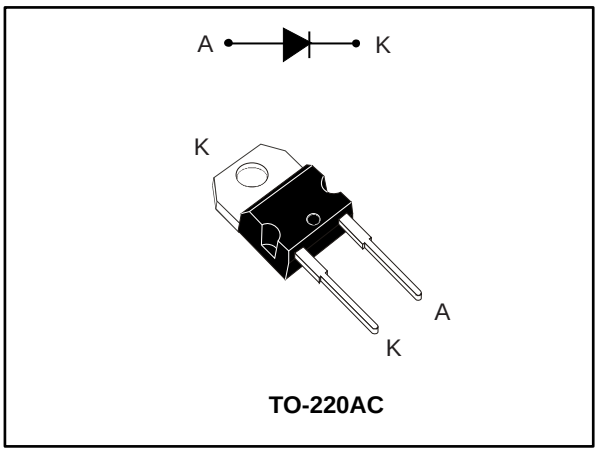
# STPSC15H12-Y

## Automotive grade 1200 V power Schottky silicon carbide diode

Datasheet - production data




**TO-220AC**

## Features

- AEC-Q101 qualified
- No or negligible reverse recovery
- Switching behavior independent of temperature
- Robust high voltage periphery
- PPAP capable
- Operating $T_j$ from -40 °C to 175 °C

## Description

The SiC diode, available in TO-220AC, is an ultrahigh performance power Schottky rectifier. It is manufactured using a silicon carbide substrate. The wide band-gap material allows the design of a low $V_F$ Schottky diode structure with a 1200 V rating. Due to the Schottky construction, no recovery is shown at turn-off and ringing patterns are negligible. The minimal capacitive turn-off behavior is independent of temperature. Especially suited for use in PFC and secondary side applications, this ST SiC diode will boost the performance in hard switching conditions. This rectifier will enhance the performance of the targeted application. Its high forward surge capability ensures a good robustness during transient phases.

**Table 1: Device summary**

| Symbol | Value |
|---|---|
| $I_{F(AV)}$ | 15 A |
| $V_{RRM}$ | 1200 V |
| $T_j$ (max.) | 175 °C |
| $V_F$ (typ.) | 1.35 V |



This is information on a product in full production.

www.st.com

# 1 Characteristics

**Table 2: 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) | | | 1200 | V |
| $I_{F(RMS)}$ | Forward rms current | | | 38 | A |
| $I_{F(AV)}$ | Average forward current | $T_C$ = 155 °C, DC current | | 15 | A |
| $I_{FRM}$ | Repetitive peak forward current | $T_C$ = 155 °C, $T_j$ = 175 °C, δ = 0.1 | | 58 | A |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | $T_C$ = 25 °C | 105 | A |
| | | | $T_C$ = 150 °C | 90 | |
| | | $t_p$ = 10 µs square | $T_C$ = 25 °C | 630 | |
| $T_{stg}$ | Storage temperature range | | | -65 to +175 | °C |
| $T_j$ | Operating junction temperature | | | -40 to +175 | °C |

**Table 3: Thermal parameters**

| Symbol | Parameter | Typ. value | Max. value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | 0.45 | 0.6 | °C/W |

**Table 4: Static electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$ (1) | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | - | 7.5 | 90 | µA |
| | | $T_j$ = 150 °C | | - | 45 | 600 | |
| $V_F$ (2) | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 15 A | - | 1.35 | 1.50 | V |
| | | $T_j$ = 150 °C | | - | 1.75 | 2.25 | |

**Notes:**

(1)Pulse test: $t_p$ = 10 ms, δ < 2%

(2)Pulse test: $t_p$ = 500 µs, δ < 2%

To evaluate the conduction losses use, the following equation:

$P = 1.09 \times I_{F(AV)} + 0.0775 \times I_{F}{}^{2}{}_{(RMS)}$

**Table 5: Dynamic electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $Q_{Cj}$ (1) | Total capacitive charge | $V_R$ = 800 V | - | 94 | - | nC |
| $C_j$ | Total capacitance | $V_R$ = 0 V, $T_c$ = 25 °C, F = 1 MHz | - | 1200 | - | pF |
| | | $V_R$ = 800 V, $T_c$ = 25 °C, F = 1 MHz | - | 78 | - | |

**Notes:**

(1)Most accurate value for the capacitive charge: $Q_{cj}(V_R) = \int_0^{V_R} C_j(V)dV$

## 1.1 Characteristics (curves)

**Figure 1: Forward voltage drop versus forward current (typical values)**

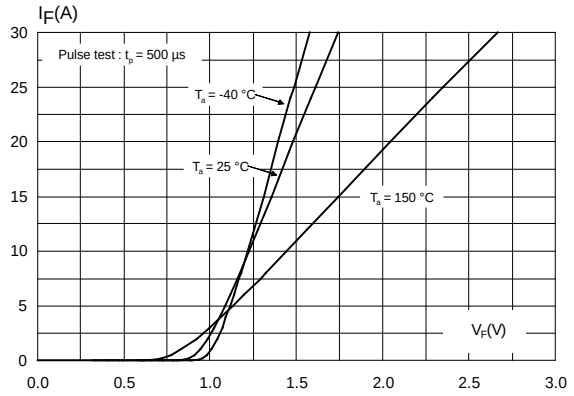



**Figure 2: Reverse leakage current versus reverse voltage applied (typical values)**

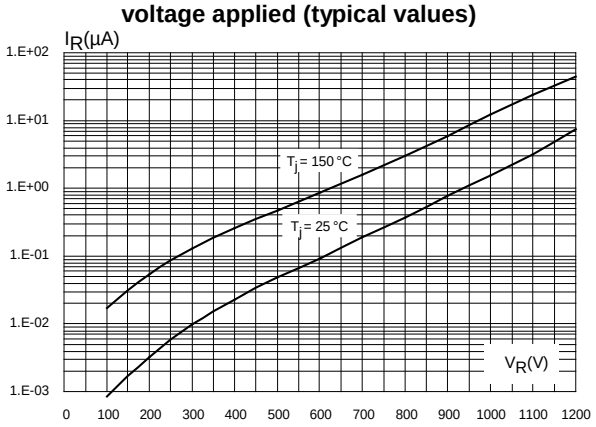



**Figure 3: Peak forward current versus case temperature**

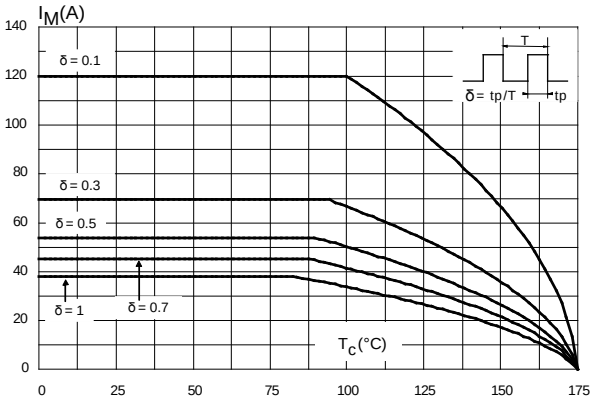



**Figure 4: Junction capacitance versus reverse voltage applied (typical values)**

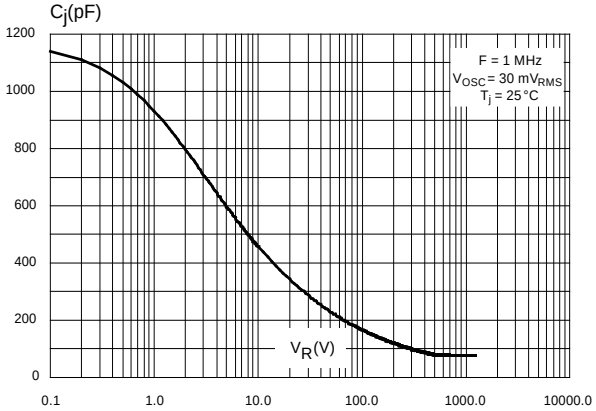



**Figure 5: Relative variation of thermal impedance junction to case versus pulse duration**

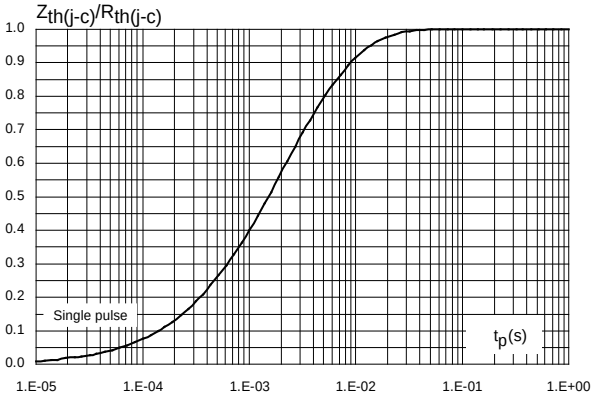



**Figure 6: Non- repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**

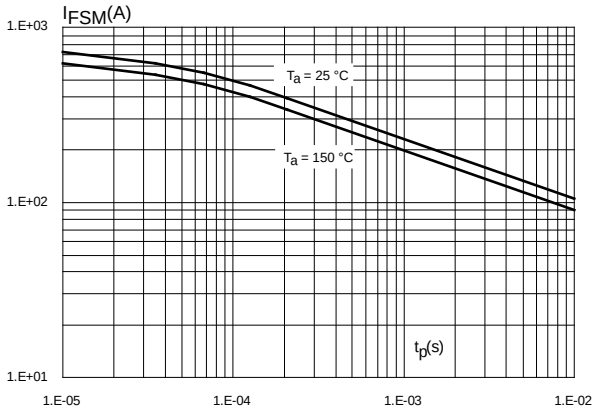
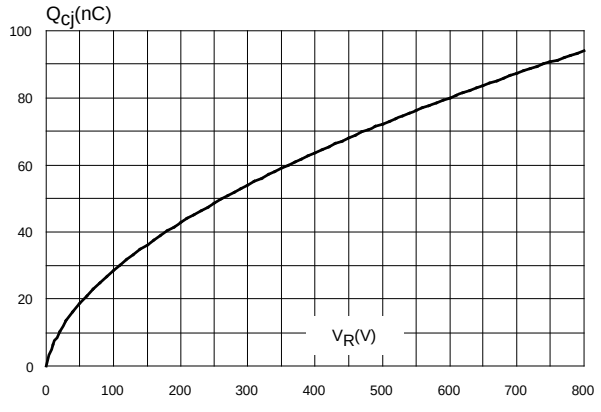


**Figure 7: Total capacitive charges versus reverse voltage applied (typical values)**



# 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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.7 N·m

## 2.1 TO-220AC package information

**Figure 8: TO-220AC package outline**

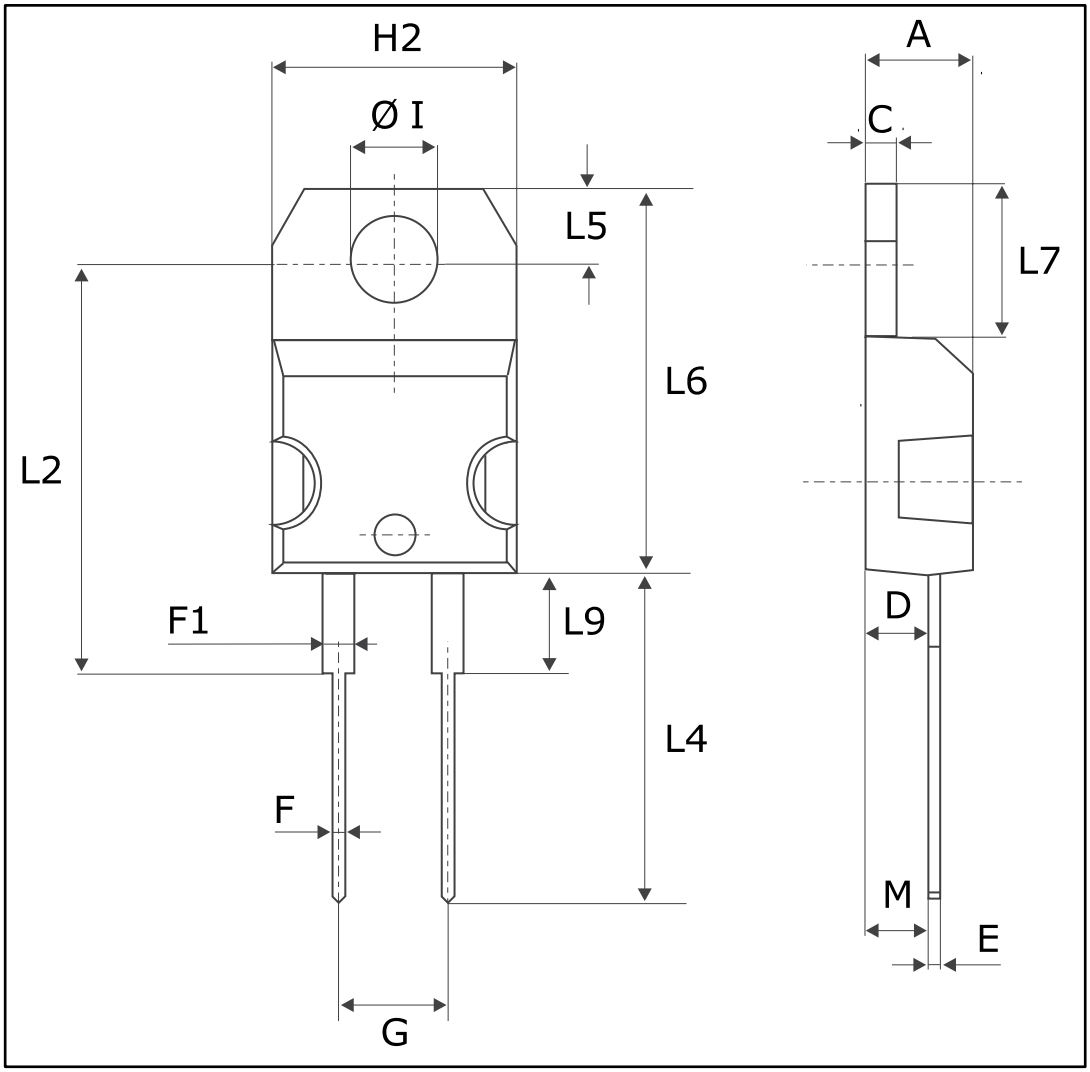


**Table 6: TO-220AC package mechanical data**

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| H2 | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.40 typ. | | 0.645 typ. | |
| L4 | 13.00 | 14.00 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Diam | 3.75 | 3.85 | 0.147 | 0.151 |

# 3 Ordering information

**Table 7: Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| STPSC15H12DY | STPSC15H12DY | TO-220AC | 1.86 g | 50 | Tube |

# 4 Revision history

**Table 8: Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 05-Jan-2017 | 1 | First issue |

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