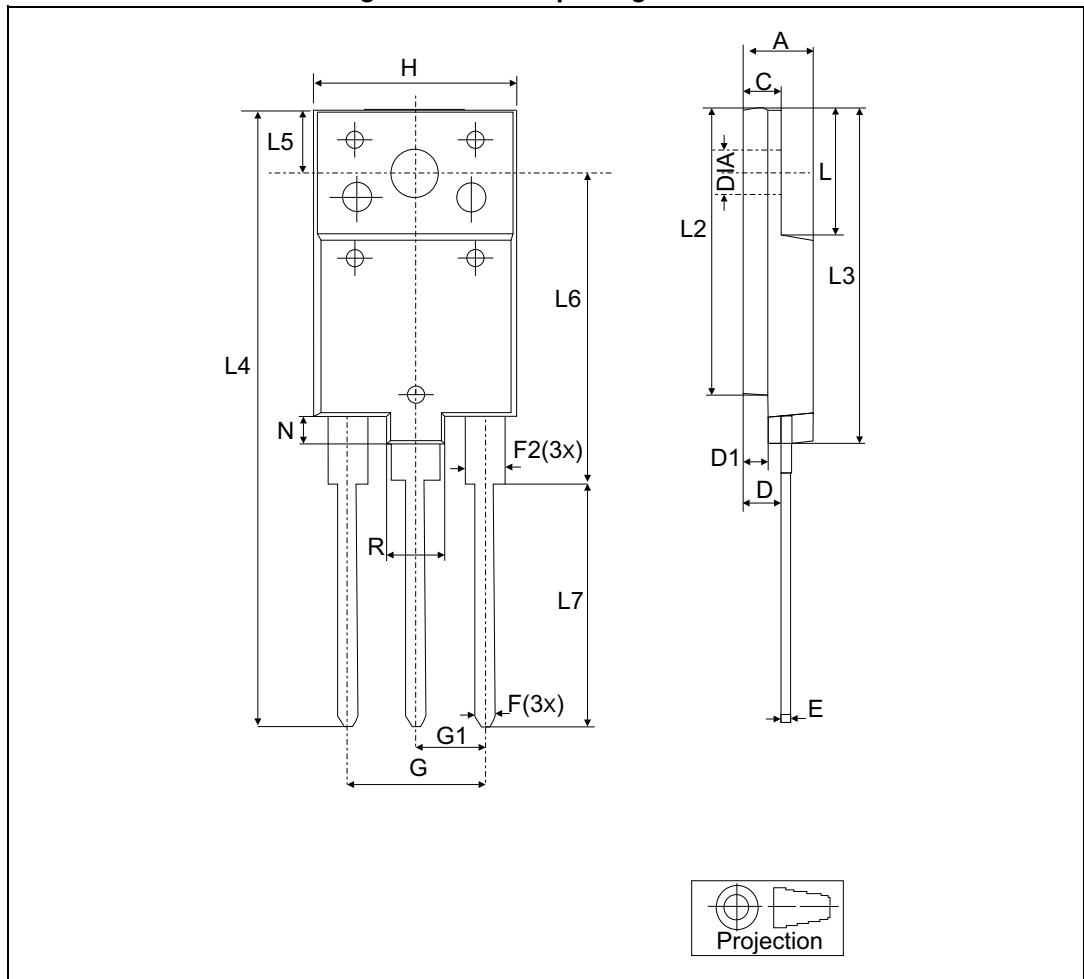


Table 7. TO-3PF package mechanical data

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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