

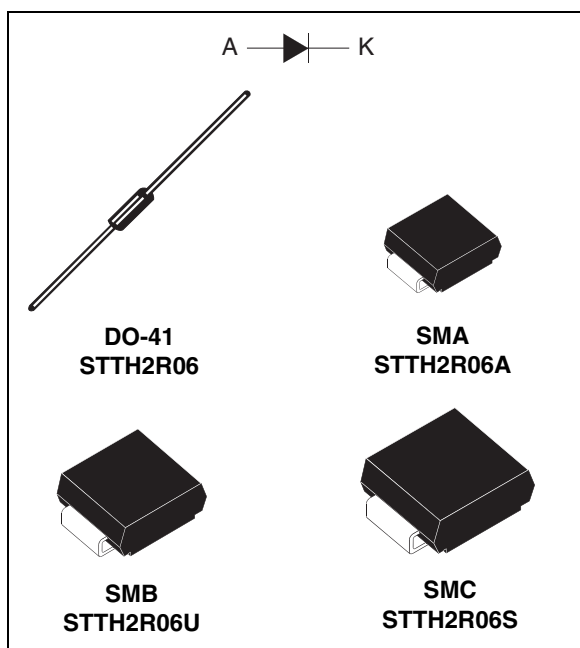
## High efficiency ultrafast diode

### Features

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

### Description

The STTH2R06 uses ST Turbo 2 600 V planar Pt doping technology. It is specially suited for switching mode base drive and transistor circuits. Packaged in axial, SMA, SMB and SMC, this device is intended for use in high frequency inverters, free wheeling and polarity protection.



**Table 1. Device summary**

| Symbol               | Value  |
|----------------------|--------|
| $I_{F(AV)}$          | 2 A    |
| $V_{RRM}$            | 600 V  |
| $T_j$                | 175 °C |
| $V_F(\text{typ})$    | 1.0 V  |
| $t_{rr}(\text{typ})$ | 35 ns  |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

| Symbol              | Parameter                            |                    |                                     | Value        | Unit |
|---------------------|--------------------------------------|--------------------|-------------------------------------|--------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage      |                    |                                     | 600          | V    |
| I <sub>F(RMS)</sub> | Forward rms current                  |                    |                                     | 7            | A    |
| I <sub>F(AV)</sub>  | Average forward current δ = 0.5      | DO-41              | T <sub>L</sub> = 70 °C              | 2            | A    |
|                     |                                      | SMA                | T <sub>L</sub> = 85 °C              |              |      |
|                     |                                      | SMB                | T <sub>L</sub> = 100 °C             |              |      |
|                     |                                      | SMC                | T <sub>L</sub> = 115 °C             |              |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current | DO-41              | t <sub>p</sub> = 10ms<br>sinusoidal | 40           | A    |
|                     |                                      | SMA / SMB /<br>SMC |                                     | 30           |      |
| T <sub>stg</sub>    | Storage temperature range            |                    |                                     | -65 to + 175 | °C   |
| T <sub>j</sub>      | Operating junction temperature range |                    |                                     | -40 to + 175 | °C   |

**Table 3. Thermal resistance**

| Symbol        | Parameter        |       |                   | Maximum | Unit                 |
|---------------|------------------|-------|-------------------|---------|----------------------|
| $R_{th(j-l)}$ | Junction to lead | DO-41 | $L = 5\text{ mm}$ | 35      | $^{\circ}\text{C/W}$ |
|               |                  | SMA   |                   | 30      |                      |
|               |                  | SMB   |                   | 25      |                      |
|               |                  | SMC   |                   | 20      |                      |

**Table 4. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions                     |                    | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-------------------------------------|--------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ }^{\circ}\text{C}$  | $V_R = V_{RRM}$    | -    | -    | 2    | $\mu\text{A}$ |
|             |                         | $T_j = 150\text{ }^{\circ}\text{C}$ |                    | -    | 12   | 85   |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ }^{\circ}\text{C}$  | $I_F = 2\text{ A}$ | -    | -    | 1.7  | V             |
|             |                         | $T_j = 150\text{ }^{\circ}\text{C}$ |                    | -    | 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 maximum conduction losses use the following equation:

$$P = 1 \times I_{F(AV)} + 0.125 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

| Symbol   | Parameter                | Test conditions                    |                                                                                                | Min. | Typ. | Max. | Unit |
|----------|--------------------------|------------------------------------|------------------------------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ }^{\circ}\text{C}$ | $I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ ,<br>$I_R = 1\text{ A}$                        | -    | -    | 30   | ns   |
|          |                          |                                    | $I_F = 1\text{ A}$ ,<br>$di_F/dt = -50\text{ A}/\mu\text{s}$<br>$V_R = 30\text{ V}$            | -    | 35   | 50   |      |
| $t_{fr}$ | Forward recovery time    | $T_j = 25\text{ }^{\circ}\text{C}$ | $I_F = 2\text{ A}$ ,<br>$di_F/dt = 100\text{ A}/\mu\text{s}$<br>$V_{FR} = 1.1 \times V_{Fmax}$ | -    | -    | 100  | ns   |
| $V_{FP}$ | Forward recovery voltage |                                    |                                                                                                | -    | -    | 10   | V    |

Figure 1. Conduction losses versus average forward current

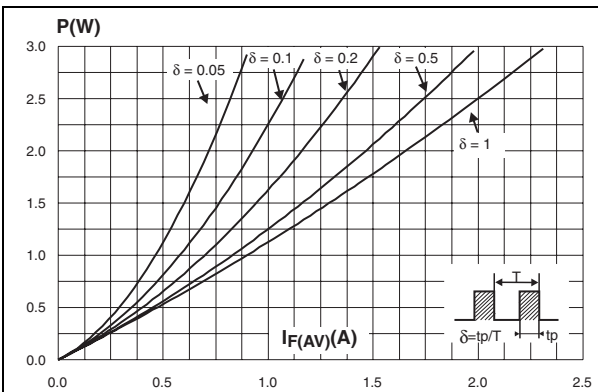


Figure 2. Forward voltage drop versus forward current

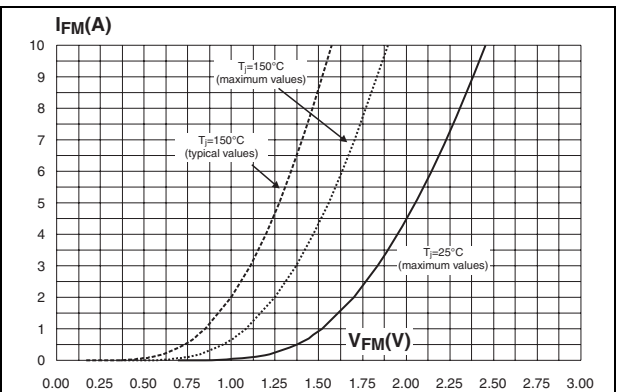


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

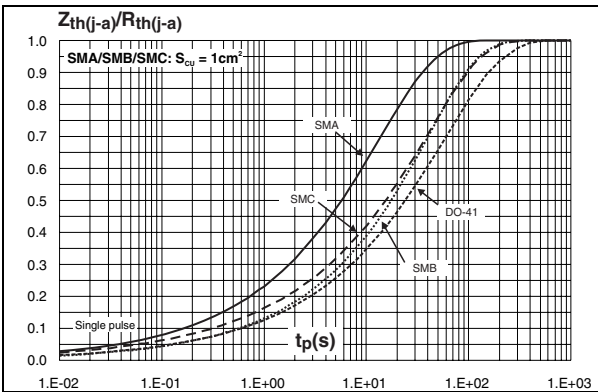


Figure 4. Peak reverse recovery current versus di\_F/dt (typical values)

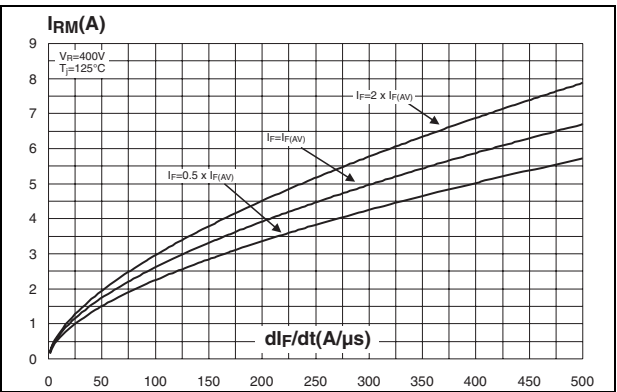


Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)

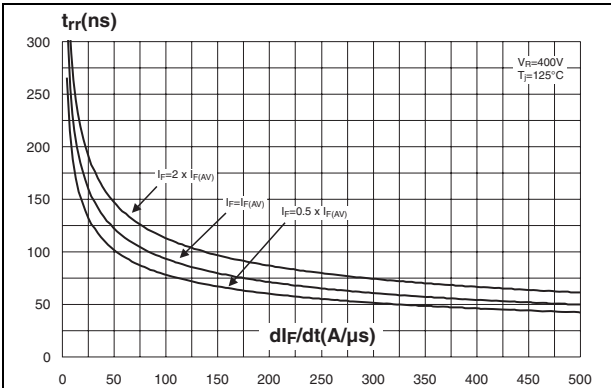


Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)

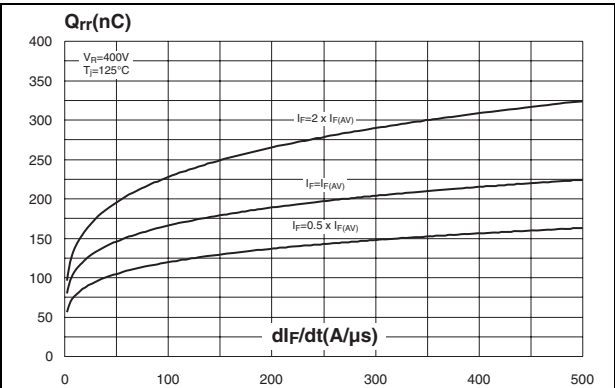


Figure 7. Relative variations of dynamic parameters versus junction temperature

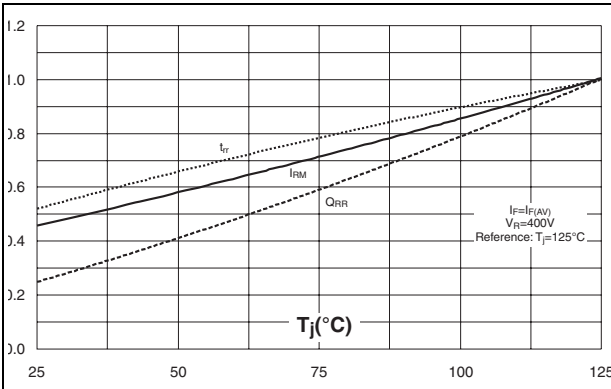


Figure 8. Transient peak forward voltage versus  $di_F/dt$  (typical values)

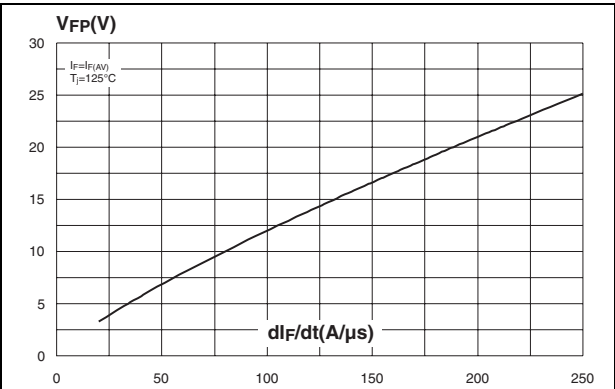


Figure 9. Forward recovery time versus  $di_F/dt$  (typical values)

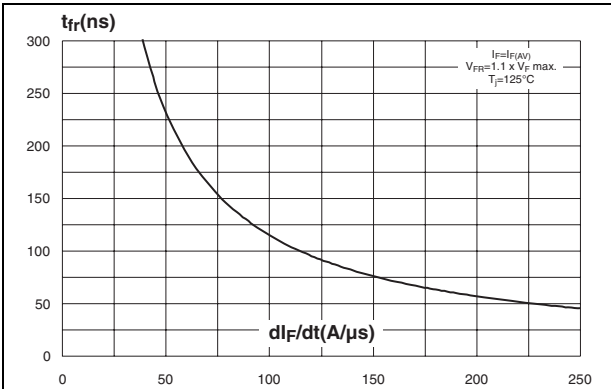


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

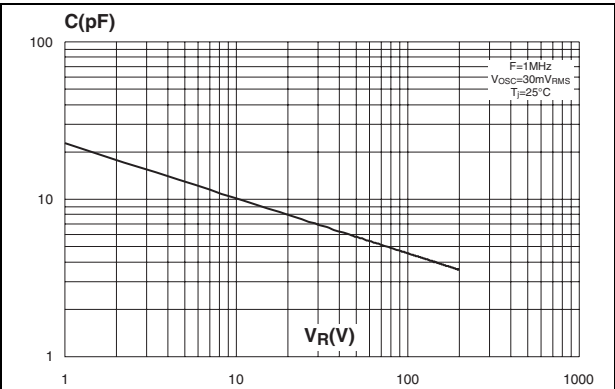


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead

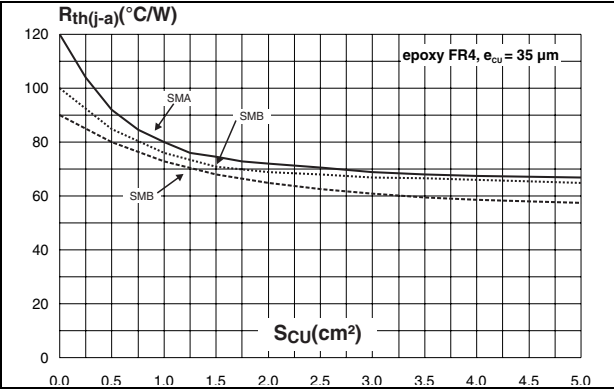
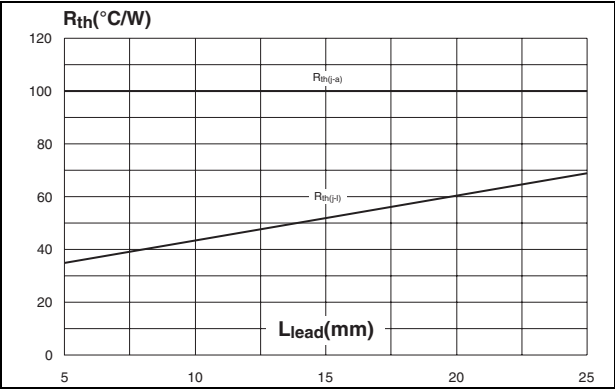


Figure 12. Thermal resistance versus lead length (DO-41)



## 2 Package information

- Epoxy meets UL 94, V0
- Band indicates cathode
- Bending method (DO-41): see Application note AN1471

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**Table 6. DO-41 (plastic) dimensions**

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    | 4.07        | 5.20 | 0.160  | 0.205 |
| B    | 2.04        | 2.71 | 0.080  | 0.107 |
| C    | 25.4        |      | 1      |       |
| D    | 0.71        | 0.86 | 0.028  | 0.034 |

**Table 7. SMA dimensions**

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.094 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| b    | 1.25        | 1.65 | 0.049  | 0.065 |
| c    | 0.15        | 0.40 | 0.006  | 0.016 |
| D    | 2.25        | 2.90 | 0.089  | 0.114 |
| E    | 4.80        | 5.35 | 0.189  | 0.211 |
| E1   | 3.95        | 4.60 | 0.156  | 0.181 |
| L    | 0.75        | 1.50 | 0.030  | 0.059 |

Figure 13. Footprint (dimensions in mm)



Table 8. SMB dimensions

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.096 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| b    | 1.95        | 2.20 | 0.077  | 0.087 |
| c    | 0.15        | 0.40 | 0.006  | 0.016 |
| D    | 3.30        | 3.95 | 0.130  | 0.156 |
| E    | 5.10        | 5.60 | 0.201  | 0.220 |
| E1   | 4.05        | 4.60 | 0.159  | 0.181 |
| L    | 0.75        | 1.50 | 0.030  | 0.059 |

Figure 14. Footprint (dimensions in mm)

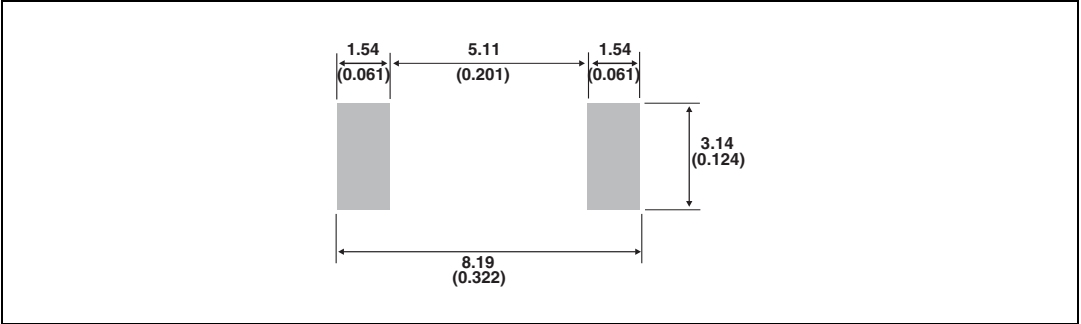


Table 9. SMC dimensions

| Ref.             | Dimensions  |      |        |       |
|------------------|-------------|------|--------|-------|
|                  | Millimeters |      | Inches |       |
|                  | Min.        | Max. | Min.   | Max.  |
| A1               | 1.90        | 2.45 | 0.075  | 0.096 |
| A2               | 0.05        | 0.20 | 0.002  | 0.008 |
| b <sup>(1)</sup> | 2.90        | 3.20 | 0.114  | 0.126 |
| c <sup>(1)</sup> | 0.15        | 0.40 | 0.006  | 0.016 |
| D                | 5.55        | 6.25 | 0.218  | 0.246 |
| E                | 7.75        | 8.15 | 0.305  | 0.321 |
| E1               | 6.60        | 7.15 | 0.260  | 0.281 |
| E2               | 4.40        | 4.70 | 0.173  | 0.185 |
| L                | 0.75        | 1.50 | 0.030  | 0.059 |

1. Dimensions b and c apply to plated leads

Figure 15. Footprint, dimensions in mm (inches)



### 3 Ordering information

**Table 10. Ordering information**

| Order code | Marking  | Package | Weight  | Base qty | Delivery mode |
|------------|----------|---------|---------|----------|---------------|
| STTH2R06   | STTH2R06 | DO-41   | 0.34 g  | 2000     | Ammopack      |
| STTH2R06RL | STTH2R06 | DO-41   | 0.34 g  | 5000     | Tape and reel |
| STTH2R06A  | R6A      | SMA     | 0.068 g | 5000     | Tape and reel |
| STTH2R06U  | R6U      | SMB     | 0.11 g  | 2500     | Tape and reel |
| STTH2R06S  | R62      | SMC     | 0.243 g | 2500     | Tape and reel |

### 4 Revision history

**Table 11. Document revision history**

| Date        | Revision | Changes                                             |
|-------------|----------|-----------------------------------------------------|
| 07-Sep-2004 | 1        | First issue                                         |
| 1-Jun-2005  | 2        | SMC package addition.                               |
| 30-Sep-2009 | 3        | Updated <a href="#">Table 6</a> package dimensions. |
| 04-Dec-2009 | 4        | Updated <a href="#">Table 9</a> package dimensions. |

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