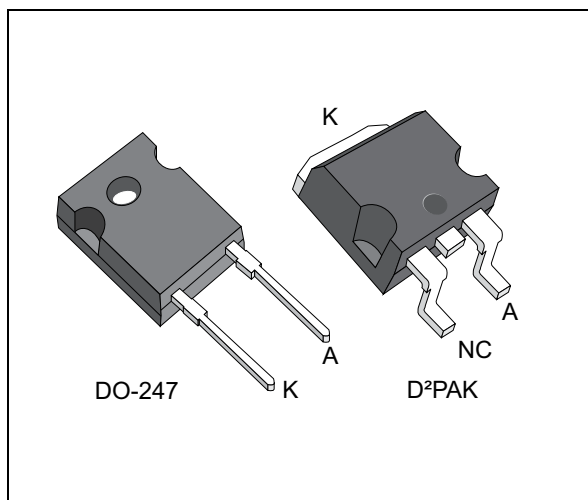


## Automotive Turbo 2 ultrafast high voltage rectifier

Datasheet — production data



**Table 1. Device summary**

| Symbol         | Value          |
|----------------|----------------|
| $I_{F(AV)}$    | 30 A           |
| $V_{RRM}$      | 600 V          |
| $t_{rr} (typ)$ | 39 ns          |
| $T_j$          | -40 to +175 °C |
| $V_F (typ)$    | 1.75 V         |

### Features

- Aluminum ribbon bonding
- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- ECOPACK®2 compliant component (DO-247)
- AEC-Q101 qualified

### Description

The STTH30ST06-Y, which uses ST Turbo 2, 600 V technology, is packaged in DO-247 and D²PAK with aluminum ribbon to ensure a high robustness. It is especially suited for use in switching power supplies and automotive applications, industrial applications, as rectification and boost diode for circuits working in continuous conduction mode.

# 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    |
| $V_{RRM}$    | Repetitive peak reverse voltage, $T_j = -40\text{ °C}$ |                                 | 560          | V    |
| $I_{F(RMS)}$ | Forward rms current                                    |                                 | 64           | A    |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$                | $T_c = 65\text{ °C}$            | 30           | A    |
| $I_{FSM}$    | Surge non repetitive forward current                   | $t_p = 10\text{ ms sinusoidal}$ | 160          | A    |
| $T_{stg}$    | Storage temperature range                              |                                 | -65 to + 175 | °C   |
| $T_j$        | Maximum operating junction temperature                 |                                 | -40 to + 175 | °C   |

**Table 3. Thermal resistance**

| Symbol        | Parameter                                     | Value | Unit   |
|---------------|-----------------------------------------------|-------|--------|
| $R_{th(j-c)}$ | Junction to case (DO-247, D <sup>2</sup> PAK) | 1.25  | °C / W |

**Table 4. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ  | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     |      |      | 50   | $\mu\text{A}$ |
|             |                         | $T_j = 125\text{ °C}$ |                     |      | 50   | 500  |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 30\text{ A}$ |      |      | 3.6  | V             |
|             |                         | $T_j = 125\text{ °C}$ |                     |      | 1.75 | 2.2  |               |

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:

$$P = 1.45 \times I_{F(AV)} + 0.025 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

| Symbol       | Parameter                | Test conditions                     |                                                                                     | Min. | Typ | Max. | Unit |
|--------------|--------------------------|-------------------------------------|-------------------------------------------------------------------------------------|------|-----|------|------|
| $I_{RM}$     | Reverse recovery current | $T_j = 125\text{ }^{\circ}\text{C}$ | $I_F = 30\text{ A}$ , $V_R = 400\text{ V}$<br>$di_F/dt = -100\text{ A}/\mu\text{s}$ |      | 4   | 5.5  | A    |
| $S_{factor}$ | Softness factor          |                                     |                                                                                     |      | 0.3 |      |      |
| $t_{rr}$     | Reverse recovery time    | $T_j = 25\text{ }^{\circ}\text{C}$  | $I_F = 1\text{ A}$ , $V_R = 30\text{ V}$<br>$di_F/dt = -50\text{ A}/\mu\text{s}$    |      | 39  | 50   | ns   |
|              |                          |                                     | $I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$<br>$I_R = 1\text{ A}$               |      |     | 30   |      |
| $t_{fr}$     | Forward recovery time    |                                     | $I_F = 30\text{ A}$ , $V_{FR} = 4\text{ V}$<br>$di_F/dt = 300\text{ A}/\mu\text{s}$ |      |     | 200  |      |
| $V_{FP}$     | Forward recovery voltage |                                     |                                                                                     |      | 7   |      | V    |

Figure 1. Average forward power dissipation versus average forward current

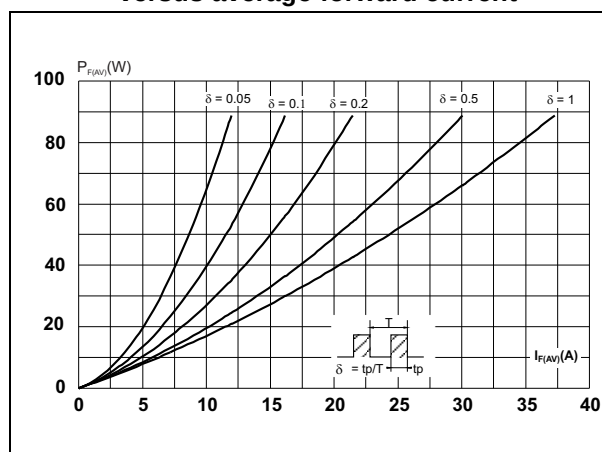


Figure 2. Forward voltage drop versus forward current

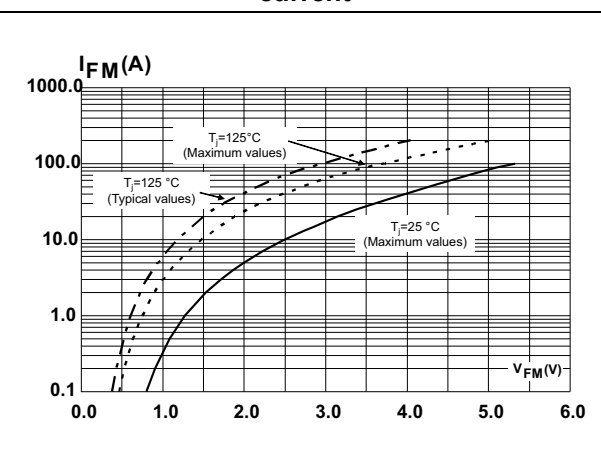


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

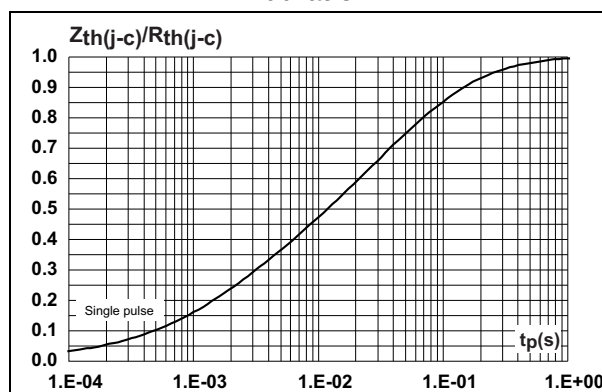


Figure 4. Peak reverse recovery current versus di\_F/dt (typical values)

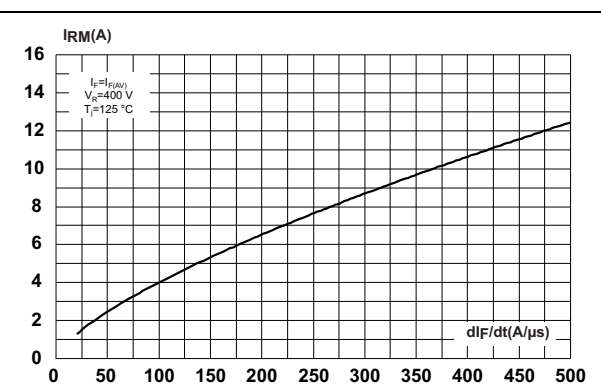


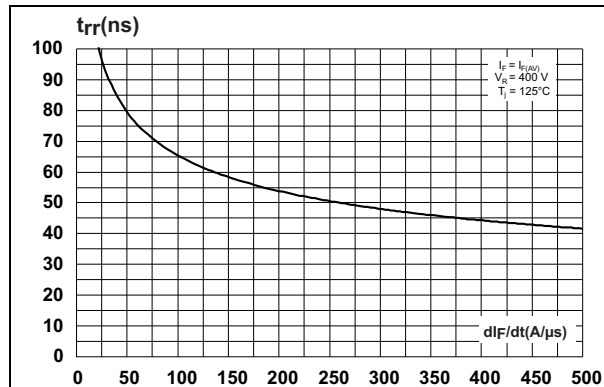
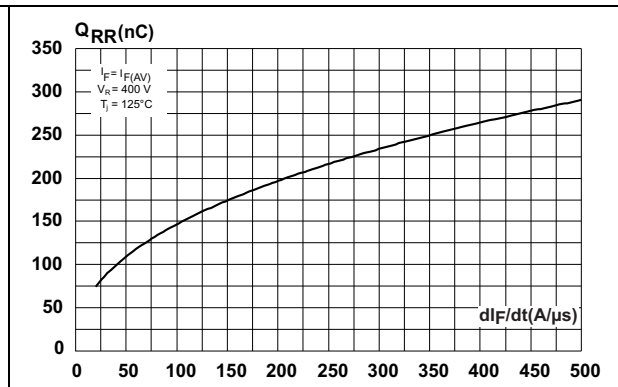
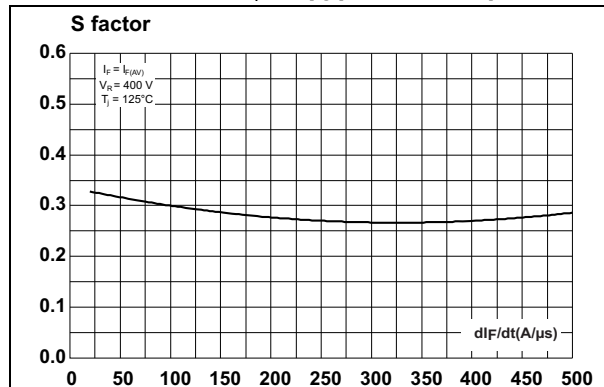
Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)

Figure 8. Relative variation of dynamic parameters versus junction temperature

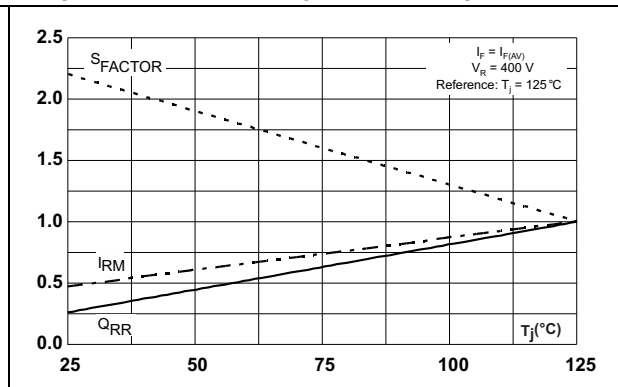
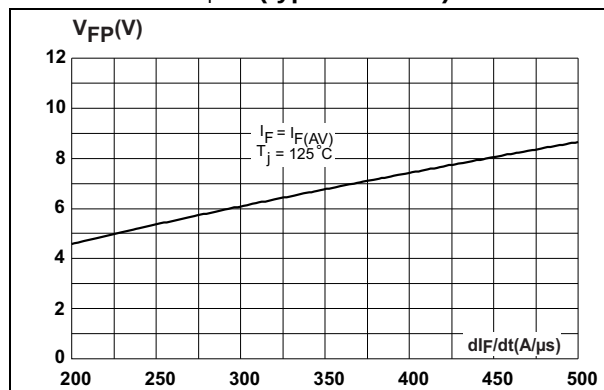
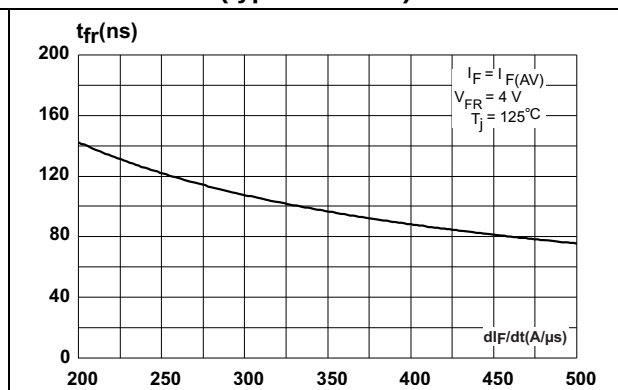
Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)

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

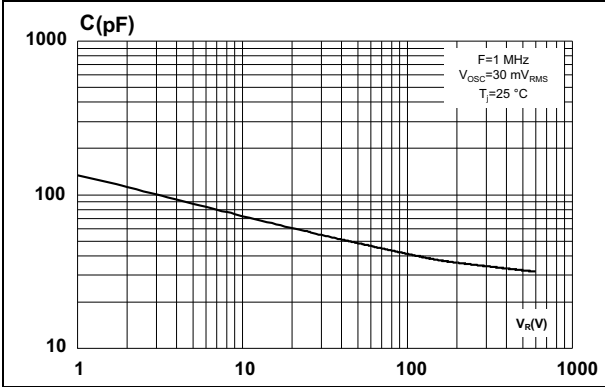
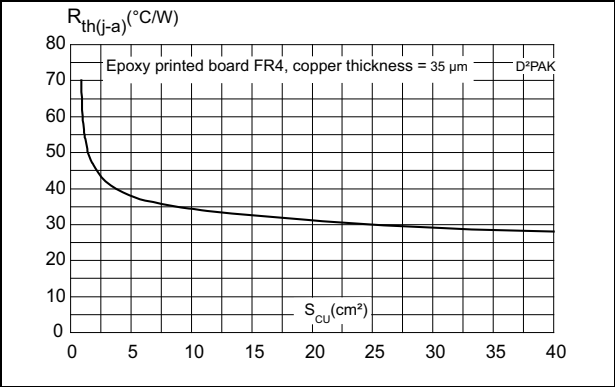


Figure 12. Junction capacitance versus reverse voltage applied (typical values)



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (1.0 N·m maximum)

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](http://www.st.com). ECOPACK® is an ST trademark.

Figure 13. D<sup>2</sup>PAK dimension definitions

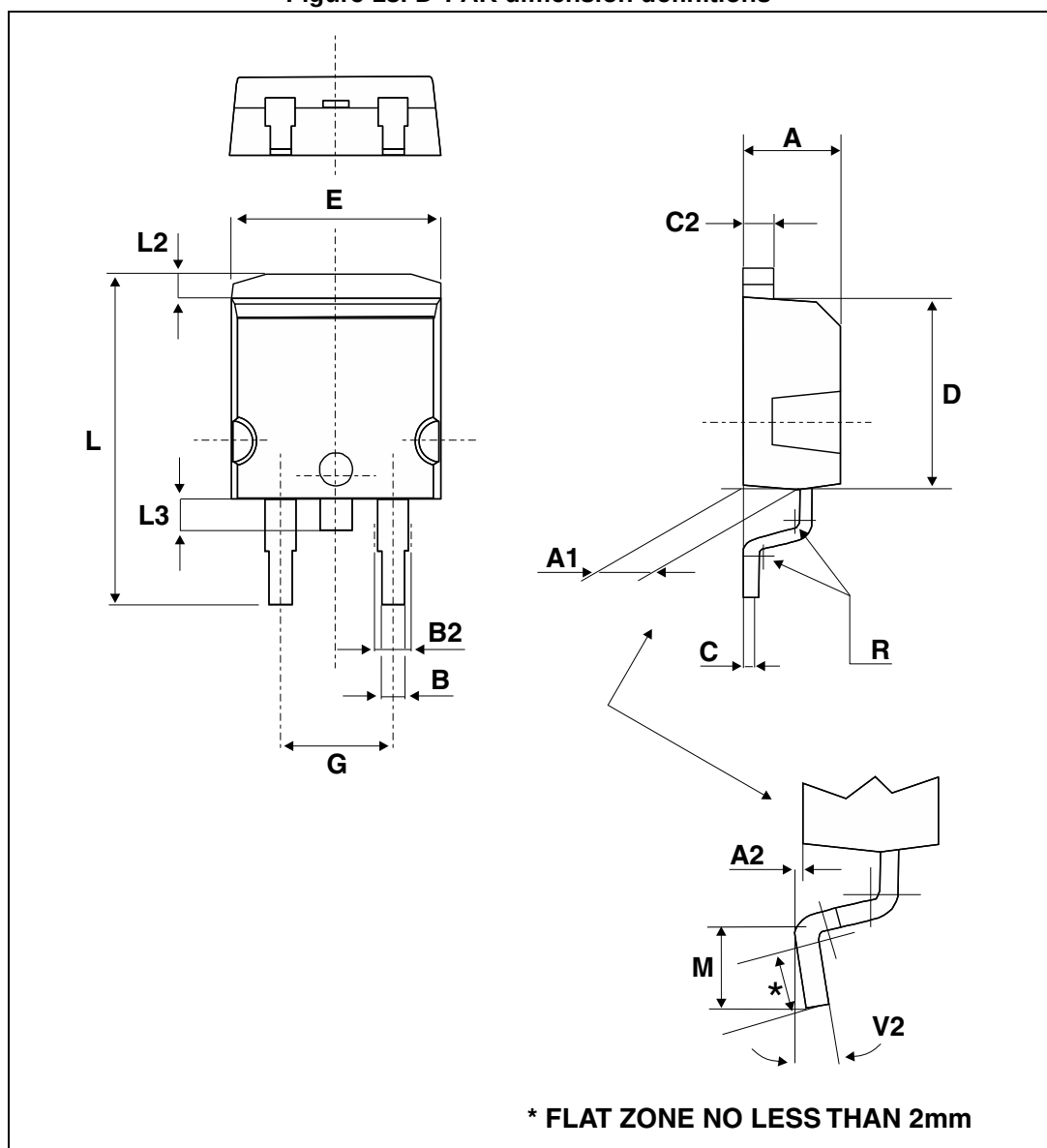


Table 6. D<sup>2</sup>PAK dimension values

| Ref. | Dimensions  |           |       |        |            |       |
|------|-------------|-----------|-------|--------|------------|-------|
|      | Millimeters |           |       | Inches |            |       |
|      | Min.        | Typ.      | Max.  | Min.   | Typ.       | 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        | 16        | 5.28  | 0.192  | 0.63       | 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)

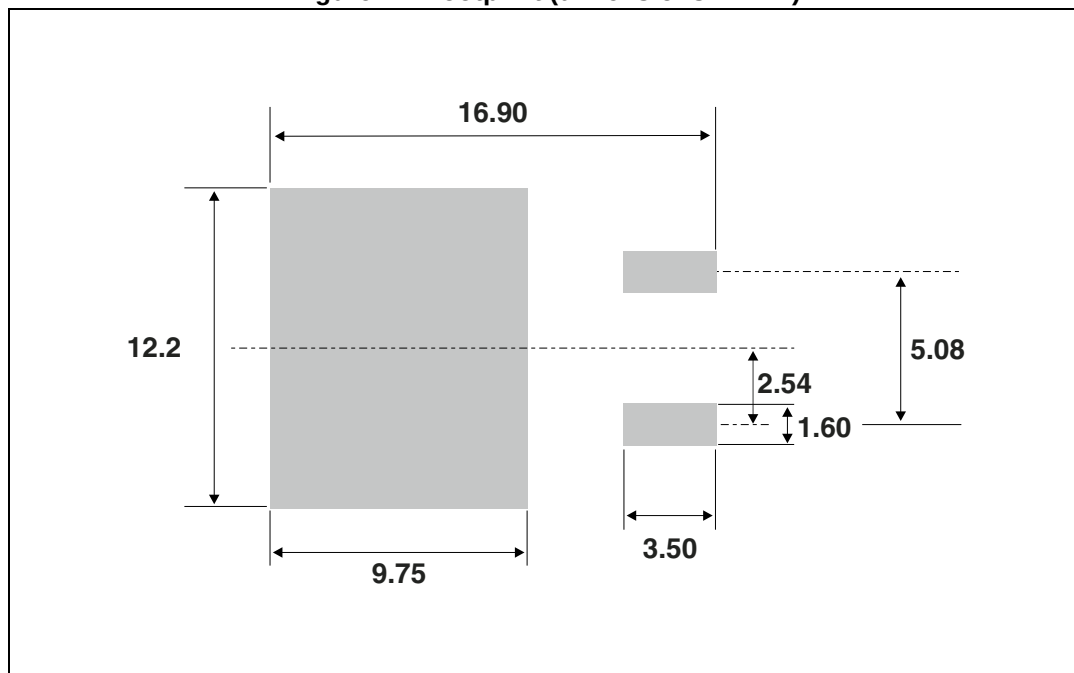


Figure 15. DO-247 dimension definitions

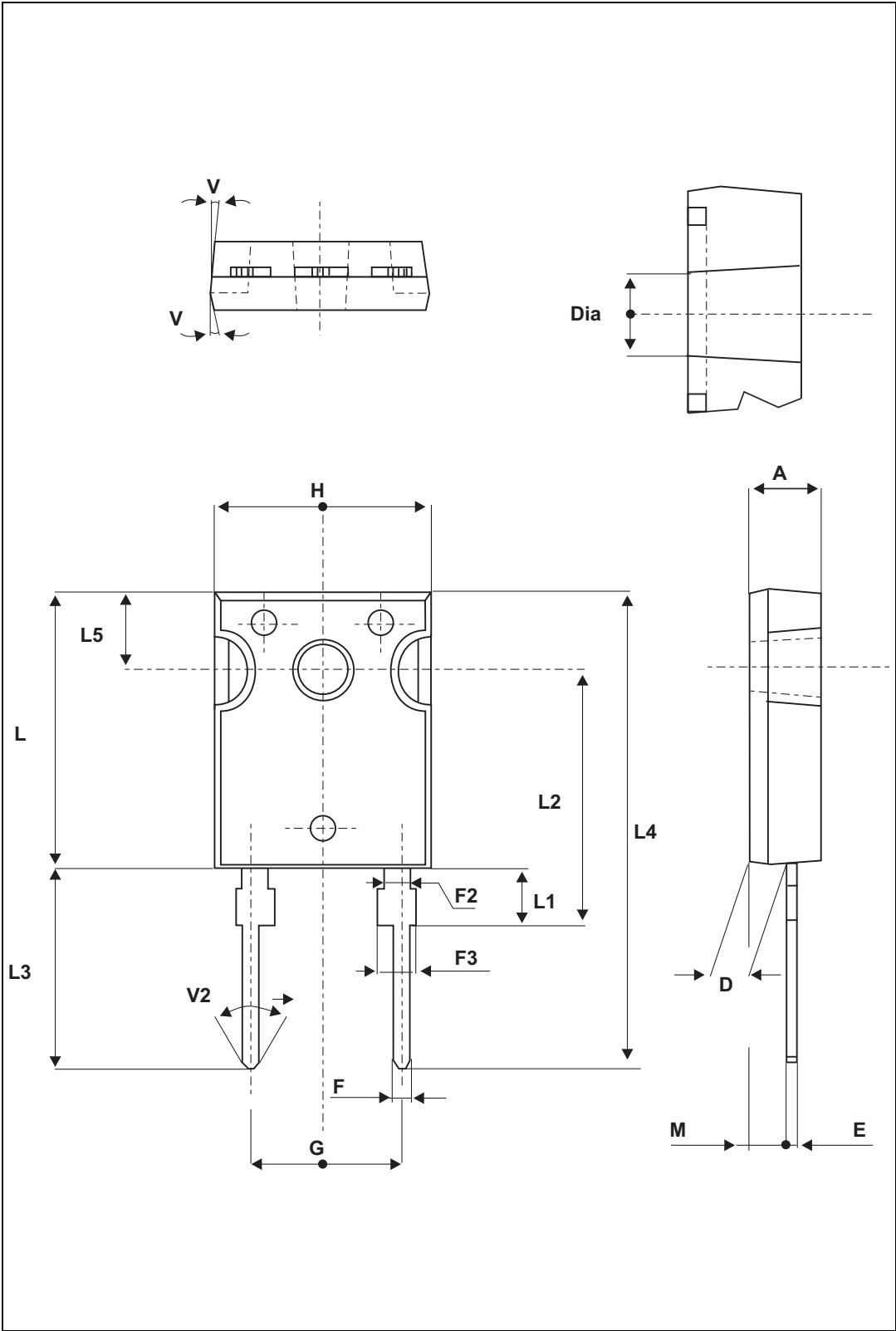


Table 7. DO-247 dimension values

| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 4.85        |       | 5.15  | 0.191  |       | 0.203 |
| D    | 2.20        |       | 2.60  | 0.086  |       | 0.102 |
| E    | 0.40        |       | 0.80  | 0.015  |       | 0.031 |
| F    | 1.00        |       | 1.40  | 0.039  |       | 0.055 |
| F2   |             | 2.00  |       |        | 0.078 |       |
| F3   | 2.00        |       | 2.40  | 0.078  |       | 0.094 |
| G    |             | 10.90 |       |        | 0.429 |       |
| H    | 15.45       |       | 15.75 | 0.608  |       | 0.620 |
| L    | 19.85       |       | 20.15 | 0.781  |       | 0.793 |
| L1   | 3.70        |       | 4.30  | 0.145  |       | 0.169 |
| L2   |             | 18.50 |       |        | 0.728 |       |
| L3   | 14.20       |       | 14.80 | 0.559  |       | 0.582 |
| L4   |             | 34.60 |       |        | 1.362 |       |
| L5   |             | 5.50  |       |        | 0.216 |       |
| M    | 2.00        |       | 3.00  | 0.078  |       | 0.118 |
| V    |             | 5°    |       |        | 5°    |       |
| V2   |             | 60°   |       |        | 60°   |       |
| Dia. | 3.55        |       | 3.65  | 0.139  |       | 0.143 |

### 3 Ordering information

Table 8. Ordering information

| Ordering type   | Marking      | Package            | Weight | Base qty | Delivery mode |
|-----------------|--------------|--------------------|--------|----------|---------------|
| STTH30ST06WY    | STTH30ST06WY | DO-247             | 4.40 g | 30       | Tube          |
| STTH30ST06GY-TR | STTH30ST06GY | D <sup>2</sup> PAK | 1.48 g | 1000     | Tape and reel |

### 4 Revision history

Table 9. Document revision history

| Date        | Revision | Changes      |
|-------------|----------|--------------|
| 14-Jan-2015 | 1        | First issue. |

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