

TMP type

PCB type

FEATURES

1. Supports magnetron and heater loads.

Capable for switching magnetron and heater loads found in microwave ovens.

2. Excellent heat resistance

Ambient temperature: up to 85°C 185°F
 Certified UL coil insulation class B and class F

3. High insulation resistance

Creepage distance and clearances between contact and coil:

Min. 8 mm .315 inch

Surge withstand voltage: 10,000V

4. Low operating power

Nominal operating power: 400mW/
 200mW (High sensitive type)

5. A wide variety of types

Product line consists of 4 types with different shapes and pins

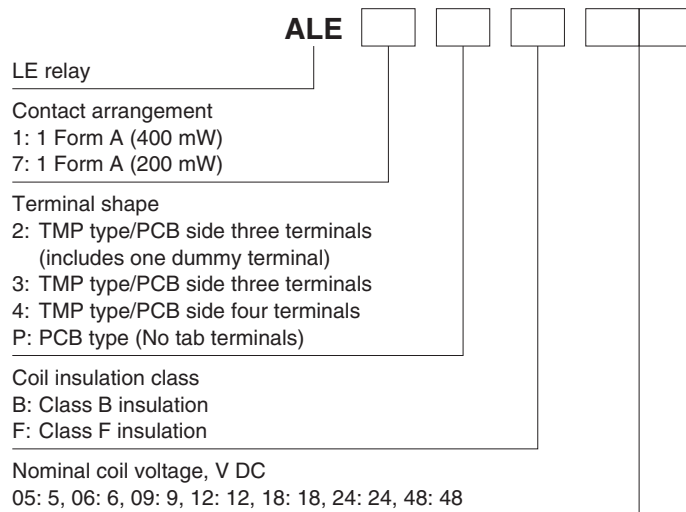
6. Conforms to the various safety standards:

UL, CSA, TÜV and VDE approved
 UL, CSA and VDE approved (PCB type)

TYPICAL APPLICATIONS

- Microwave ovens
- Refrigerators
- OA equipment

ORDERING INFORMATION



Notes: • Certified by UL, CSA, TÜV and VDE (TMP type).
 • Certified by UL, CSA and VDE (PCB type).

LE (ALE)

TYPES

1. Standard type

| Contact arrangement | Nominal coil voltage | TMP type | | | PCB type (No tab terminals) |
|---------------------|----------------------|---|--------------------------|-------------------------|--------------------------------|
| | | PCB side three terminals (includes one dummy terminal) | PCB side three terminals | PCB side four terminals | |
| | | Part No. | Part No. | Part No. | |
| 1 Form A | 5V DC | ALE12○05 | ALE13○05 | ALE14○05 | ALE1P○05 |
| | 6V DC | ALE12○06 | ALE13○06 | ALE14○06 | ALE1P○06 |
| | 9V DC | ALE12○09 | ALE13○09 | ALE14○09 | ALE1P○09 |
| | 12V DC | ALE12○12 | ALE13○12 | ALE14○12 | ALE1P○12 |
| | 18V DC | ALE12○18 | ALE13○18 | ALE14○18 | ALE1P○18 |
| | 24V DC | ALE12○24 | ALE13○24 | ALE14○24 | ALE1P○24 |
| | 48V DC | ALE12○48 | ALE13○48 | ALE14○48 | ALE1P○48 |

○: Input the following letter. Class B: B, Class F: F

Note: Standard packing; Carton: 100 pcs. Case 500 pcs.

2. High sensitive type

| Contact arrangement | Nominal coil voltage | TMP type | | | PCB type (No tab terminals) |
|--|----------------------|---|--------------------------|-------------------------|--------------------------------|
| | | PCB side three terminals (includes one dummy terminal) | PCB side three terminals | PCB side four terminals | |
| | | Part No. | Part No. | Part No. | |
| 1 Form A (High sensitivity: 200mW) | 5V DC | ALE72○05 | ALE73○05 | ALE74○05 | ALE7P○05 |
| | 6V DC | ALE72○06 | ALE73○06 | ALE74○06 | ALE7P○06 |
| | 9V DC | ALE72○09 | ALE73○09 | ALE74○09 | ALE7P○09 |
| | 12V DC | ALE72○12 | ALE73○12 | ALE74○12 | ALE7P○12 |
| | 18V DC | ALE72○18 | ALE73○18 | ALE74○18 | ALE7P○18 |
| | 24V DC | ALE72○24 | ALE73○24 | ALE74○24 | ALE7P○24 |
| | 48V DC | ALE72○48 | ALE73○48 | ALE74○48 | ALE7P○48 |

○: Input the following letter. Class B: B, Class F: F

Note: Standard packing; Carton: 100 pcs. Case 500 pcs.

RATING

1. Coil data

1) Standard type

| Nominal coil voltage | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Nominal operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Nominal operating power (at 20°C 68°F) | Max. applied voltage (at 20°C 68°F) |
|----------------------|--|---|--|--|---|--|
| 5V DC | 75%V or less of nominal voltage (Initial) | 5%V or more of nominal voltage (Initial) | 80 mA | 63Ω | 400mW | 7.25V DC |
| 6V DC | | | 66.7mA | 90Ω | | 8.7 V DC |
| 9V DC | | | 44.4mA | 203Ω | | 13.05V DC |
| 12V DC | | | 33.3mA | 360Ω | | 17.4 V DC |
| 18V DC | | | 22.2mA | 810Ω | | 26.1 V DC |
| 24V DC | | | 16.7mA | 1,440Ω | | 34.8 V DC |
| 48V DC | | | 8.3mA | 5,760Ω | | 69.6 V DC |

2) High sensitive type

| Nominal coil voltage | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Nominal operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Nominal operating power (at 20°C 68°F) | Max. applied voltage (at 20°C 68°F) |
|----------------------|--|---|--|--|---|--|
| 5V DC | 75%V or less of nominal voltage (Initial) | 5%V or more of nominal voltage (Initial) | 40 mA | 125Ω | 200mW | 7.25V DC |
| 6V DC | | | 33.3mA | 180Ω | | 8.7 V DC |
| 9V DC | | | 22.2mA | 405Ω | | 13.05V DC |
| 12V DC | | | 16.7mA | 720Ω | | 17.4 V DC |
| 18V DC | | | 11.1mA | 1,620Ω | | 26.1 V DC |
| 24V DC | | | 8.3mA | 2,880Ω | | 34.8 V DC |
| 48V DC | | | 4.2mA | 11,520Ω | | 69.6 V DC |

2. Specifications

| Characteristics | Item | Specifications | |
|----------------------------|--|--|---|
| Contact | Contact material | AgSnO ₂ type | |
| | Arrangement | 1 Form A | |
| | Contact resistance (Initial) | Max. 100 mΩ (By voltage drop 6 V DC 1A) | |
| Rating | Nominal switching capacity (resistive load) | 16A 277V AC | |
| | Max. switching power (resistive load) | 4,432VA | |
| | Max. switching voltage | 277V AC | |
| | Max. switching current | 16A | |
| | Nominal operating power | 400mW (Standard type), 200mW (High sensitive type) | |
| | Min. switching capacity (reference value)** | 100mA, 5V DC | |
| Electrical characteristics | Insulation resistance (Initial) | Min. 1,000MΩ (at 500V DC) Measurement at same location as "Breakdown voltage" section. | |
| | Breakdown voltage (Initial) | Between open contacts | 1,000 Vrms for 1 min. (Detection current: 10 mA) |
| | | Between contact and coil | 4,000 Vrms for 1 min. (Detection current: 10 mA) |
| | Temperature rise (coil) | Max. 55°C 131°F, Max. 45°C 113°F (200mW type) (By resistive method, nominal coil voltage applied to the coil; contact carrying current: 16A, at 20°C 68°F) | |
| | Surge breakdown voltage*2 (Between contact and coil) (Initial) | 10,000 V | |
| | Operate time (at nominal voltage) (at 20°C 68°F) | Max. 20 ms (excluding contact bounce time.) | |
| | Release time (at nominal voltage) (at 20°C 68°F) | Max. 20 ms, Max. 25 ms (200mW type) (excluding contact bounce time) (With diode) | |
| Mechanical characteristics | Shock resistance | Functional | 200 m/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.) |
| | | Destructive | 1,000 m/s ² (Half-wave pulse of sine wave: 6 ms.) |
| | Vibration resistance | Functional | 10 to 55 Hz at double amplitude of 1.5 mm (Detection time: 10μs.) |
| | | Destructive | 10 to 55 Hz at double amplitude of 1.5 mm |
| Expected life | Mechanical (at 180 times/min.) | Min. 2×10 ⁶ | |
| | Electrical (at 20 times/min.) | Min. 10 ⁵ (at resistive load) | |
| Conditions | Conditions for operation, transport and storage*3 | Ambient temperature: -40°C to +85°C -40°F to +185°F; Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) | |
| | Max. operating speed | 20 times/min. (at nominal switching capacity) | |
| Unit weight | Approx. 17 g .60 oz, Approx. 15 g .53 oz (PCB type) | | |

* Specifications will vary with foreign standards certification ratings.

Notes:

*1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*2. Wave is standard shock voltage of $\pm 1.2 \times 50\mu\text{s}$ according to JEC-212-1981

*3. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to "6. Usage, Storage and Transport Conditions" in [AMBIENT ENVIRONMENT](#) section in [Relay Technical Information](#).

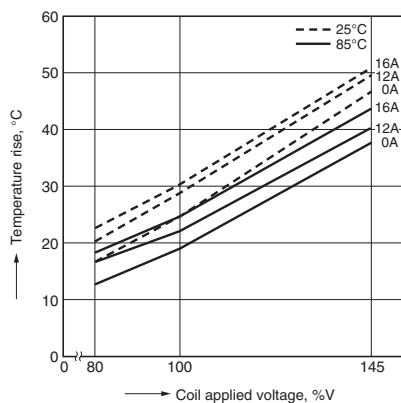
REFERENCE DATA

1-1. Coil temperature rise (400mW type)

Sample: ALE14B12, 6 pcs.

Point measured: coil inside

Ambient temperature: 25°C 77°F, 85°C 185°F

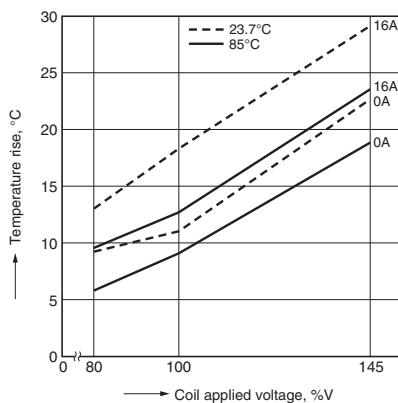


1-2. Coil temperature rise (200mW type)

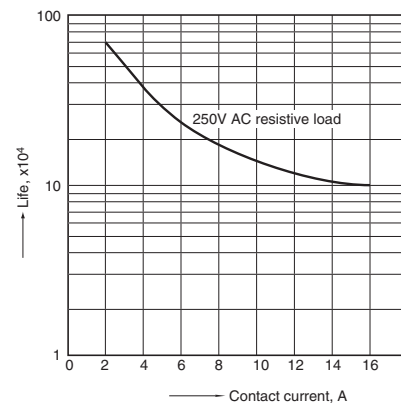
Sample: ALE74B12, 6 pcs.

Point measured: coil inside

Ambient temperature: 23.7°C 74.66°F, 85°C 185°F



2. Life curve



LE (ALE)

3. Electrical life test (16 A 277 V AC, resistive load)

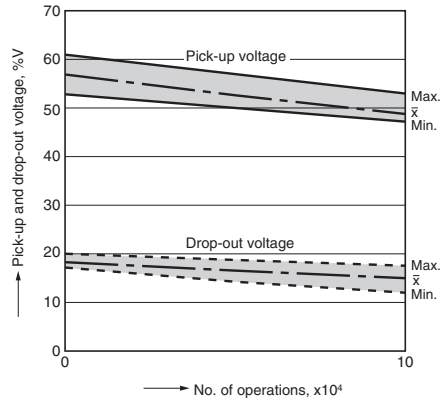
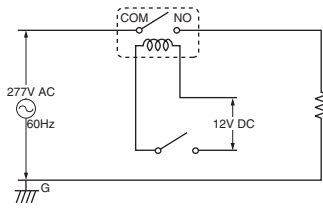
Sample: ALE14B12, 6 pcs.

Operation frequency: 20 times/min.

(ON/OFF = 1.5s: 1.5s)

Ambient temperature: Room temperature

Circuit:



DIMENSIONS (mm inch)

Download [CAD Data](#) from our Web site.

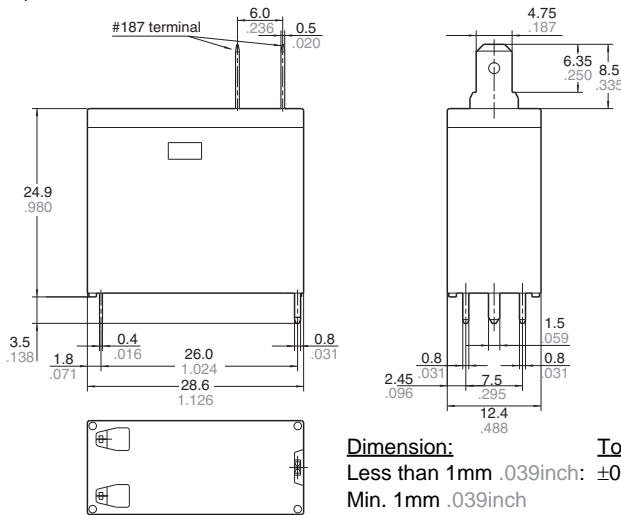
1. TMP type

PCB side three terminals
(includes one dummy terminal)

[CAD Data](#)

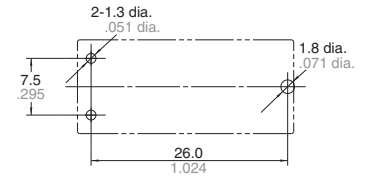


External dimensions



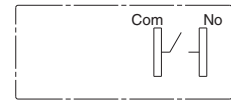
| Dimension: | Tolerance |
|--------------------------|--------------------|
| Less than 1mm .039inch: | $\pm 0.1 \pm .004$ |
| Min. 1mm .039inch | |
| less than 3mm .118 inch: | $\pm 0.2 \pm .008$ |
| Min. 3mm .118 inch: | $\pm 0.3 \pm .012$ |

PC board pattern (Bottom view)



Tolerance: $\pm 0.1 \pm .004$

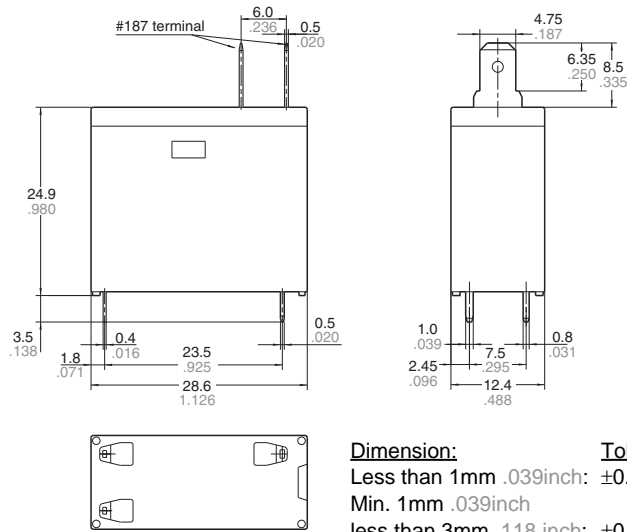
Schematic (Bottom view)



PCB side three terminals

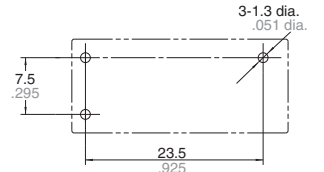
[CAD Data](#)

External dimensions



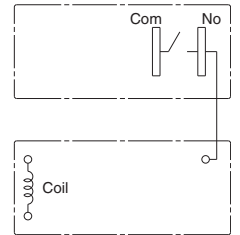
| Dimension: | Tolerance |
|--------------------------|--------------------|
| Less than 1mm .039inch: | $\pm 0.1 \pm .004$ |
| Min. 1mm .039inch | |
| less than 3mm .118 inch: | $\pm 0.2 \pm .008$ |
| Min. 3mm .118 inch: | $\pm 0.3 \pm .012$ |

PC board pattern (Bottom view)



Tolerance: $\pm 0.1 \pm .004$

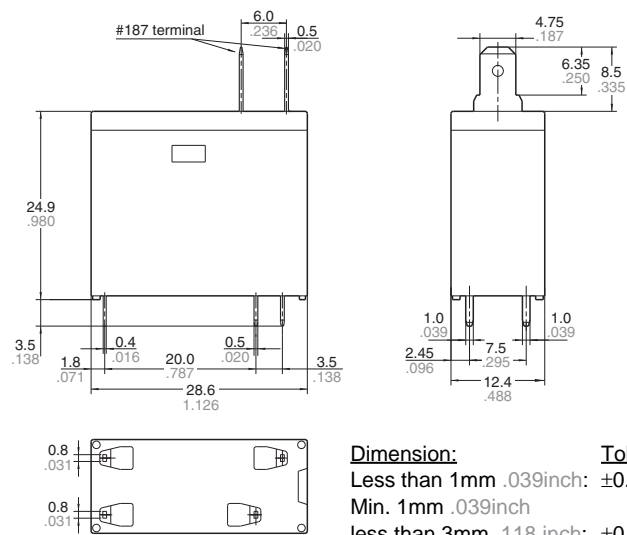
Schematic (Bottom view)



PCB side four terminals

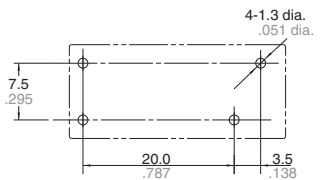
[CAD Data](#)

External dimensions



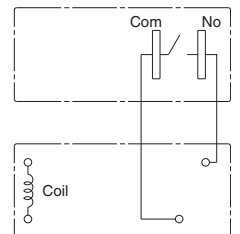
| Dimension: | Tolerance |
|--------------------------|--------------------|
| Less than 1mm .039inch: | $\pm 0.1 \pm .004$ |
| Min. 1mm .039inch | |
| less than 3mm .118 inch: | $\pm 0.2 \pm .008$ |
| Min. 3mm .118 inch: | $\pm 0.3 \pm .012$ |

PC board pattern (Bottom view)



Tolerance: $\pm 0.1 \pm .004$

Schematic (Bottom view)



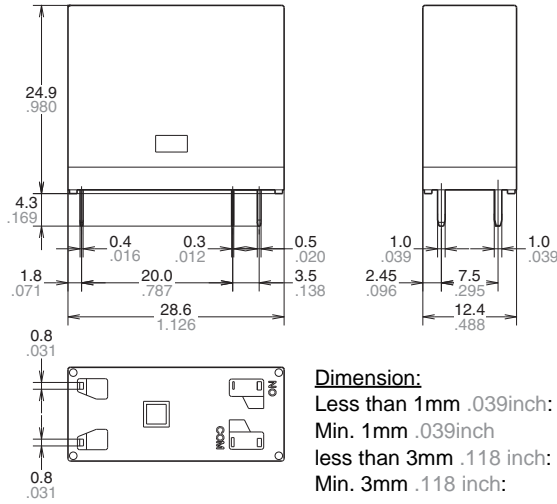
LE (ALE)

2. PCB type (No tab terminals)

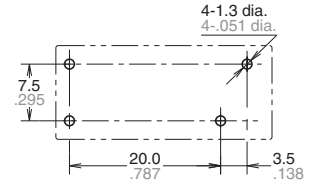
CAD Data



External dimensions



PC board pattern (Bottom view)



Tolerance: $\pm 0.1 \pm 0.004$

Schematic (Bottom view)



SAFETY STANDARDS

| UL/C-UL (Recognized) | | CSA (Certified) | | VDE (Certified) | | TV rating (UL/CSA) | | TÜV (Certified) | |
|----------------------|--|-----------------|--|-----------------|--|--------------------------------|--------|----------------------|--|
| File No. | Contact rating | File No. | Contact rating | File No. | Contact rating | File No. | Rating | File No. | Rating |
| E43149 | 16A 277V AC 16A 30V DC 18A 125V AC | LR26550 | 16A 277V AC 16A 30V DC 18A 125V AC | 40009159 | 16A 250V AC (cosφ=1.0) 16A 30V DC (0ms) | UL E43149 CSA LR26550 | TV-5 | B 11 05 13461 297 | 16A 250V AC (cosφ=1.0) 16A 30V DC (0ms) |

For Cautions for Use, see [Relay Technical Information](#).