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STTH5R06DJF

Ultrafast recovery diode high efficiency

Datasheet – production data

Features

- Suited for DC/DC converts
- Low losses
- High T_j
- High surge current capability
- High energy avalanche capability
- 1 mm package thickness
- ECOPACK[®]2 compliant component

Description

High performance diode suited for high frequency DC to DC converters. Packaged in PowerFLAT[™] 5x6, this device is intended for use in low voltage high frequency inverters.

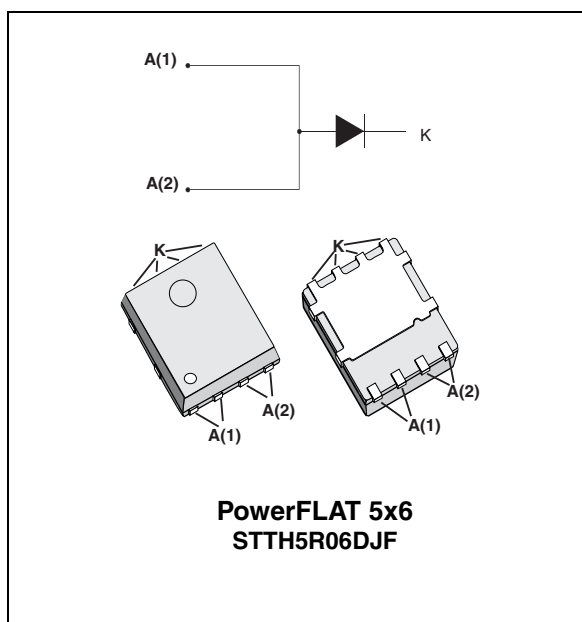


Table 1. Device summary

| Symbol | Value |
|----------------|--------|
| $I_{F(AV)}$ | 5 A |
| V_{RRM} | 600 V |
| T_j | 175 °C |
| V_F (typ) | 0.95 V |
| t_{rr} (typ) | 30 ns |

TM: PowerFLAT is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute ratings (limiting values with anode terminals short-circuited)

| 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 | $T_c = 160\text{ °C}$ $\delta = 0.5$ | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | A |
| T_{stg} | Storage temperature range | -65 to + 175 | °C |
| T_j | Maximum operating junction temperature | 175 | °C |

Table 3. Thermal parameter

| Symbol | Parameter | Maximum | Unit |
|---------------|------------------|---------|------|
| $R_{th(j-c)}$ | Junction to case | 2.0 | °C/W |

Table 4. Static electrical characteristics (anode terminals short-circuited)

| Symbol | Parameter | Test conditions | Min. | Typ | Max. | Unit | |
|-------------|-------------------------|-----------------------|----------------------|------|------|---------------|---|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = 600\text{ V}$ | | 60 | μA | |
| | | $T_j = 125\text{ °C}$ | | 60 | 600 | | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 5\text{ A}$ | | 1.55 | 2.00 | V |
| | | $T_j = 125\text{ °C}$ | | 0.95 | 1.20 | | |

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 maximum conduction losses use the following equation:

$$P = 0.9 \times I_{F(AV)} + 0.06 I_{F(RMS)}^2$$

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Table 5. Recovery characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|--------------|----------------------------------|-----------------------------------|---|------|-----|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 1\text{ A}$ $V_r = 30\text{ V}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ | | 30 | 40 | ns |
| | | | $I_F = 1\text{ A}$ $V_r = 30\text{ V}$ $di_F/dt = -50\text{ A}/\mu\text{s}$ | | 40 | 55 | |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ }^\circ\text{C}$ | $I_F = 5\text{ A}$, $di_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 400\text{ V}$ | | 6.0 | 8.0 | A |
| S_{factor} | Reverse recovery softness factor | | | | 0.5 | | - |
| Q_{rr} | Reverse recovery charges | | | | 180 | | nC |

Table 6. Turn-on switching characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ | Max. | Unit |
|----------|--------------------------|----------------------------------|--|------|-----|------|------|
| t_{fr} | Forward recovery time | $T_j = 25\text{ }^\circ\text{C}$ | $I_F = 5\text{ A}$ $di_F/dt = -100\text{ A}/\mu\text{s}$ $V_{FR} = 1.6\text{ V}$ | | | 150 | ns |
| V_{FP} | Forward recovery voltage | | | | 2.3 | 3.5 | V |

Figure 1. Average forward power dissipation versus average forward current

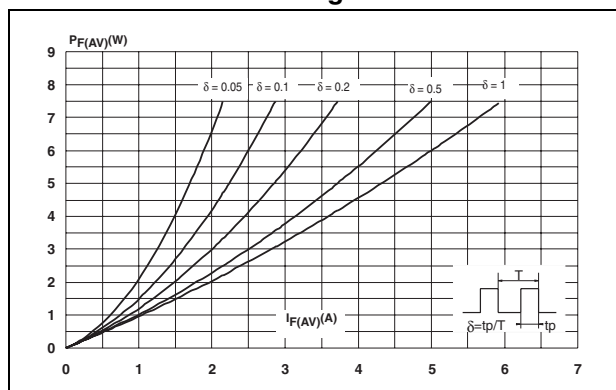
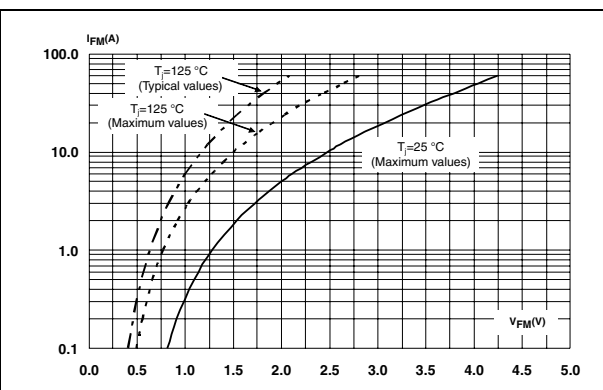


Figure 2. Forward voltage drop versus forward current



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

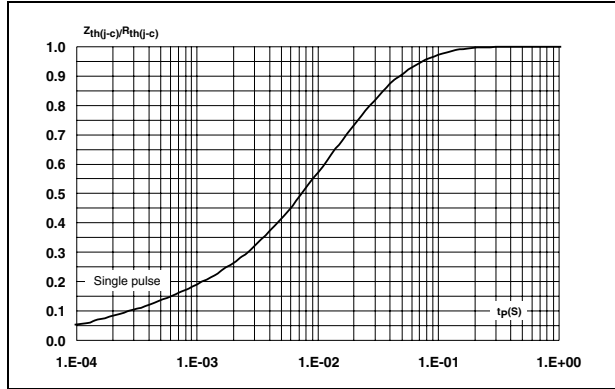


Figure 4. Peak reverse recovery current versus di_F/dt (typical values)

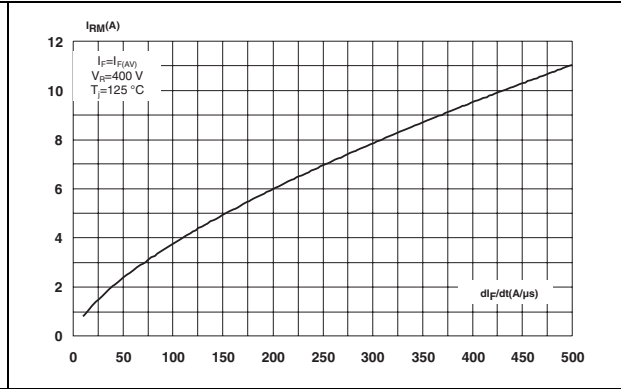


Figure 5. Reverse recovery time versus di_F/dt (typical values)

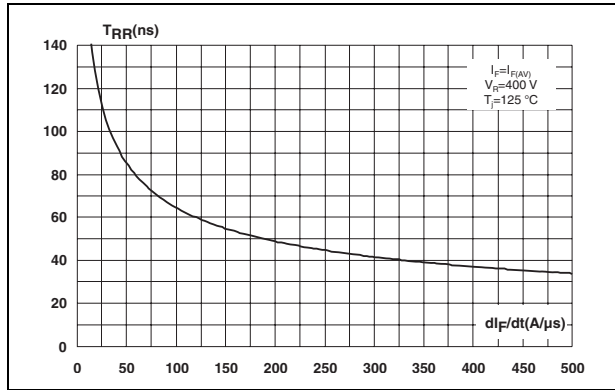


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

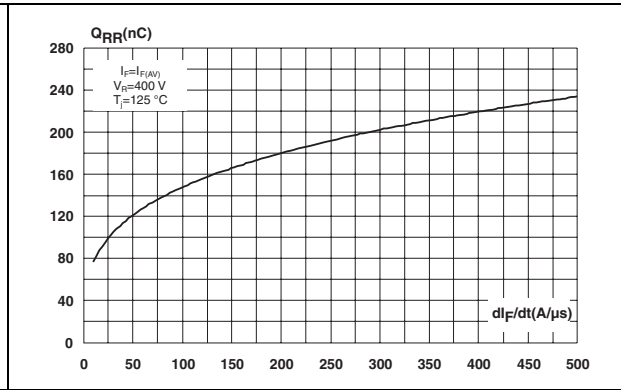


Figure 7. Softness factor versus di_F/dt (typical values)

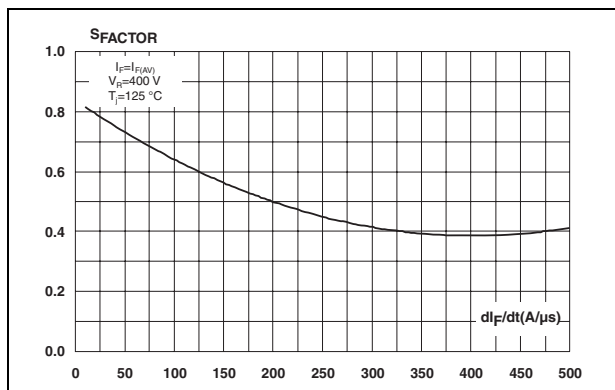
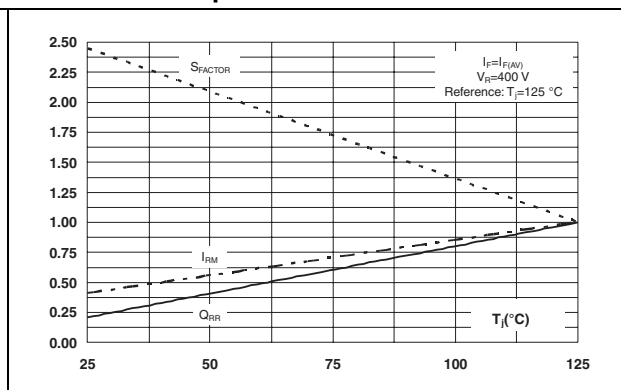


Figure 8. Relative variations of dynamic parameters versus junction temperature



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

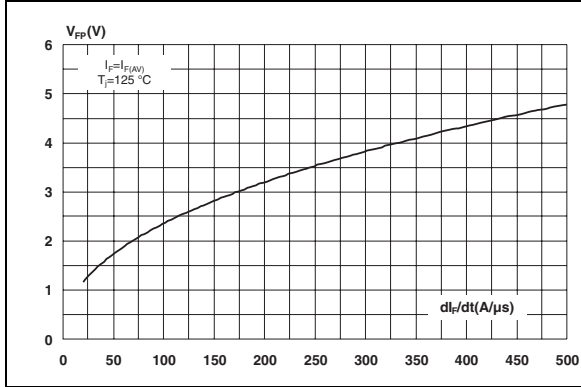


Figure 10. Forward recovery time versus di_F/dt (typical values)

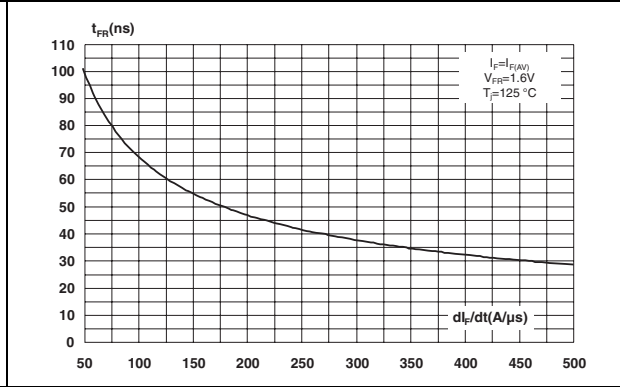


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

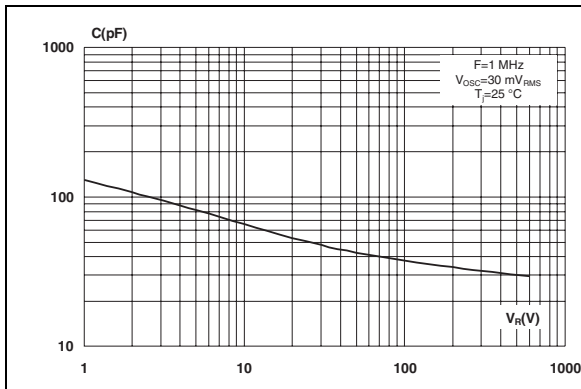
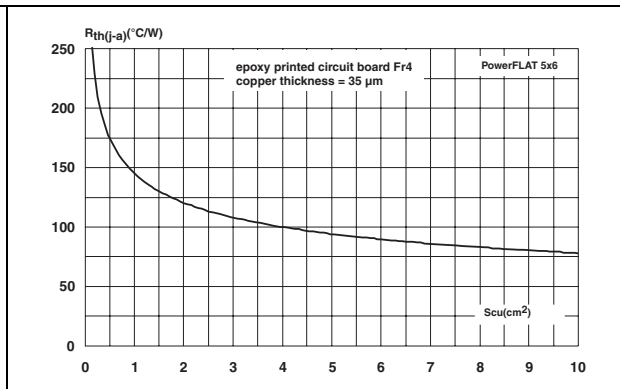


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



Package information

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2 Package information

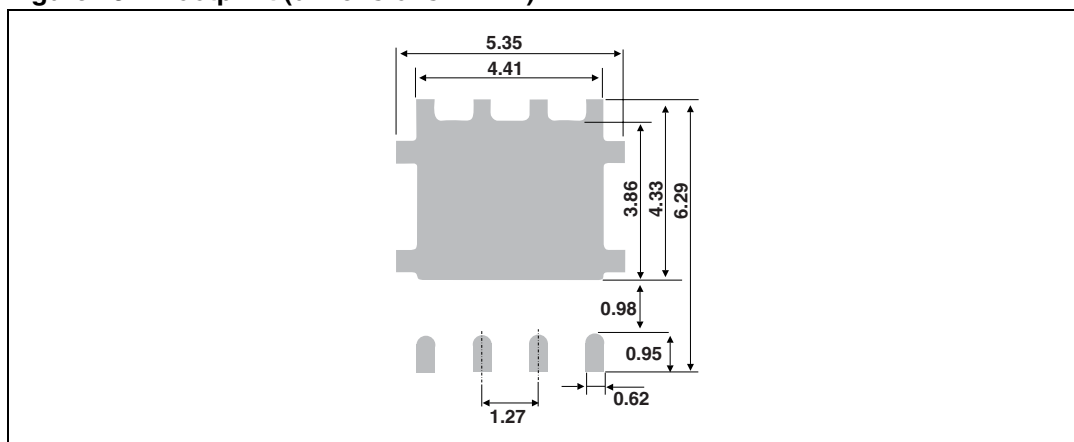
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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.

Table 7. PowerFLAT 5x6 dimensions

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.80 | | 1.00 | 0.031 | | 0.039 |
| A1 | 0.02 | | 0.05 | 0.001 | | 0.002 |
| A2 | | 0.25 | | | 0.010 | |
| b | 0.30 | | 0.50 | 0.012 | | 0.020 |
| D | | 5.20 | | 0.205 | | |
| D2 | 4.11 | | 4.31 | 0.162 | | 0.170 |
| e | | 1.27 | | | 0.050 | |
| E | | 6.15 | | | 0.242 | |
| E2 | 3.50 | | 3.70 | 0.138 | | 0.146 |
| L | 0.50 | | 0.80 | 0.020 | | 0.031 |
| K | 1.275 | | 1.575 | 0.050 | | 0.062 |

Figure 13. Footprint (dimensions in mm)



3 Ordering information

Table 8. Other information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|---------|------------------|---------|----------|---------------|
| STTH5R06DJF-TR | TH5R 06 | PowerFLAT 5x6 | 0.095 g | 3000 | Tape and Reel |

4 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------|
| 16-Mar-2012 | 1 | First issue. |

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