

Features

- Very low switching losses
- High frequency and high pulse current operation
- Low thermal resistance
- High junction temperature
- ECOPACK[®]2 compliant component

Description

The STTH4R06 series uses ST's new 600 V planar Pt doping technology. The STTH4R06 is specially suited for switching mode base drive and transistor circuits.

Packaged in PowerFLAT[™], this device is intended for use in low profile applications.

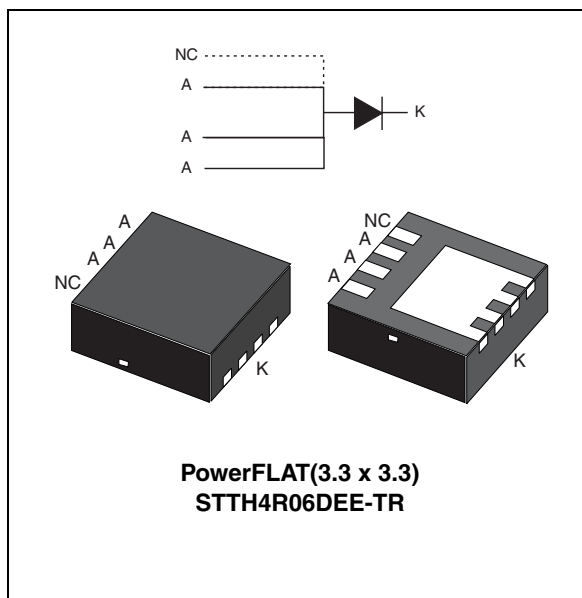


Table 1. Device summary

| Symbol | Value |
|----------------|--------|
| $I_{F(AV)}$ | 4 A |
| V_{RRM} | 600 V |
| T_j (max) | 150 °C |
| V_F (typ) | 1.0 V |
| T_{RR} (typ) | 30 ns |

TM: PowerFLAT is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute ratings (limiting values $T_{amb} = 25\text{ °C}$ unless otherwise specified)

| Symbol | Parameter | | Value | Unit |
|--------------|--|-------------------------------------|-------------|------|
| V_{RRM} | Repetitive peak reverse voltage | | 600 | V |
| $I_{F(RMS)}$ | Forward rms current | | 15 | A |
| $I_{F(AV)}$ | Average forward current | $T_c = 120\text{ °C}, \delta = 0.5$ | 4 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 60 | A |
| T_{stg} | Storage temperature range | | -65 to +150 | °C |
| T_j | Maximum operating junction temperature | | 150 | °C |

Table 3. Thermal resistance

| Symbol | Parameter | Value | Unit |
|---------------|---|-------|------|
| $R_{th(j-c)}$ | Junction to case | 4.5 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit board (with recommended footprint, copper thickness = 35 μm) | 250 | °C/W |

Table 4. Static electrical characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit | |
|-------------|-------------------------|-----------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 3 | μA |
| | | $T_j = 125\text{ °C}$ | | - | 3 | 30 | μA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 4\text{ A}$ | | 1.30 | 1.70 | V |
| | | $T_j = 150\text{ °C}$ | | - | 1.0 | 1.25 | |

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

2. Pulse test: $t_p = 380\text{ }\mu\text{s}, \delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1 \times I_{F(AV)} + 0.062 \times I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|-----------------------|--|------|------|------|------|
| I_{RM} | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 4\text{ A}, V_R = 400\text{ V},$ $di_F/dt = -200\text{ A}/\mu\text{s}$ | | 5.5 | 7.5 | A |
| S_{factor} | Softness factor | | | | 2 | | |
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 1\text{ A}, V_R = 30\text{ V},$ $di_F/dt = -50\text{ A}/\mu\text{s}$ | | 35 | 50 | ns |
| | | | | | 30 | 40 | |
| t_{fr} | Forward recovery time | $T_j = 25\text{ °C}$ | $I_F = 4\text{ A}, V_{FR} = 2\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ | | | 100 | ns |
| V_{FP} | Forward recovery voltage | $T_j = 25\text{ °C}$ | | | 3.5 | 5 | V |

Figure 1. Average forward power dissipation versus average forward current

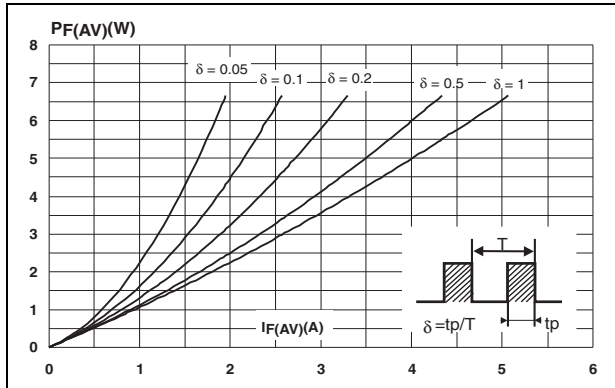


Figure 2. Forward voltage drop versus forward current

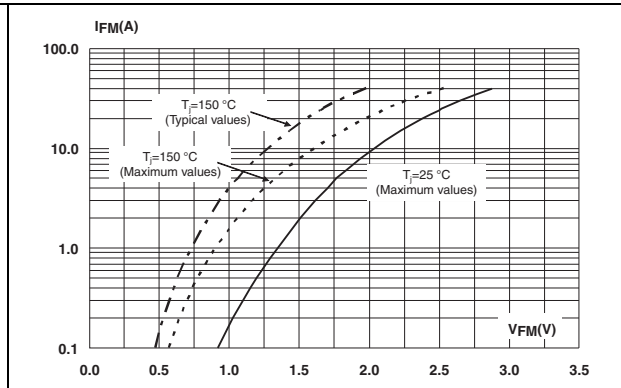


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

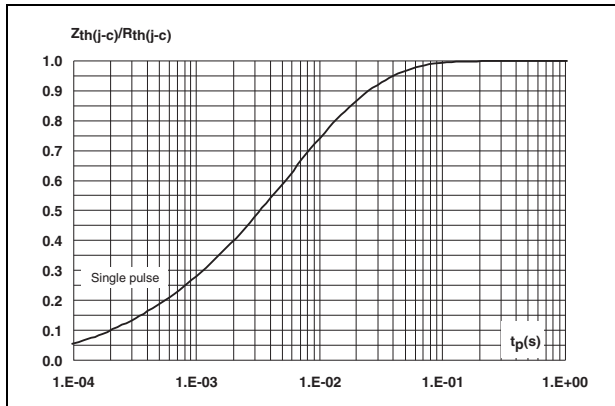


Figure 4. Peak reverse recovery current versus diF/dt (typical values)

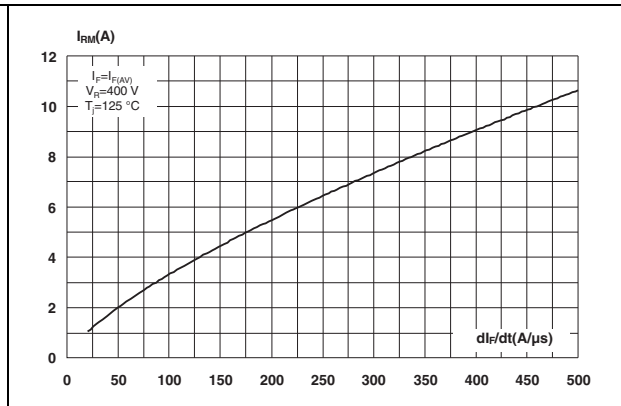


Figure 5. Reverse recovery time versus diF/dt (typical values)

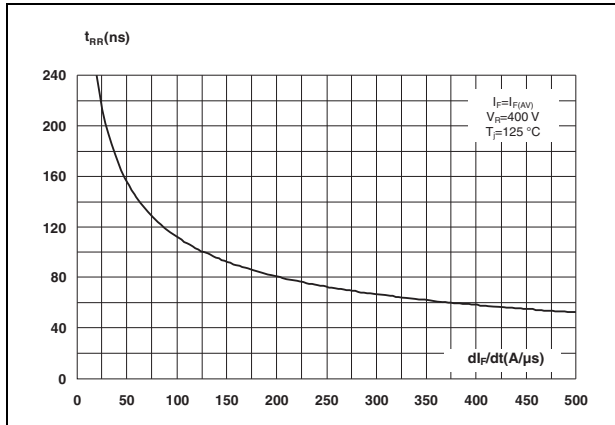


Figure 6. Reverse recovery charges versus diF/dt (typical values)

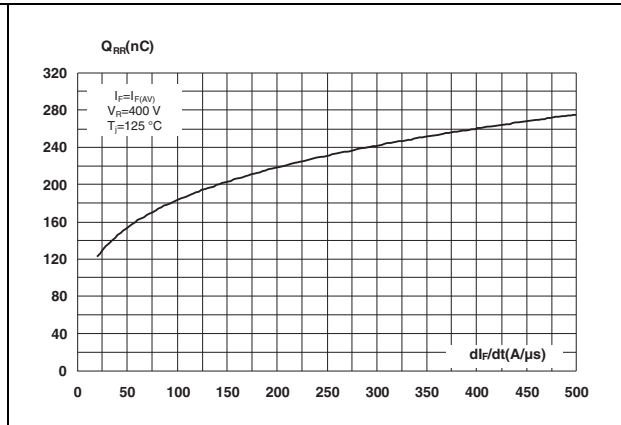


Figure 7. Reverse recovery softness factor versus di_F/dt (typical values)

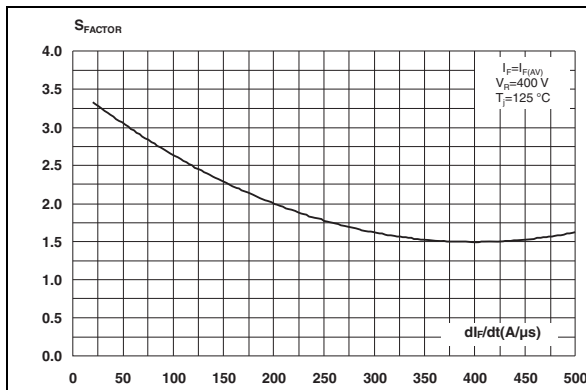


Figure 8. Relative variation of dynamic parameters versus junction temperature

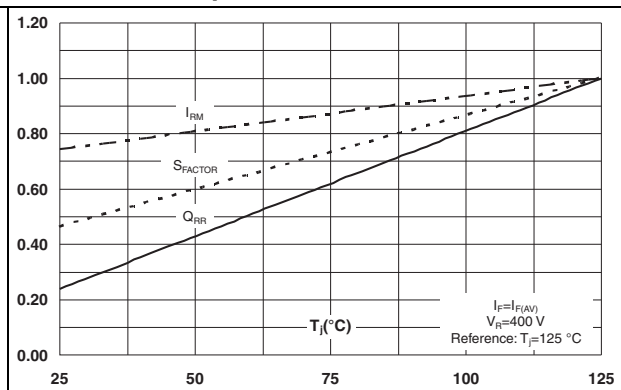


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

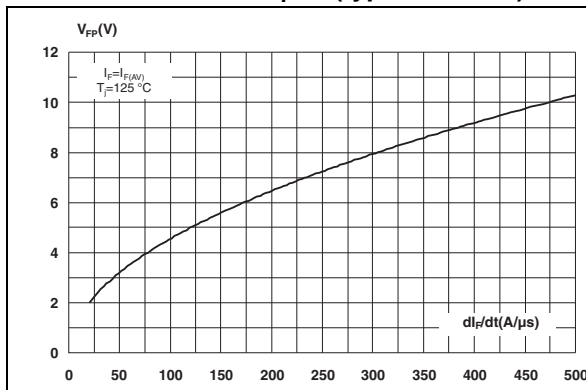


Figure 10. Forward recovery time versus di_F/dt (typical values)

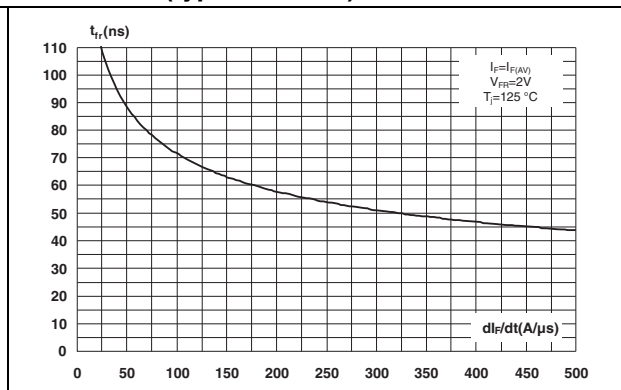


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

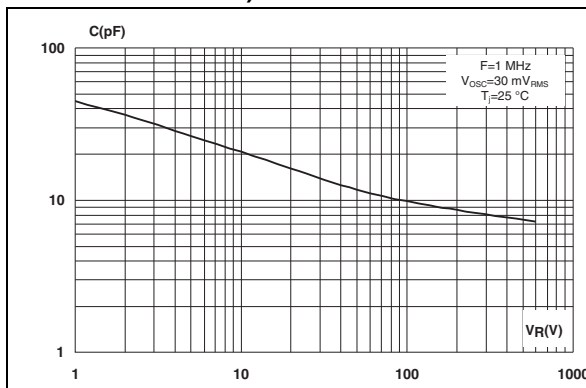
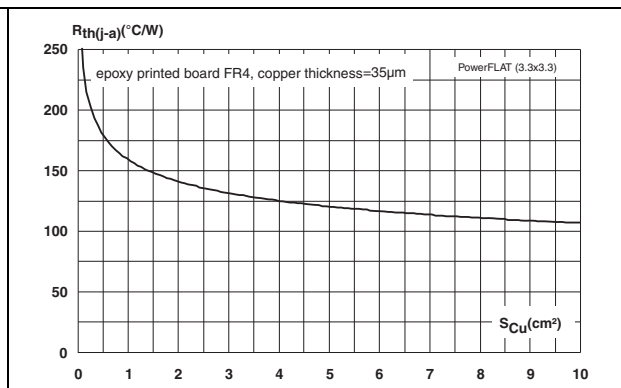


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

- Epoxy meets UL94,V0
- Lead-free package

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.

Figure 13. PowerFLAT (3.3 x 3.3) dimensions (definitions)

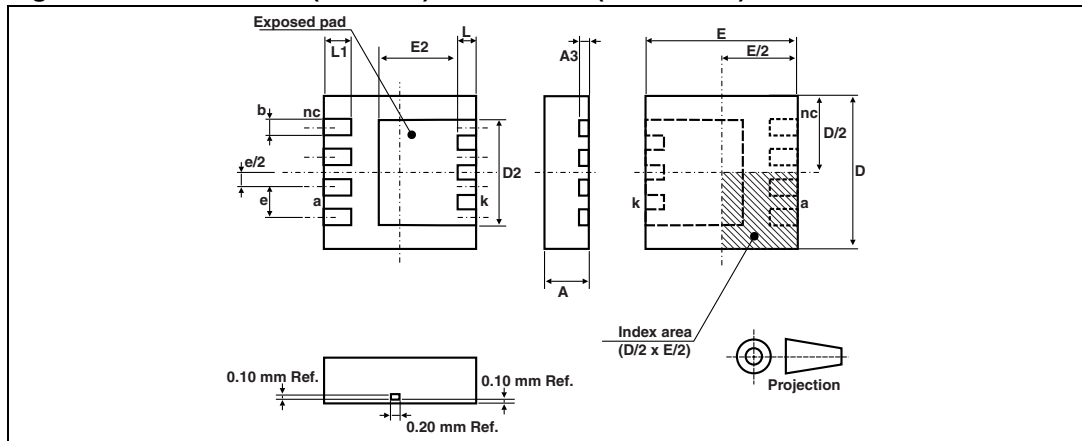
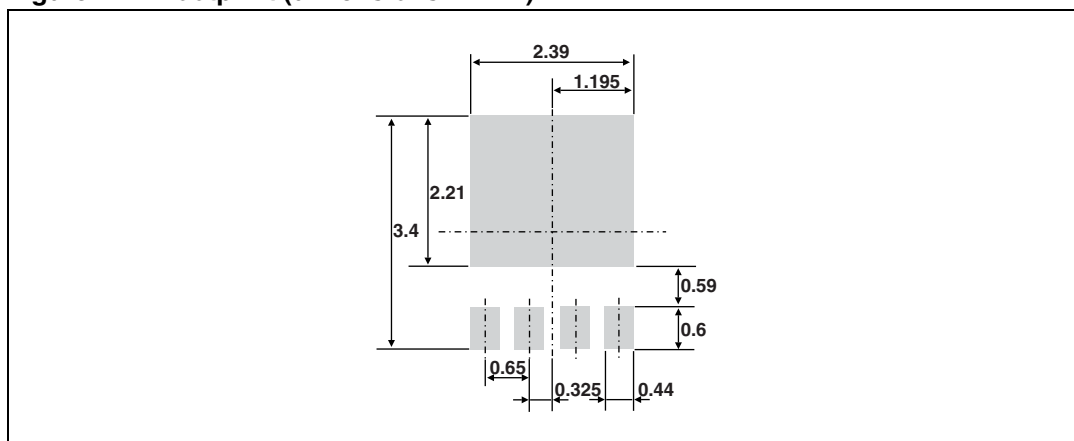


Table 6. PowerFLAT (3.3 x 3.3) dimensions (values)

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.95 | | 1.0 | 0.037 | | 0.039 |
| A3 | | 0.2 | | | 0.008 | |
| b | 0.29 | 0.34 | 0.39 | 0.011 | 0.013 | 0.015 |
| D | 3.20 | 3.30 | 3.40 | 0.126 | 0.130 | 0.134 |
| D2 | 2.24 | 2.29 | 2.34 | 0.088 | 0.090 | 0.092 |
| E | 3.20 | 3.30 | 3.40 | 0.126 | 0.130 | 0.134 |
| E2 | 1.66 | 1.71 | 1.76 | 0.065 | 0.067 | 0.069 |
| e | | 0.65 | | | 0.026 | |
| L | | 0.40 | | | 0.016 | |
| L1 | 0.45 | 0.50 | 0.55 | 0.018 | 0.20 | 0.22 |

Figure 14. Footprint (dimensions in mm)



3 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|---------|--------------------------|--------|----------|---------------------------|
| STTH4R06DEE-TR | TH4R06 | PowerFLAT (3.3 x 3.3) | 34 mg | 3000 | Tape and reel 13" reel |

4 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------|
| 11-Sep-2012 | 1 | First issue. |

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