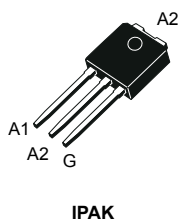


## 4 A - Triac in IPAK package



### Features

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

### Applications

- Actuators
- Heating elements
- Inrush current limiting circuits

### Description

The Z0409MH series is 4 A Triac housed in compact through-hole IPAK package. 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

[Z0409MH](#)

#### Product summary

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

# 1 Characteristics

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

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

**Table 2. Electrical characteristics ( $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

| Symbol            | Test conditions                                         |                                             | Value | Unit                   |
|-------------------|---------------------------------------------------------|---------------------------------------------|-------|------------------------|
| $I_{GT}^{(1)}$    | $V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$          | Max.                                        | 10    | mA                     |
| $V_{GT}$          | $V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$          | Max.                                        | 1.3   | V                      |
| $V_{GD}$          | $V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$            | $T_j = 125\text{ }^{\circ}\text{C}$<br>Min. | 0.2   | V                      |
| $I_L$             | $I_G = 1.2 \times I_{GT}$                               | I-III-IV<br>Max.                            | 15    | mA                     |
|                   |                                                         | II<br>Max.                                  | 25    | mA                     |
| $I_H^{(2)}$       | $I_T = 500\text{ mA}$ , gate open                       | Max.                                        | 10    | mA                     |
| $dV/dt^{(2)}$     | $V_D = 67\% V_{DRM}$ ; $V_R = 67\% V_{RRM}$ , gate open | $T_j = 110\text{ }^{\circ}\text{C}$<br>Min. | 100   | $\text{V}/\mu\text{s}$ |
| $(dV/dt)_c^{(2)}$ | $(di/dt)_c = 1.8\text{ A/ms}$                           | $T_j = 110\text{ }^{\circ}\text{C}$<br>Min. | 2     | $\text{V}/\mu\text{s}$ |

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             |
|-------------------|----------------------------------------------------------|-------------------------------|------|-------|------------------|
| $V_{TM}^{(1)}$    | $I_{TM} = 5.5\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$ | $25\text{ }^{\circ}\text{C}$  | Max. | 2     | V                |
| $V_{TO}^{(1)}$    | Threshold voltage                                        | $125\text{ }^{\circ}\text{C}$ | Max. | 0.95  | V                |
| $R_D^{(1)}$       | Dynamic resistance                                       | $125\text{ }^{\circ}\text{C}$ | Max. | 180   | $\text{m}\Omega$ |
| $I_{DRM}/I_{RRM}$ | $V_D = V_R = V_{DRM} = V_{RRM}$                          | $25\text{ }^{\circ}\text{C}$  | Max. | 5     | $\mu\text{A}$    |
|                   |                                                          | $125\text{ }^{\circ}\text{C}$ |      | 0.5   | mA               |

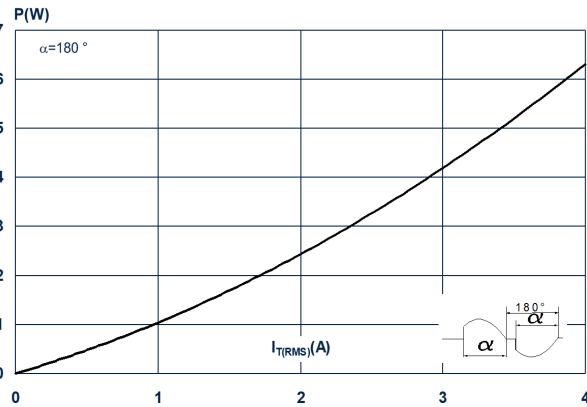
1. For both polarities of A2 referenced to A1.

**Table 4. Thermal resistance**

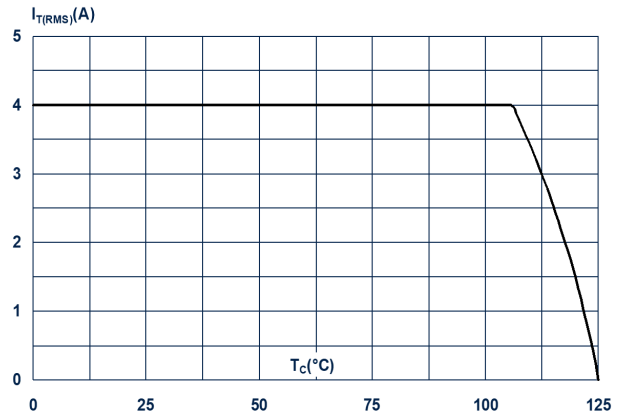
| Symbol        | Parameter             |      | Value | Unit |
|---------------|-----------------------|------|-------|------|
| $R_{th(j-c)}$ | Junction to case (AC) | Max. | 3     | °C/W |
| $R_{th(j-a)}$ | Junction to ambient   | Typ. | 70    | °C/W |

## 1.1 Characteristics (curves)

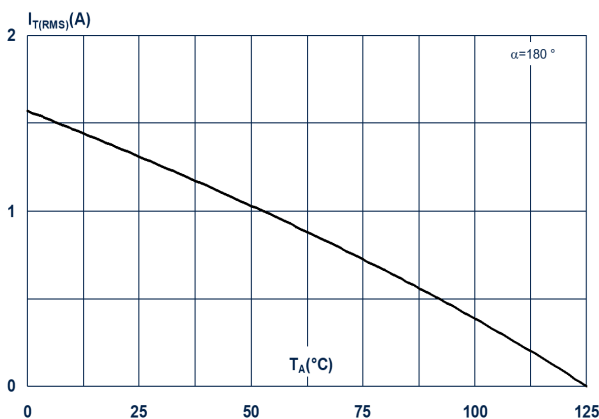
**Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)**



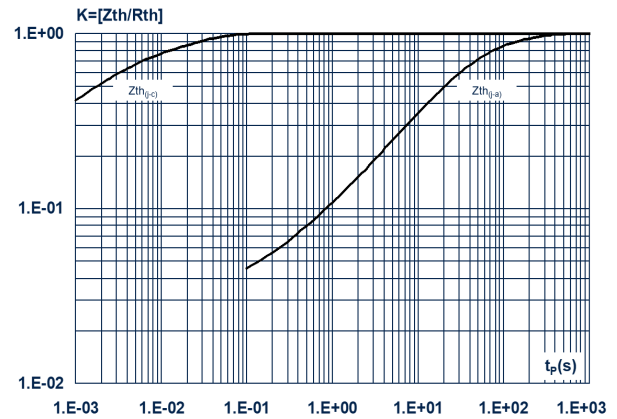
**Figure 2. Average and DC on-state current versus case temperature**



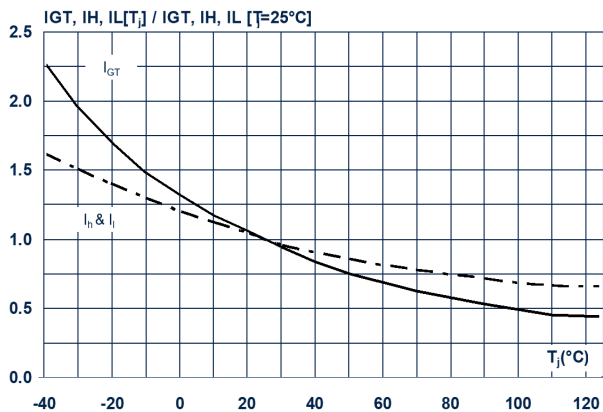
**Figure 3. On-state RMS current versus ambient temperature (full cycle)**



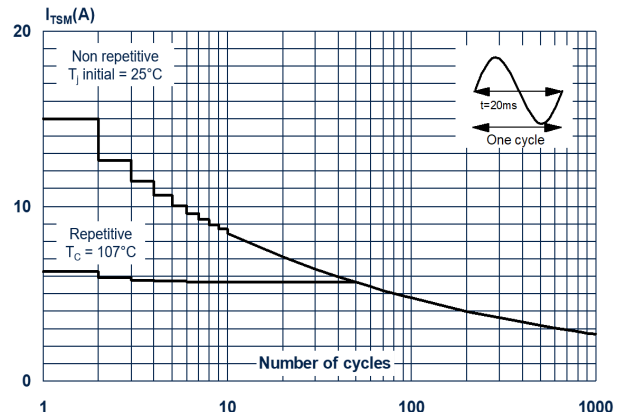
**Figure 4. Relative variation of thermal impedance versus pulse duration**



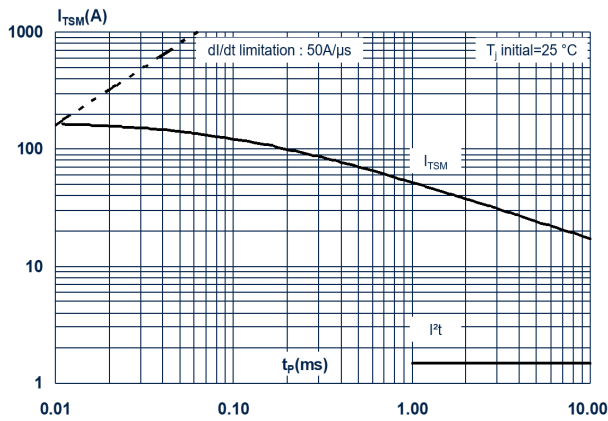
**Figure 5. Relative variation of gate triggering current and voltage versus junction temperature (typical values)**



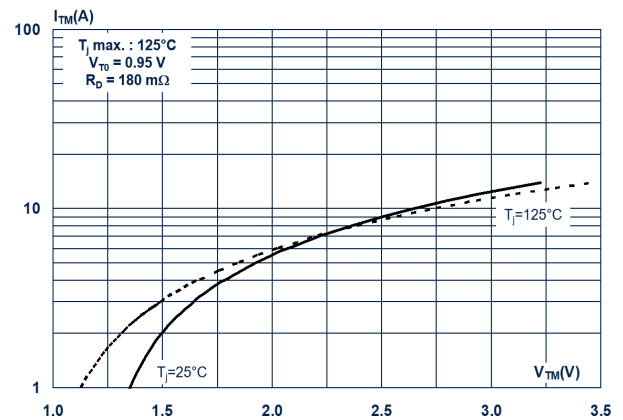
**Figure 6. Surge peak on-state current versus number of cycles**



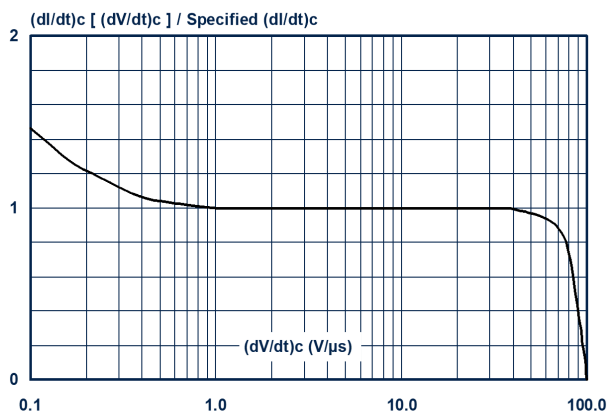
**Figure 7.** Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms and corresponding value of  $I^2t$



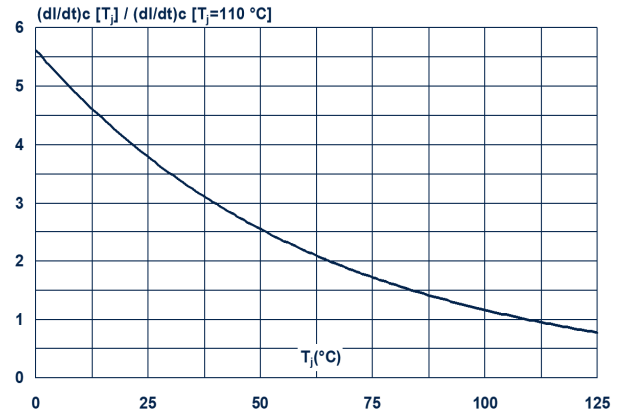
**Figure 8.** On-state characteristics (maximum values)



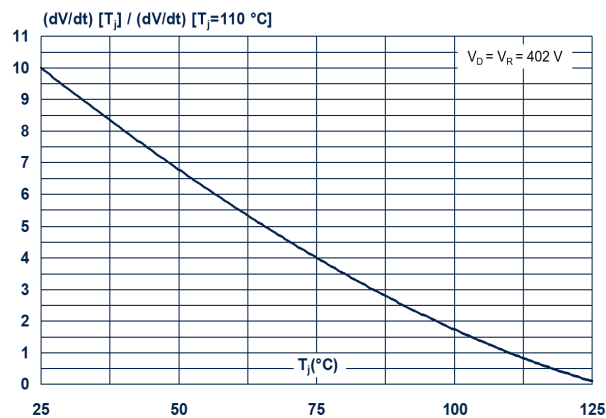
**Figure 9.** Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values)



**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



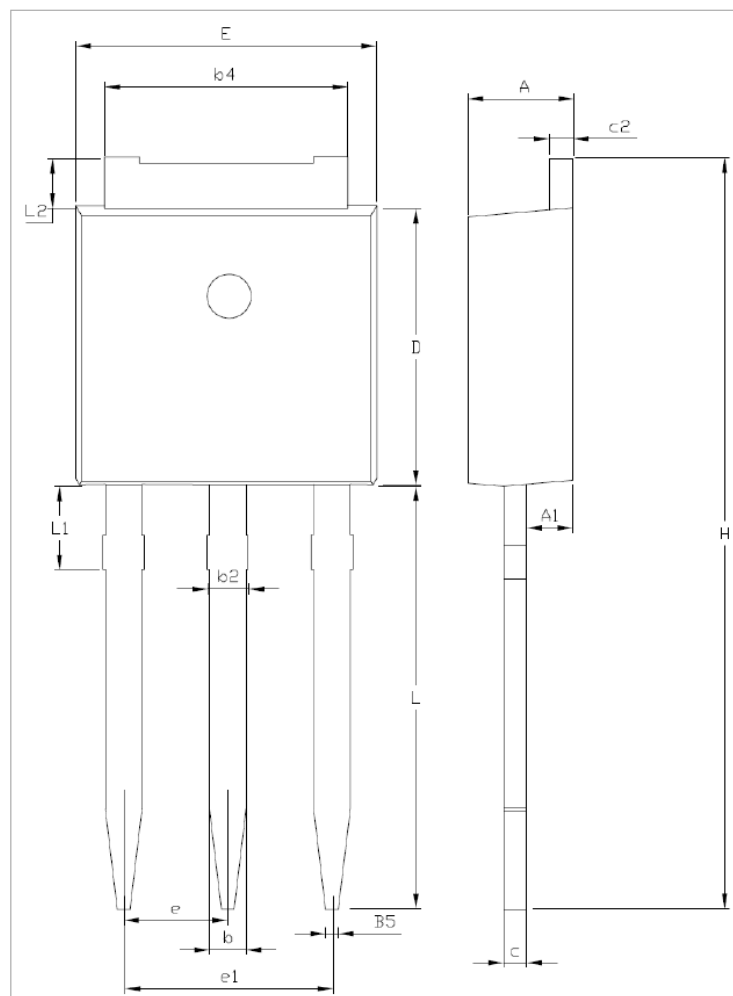
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 IPAK package information

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

**Figure 12. IPAK package outline**



**Table 5. IPAK package mechanical data**

| Ref. | Dimensions                             |       |      |       |       |       |
|------|----------------------------------------|-------|------|-------|-------|-------|
|      | MillimetersInches (for reference only) |       |      |       |       |       |
|      | Min.                                   | Typ.  | Max. | Min.  | Typ.  | Max.  |
| A    | 2.20                                   |       | 2.40 | 0.086 |       | 0.094 |
| A1   | 0.90                                   |       | 1.10 |       |       | 0.035 |
| b    | 0.64                                   |       | 0.90 | 0.025 |       | 0.035 |
| b2   |                                        |       | 0.95 |       |       | 0.037 |
| b4   | 5.20                                   |       | 5.43 |       |       |       |
| B5   |                                        | 0.30  |      |       | 0.012 |       |
| c    | 0.45                                   |       | 0.60 |       |       |       |
| c2   | 0.46                                   |       | 0.60 |       |       |       |
| D    | 6                                      |       | 6.20 |       |       |       |
| E    | 6.40                                   |       | 6.65 | 0.252 |       | 0.262 |
| e    |                                        | 2.28  |      |       | 0.090 |       |
| e1   | 4.40                                   |       | 4.60 | 0.173 |       | 0.181 |
| H    |                                        | 16.10 |      |       | 0.634 |       |
| L    | 9                                      |       | 9.60 | 0.354 |       | 0.377 |
| L1   | 0.8                                    |       | 1.20 | 0.031 |       | 0.047 |
| L2   |                                        | 0.80  | 1.25 |       | 0.031 | 0.049 |
| V1   |                                        | 10°   |      |       | 10°   |       |

### 3 Ordering information

Figure 13. Ordering information scheme

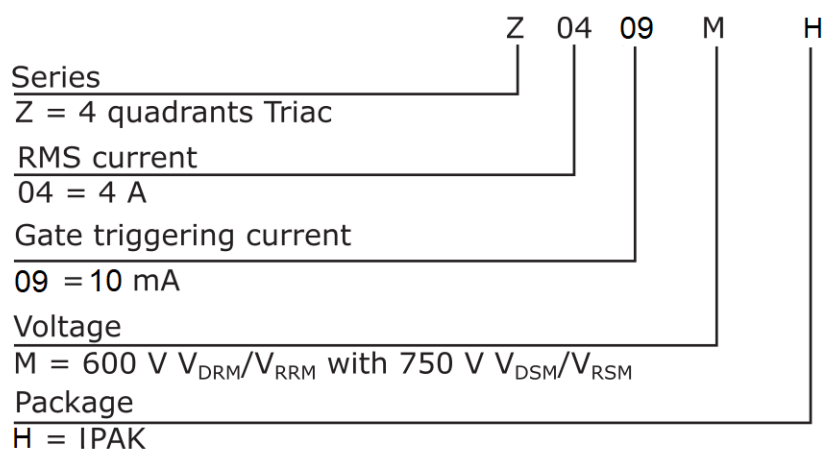


Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|------------|---------|---------|--------|-----------|---------------|
| Z0409MH    | Z0409MH | IPAK    | 0.31 g | 75        | Tube          |

## Revision history

**Table 7. Document revision history**

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

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