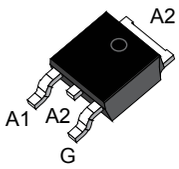
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# Z0409MB

Datasheet

## 4 A - Triac in DPAK package




**DPAK**

## Features

- 4 A Triac
- $V_{DRM}$ / $V_{RRM}$ = 600 V and $V_{DSM}$ / $V_{RSM}$ = 750 V
- 125 °C maximum junction temperature $T_j$
- DPAK package
- 4 quadrants triacs with $I_{GT}$ = 10 mA
- Halogen-free molding, lead-free plating
- ECOPACK2 compliant

## Applications

- Actuators
- Heating elements
- Inrush current limiting circuits

## Description

The Z0409MB series is 4 A Triac housed in compact SMD DPAK. This 4 quadrants device is suited to home appliances or power tools and industrial systems and drives loads up to 4 A.

| Product status link |
|---|
| Z0409MB |

| Product summary | |
|---|---|
| $I_{T(RMS)}$ | 4 A |
| $V_{DSM}/V_{RSM}$ | 750 V |
| $I_{GT}$ | 10 mA |
| $T_j$ max. | 125 °C |

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# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | $T_c$ = 107 °C | 4 | A |
| $I_{TSM}$ | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C) | t = 16.7 ms | 16 | A |
| | | t = 20 ms | 15 | |
| $I^2t$ | $I^2t$ value for fusing | $t_p$ = 10 ms | 1.5 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current, $I_G$ = 2 x $I_{GT}$, tr ≤ 100 ns, f = 120 Hz | $T_j$ = 125 °C | 50 | A/µs |
| $V_{DRM}/V_{RRM}$ | Repetitive peak off-state voltage | $T_j$ = 125 °C | 600 | V |
| $V_{DSM}/V_{RSM}$ | Non Repetitive peak off-state voltage, 10 ms | | 750 | V |
| $I_{GM}$ | Maximum peak gate current | $t_p$ = 20 µs, $T_j$ = 125 °C | 1.2 | A |
| $P_{GM}$ | Maximum gate power dissipation | | 0.5 | W |
| $T_{stg}$ | Storage temperature range | | -40 to +125 | °C |
| $T_j$ | Operating junction temperature range | | -40 to +125 | °C |
| $T_L$ | Maximum lead temperature for soldering during 10 s | | 260 | °C |

**Table 2. Electrical characteristics ($T_j$ = 25 °C, unless otherwise specified)**

| Symbol | Test conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{GT}$ (1) | $V_D$ = 12 V, $R_L$ = 33 Ω | | Max. | 10 | mA |
| $V_{GT}$ | $V_D$ = 12 V, $R_L$ = 33 Ω | | Max. | 1.3 | V |
| $V_{GD}$ | $V_D$ = $V_{DRM}$, $R_L$ = 3.3 kΩ | $T_j$ = 125 °C | Min. | 0.2 | V |
| $I_L$ | $I_G$ = 1.2 x $I_{GT}$ | I-III-IV | Max. | 15 | mA |
| | | II | Max. | 25 | mA |
| $I_H$ (2) | $I_T$ = 500 mA, gate open | | Max. | 10 | mA |
| dV/dt (2) | $V_D$ = 67 % $V_{DRM}$ ; $V_R$ = 67 % $V_{RRM}$ , gate open | $T_j$ = 110 °C | Min. | 100 | V/µs |
| (dV/dt)c (2) | (dI/dt)c = 1.8 A/ms | $T_j$ = 110 °C | Min. | 2 | V/µs |

1. *For both polarities of OUT pin referenced to COM pin.*
2. *For both polarities of A2 referenced to A1.*

**Table 3. Static characteristics**

| Symbol | Test conditions | $T_j$ | | Value | Unit |
|---|---|---|---|---|---|
| $V_{TM}$ (1) | $I_{TM}$ = 5.5 A, $t_p$ = 380 µs | 25 °C | Max. | 2 | V |
| $V_{TO}$ (1) | Threshold voltage | 125 °C | Max. | 0.95 | V |
| $R_D$ (1) | Dynamic resistance | 125 °C | Max. | 180 | mΩ |
| $I_{DRM}/I_{RRM}$ | $V_D$ = $V_R$ = $V_{DRM}$ = $V_{RRM}$ | 25 °C | Max. | 5 | µA |
| | | 125°C | | 0.5 | mA |

1. *For both polarities of A2 referenced to A1.*

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Table 4. **Thermal resistance**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case (AC) | Max. | 3 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient: $S_{CU}$ = 0.5 cm² | Typ. | 70 | °C/W |

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## 1.1 Characteristics (curves)

**Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)**

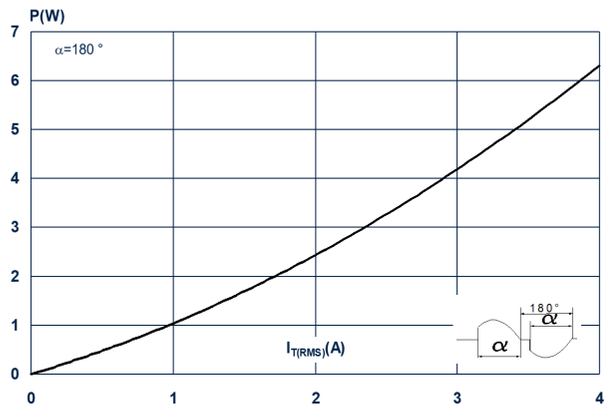



**Figure 2. Average and DC on-state current versus case temperature**

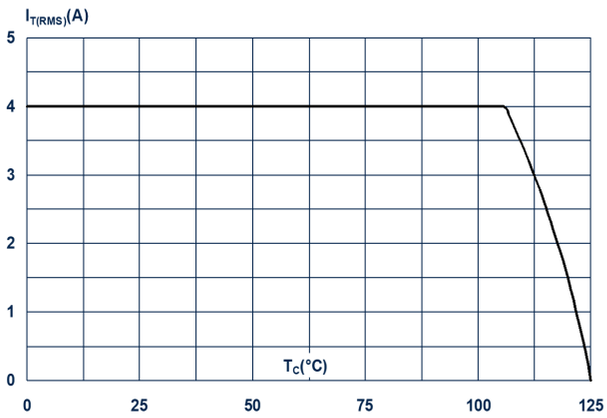



**Figure 3. On-state RMS current versus ambient temperature (full cycle)**

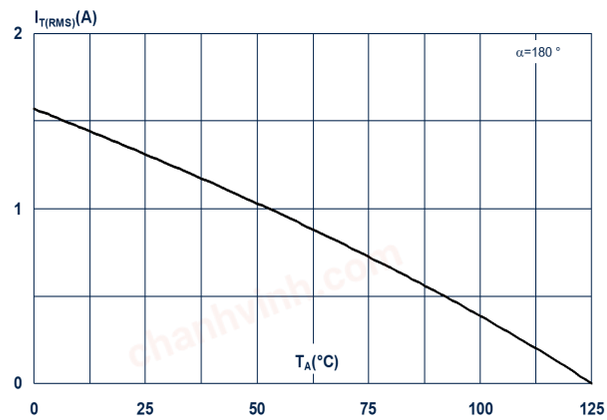



**Figure 4. Relative variation of thermal impedance versus pulse duration**

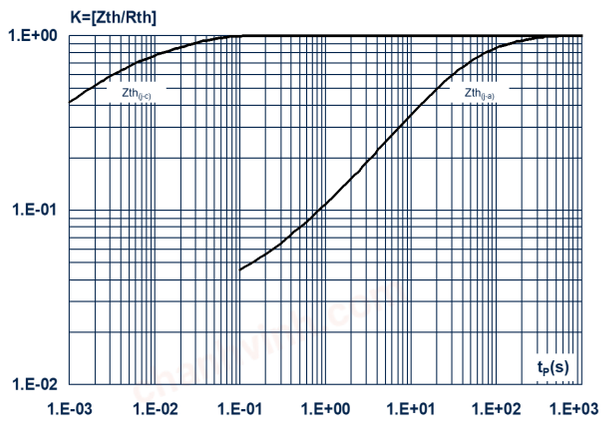



**Figure 5. Relative variation of gate triggering current and voltage versus junction temperature (typical values)**

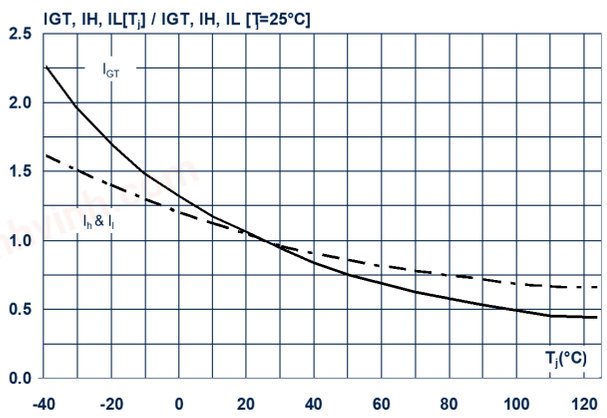
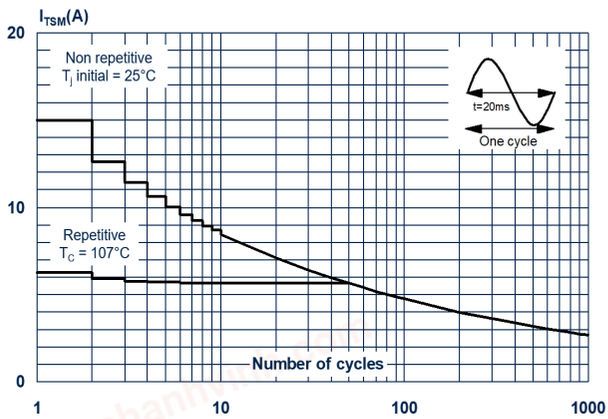



**Figure 6. Surge peak on-state current versus number of cycles**



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**Figure 7.** Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p$ < 10 ms and corresponding value of $I^2t$

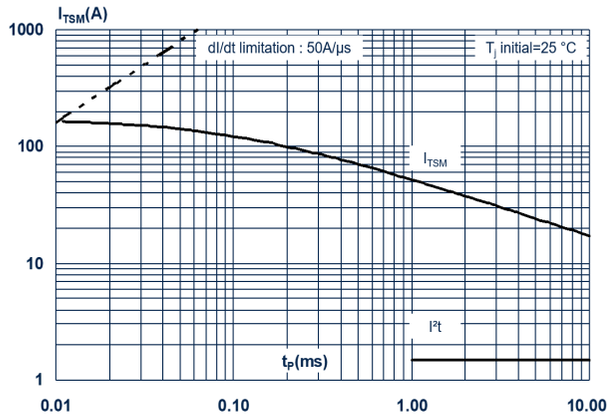



**Figure 8.** On-state characteristics (maximum values)

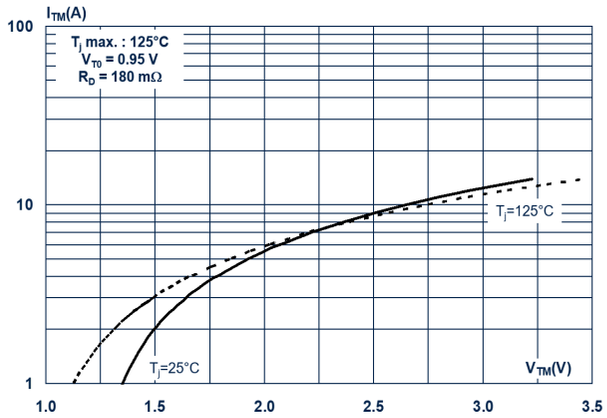



**Figure 9.** Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

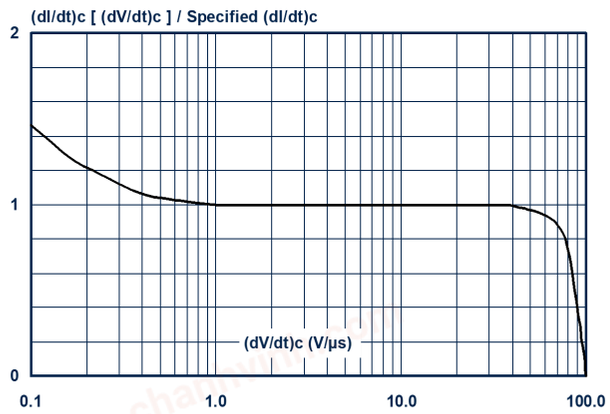



**Figure 10.** Relative variation of critical rate of decrease of main current versus junction temperature

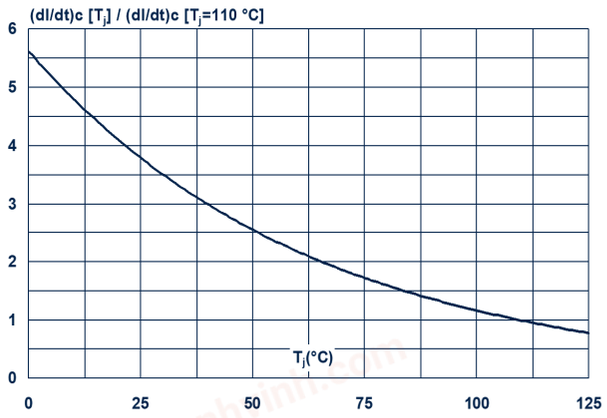



**Figure 11.** Relative variation of static dV/dt immunity versus junction temperature

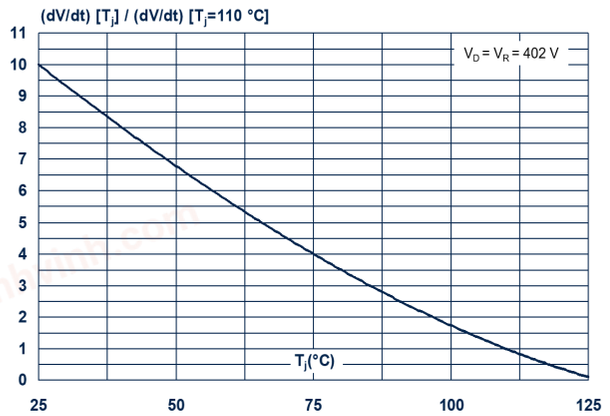
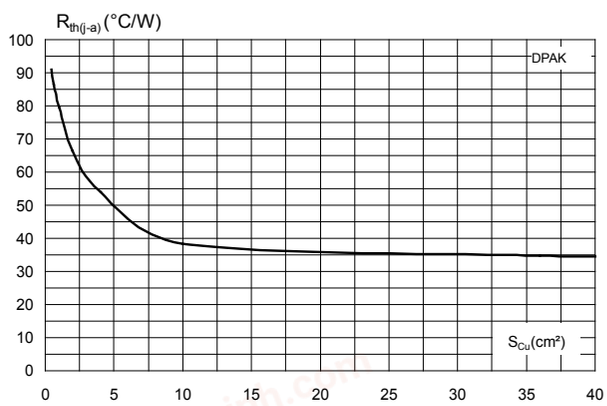



**Figure 12.** Thermal resistance junction to ambient versus copper surface under tab (typical values)



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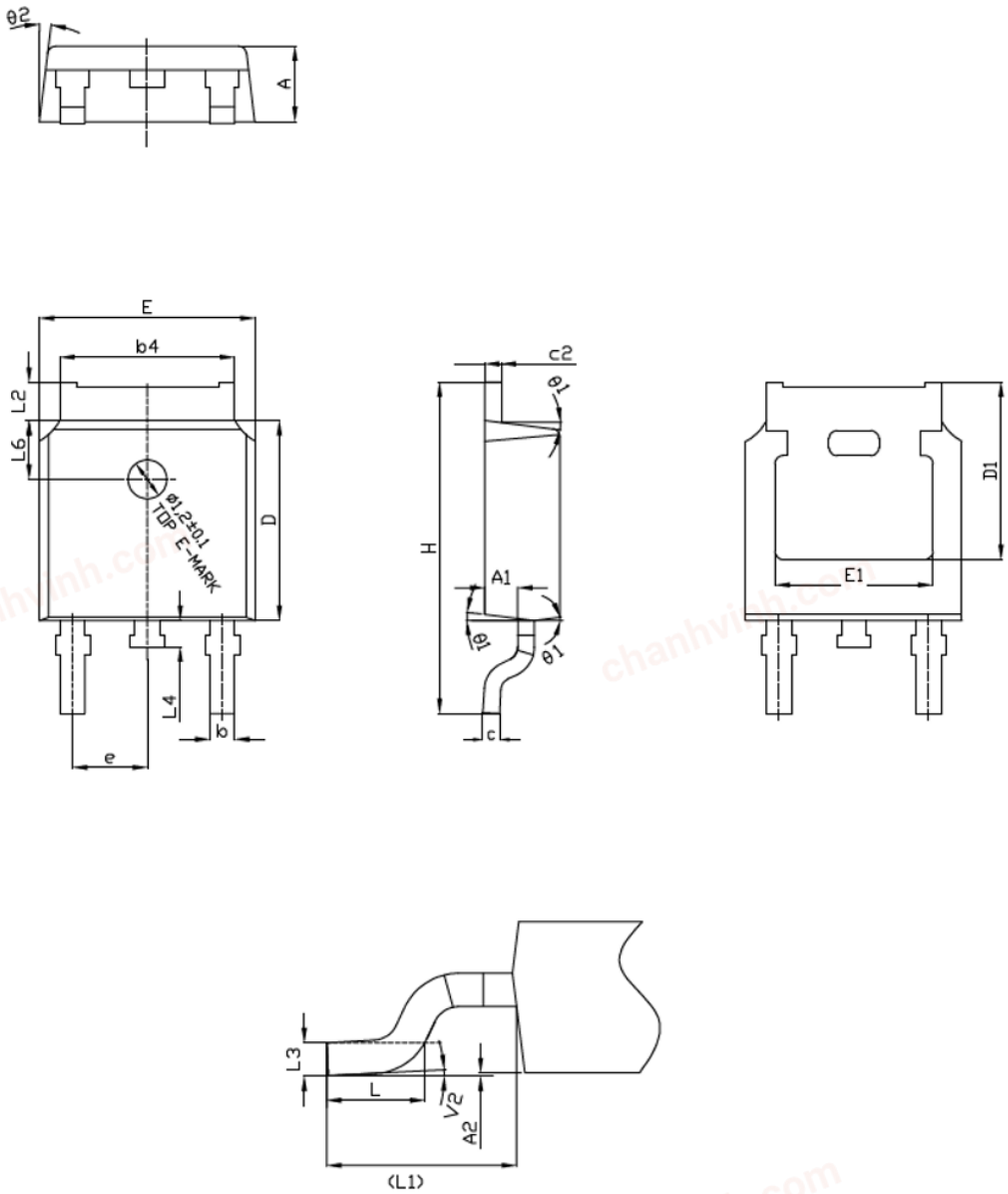
# 2 Package information

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 DPAK package information

- Molding compounded resin is halogen free and meets UL94 flammability standard, level V0
- Lead-free package leads plating

**Figure 13. DPAK package outline**



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Table 5. **DPAK package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches[1] | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.20 | 2.30 | 2.38 | 0.0866 | 0.0906 | 0.0937 |
| A1 | 0.90 | 1.01 | 1.10 | 0.0354 | 0.0398 | 0.0433 |
| A2 | 0.00 | | 0.10 | 0.0000 | | 0.0039 |
| b | 0.72 | | 0.85 | 0.0283 | | 0.335 |
| b4 | 5.13 | 5.33 | 5.46 | 0.2020 | 0.2098 | 0.2150 |
| c | 0.47 | | 0.60 | 0.0185 | | 0.0236 |
| c2 | 0.47 | | 0.60 | 0.0185 | | 0.0236 |
| D | 6.00 | 6.10 | 6.20 | 0.2362 | 0.2402 | 0.2441 |
| D1 | 5.15 | 5.40 | 5.65 | 0.2028 | 0.2126 | 0.2224 |
| E | 6.50 | 6.60 | 6.70 | 0.2550 | 0.2598 | 0.2638 |
| E1 | 4.70 | 4.85 | 5.00 | 0.1850 | 0.1909 | 0.1969 |
| e | 2.186 | 2.286 | 2.386 | 0.0860 | 0.0900 | 0.0940 |
| H | 9.80 | 10.10 | 10.40 | 0.3858 | 0.3976 | 0.4094 |
| L | 1.40 | 1.50 | 1.70 | 0.0551 | 0.0591 | 0.0669 |
| L1 | 2.90 REF | | | 0.1142 REF | | |
| L2 | 0.90 | | 1.25 | 0.0354 | | 0.0492 |
| L3 | 0.51 BSC | | | 0.201 BSC | | |
| L4 | 0.60 | 0.80 | 1.00 | 0.0236 | 0.0315 | 0.0394 |
| L6 | 1.80 BSC | | | 0.0709 BSC | | |
| Θ1 | 5° | 7° | 9° | 5° | 7° | 9° |
| Θ2 | 5° | 7° | 9° | 5° | 7° | 9° |
| V2 | 0° | | 8° | 0° | | 8° |

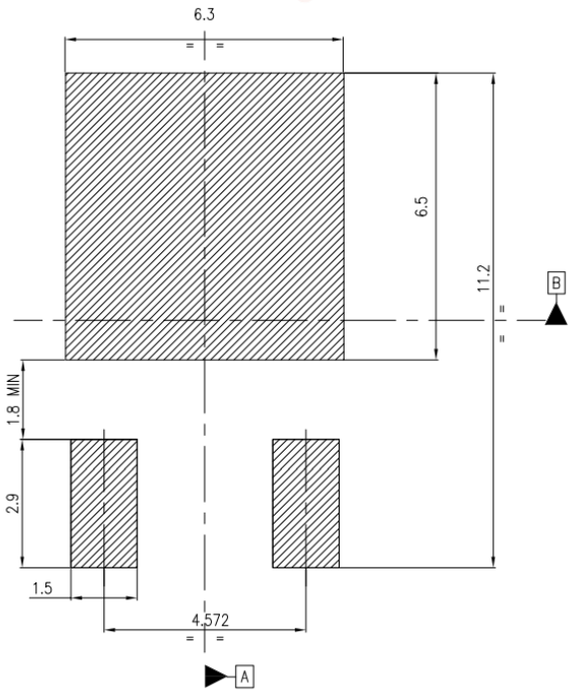
1. *Dimensions in inches are given for reference only*

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

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Figure 14. **DPAK recommended footprint (dimensions are in mm)**



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## 3 Ordering information

Figure 15. **Ordering information scheme**

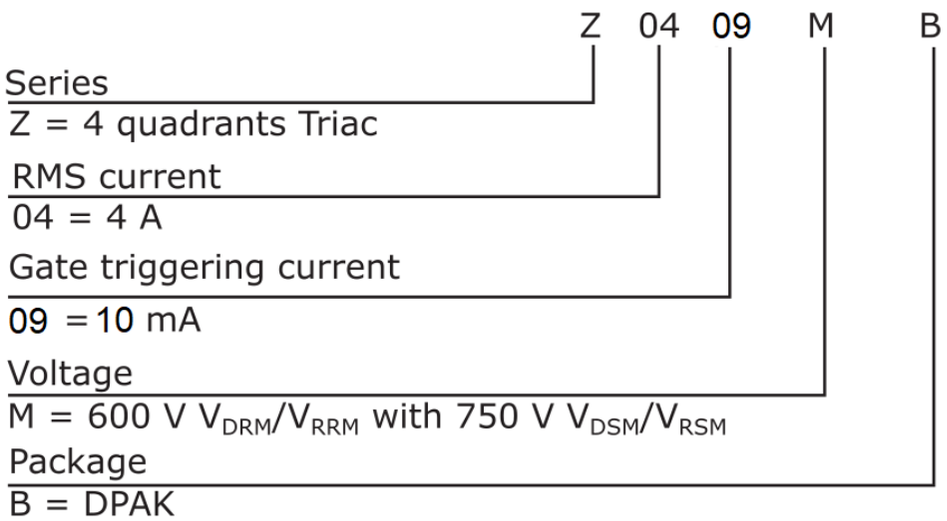



Table 6. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| Z0409MB | Z0409MB | DPAK | 0.3 g | 2500 | Tape and reel |

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## Revision history

Table 7. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 05-Sep-2022 | 1 | Initial release. |

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