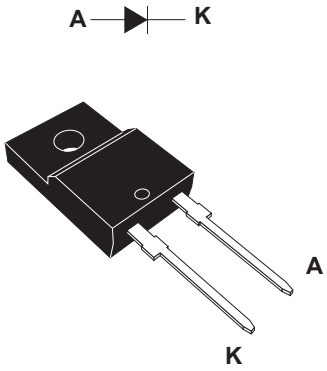
# STTH30M06

Datasheet

## 600 V, 30 A ultrafast high voltage diode




TO220FPAC

## Features

- Ultrafast recovery, soft recovery
- Low power losses at high switching frequency operations
- Low leakage current
- High junction temperature
- High overcurrent capability
- ECOPACK2 compliant
- Insulated package TO-220FPAC:
  - Insulated voltage: 2000 $V_{RMS}$

## Applications

- Boost PFC
- Clamping diode
- Air conditioning equipment

## Description

The STTH30M06 is an ultrafast recovery power rectifier especially suited for boost or clamping circuits working at high switching frequencies in heavy duty applications such as air conditioning equipment or telecom power supplies.

Designed with the latest ST's ultrafast technology, this 600 V 30 A diode in TO-220FPAC has a robust behavior against electrostatic discharge and high overcurrent capability.

| Product label |
|---|
| SUSTAINABLE TECHNOLOGY |

| Product status |
|---|
| STTH30M06 |

| Product summary | |
|---|---|
| **Symbol** | **Value** |
| $I_{F(AV)}$ | 30 A |
| $V_{RRM}$ | 600 V |
| $t_{rr(typ.)}$ | 25 ns |
| $T_{j(max.)}$ | 175 °C |
| $V_{F(typ.)}$ | 1.7 V |

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 600 | V |
| $I_{F(AV)}$ | Average forward current | δ = 0.5 square | 30 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | 170 | A |
| $T_{stg}$ | Storage temperature range | | -65 to +175 | °C |
| $T_j$ | Maximum operating junction temperature | | +175 | °C |

**Table 2. Thermal resistance parameter**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | Typ. | 2.45 | °C/W |
| | | Max. | 3.5 | |

For more information, refer to the following application note :

- AN5088: Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j$ = 25 °C | $V_R$ = 600 V | - | | 60 | µA |
| | | $T_j$ = 125 °C | | - | 70 | 800 | |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 15 A | - | 2.1 | | V |
| | | $T_j$ = 150 °C | | - | 1.3 | | |
| | | $T_j$ = 25 °C | $I_F$ = 30 A | - | 2.6 | 3.8 | |
| | | $T_j$ = 150 °C | | - | 1.7 | 2.3 | |

1. *Pulse test: $t_p$ = 5 ms, δ < 2%*
2. *Pulse test: $t_p$ = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 1.08 \times I_{F(AV)} + 0.04 \times I_F{}^2{}_{(RMS)}$

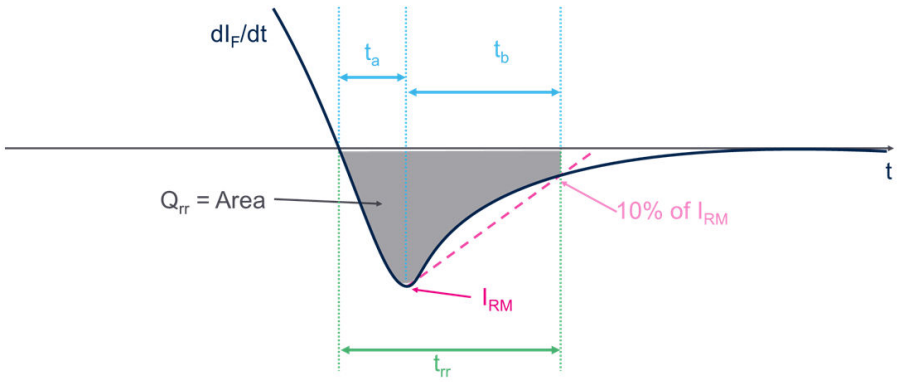
For more information, refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

**Table 4. Dynamic electrical characteristics**

| Symbol | Parameters | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $T_j$ = 25 °C | $I_F$ = 1 A<br>$dI_F/dt$ = -50 A/µs<br>$V_R$ = 30 V | - | | 50 | ns |
| | | | $I_F$ = 1 A<br>$dI_F/dt$ = -100 A/µs<br>$V_R$ = 30 V | - | 25 | 35 | |
| | | $T_j$ = 125 °C | $I_F$ = 30 A<br>$dI_F/dt$ = -200 A/µs<br>$V_R$ = 400 V | - | 100 | | |
| $I_{RM}$ | Reverse recovery current | $T_j$ = 125 °C | $I_F$ = 30 A<br>$dI_F/dt$ = -200 A/µs<br>$V_R$ = 400 V | - | 5.2 | | A |
| $Q_{rr}$ | Reverse recovery charge | | | - | 380 | | nC |

**Figure 1.**




For more information, refer to the following application notes related to the power losses:

- AN5028: Calculation of turn-off power losses generated by an ultrafast diode

## 1.1 Characteristics (curves)

**Figure 2. Average forward power dissipation versus average forward current**

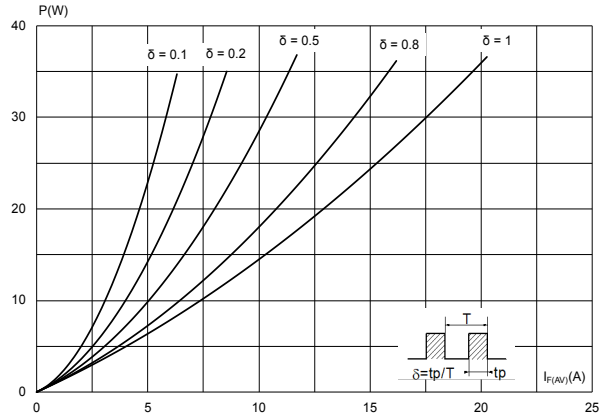



**Figure 3. Forward voltage drop versus forward current (typical values)**

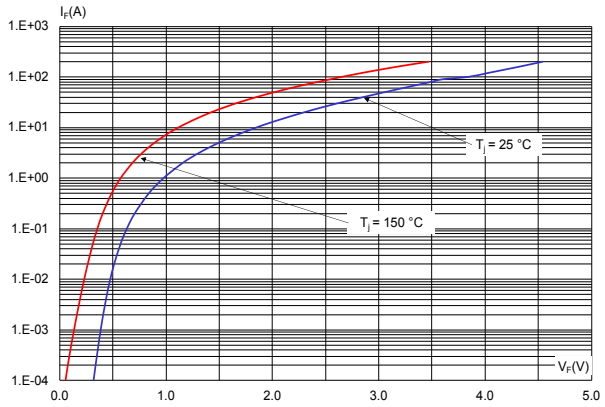



**Figure 4. Forward voltage drop versus forward current (maximum values)**

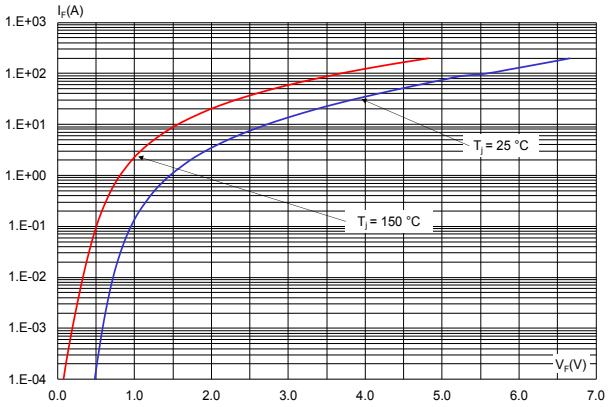



**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**

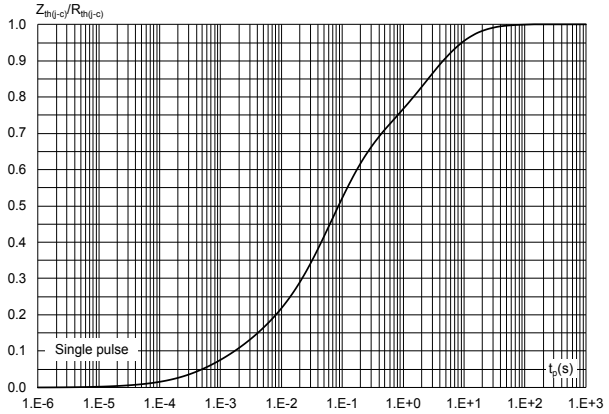



**Figure 6. Peak reverse recovery current versus $dI_F/dt$ (typical values)**

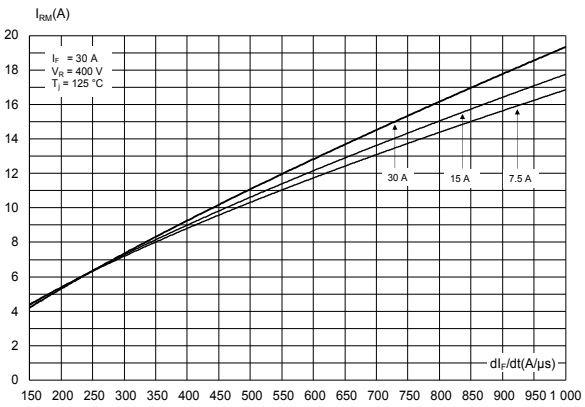



**Figure 7. Reverse recovery time versus $dI_F/dt$ (typical values)**

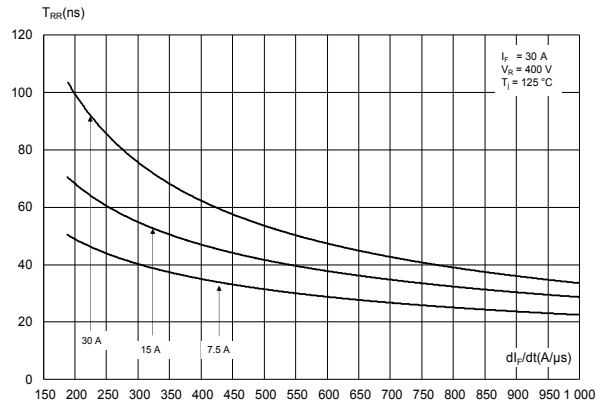


**Figure 8. Reverse recovery charges versus $dI_F/dt$ (typical values)**

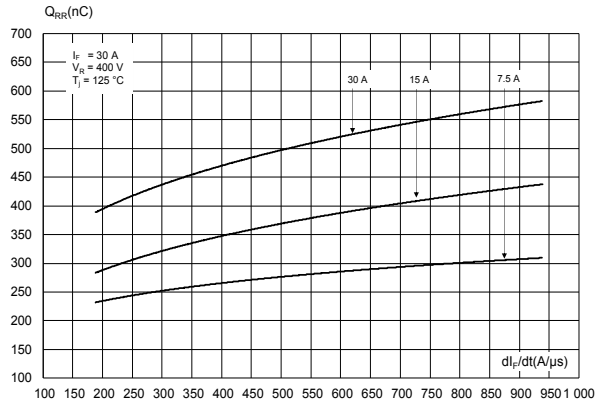



**Figure 9. Reverse recovery softness factor versus $dI_F/dt$ (typical values)**

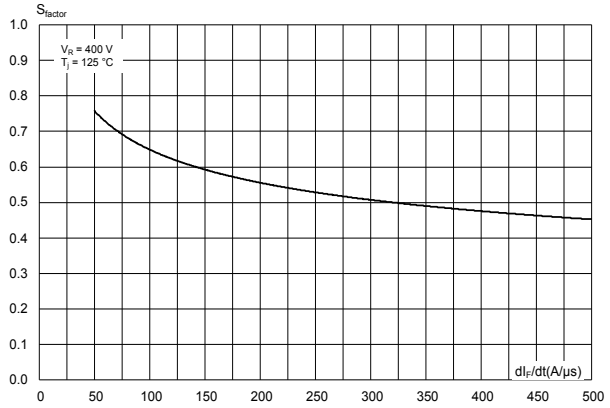



**Figure 10. Relative variations of dynamic parameters versus junction temperature**

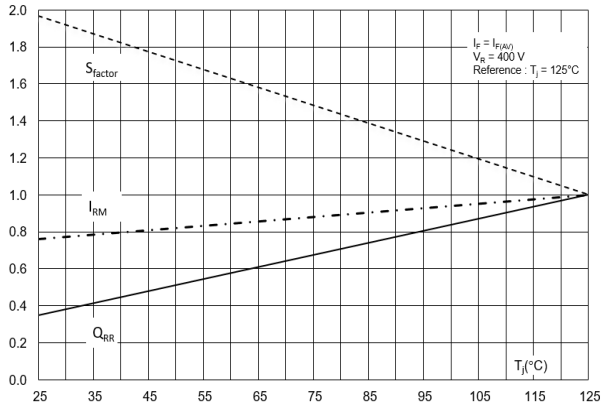



**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**

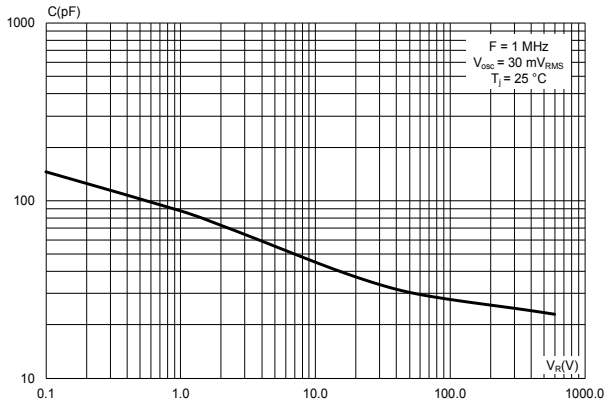



**Figure 12. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**

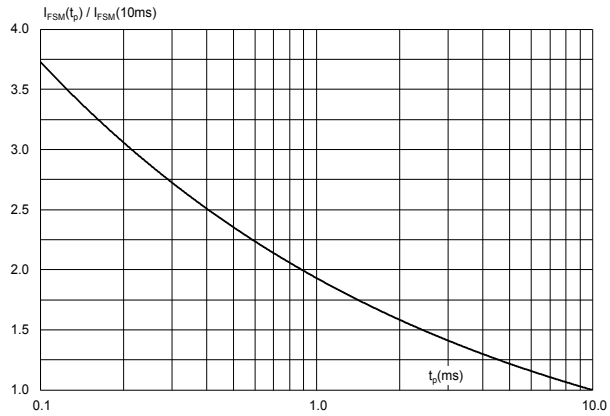
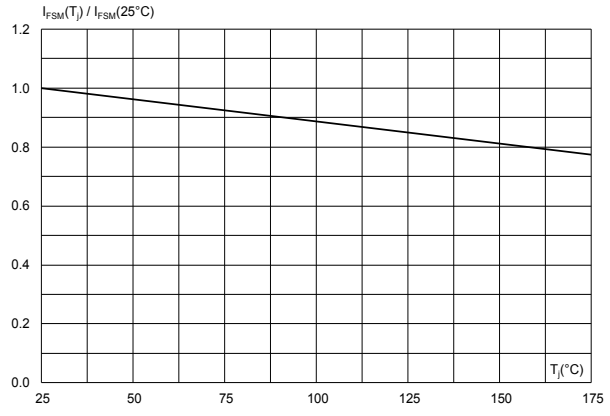



**Figure 13. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)**



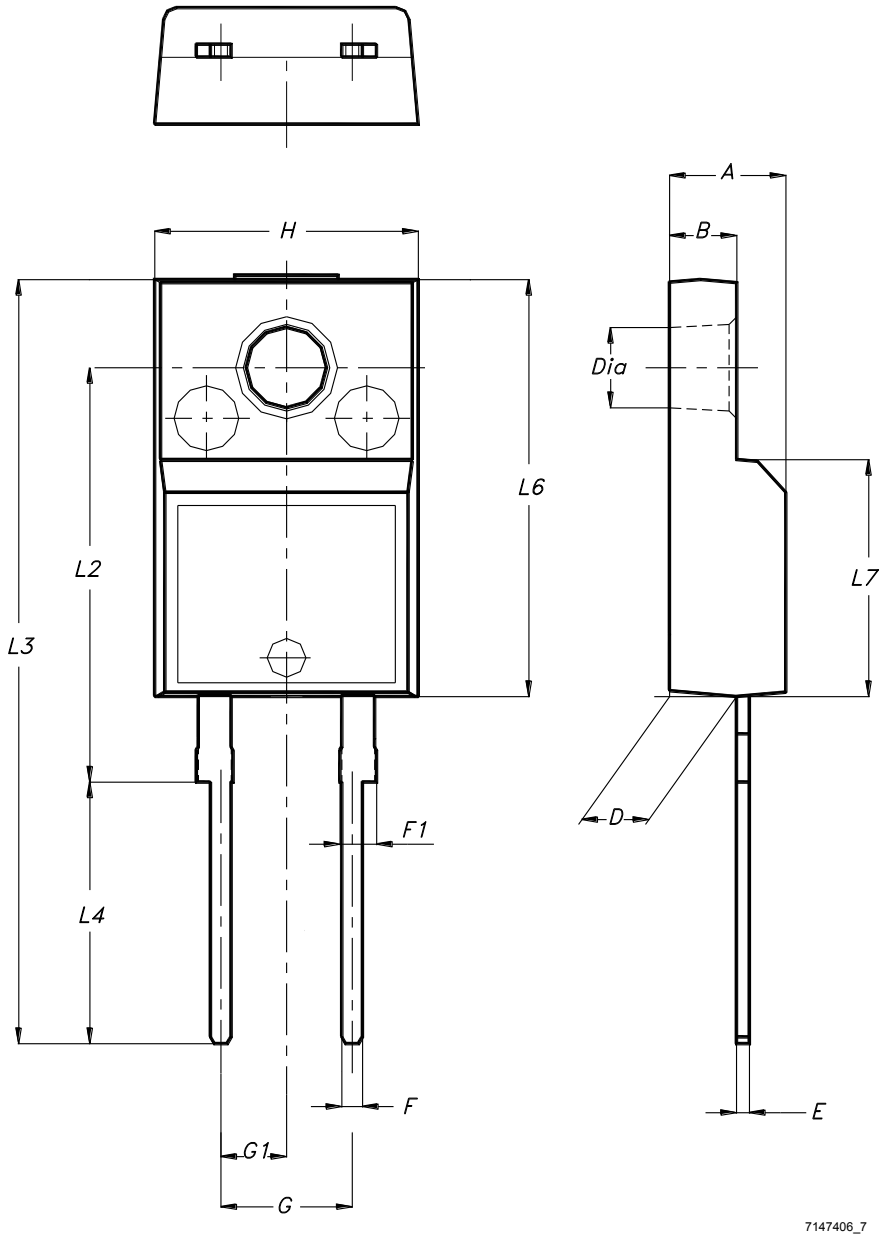
# 2 Package information

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.

## 2.1 TO-220FPAC package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 14. TO-220FPAC package outline**



*Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

**Table 5. TO-220FPAC package mechanical data**

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches (for reference only) | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| B | 2.50 | 2.70 | 0.098 | 0.106 |
| D | 2.50 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.70 | 0.094 | 0.106 |
| H | 10 | 10.40 | 0.393 | 0.409 |
| L2 | 16 typ. | | 0.63 typ. | |
| L3 | 28.6 | 30.60 | 1.126 | 1.205 |
| L4 | 9.8 | 10.60 | 0.386 | 0.417 |
| L6 | 15.9 | 16.40 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Diam | 3.00 | 3.20 | 0.118 | 0.126 |

*Note: For package and tape orientation, reel and inner box dimensions and tape outline you can check TN1173.*

# 3 Ordering information

Table 6. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| STTH30M06FP | TH30M06FP | TO-220FPAC | 1.9 g | 50 | Tube |

## Revision history

Table 7. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 17-Dec-2025 | 1 | Initial release. |

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