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STTH4L06

Turbo 2 ultrafast high voltage rectifier

Features

- Ultrafast switching
- Low forward voltage drop
- Low leakage current (platinum doping)
- High operating junction temperature

Description

The STTH4L06, which uses ST Turbo 2 600 V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

Packaged in DO-201AD and DO-15, this device is intended for use as a free wheeling diode in power supplies and other power switching applications.

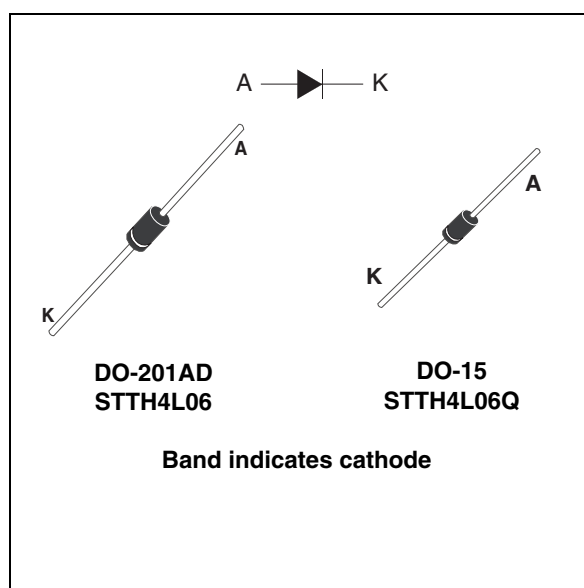


Table 1. Device summary

| | |
|----------------|--------|
| $I_{F(AV)}$ | 4 A |
| V_{RRM} | 600 V |
| T_j | 175 °C |
| V_F (typ) | 0.9 V |
| t_{rr} (typ) | 40 ns |

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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 | | 10 | A |
| $I_{F(AV)}$ | Average forward current | | 4 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 8.3$ ms sinusoidal | 80 | A |
| T_{stg} | Storage temperature range | | -65 to + 175 | °C |
| T_j | Maximum operating junction temperature | | 175 | °C |

Table 3. Thermal resistance

| Symbol | Parameter | | Maximum | Unit | |
|---------------|---------------------|-------------------------|----------|------|------|
| $R_{th(j-l)}$ | Junction to lead | Terminal length = 10 mm | DO-15 | 25 | °C/W |
| | | | DO-201AD | 20 | |
| $R_{th(j-a)}$ | Junction to ambient | | DO-15 | 80 | °C/W |
| | | | DO-201AD | 75 | |

Table 4. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------|-----------------|------|------|------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25$ °C | $V_R = V_{RRM}$ | - | - | 3 | µA |
| | | $T_j = 150$ °C | | - | 15 | 100 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25$ °C | $I_F = 3$ A | - | - | 1.30 | V |
| | | $T_j = 150$ °C | | - | 0.85 | 1.05 | |
| | | $T_j = 150$ °C | $I_F = 4$ A | - | 0.90 | 1.10 | |

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

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

To evaluate the maximum conduction losses use the following equation:

$$P = 0.92 \times I_{F(AV)} + 0.045 \times I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|----------|--------------------------|----------------------------------------------------------------------|------------------------------------------------------|------|-----|------|------|
| t_{rr} | Reverse recovery time | $dI_F/dt = -50$ A/µs | $I_F = 1$ A, $V_R = 30$ V | - | 55 | 75 | ns |
| | | $dI_F/dt = -100$ A/µs | | - | 40 | 55 | |
| I_{RM} | Reverse recovery current | $T_j = 25$ °C | $I_F = 4$ A, $V_R = 400$ V, $dI_F/dt = -100$ A/µs | - | 3 | 4 | A |
| | | $T_j = 150$ °C | | - | 5 | 6.5 | |
| t_{fr} | Forward recovery time | $I_F = 4$ A, $dI_F/dt = 100$ A/µs, $V_{FR} = 1.1 \times V_{Fmax}$ | | - | - | 130 | ns |
| V_{FP} | Forward recovery voltage | $I_F = 4$ A, $dI_F/dt = 100$ A/µs | | - | - | 7.5 | V |

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Figure 1. Conduction losses versus average current

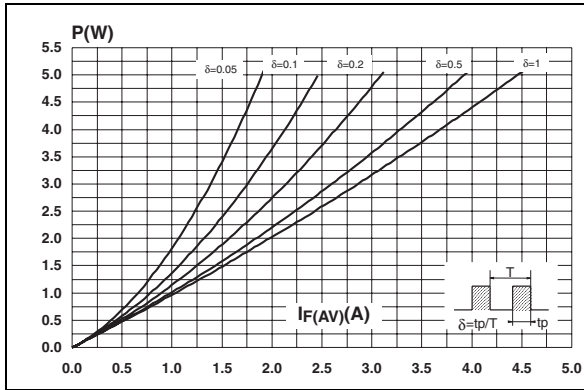


Figure 2. Forward voltage drop versus forward current

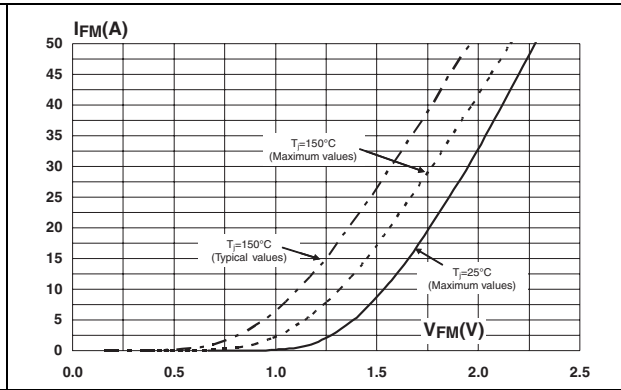


Figure 3. Relative variation of thermal impedance junction ambient versus pulse duration (DO-201AD)

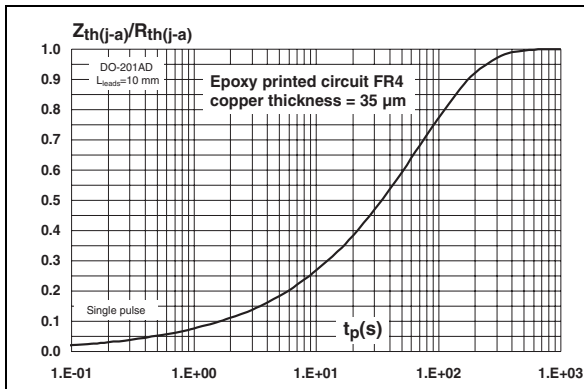


Figure 4. Relative variation of thermal impedance junction ambient versus pulse duration (DO-15)

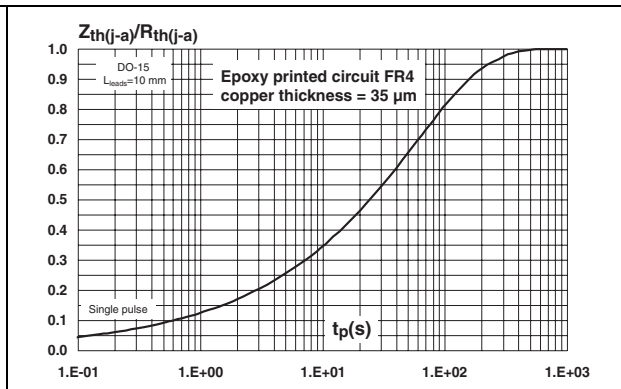


Figure 5. Peak reverse recovery current versus diF/dt (typical values)

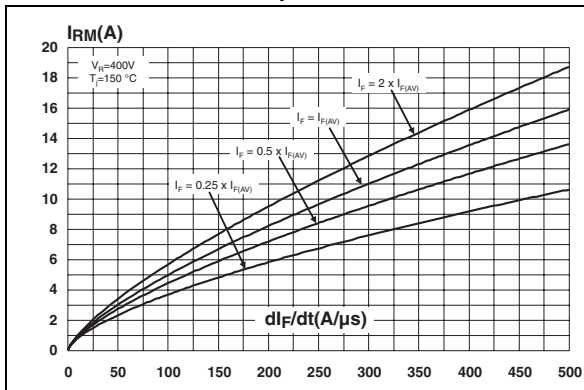
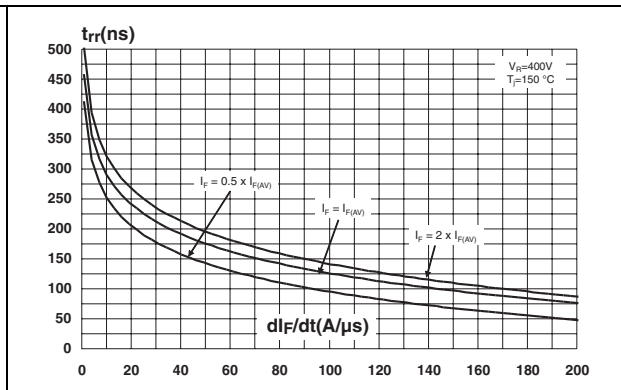


Figure 6. Reverse recovery time versus diF/dt (typical values)



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

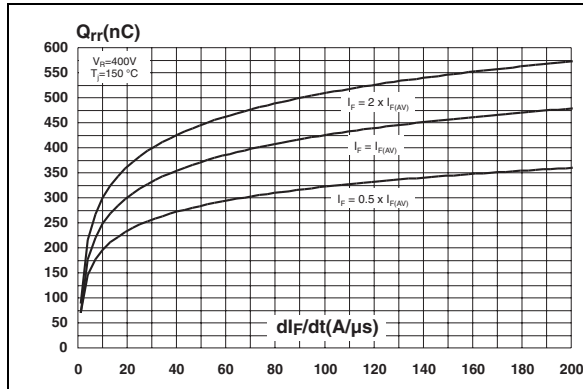


Figure 8. Relative variations of dynamic parameters versus junction temperature

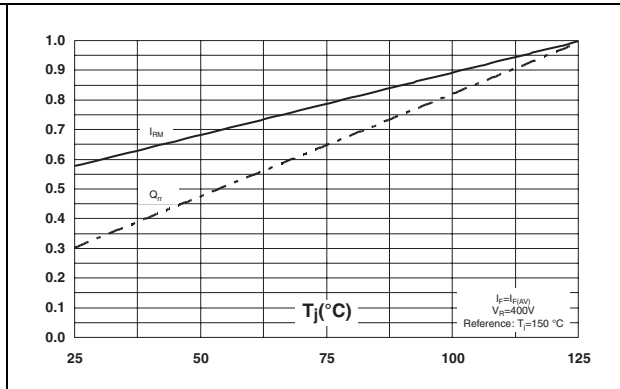


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

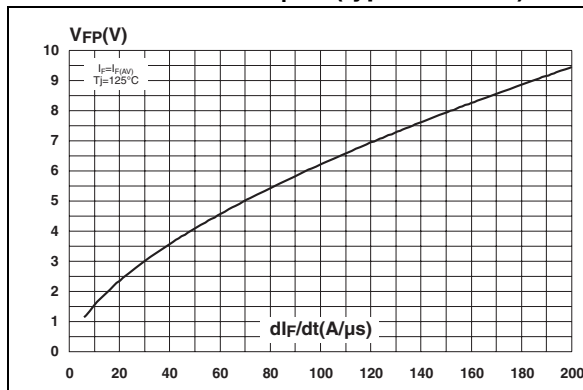


Figure 10. Forward recovery time versus di_F/dt (typical values)

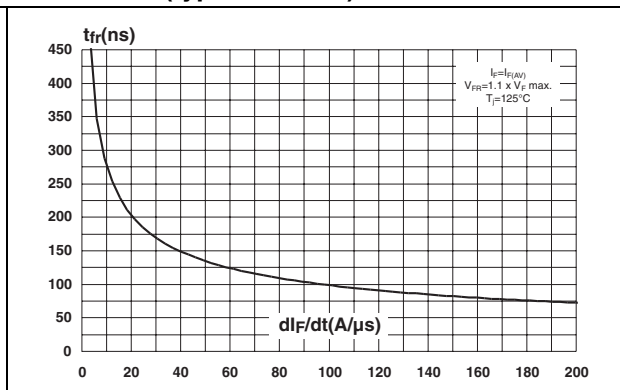


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

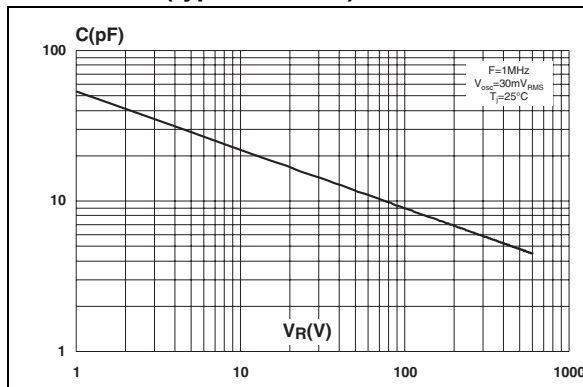
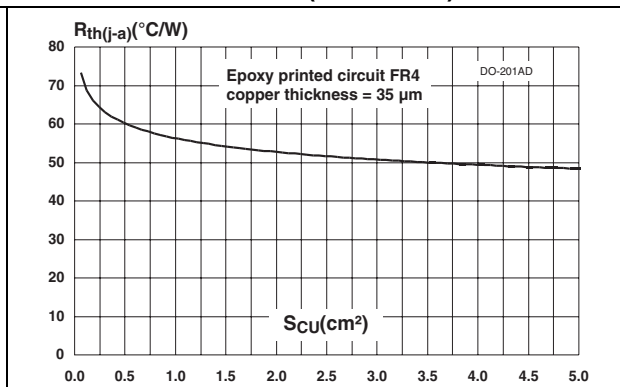


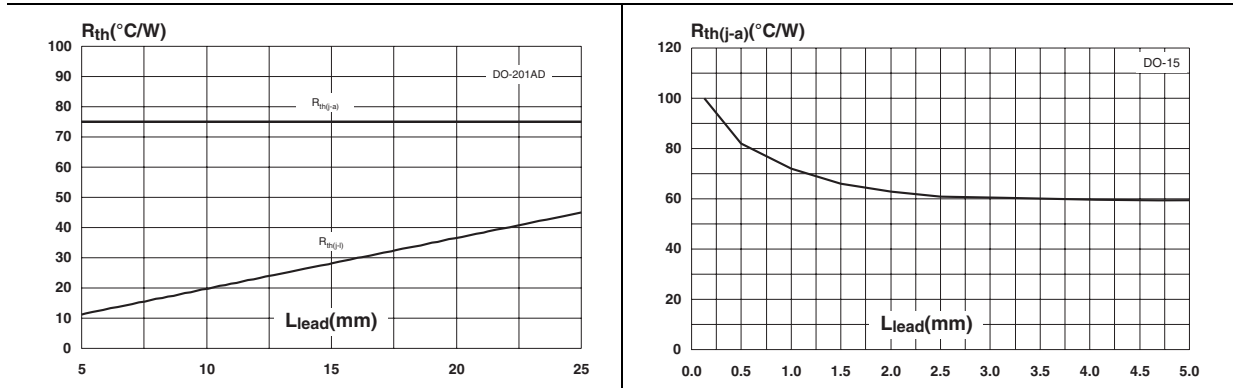
Figure 12. Thermal resistance junction to ambient versus copper surface under lead (DO-201AD)



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Figure 13. Thermal resistance versus lead length (DO-201AD) Figure 14. Thermal resistance versus lead length (DO-15)



2 Package information

- Epoxy meets UL94, V0
- Band indicates cathode
- Bending method: see application note AN1471

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Table 6. DO-15 dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 6.05 | 6.75 | 0.238 | 0.266 |
| B | 2.95 | 3.53 | 0.116 | 0.139 |
| C | 26 | 31 | 1.024 | 1.220 |
| D | 0.71 | 0.88 | 0.028 | 0.035 |

Table 7. DO-201AD dimensions

| Ref. | Dimensions | | | |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | | 9.50 | | 0.374 |
| B | 25.40 | | 1.000 | |
| C | | 5.30 | | 0.209 |
| D | | 1.30 | | 0.051 |
| E | | 1.25 | | 0.049 |
| Notes | 1 - The lead diameter $\varnothing D$ is not controlled over zone E 2 - The minimum length which must stay straight between the right angles after bending is 0.59" (15mm) | | | |

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Ordering information

3 Ordering information

Table 8. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-------------|----------|----------|--------|----------|---------------|
| STTH4L06 | STTH4L06 | DO-201AD | 1.16 g | 600 | Ammopack |
| STTH4L06RL | STTH4L06 | DO-201AD | 1.16 g | 1900 | Tape and reel |
| STTH4L06Q | STTHL06Q | DO-15 | 0.4 g | 600 | Ammopack |
| STTH4L06QRL | STTHL06Q | DO-15 | 0.4 g | 1900 | Tape and reel |

4 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|-------------|
| 22-Sep-2009 | 1 | First issue |

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