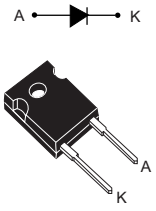
# STTH60RQ06-Y

Datasheet

## Automotive turbo 2 ultrafast high voltage rectifier




DO-247

### Features

- AEC-Q101 qualified
- High junction temperature capability
- Ultrafast with soft recovery behavior
- Low reverse current
- Low thermal resistance
- Reduced switching and conduction losses
- PPAP capable

### Description

The STTH60RQ06-Y has been developed for applications requiring a high-voltage secondary rectification for LLC full bridge topology.

Also it is ideal for switching power supplies, industrial and automotive applications, as rectification, freewheeling and clamping diode.

| Product status link | |
|---|---|
| STTH60RQ06-Y | |
| **Product summary** | |
| **Symbol** | **Value** |
| $I_{F(AV)}$ | 60 A |
| $V_{RRM}$ | 600 V |
| $V_{F(max)}$ | 1.45 V |
| $t_{rr\ (max)}$ | 35 ns |
| $T_j$ | -40 to +175 °C |

# 1 Characteristics

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

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage ($T_j$ = -40 °C to +175 °C) | | 600 | V |
| $I_{F(RMS)}$ | Forward rms current | | 90 | A |
| $I_{F(AV)}$ | Average forward current | | 60 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | 425 | A |
| $T_{stg}$ | Storage temperature range | | -65 to +175 | °C |
| $T_j$ | Operating junction temperature range | | -40 to +175 | °C |

**Table 2. Thermal resistance parameters**

| Symbol | Parameter | Max. | Unit |
|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | 0.38 | °C/W |

**Table 3. Static electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$(1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | | 80 | µA |
| | | $T_j$ = 150 °C | | - | 160 | 1600 | |
| $V_F$(2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 30 A | - | | 2.45 | V |
| | | $T_j$ = 150 °C | | - | 1.15 | 1.45 | |
| | | $T_j$ = 25 °C | $I_F$ = 60 A | - | | 2.95 | |
| | | $T_j$ = 150 °C | | - | 1.45 | 1.85 | |

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

To evaluate the conduction losses, use the following equation:

$P = 1.05 \times I_{F(AV)} + 0.013 \times I_F{}^2{}_{(RMS)}$

**Table 4. Dynamic electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse recovery time | $T_j$ = 25 °C | $I_F$ = 0.5 A, $I_{rr}$ = 0.25 A, $I_R$ = 1 A | - | | 35 | ns |
| | | | $I_F$ = 1 A, $V_R$ = 30 V, $dI_F/dt$ = -50 A/µs | - | 50 | 65 | |
| $I_{RM}$ | Reverse recovery current | $T_j$ = 125 °C | $I_F$ = 60 A, $V_R$ = 400 V, $dI_F/dt$ = -200 A/µs | - | 12 | 16 | A |
| $Q_{rr}$ | Reverse recovery charge | | | - | 660 | | nC |
| $t_{rr}$ | Reverse recovery time | | | - | 92 | | ns |

## 1.1 Characteristics (curves)

**Figure 1. Average forward power dissipation versus average forward current (square waveform)**

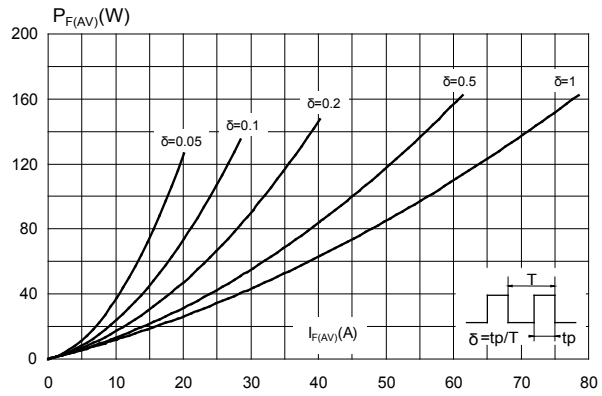



**Figure 2. Average forward power dissipation versus average forward current (sinusoidal waveform)**

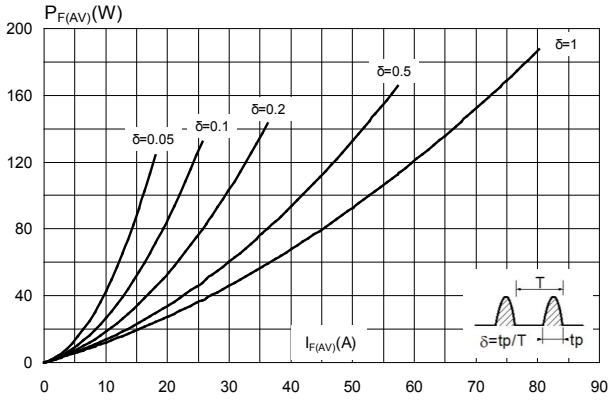



**Figure 3. Forward voltage drop versus forward current (typical values)**

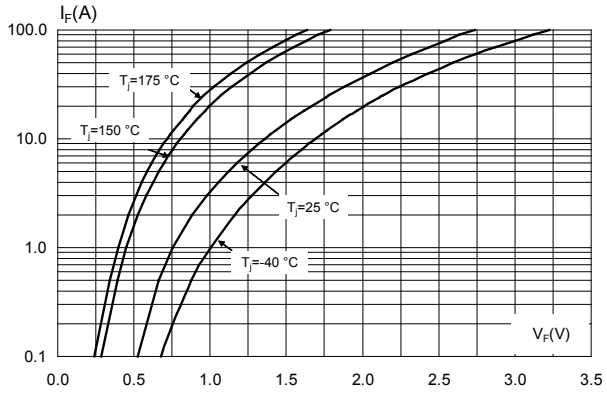



**Figure 4. Forward voltage drop versus forward current (maximum values)**

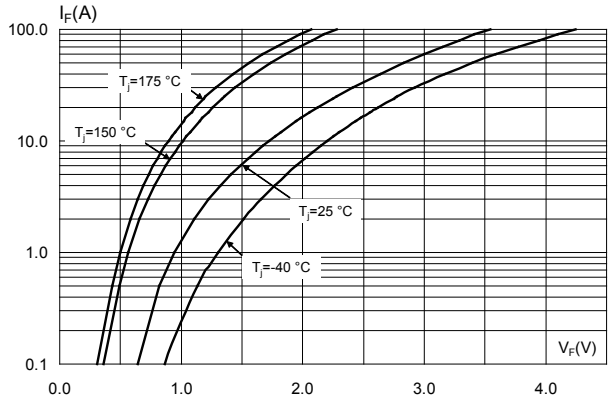



**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**

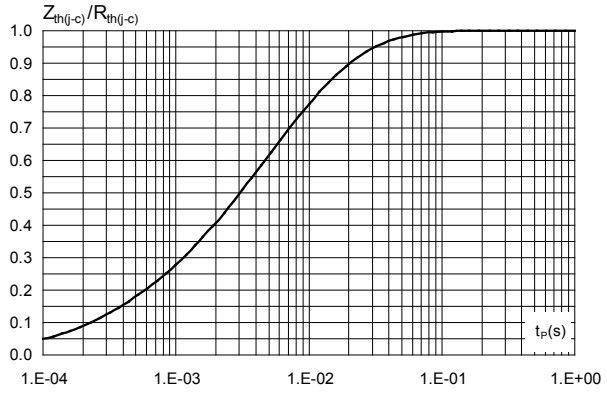



**Figure 6. Peak reverse recovery current versus $dI_F/dt$ (typical values)**

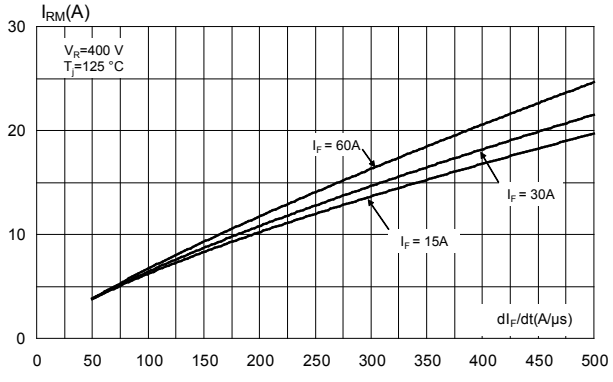


**Figure 7. Reverse recovery time versus $dI_F/dt$ (typical values)**

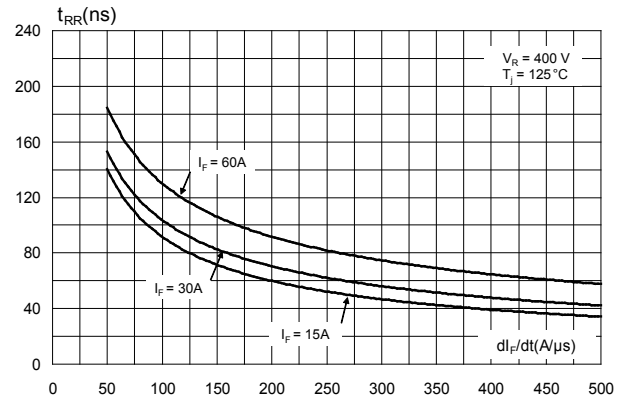



**Figure 8. Reverse recovery charges versus $dI_F/dt$ (typical values)**

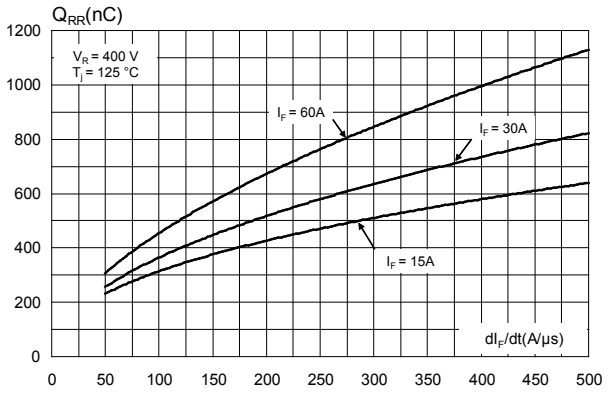



**Figure 9. Reverse recovery softness factor versus $dI_F/dt$ (typical values)**

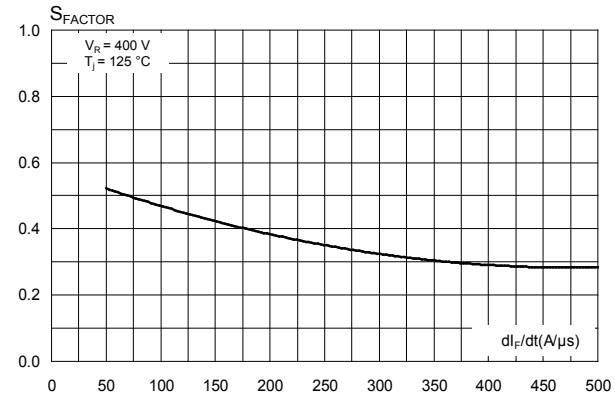



**Figure 10. Relative variations of dynamic parameters versus junction temperature**

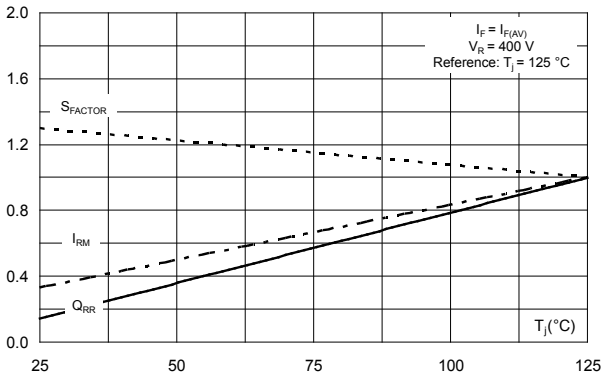



**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**

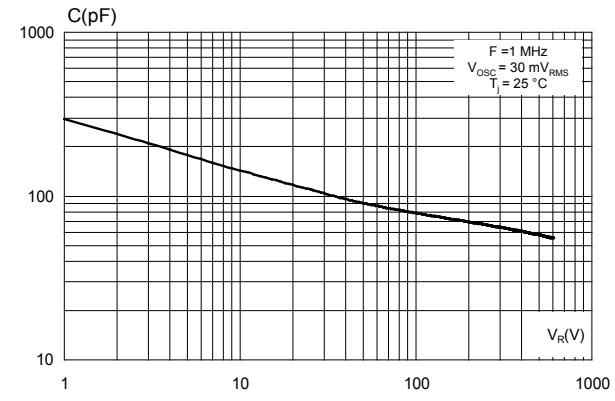



**Figure 12. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**

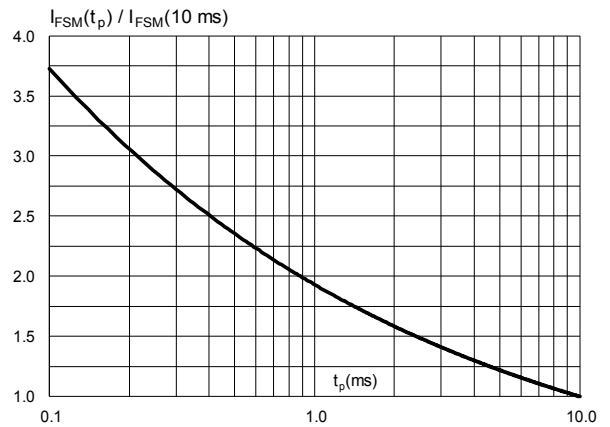
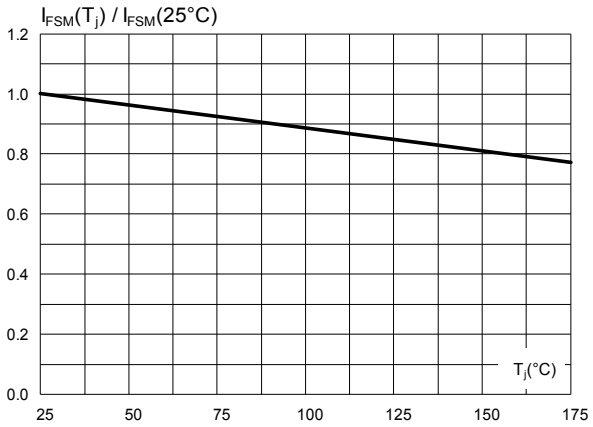


**Figure 13. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)**



# 2 Package information

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.

## 2.1 [Package name] package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m (DO-247)
- Maximum torque value: 1.0 N·m (DO-247)

**Figure 14. DO-247 package outline**

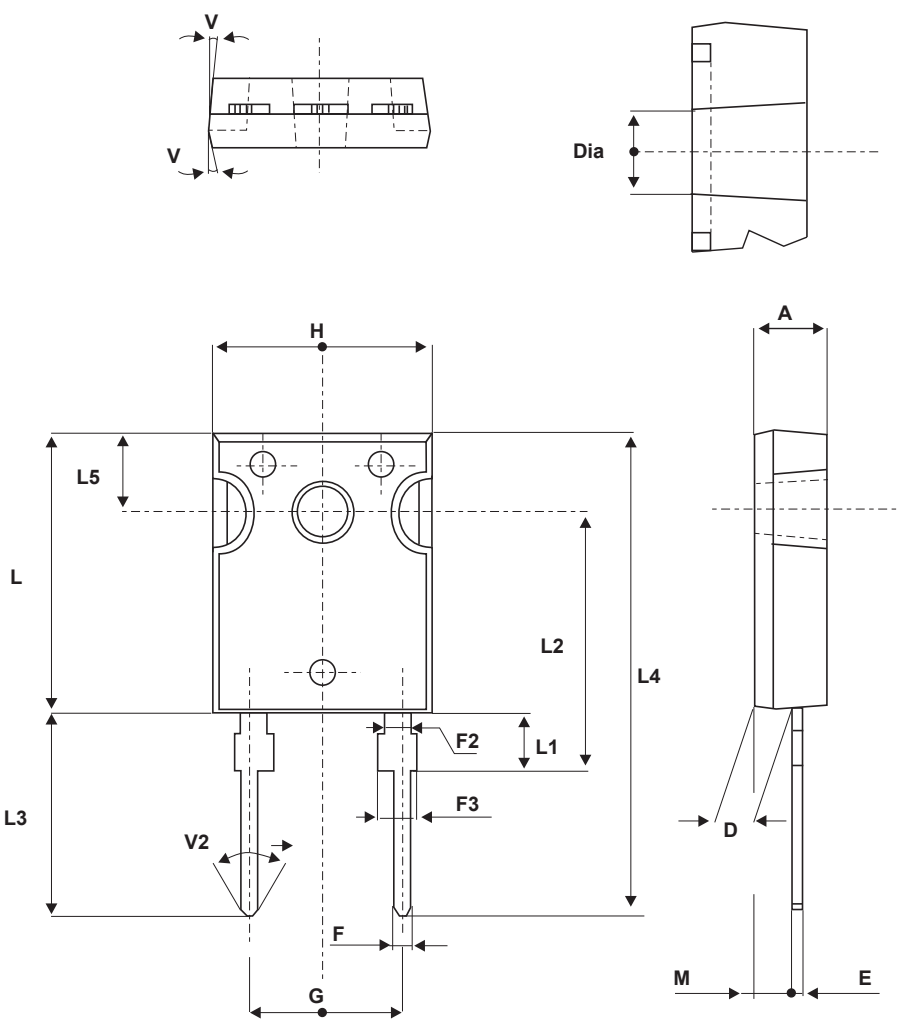


Table 5. **DO-247 package mechanical data**

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | 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 typ. | | 0.078 typ. | |
| F3 | 2.00 | 2.40 | 0.078 | 0.094 |
| G | 10.90 typ. | | 0.429 typ. | |
| 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 typ. | | 0.728 typ. | |
| L3 | 14.20 | 14.80 | 0.559 | 0.582 |
| L4 | 34.60 typ. | | 1.362 typ. | |
| L5 | 5.50 typ. | | 0.216 typ. | |
| 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 6. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| STTH60RQ06WY | STTH60RQ06WY | DO-247 | 4.40 g | 30 | Tube |

## Revision history

Table 7. **Document revision history**

| Date | Version | Changes |
|---|---|---|
| 20-Mar-2018 | 1 | Initial release. |
| 05-Apr-2018 | 2 | Updated Section ● Features.<br>Minor text changes to improve readability. |

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
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