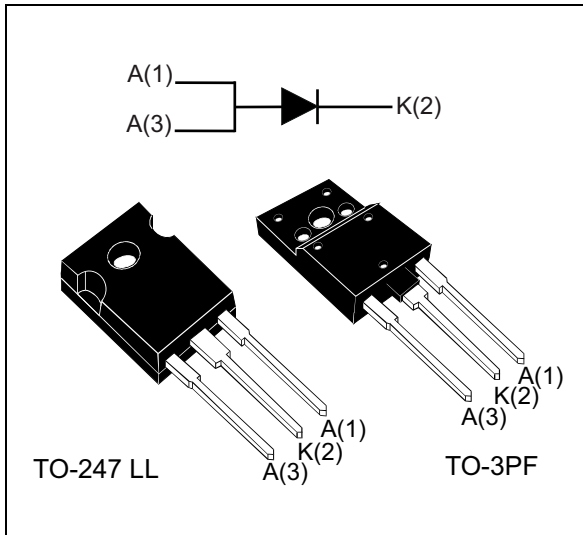


Turbo 2 ultrasoft high voltage rectifier

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 | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}$, $V_R = 30\text{ A}$, $di_F/dt = -100\text{ A}/\mu\text{s}$ | | 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 | | μC |
| 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

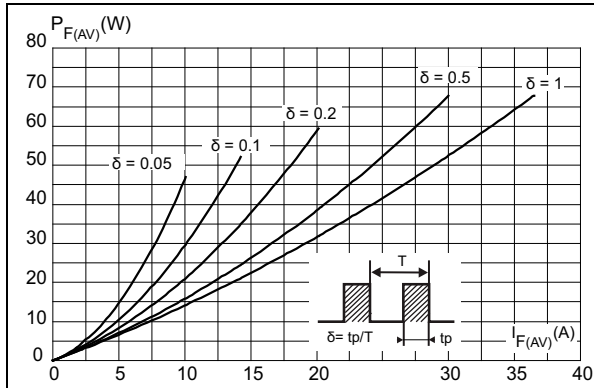


Figure 2. Forward voltage drop versus forward current (typical values)

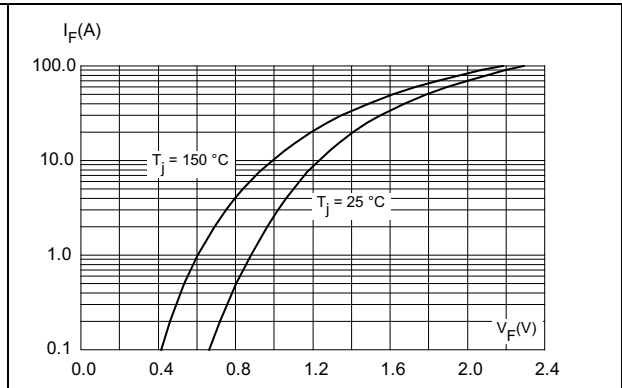


Figure 3. Forward voltage drop versus forward current (maximum values)

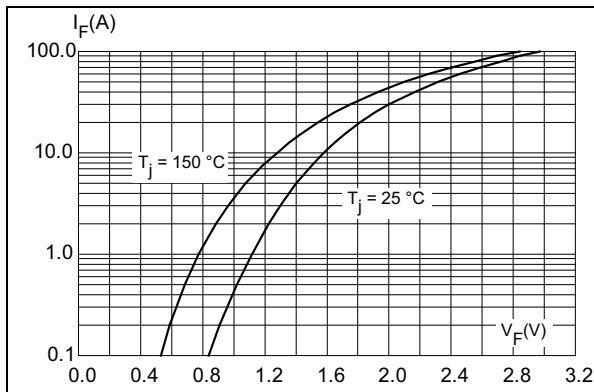


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-247 LL)

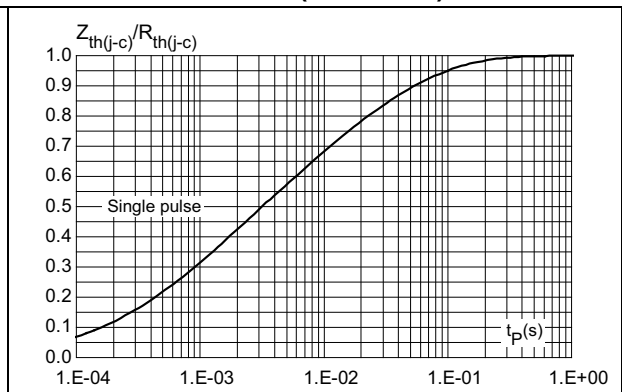


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)

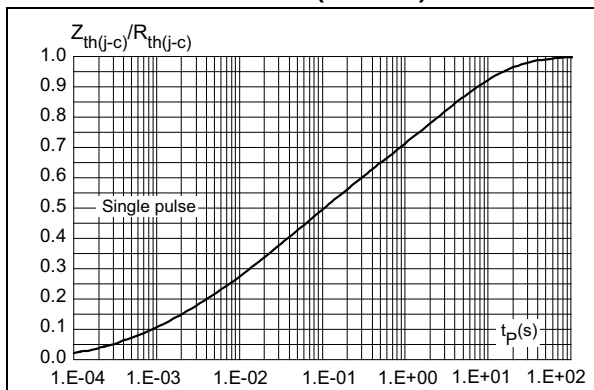
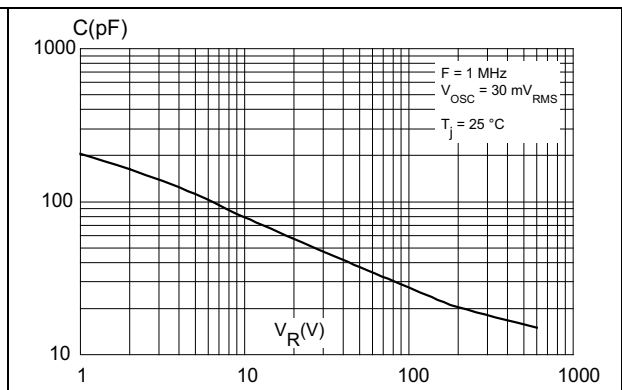


Figure 6. Junction capacitance versus reverse voltage applied (typical values)



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

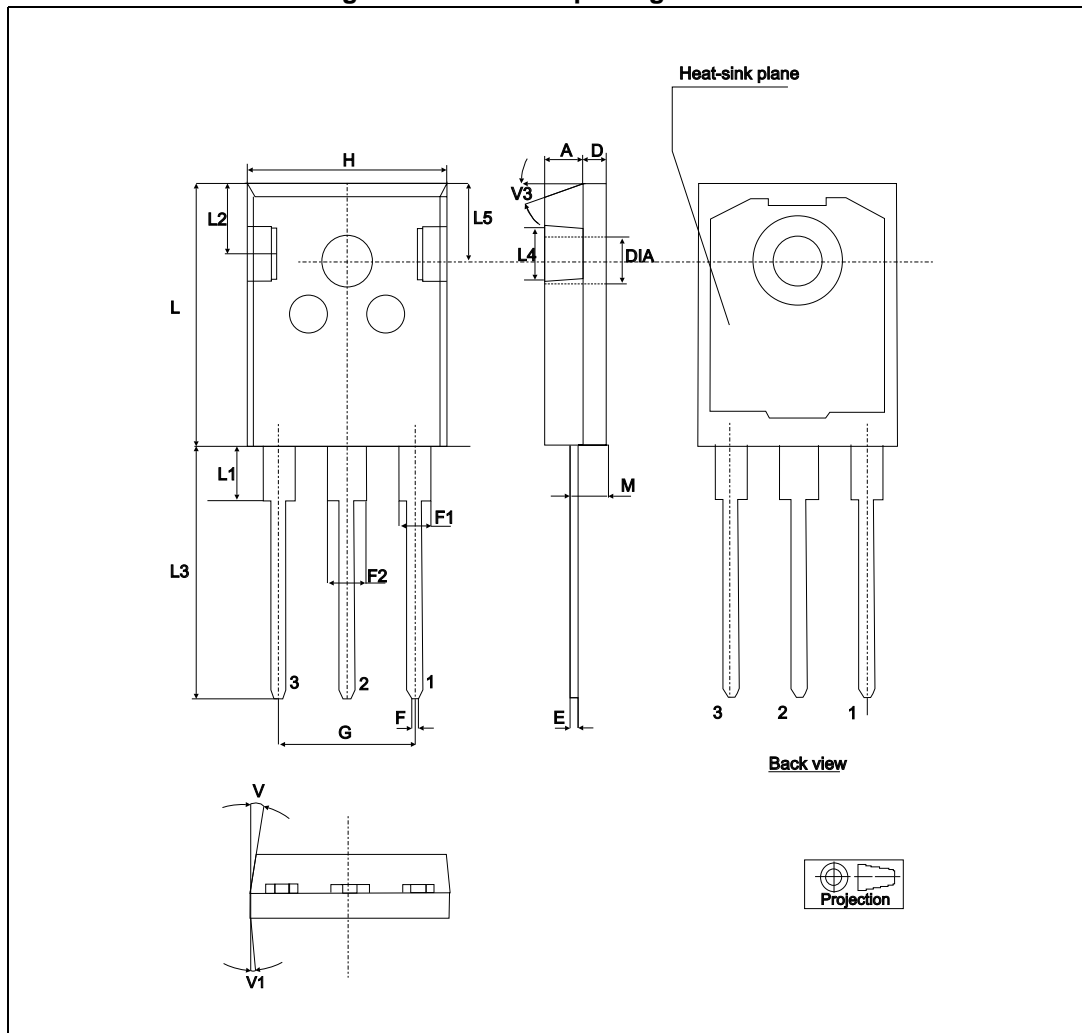


Table 6. TO-247 LL package mechanical data

| 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° | |
| ∅ | 3.55 | | 3.66 | 0.139 | | 0.143 |

2.2 TO-3PF package information

Figure 8. TO-3PF package outline

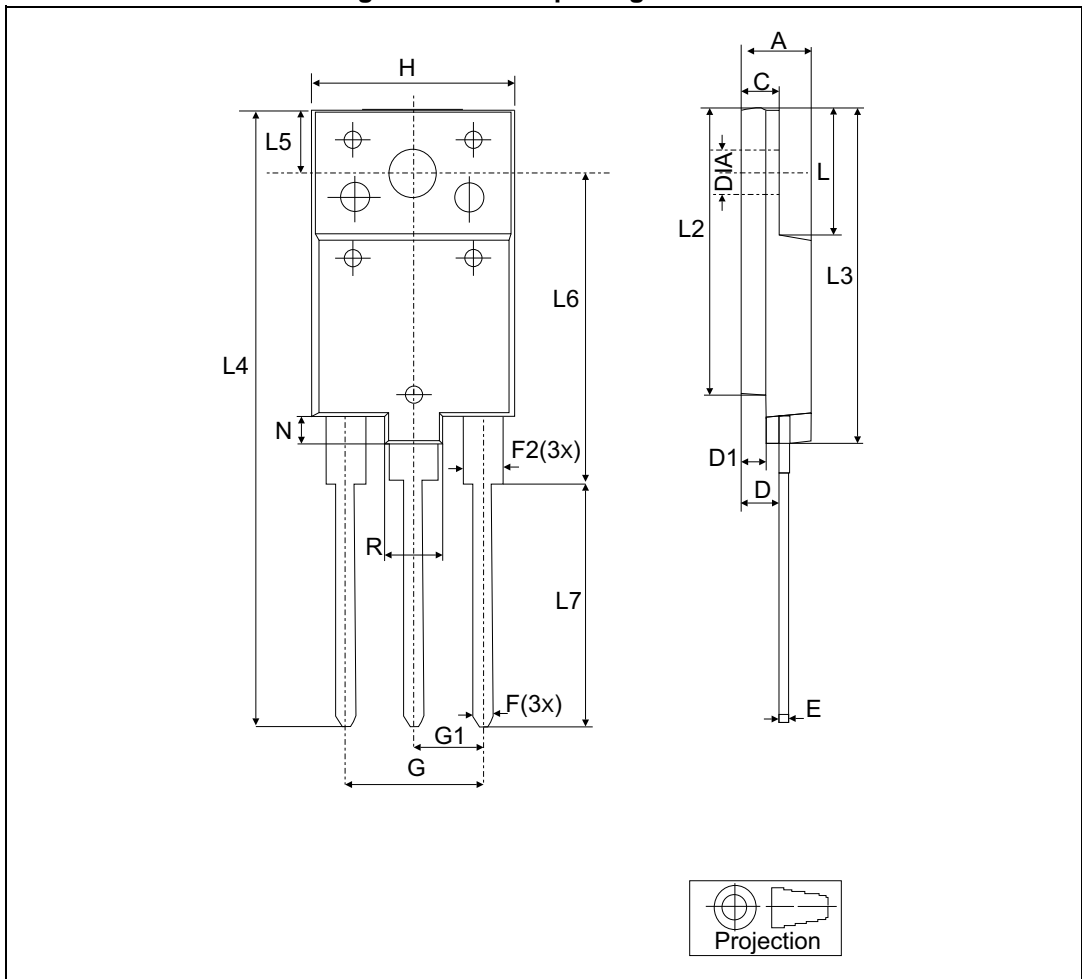


Table 7. TO-3PF package mechanical data

| 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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