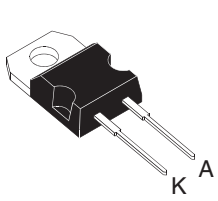
# STTH30L06

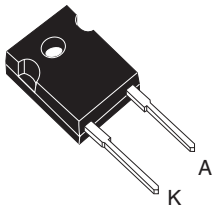
## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

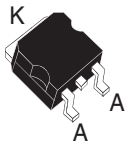
| | |
|---|---|
| $I_{F(AV)}$ | 30 A |
| $V_{RRM}$ | 600 V |
| $T_j$ | 175°C |
| $V_F$ (typ) | 1.0 V |
| $t_{rr}$ (max) | 65 ns |



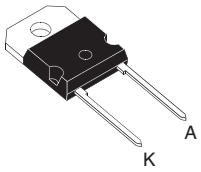

**TO-220AC**
**STTH30L06D**



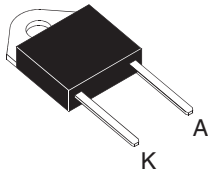

**DO-247**
**STTH30L06W**




**D²PAK**
**STTH30L06G**




**SOD-93**
**STTH30L06P**




**DOP3I**
**STTH30L06PI**

### FEATURES AND BENEFITS

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

### DESCRIPTION

The STTH30L06, which is using ST Turbo 2 600V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.

**Table 2: Order Codes**

| Part Number | Marking |
|---|---|
| STTH30L06D | STTH30L06D |
| STTH30L06G | STTH30L06G |
| STTH30L06G-TR | STTH30L06G |
| STTH30L06W | STTH30L06W |
| STTH30L06P | STTH30L06P |
| STTH30L06PI | STTH30L06PI |

**Table 3: Absolute Ratings** (limiting values)

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | | 600 | V |
| $I_{F(RMS)}$ | RMS forward voltage | | | 50 | A |
| $I_{F(AV)}$ | Average forward current | TO-220AC / TO-247 / $D^2$PAK / SOT-93 | Tc = 125°C $\delta$ = 0.5 | 30 | A |
| | | DOP3I | Tc = 95°C $\delta$ = 0.5 | | |
| $I_{FSM}$ | Surge non repetitive forward current | | tp = 10ms sinusoidal | 160 | A |
| $T_{stg}$ | Storage temperature range | | | -65 to + 175 | °C |
| $T_j$ | Maximum operating junction temperature | | | 175 | °C |

**Table 4: Thermal Resistance**

| Symbol | Parameter | | Value (max). | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | TO-220AC / TO-247 / $D^2$PAK / SOT-93 | 1.1 | °C/W |
| | | DOP3I | 1.7 | |

**Table 5: Static Electrical Characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$ * | Reverse leakage current | $T_j$ = 25°C | $V_R = V_{RRM}$ | | | 25 | µA |
| | | $T_j$ = 150°C | | | 80 | 800 | |
| $V_F$ ** | Forward voltage drop | $T_j$ = 25°C | $I_F$ = 30A | | | 1.55 | V |
| | | $T_j$ = 150°C | | | 1.0 | 1.25 | |

Pulse test: * tp = 5 ms, $\delta$ < 2%

** tp = 380 µs, $\delta$ < 2%

To evaluate the conduction losses use the following equation: $P = 0.95 \times I_{F(AV)} + 0.010\ I_F{}^2{}_{(RMS)}$

**Table 6: Dynamic Characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $T_j$ = 25°C | $I_F$ = 0.5A Irr = 0.25A $I_R$ =1A | | | 65 | ns |
| | | | $I_F$ = 1A $dI_F/dt$ = 50 A/µs $V_R$ =30V | | 65 | 90 | |
| $I_{RM}$ | Reverse recovery current | $T_j$ = 125°C | $I_F$ = 30A $V_R$ = 400V $dI_F/dt$ = 100 A/µs | | 11.5 | 16 | A |
| $t_{fr}$ | Forward recovery time | $T_j$ = 25°C | $I_F$ = 30A $dI_F/dt$ = 100 A/µs $V_{FR} = 1.1 \times V_{Fmax}$ | | | 500 | ns |
| $V_{FP}$ | Forward recovery voltage | $T_j$ = 25°C | $I_F$ = 30A $dI_F/dt$ = 100 A/µs $V_{FR} = 1.1 \times V_{Fmax}$ | | 2.5 | | V |

**Figure 1: Conduction losses versus average forward current**

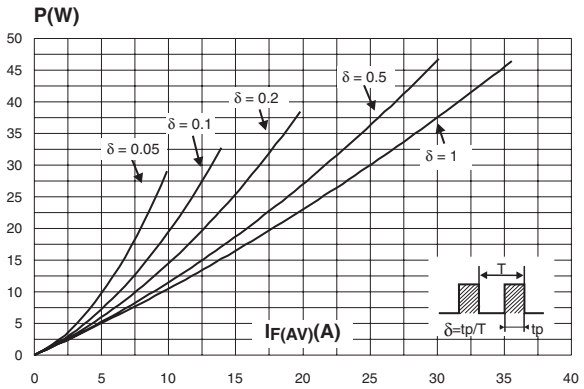



**Figure 2: Forward voltage drop versus forward current**

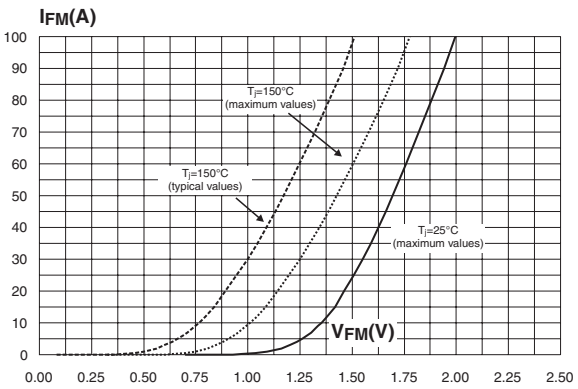



**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration**

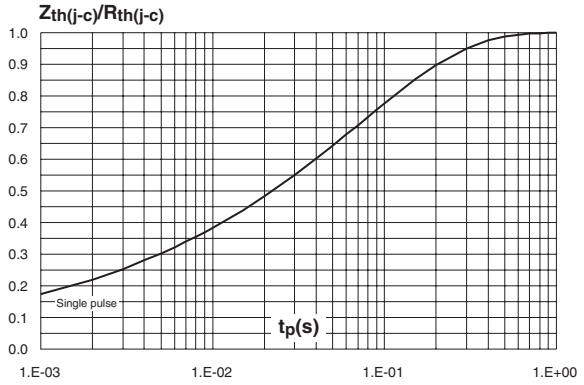



**Figure 4: Peak reverse recovery current versus $dI_F/dt$ (typical values)**

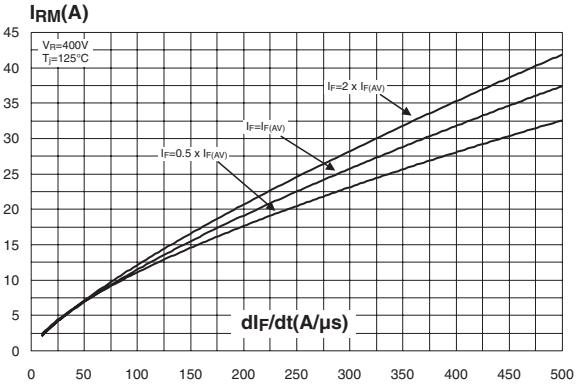



**Figure 5: Reverse recovery time versus $dI_F/dt$ (typical values)**

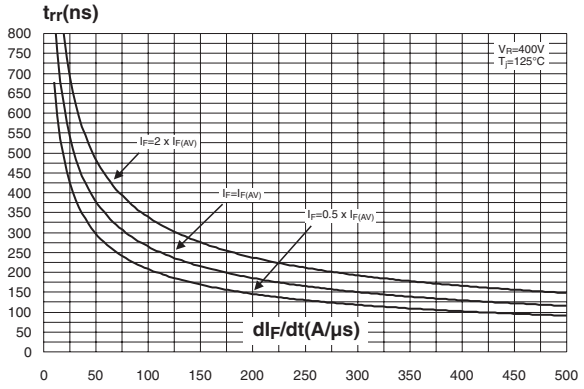



**Figure 6: Reverse recovery charges versus $dI_F/dt$ (typical values)**

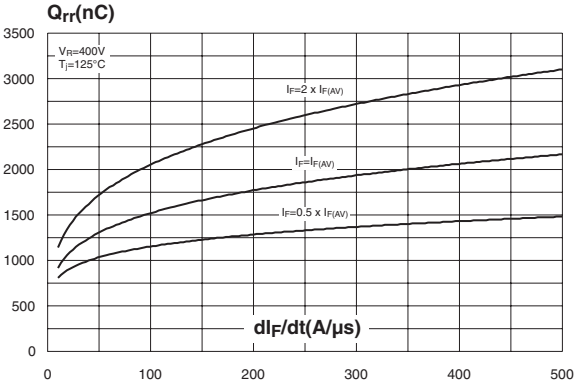


**Figure 7: Reverse recovery softness factor versus $dI_F/dt$ (typical values)**

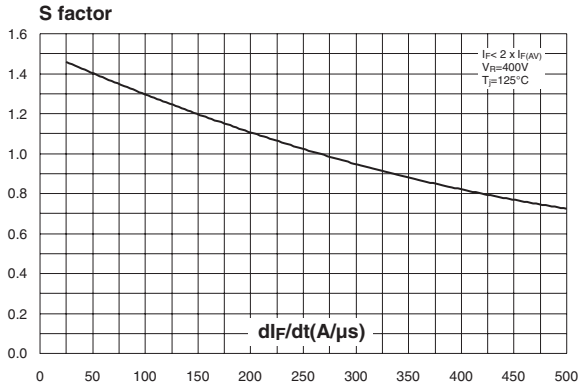



**Figure 8: Relative variations of dynamic parameters versus junction temperature**

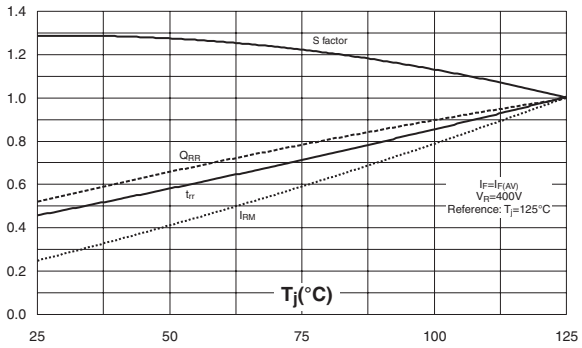



**Figure 9: Transient peak forward voltage versus $dI_F/dt$ (typical values)**

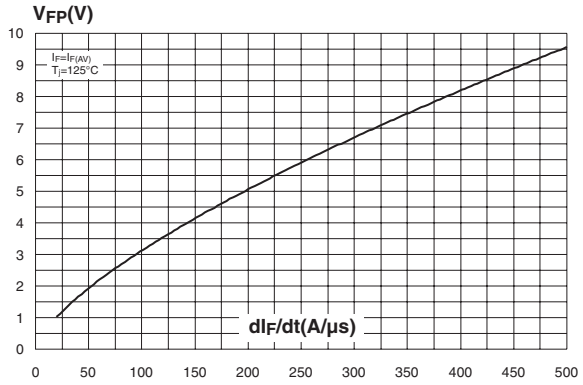



**Figure 10: Forward recovery time versus $dI_F/dt$ (typical values)**

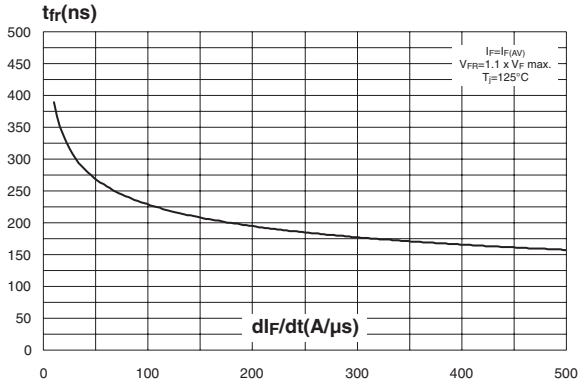



**Figure 11: Junction capacitance versus reverse voltage applied (typical values)**

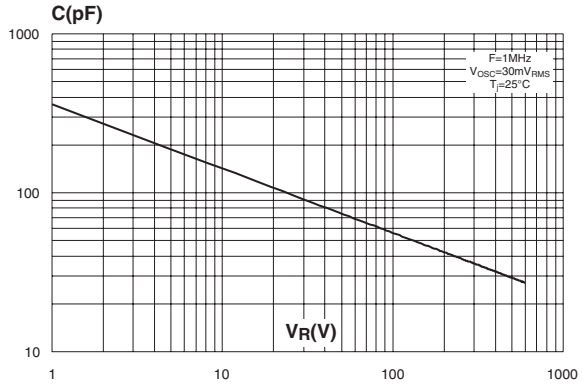



**Figure 12: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, $e_{CU}$=35µm) ($D^2PAK$)**

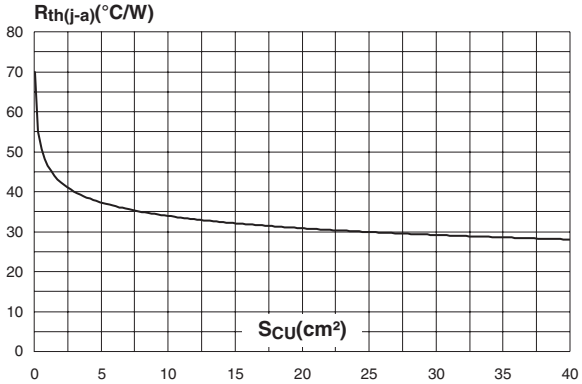
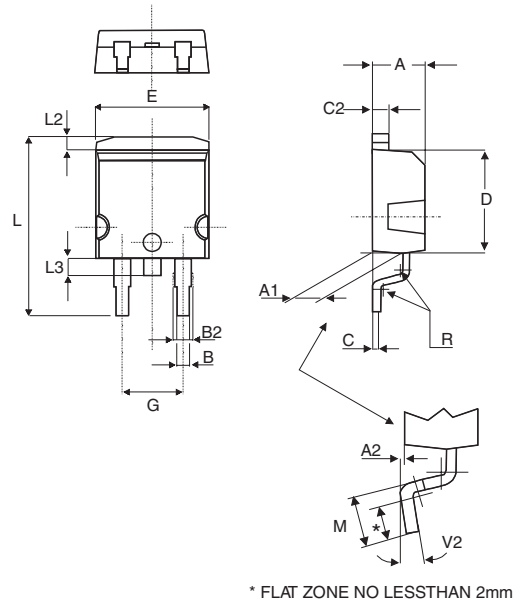


**Figure 13: D²PAK Package Mechanical Data**




| 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 14: D²PAK Foot Print Dimensions**
(in millimeters)

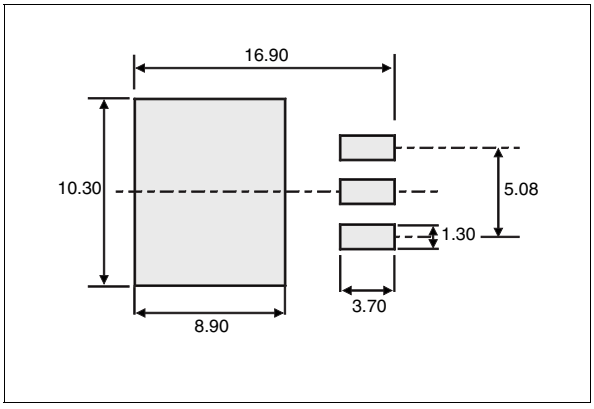
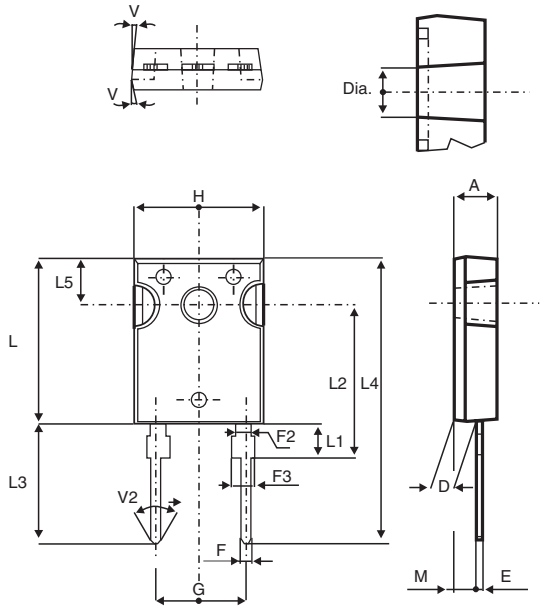
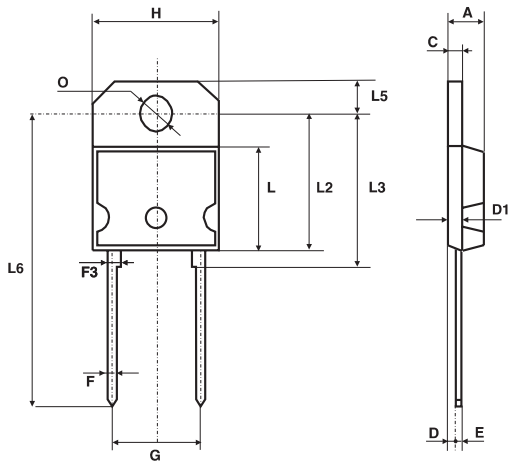


**Figure 15: DO-247 Package Mechanical Data**



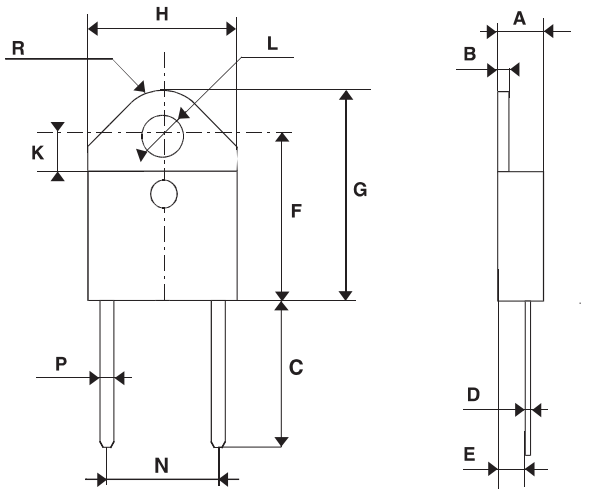

| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.85 | | 5.15 | 0.191 | | 0.203 |
| D | 2.20 | | 2.60 | 0.086 | | 0.102 |
| E | 0.40 | | 0.80 | 0.015 | | 0.031 |
| F | 1.00 | | 1.40 | 0.039 | | 0.055 |
| 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 |

**Figure 16: SOD-93 Package Mechanical Data**



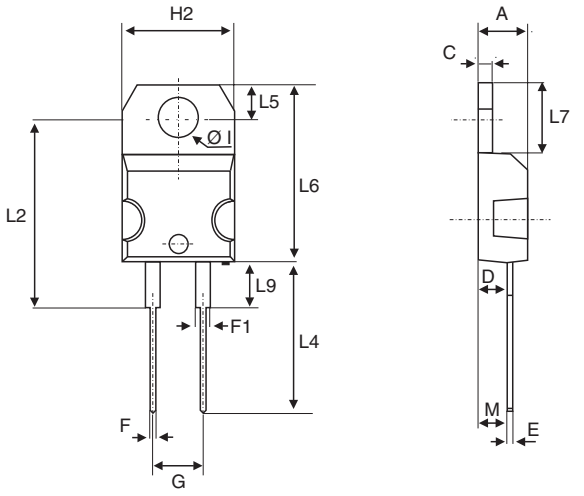

| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.70 | 4.90 | 0.185 | 0.193 |
| C | 1.17 | 1.37 | 0.046 | 0.054 |
| D | 2.50 Typ. | | 0.098 Typ. | |
| D1 | 1.27 Typ. | | 0.050 Typ. | |
| E | 0.50 | 0.78 | 0.020 | 0.031 |
| F | 1.10 | 1.30 | 0.043 | 0.051 |
| F3 | 1.75 Typ. | | 0.069 Typ | |
| G | 10.80 | 11.10 | 0.425 | 0.437 |
| H | 14.70 | 15.20 | 0.578 | 0.598 |
| L | | 12.20 | | 0.480 |
| L2 | | 16.20 | | 0.638 |
| L3 | 18.0 Typ | | 0.709 Typ. | |
| L5 | 3.95 | 4.15 | 0.156 | 0.163 |
| L6 | 31.00 Typ. | | 1.220 Typ. | |
| O | 4.00 | 4.10 | 0.157 | 0.161 |

**Figure 17: SOD-93 Package Mechanical Data**




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 1.45 | 1.55 | 0.057 | 0.061 |
| C | 14.35 | 15.60 | 0.565 | 0.614 |
| D | 0.5 | 0.7 | 0.020 | 0.028 |
| E | 2.7 | 2.9 | 0.106 | 0.114 |
| F | 15.8 | 16.5 | 0.622 | 0.650 |
| G | 20.4 | 21.1 | 0.815 | 0.831 |
| H | 15.1 | 15.5 | 0.594 | 0.610 |
| K | 3.4 | 3.65 | 0.134 | 0.144 |
| L | 4.08 | 4.17 | 0.161 | 0.164 |
| N | 10.8 | 11.3 | 0.425 | 0.444 |
| P | 1.20 | 1.40 | 0.047 | 0.055 |
| R | 4.60 typ. | | 0.181 typ. | |

**Figure 18: TO-220AC Package Mechanical Data**




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| H2 | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.40 typ. | | 0.645 typ. | |
| L4 | 13.00 | 14.00 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Diam. I | 3.75 | 3.85 | 0.147 | 0.151 |

**Table 7: Ordering Information**

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STTH30L06D | STTH30L06D | TO-220AC | 1.90 g | 50 | Tube |
| STTH30L06G | STTH30L06G | $D^2PAK$ | 1.48 g | 50 | Tube |
| STTH30L06G-TR | STTH30L06G | $D^2PAK$ | 1.48 g | 1000 | Tape & reel |
| STTH30L06W | STTH30L06W | DO-247 | 4.40 g | 30 | Tube |
| STTH30L06P | STTH30L06P | SOD-93 | 3.79 g | 30 | Tube |
| STTH30L06P | STTH30L06P | DOP3I | 4.46 g | 30 | Tube |

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N. (TO-220FPAC) / 0.55 m.N. (TO-220AC)
- Maximum torque value: 1.0 m.N. (TO-220FPAC) / 0.70 m.N. (TO-220AC)

**Table 8: Revision History**

| Date | Revision | Description of Changes |
|---|---|---|
| 07-Sep-2004 | 1 | First issue. |
| 21-Oct-2004 | 2 | DOP3I package added. |
| 11-Jan-06 | 3 | Table 3 on page 2:<br>. $I_{F(RMS)}$ corrected from 30A to 50A<br>. $I_{F(AV)}$ corrected from 50A to 30A |

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