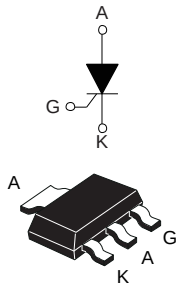
# P0102DN

## Sensitive 0.8 A SCR thyristor

Datasheet - production data




**SOT-223**

## Features

- $I_{T(RMS)}$ 0.8 A
- 125 °C max $T_j$
- Low 0.2 mA gate current
- 400 V $V_{DRM}/V_{RRM}$
- ECOPACK®2 compliant component

## Applications

- Proximity sensors
- Gate driver for large Thyristors
- Overvoltage crowbar protection
- Ground fault circuit interrupters
- Arc fault circuit interrupter
- Solid state relay pilot circuit
- Standby mode power supplies
- Residual current detector

## Description

Thanks to highly sensitive triggering levels, the 0.8 A P0102DN SCR thyristor is suitable for all applications where available gate current is limited. This device offers a high blocking voltage of 400 V, ideal for applications like interrupters circuits in 110 V mains regions.

The surface mount SOT-223 package allows compact, SMD based designs for automated manufacturing.

**Table 1: Device summary**

| Symbol | Value | Unit |
|---|---|---|
| $I_{T(RMS)}$ | 0.8 | A |
| $V_{DRM}/V_{RRM}$ | 400 | V |
| $I_{GT}$ | 0.2 | mA |
| $T_j$ max. | 125 | °C |



This is information on a product in full production.

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# 1 Characteristics

**Table 2: Absolute maximum ratings (limiting values), $T_j$ = 25 °C unless otherwise specified**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | RMS on-state current (180 ° conduction angle) | | $T_{amb}$ = 70 °C | 0.8 | A |
| $I_{T(AV)}$ | Average on-state current (180 ° conduction angle) | | | 0.5 | |
| $I_{TSM}$ | Non repetitive surge peak on-state current ($T_j$ initial = 25 °C | | $t_p$ = 8.3 ms | 8 | A |
| | | | $t_p$ = 10 ms | 7 | |
| $I^2t$ | $I^2t$ value for fusing | | $t_p$ = 10 ms | 0.24 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current $I_G$ = 2 x $I_{GT}$, $t_r \leq$ 100 ns | f = 60 Hz | $T_j$ = 125 °C | 50 | A/µs |
| $V_{DRM}/V_{RRM}$ | Repetitive peak off-state voltage | | $T_j$ = 125 °C | 400 | V |
| $I_{GM}$ | Peak gate current | $t_p$ = 20 µs | $T_j$ = 125 °C | 1 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j$ = 125 °C | 0.1 | W |
| $T_{stg}$ | Storage junction temperature range | | | -40 to +150 | °C |
| $T_j$ | Operating junction temperature | | | -40 to +125 | °C |

**Table 3: Electrical characteristics ($T_j$ = 25 °C unless otherwise specified)**

| Symbol | Test conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{GT}$ | $V_D$ = 12 V, $R_L$ = 140 Ω | | Max. | 200 | µA |
| $V_{GT}$ | | | Max. | 0.8 | V |
| $V_{GD}$ | $V_D$ = $V_{DRM}$, $R_L$ = 3.3 kΩ, $R_{GK}$ = 1000 Ω | $T_j$ = 125 °C | Min. | 0.1 | V |
| $V_{RG}$ | $I_{RG}$ = 10 µA | | Min. | 8 | V |
| $I_H$ | $I_T$ = 50 mA, $R_{GK}$ = 1000 Ω | | Max. | 5 | mA |
| $I_L$ | $I_G$ = 1.2 x $I_{GT}$, $R_{GK}$ = 1000 Ω | | Max. | 6 | mA |
| dV/dt | $V_D$ = 67 % $V_{DRM}$, $R_{GK}$ = 1000 Ω | $T_j$ = 125 °C | Min. | 75 | V/µs |

**Table 4: Static characteristics**

| Symbol | Test conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{TM}$ | $I_{TM}$ = 1.6 A, $t_p$ = 380 µs | $T_j$ = 25 °C | Max. | 1.95 | V |
| $V_{TO}$ | Threshold voltage | $T_j$ = 125 °C | Max. | 0.95 | |
| $R_D$ | Dynamic resistance | $T_j$ = 125 °C | Max. | 600 | mΩ |
| $I_{DRM}/I_{RRM}$ | $V_D$ = $V_{DRM}$; $V_R$ = $V_{RRM}$, $R_{GK}$ = 1000 Ω | $T_j$ = 25 °C | Max. | 1 | µA |
| | | $T_j$ = 125 °C | | 100 | |

**Table 5: Thermal parameters**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{th(j-t)}$ | Junction to tab (DC) | | 30 | |
| $R_{th(j-a)}$ | Junction to ambient (DC) | S(1) = 5 cm² | 60 | °C/W |

**Notes:**

(1)S = copper surface under tab.

# 1.1 Characteristics (curves)

**Figure 1: Maximum average power dissipation versus average on-state current**

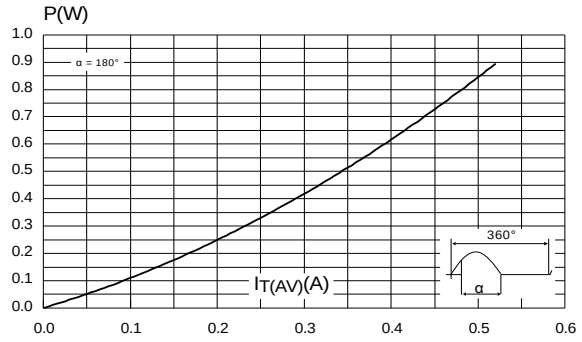



**Figure 2: Average and DC on-state current versus case temperature**

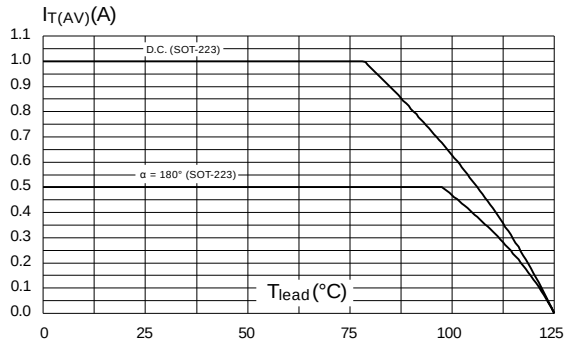



**Figure 3: Average and DC on-state current versus ambient temperature**

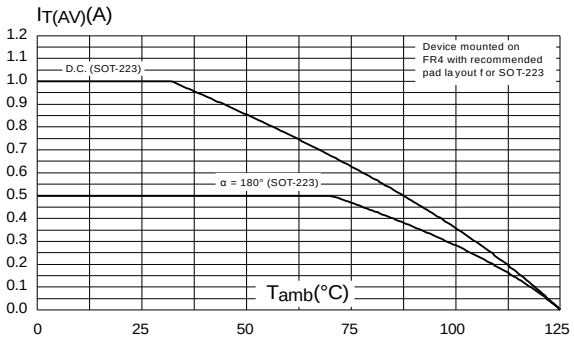



**Figure 4: Relative variation of thermal impedance versus pulse duration**

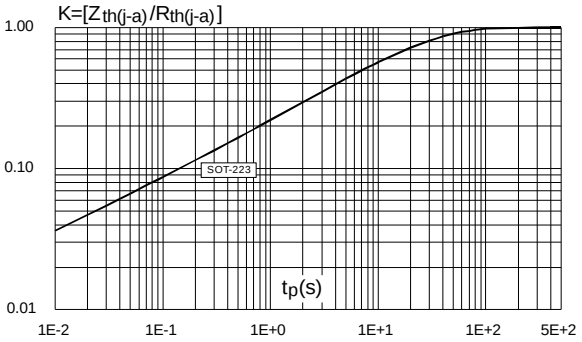



**Figure 5: Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)**

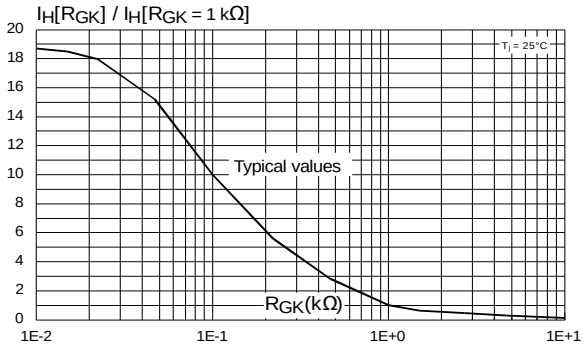



**Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)**

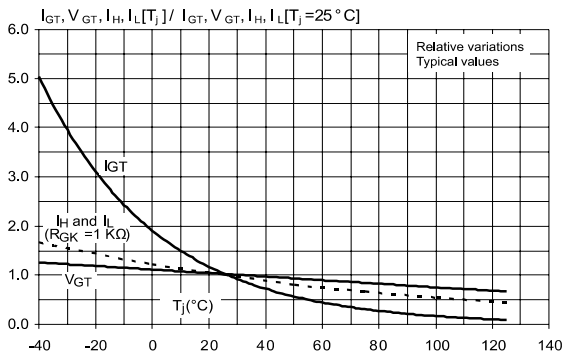


**Figure 7: Relative variation of static dV/dt immunity versus gate-cathode resistance (typical values)**

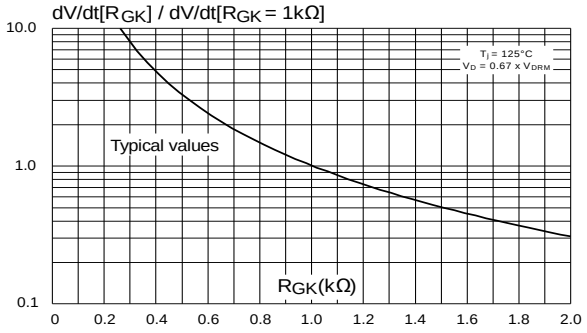



**Figure 8: Relative variation of static dV/dt immunity versus junction temperature (typical values)**

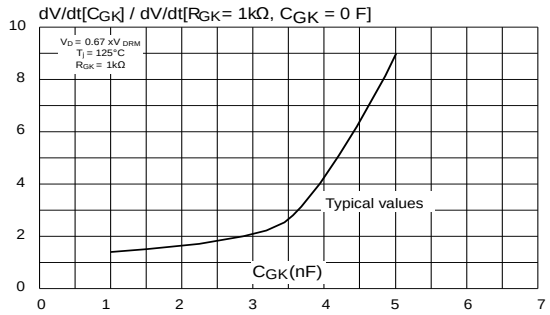



**Figure 9: Surge peak on-state current versus number of cycles**

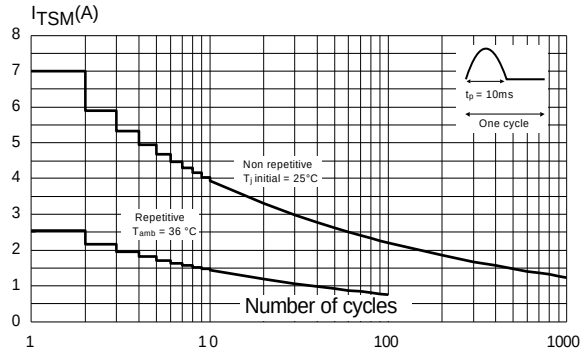



**Figure 10: Non-repetitive surge peak on-state current for sinusoidal pulse ($t_p$ < 10 ms)**

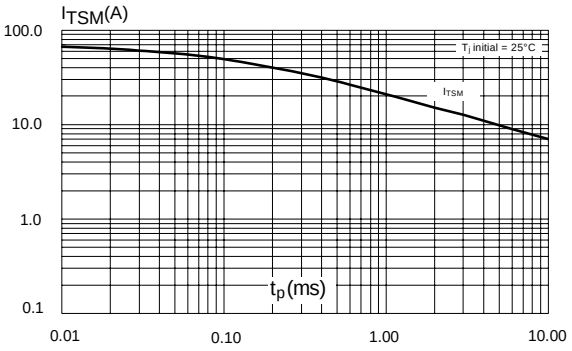



**Figure 11: On-state characteristics (maximum values)**

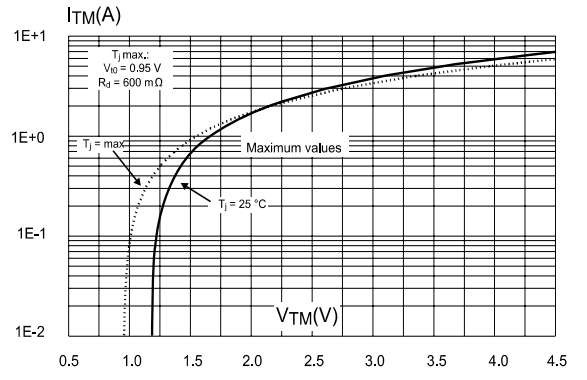
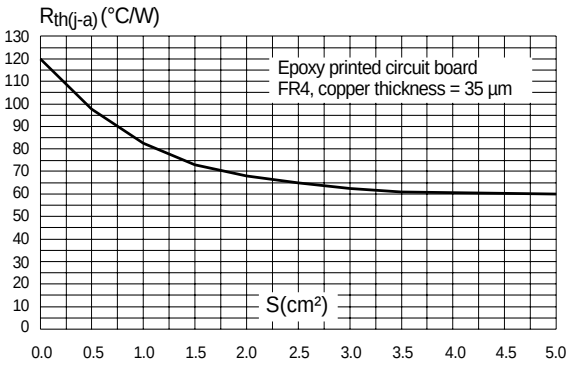



**Figure 12: Thermal resistance junction to ambient versus copper surface tab**



# 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.

- Lead-free package
- Halogen free molding resin
- Epoxy meets UL94, V0

## 2.1 SOT-223 package information

**Figure 13: SOT-223 package outline**

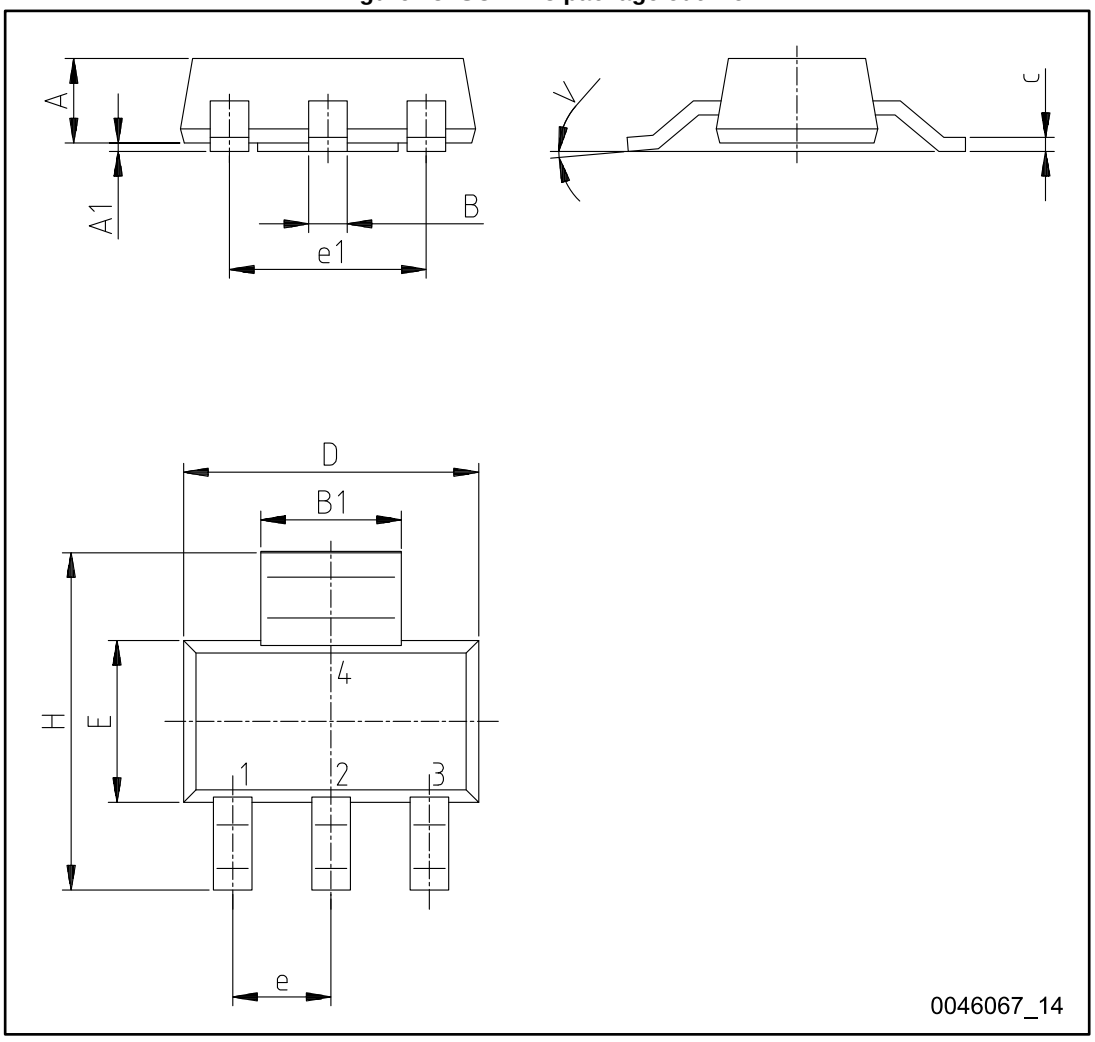


**Table 6: SOT-223 package mechanical data**

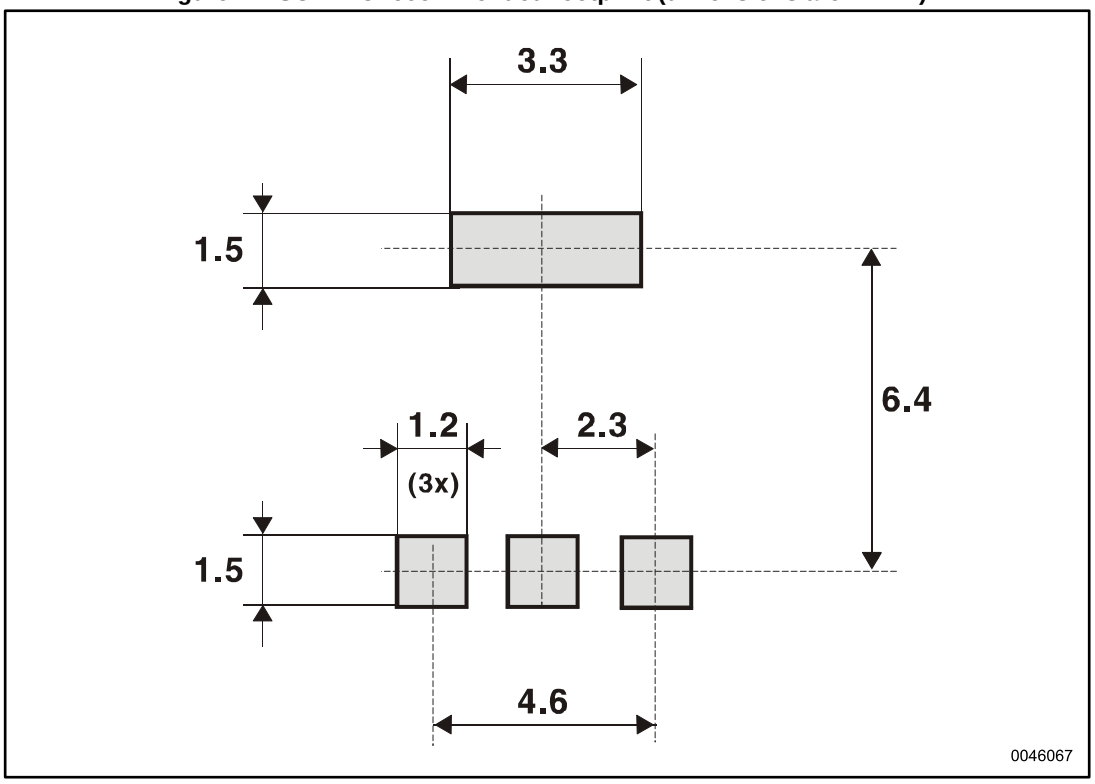
| Dim. | Millimeters | | | Inches[1] | | |
|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.8 | | | 0.0709 |
| A1 | 0.02 | | 0.1 | 0.0008 | | 0.0039 |
| B | 0.6 | 0.7 | 0.85 | 0.0236 | 0.0276 | 0.0335 |
| B1 | 2.9 | 3 | 3.15 | 0.1142 | 0.1181 | 0.1240 |
| c | 0.24 | 0.26 | 0.35 | 0.0094 | 0.0102 | 0.0138 |
| D[2] | 6.3 | 6.5 | 6.7 | 0.2480 | 0.2559 | 0.2638 |
| e | | 2.3 | | | 0.0906 | |
| e1 | | 4.6 | | | 0.1811 | |
| E | 3.3 | 3.5 | 3.7 | 0.1299 | 0.1378 | 0.1457 |
| H | 6.7 | 7.0 | 7.3 | 0.2638 | 0.2756 | 0.2874 |
| V | | | 10º | | | 10° |

**Notes:**

[1]Inches dimensions given only for reference

[2]Does not include mold flash or protusions. Mold flash or protusions must not exceed 0.15 mm (0.006 inches)

**Figure 14: SOT-223 recommended footprint (dimensions are in mm)**



# 3 Ordering information

**Figure 15: Ordering information scheme**

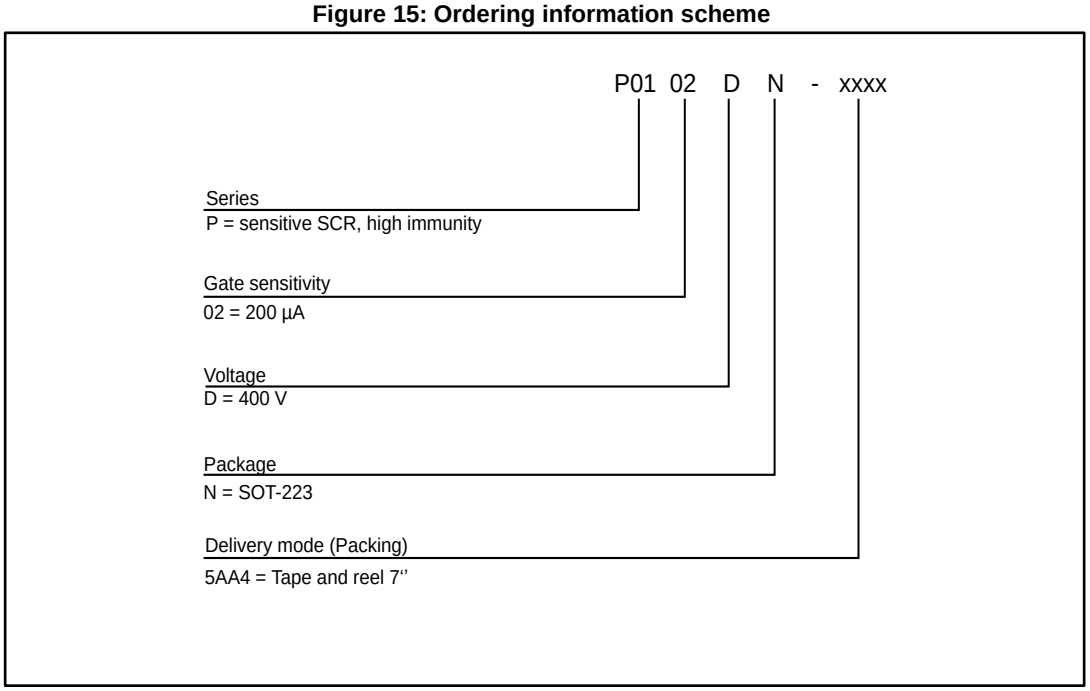



**Table 7: Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| P0102DN 5AA4 | P2D | SOT-223 | 0.12 g | 1000 | Tape and reel 7" |

# 4 Revision history

**Table 8: Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 26-Oct-2017 | 1 | Initial release. |

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