

Turbo 2 ultrafast high voltage rectifier

Main product characteristics

| | |
|----------------|-------------|
| $I_{F(AV)}$ | 8 A |
| V_{RRM} | 600 V |
| I_R (max) | 200 μ A |
| T_j | 175° C |
| V_F (typ) | 0.85 V |
| t_{rr} (typ) | 75 ns |

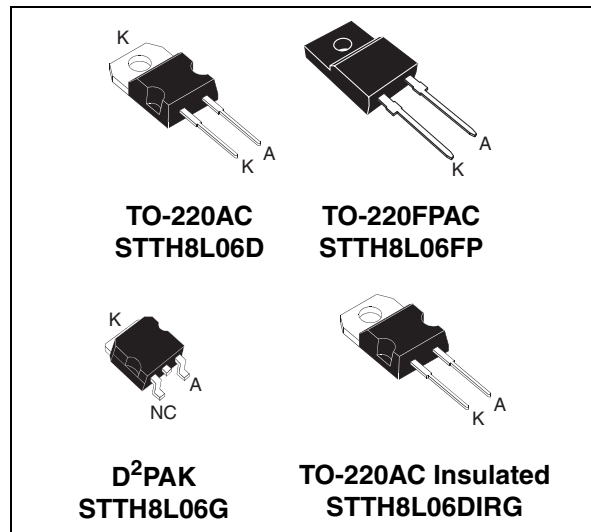
Features and benefits

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching and conduction losses
- Package insulation voltage:
TO-220AC Ins: 2500 V_{RMS}
TO-220FPAC: 2000 V_{DC}

Description

The STTH8L06, which is using ST Turbo2 600V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.



Order codes

| Part Number | Marking |
|--------------|------------|
| STTH8L06D | STTH8L06D |
| STTH8L06FP | STTH8L06FP |
| STTH8L06G | STTH8L06G |
| STTH8L06G-TR | STTH8L06G |
| STTH8L06DIRG | STTH8L06DI |

Table 1. Absolute ratings (limiting values)

| Symbol | Parameter | | Value | Unit | |
|--------------|---|--|------------|------|---------------------|
| V_{RRM} | Repetitive peak reverse voltage | | 600 | V | |
| $I_{F(RMS)}$ | RMS forward current | TO-220AC / TO-220FPAC / D ² PAK | 30 | A | |
| | | TO-220AC Ins. | 24 | | |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | TO-220AC / D ² PAK | 8 | A | |
| | | TO-220FPAC | | | $T_c = 125^\circ$ C |
| | | TO-220AC Ins. | | | $T_c = 135^\circ$ C |
| I_{FSM} | Surge non repetitive forward current | | 120 | A | |
| T_{stg} | Storage temperature range | | -65 to 175 | °C | |
| T_j | Operating junction temperature range | | -40 to 175 | °C | |

1 Characteristics

Table 2. Thermal resistance

| Symbol | Parameter | | Value (max) | Unit |
|---------------|------------------|---------------------------------|-------------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AC / D ² PAK / | 2.5 | °C/W |
| | | TO-220FPAC | 5 | |
| | | TO-220AC Ins. | 4 | |

Table 3. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min | Typ | Max | Unit |
|--------|-------------------------|---------------------------|--------------------|-----|------|------|---------------|
| I_R | Reverse leakage current | $T_j = 25^\circ\text{C}$ | $V_R = V_{RRM}$ | | | 8 | μA |
| | | $T_j = 150^\circ\text{C}$ | | | 16 | 200 | |
| V_F | Forward voltage drop | $T_j = 25^\circ\text{C}$ | $I_F = 8\text{ A}$ | | | 1.3 | V |
| | | $T_j = 150^\circ\text{C}$ | | | 0.85 | 1.05 | |

To evaluate the conduction losses use the following equation: $P = 0.89 \times I_{F(AV)} + 0.022 I_{F(RMS)}^2$

Table 4. Dynamic characteristics

| Symbol | Parameter | Test conditions | | Min | Typ | Max | Unit |
|----------|--------------------------|--------------------------|--|-----|-----|-----|------|
| t_{rr} | Reverse recovery time | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{ A}, dI_F/dt = -50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$ | | 75 | 105 | ns |
| t_{fr} | Forward recovery time | $T_j = 25^\circ\text{C}$ | $I_F = 8\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ | | | 150 | ns |
| V_{FP} | Forward recovery voltage | | $I_F = 8\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$ | | | 6 | V |

Figure 1. Conduction losses versus average current

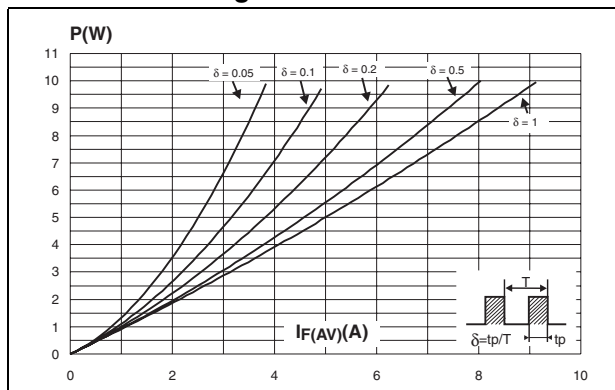


Figure 2. Forward voltage drop versus forward current

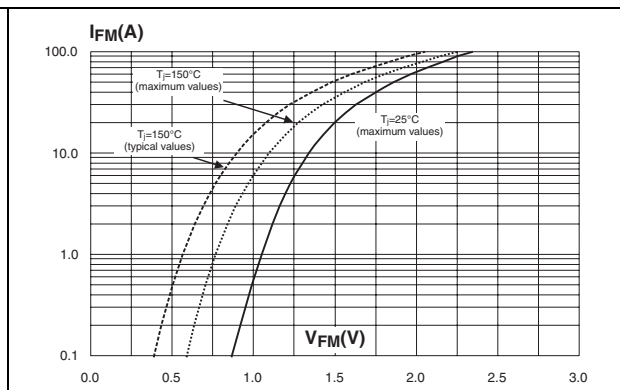


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

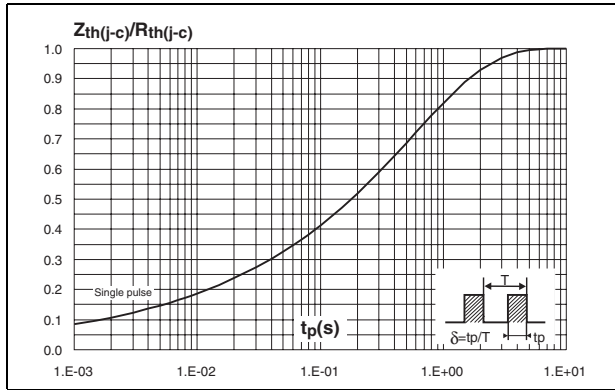


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, TO-220AC Ins, D²PAK)

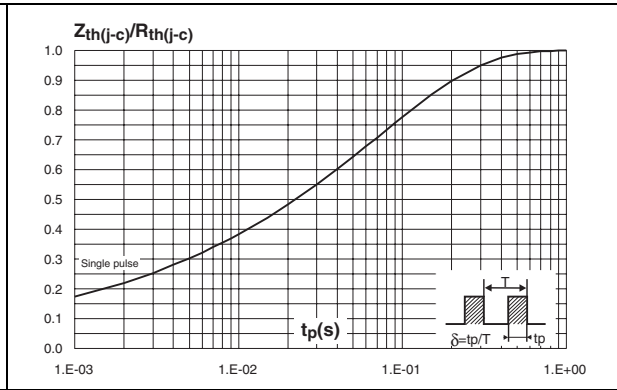


Figure 5. Peak reverse recovery current versus di_F/dt (typical values)

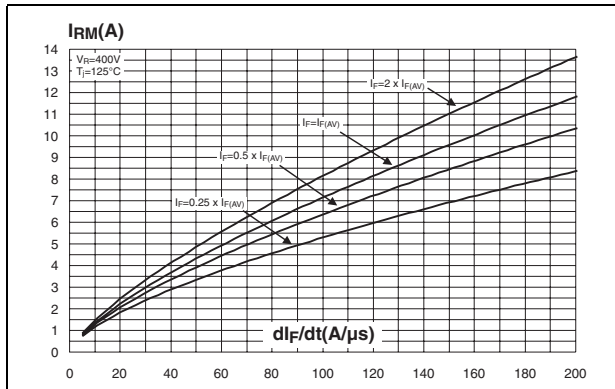


Figure 6. Reverse recovery time versus di_F/dt (typical values)

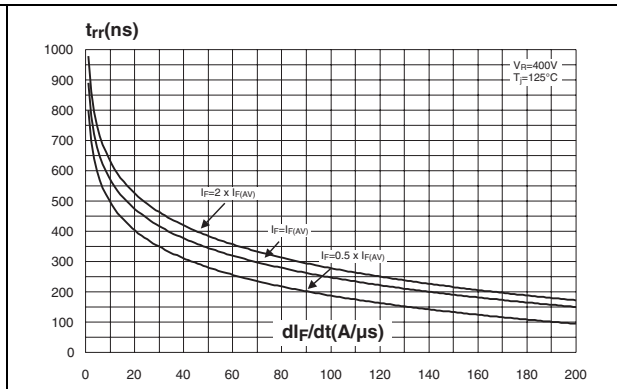


Figure 7. Reverse recovery charges versus di_F/dt (typical values)

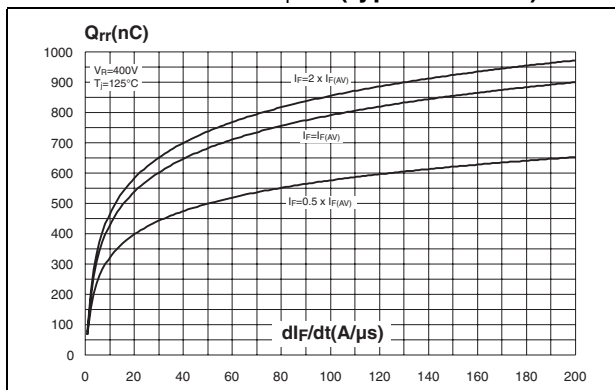


Figure 8. Softness factor versus di_F/dt (typical values)

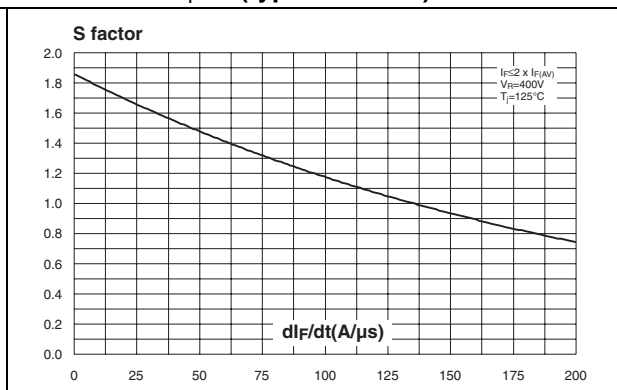


Figure 9. Relative variations of dynamic parameters versus junction temperature

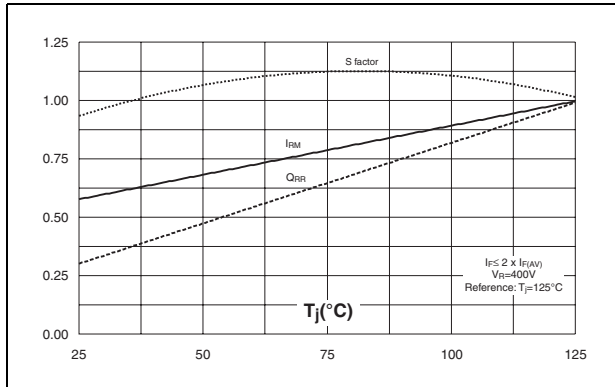


Figure 10. Transient peak forward voltage versus di_F/dt (typical values)

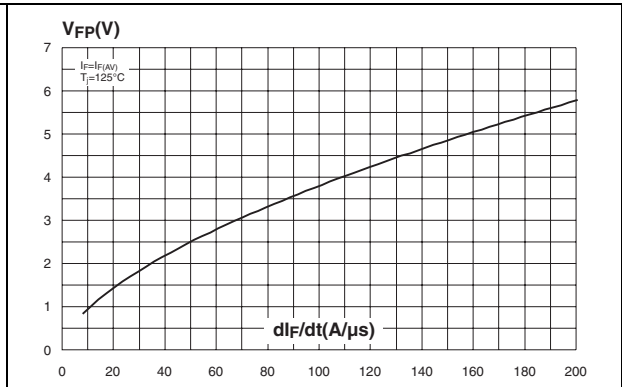


Figure 11. Forward recovery time versus di_F/dt (typical values)

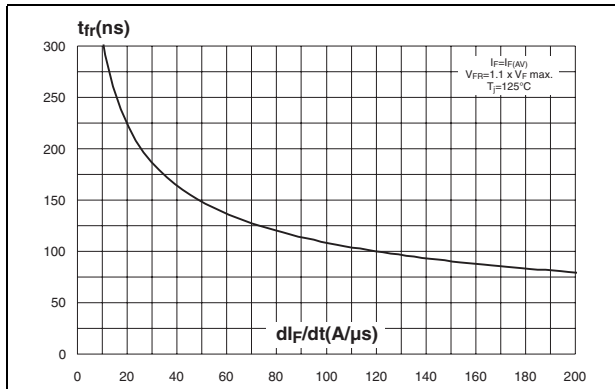


Figure 12. Junction capacitance versus reverse voltage applied (typical values)

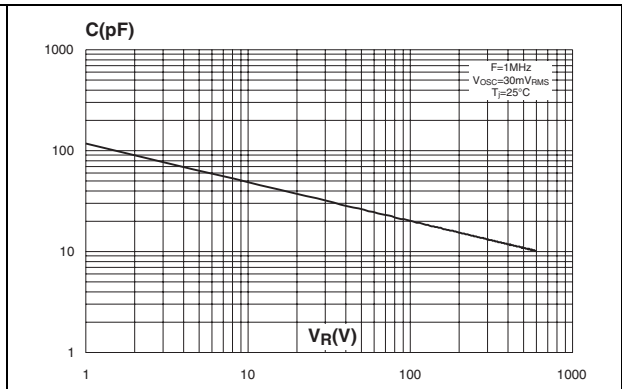
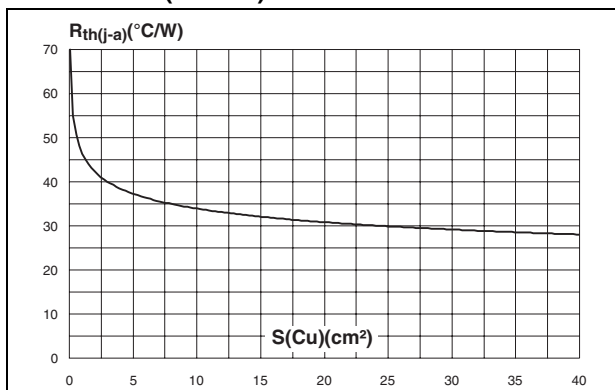


Figure 13. Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, $e_{Cu} = 35 \mu m$) (D²PAK)



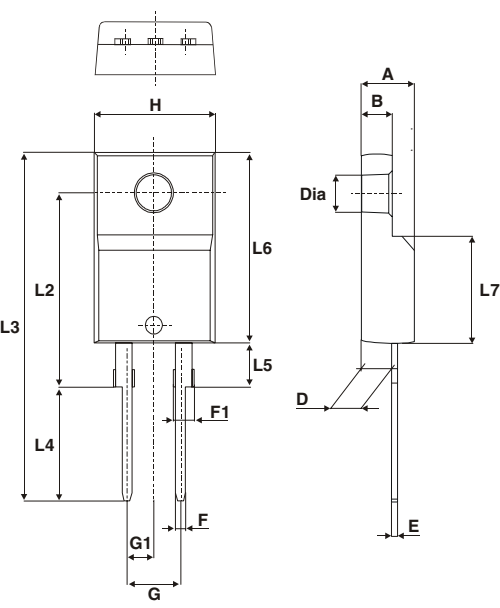
2 Package information

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

Table 5. TO-220AC dimensions

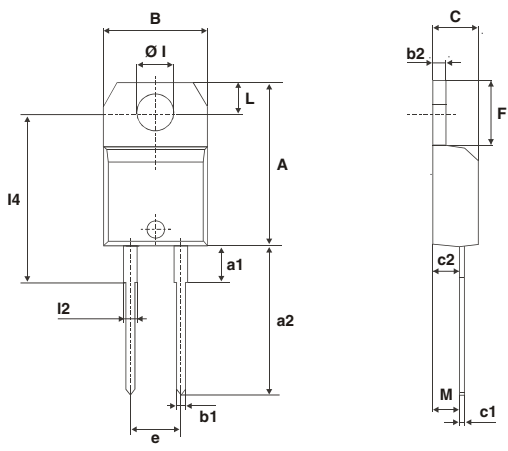
| Ref. | Dimensions | | | |
|---------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 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 6. TO-220FPAC Dimensions



| Ref. | Dimensions | | | |
|------|-------------|------|-----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

Table 7. TO-220AC (Nlns. & Ins. 20-up) Dimensions

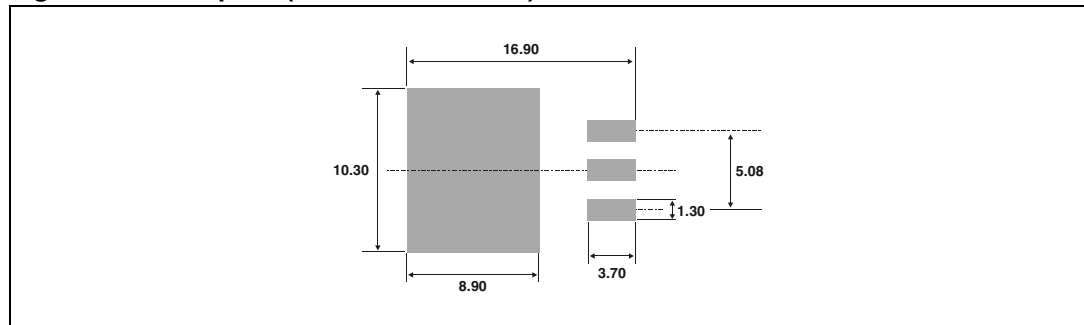


| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 15.20 | | 15.90 | 0.598 | | 0.625 |
| a1 | | 3.75 | | | 0.147 | |
| a2 | 13.00 | | 14.00 | 0.511 | | 0.551 |
| B | 10.00 | | 10.40 | 0.393 | | 0.409 |
| b1 | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b2 | 1.23 | | 1.32 | 0.048 | | 0.051 |
| C | 4.40 | | 4.60 | 0.173 | | 0.181 |
| c1 | 0.49 | | 0.70 | 0.019 | | 0.027 |
| c2 | 2.40 | | 2.72 | 0.094 | | 0.107 |
| e | 4.80 | | 5.40 | 0.189 | | 0.212 |
| F | 6.20 | | 6.60 | 0.244 | | 0.259 |
| ØI | 3.75 | | 3.85 | 0.147 | | 0.151 |
| I4 | 15.80 | 16.40 | 16.80 | 0.622 | 0.646 | 0.661 |
| L | 2.65 | | 2.95 | 0.104 | | 0.116 |
| I2 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| M | | 2.60 | | | 0.102 | |

Table 8. 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 14. Footprint (dimensions in mm)



3 Ordering information

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|------------|--------------------|--------|----------|---------------|
| STTH8L06D | STTH8L06D | TO-220AC | 1.90 g | 50 | Tube |
| STTH8L06G | STTH8L06G | D ² PAK | 1.48 g | 50 | Tube |
| STTH8L066G-TR | STTH8L06G | D ² PAK | 1.48 g | 1000 | Tape and reel |
| STTH8L06FP | STTH8L06FP | TO-220FPAC | 1.70 g | 50 | Tube |
| STTH8L06DIRG | STTH8L06DI | TO-220AC Ins. | 1.86 g | 50 | Tube |

4 Revision history

| Date | Revision | Changes |
|-------------|----------|--|
| Nov-2002 | 2A | Last issue |
| 18-Oct-2004 | 3 | TO-220AC Insulated and D ² PAK packages added |
| 13-Jun-2005 | 4 | T _j changed from value 175 to range -40 to 175° C - Page1 |
| 10-Aug-2006 | 5 | Reformatted to current standard. Added package insulation voltage data on page 1. Changed order code STTH8L06DI to STTH8L06DIRG. |

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