



# THE DATASHEET OF ALE15B24





TMP type

PCB type



New PCB type

**RoHS Directive compatibility information**  
<http://www.nais-e.com/>

### FEATURES

#### 1. Price competitive

having better price competitiveness (New PCB type 400 mW only)

#### 2. Supports magnetron and heater loads.

Switching possible for magnetron and heater loads found in microwave ovens.

#### 3. Excellent heat resistance

Ambient temperature: up to 85°C 185°F  
 This satisfies UL coil insulation class B/  
 class F available

#### 4. High insulation resistance

Creepage distance and clearances  
 between contact and coil:

Min. 8 mm .315 inch

Surge withstand voltage: Min. 10,000V

#### 5. Low operating power

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

#### 6. A wide variety of types

Product line consists of 5 types with  
 different shapes and pins

#### 7. Conforms to the various safety standards:

UL/CSA, TÜV, VDE approved and  
 SEMKO available

### TYPICAL APPLICATIONS

- Microwave ovens
- Refrigerators
- OA equipment

## SPECIFICATIONS

### Contact

|  |  |                     |
|--|--|---------------------|
| Arrangement  | 1 Form A                                   |                     |
| Initial contact resistance, max.<br>(By voltage drop 6 V DC 1 A) | 100 mΩ                                     |                     |
| Contact material   | AgSnO <sub>2</sub> type                    |                     |
| Rating<br>(resistive load)                                       | Nominal switching capacity                 | 16 A 277 V AC       |
|  | Max. switching power                       | 4,432 V A           |
|  | Max. switching voltage                     | 277 V AC            |
|  | Max. switching current                     | 16 A                |
|  | Min. switching capacity <sup>#1</sup>      | 100 mA, 5 V DC      |
| Expected life<br>(min. operations)                               | Mechanical<br>(at 180 cpm)                 | 2 × 10 <sup>6</sup> |
|  | Electrical (at 20 cpm)<br>(Resistive load) | 10 <sup>5</sup>     |

### Coil

| Type                    | Standard | High sensitive |
|-------------------------|----------|----------------|
| Nominal operating power | 400 mW   | 200 mW         |

<sup>#1</sup> 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.

### Remarks

\* Specifications will vary with foreign standards certification ratings.

<sup>#1</sup> Measurement at same location as "Initial breakdown voltage" section.

<sup>#2</sup> Detection current: 10mA

<sup>#3</sup> Wave is standard shock voltage of  $\pm 1.2 \times 50\mu\text{s}$  according to JEC-212-1981

<sup>#4</sup> Excluding contact bounce time.

<sup>#5</sup> Half-wave pulse of sine wave: 11 ms; detection time: 10  $\mu\text{s}$

<sup>#6</sup> Half-wave pulse of sine wave: 6 ms

<sup>#7</sup> Detection time: 10  $\mu\text{s}$

<sup>#8</sup> Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT.

### Characteristics

|  |   |  |
|--|---|--|
| Max. operating speed<br>(at rated load)  | 20 cpm                                  |  |
| Initial insulation resistance <sup>*1</sup>  | Min. 1,000 MΩ (at 500 V DC)             |  |
| Initial breakdown voltage <sup>*2</sup>  | Between open contacts                   | 1,000 Vrms for 1 min.                      |
|  | Between contacts and coil               | 4,000 Vrms for 1 min.                      |
| Initial surge voltage between contact and coil <sup>*3</sup>   | Min. 10,000 V                           |  |
| Operate time <sup>*4</sup><br>(at nominal voltage) (at 20°C 68°F)  | Max. 20ms                               |  |
| Release time (with diode) <sup>*4</sup><br>(at nominal voltage) (at 20°C 68°F)   | Max. 20ms<br>Max. 25ms<br>(200 mW type) |  |
| Temperature rise (at nominal voltage)<br>(resistance method, contact current<br>16 A, 20°C 68°F)                           | Max. 55°C<br>Max. 45°C<br>(200 mW type) |  |
| Shock resistance   | Functional <sup>*5</sup>                | Min. 200 m/s <sup>2</sup> {20 G}           |
|  | Destructive <sup>*6</sup>               | Min. 1,000 m/s <sup>2</sup> {100 G}        |
| Vibration resistance   | Functional <sup>*7</sup>                | 10 to 55Hz<br>at double amplitude of 1.5mm |
|  | Destructive                             | 10 to 55Hz<br>at double amplitude of 1.5mm |
| Conditions for operation,<br>transport and storage <sup>*8</sup><br>(Not freezing and<br>condensing at low<br>temperature) | Ambient temp.                           | -40°C to +85°C<br>-40°F to +185°F          |
|  | Humidity                                | 5 to 85% R.H.                              |
| Unit weight  | Approx. 17 g .60 oz                     |  |

# LE (ALE)

## ORDERING INFORMATION

Ex. A LE 1 2 B 12

| Product name | Contact arrangement                          | Terminal shape   | Coil insulation class                          | Coil voltage, V DC                |                            |
|--------------|--|--|--|-----------------------------------|----------------------------|
| LE           | 1: 1 Form A (400 mW)<br>7: 1 Form A (200 mW) | 2: TMP type/PCB side three terminals (includes one dummy terminal)<br>3: TMP type/PCB side three terminals<br>4: TMP type/PCB side four terminals<br>5: PCB type (No tab terminals)<br>P: New PCB type | B: Class B insulation<br>F: Class F insulation | 05: 5<br>06: 6<br>09: 9<br>12: 12 | 18: 18<br>24: 24<br>48: 48 |

UL/CSA, TÜV, VDE approved type is standard.

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

## TYPES

### 1. Standard type

| Contact arrangement | Coil voltage, V DC | TMP type/PCB side three terminals (includes one dummy terminal) | TMP type/PCB side three terminals | TMP type/PCB side four terminals | PCB type (No tab terminals) | New PCB type |
|---------------------|--------------------|---|-----------------------------------|----------------------------------|-----------------------------|--------------|
|                     |                    | Part No.  | Part No.                          | Part No.                         | Part No.                    | Part No.     |
| 1 Form A            | 5                  | ALE12○05  | ALE13○05                          | ALE14○05                         | ALE15○05                    | ALE1P○05     |
|                     | 6                  | ALE12○06  | ALE13○06                          | ALE14○06                         | ALE15○06                    | ALE1P○06     |
|                     | 9                  | ALE12○09  | ALE13○09                          | ALE14○09                         | ALE15○09                    | ALE1P○09     |
|                     | 12                 | ALE12○12  | ALE13○12                          | ALE14○12                         | ALE15○12                    | ALE1P○12     |
|                     | 18                 | ALE12○18  | ALE13○18                          | ALE14○18                         | ALE15○18                    | ALE1P○18     |
|                     | 24                 | ALE12○24  | ALE13○24                          | ALE14○24                         | ALE15○24                    | ALE1P○24     |
|                     | 48                 | ALE12○48  | ALE13○48                          | ALE14○48                         | ALE15○48                    | ALE1P○48     |

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

### 2. High sensitive type

| Contact arrangement                      | Coil voltage, V DC | TMP type/PCB side three terminals (includes one dummy terminal) | TMP type/PCB side three terminals | TMP type/PCB side four terminals | PCB type (No tab terminals) |
|--|--------------------|---|-----------------------------------|----------------------------------|-----------------------------|
|  |                    | Part No.  | Part No.                          | Part No.                         | Part No.                    |
| 1 Form A<br>(High sensitivity:<br>200mW) | 5                  | ALE72○05  | ALE73○05                          | ALE74○05                         | ALE75○05                    |
|  | 6                  | ALE72○06  | ALE73○06                          | ALE74○06                         | ALE75○06                    |
|  | 9                  | ALE72○09  | ALE73○09                          | ALE74○09                         | ALE75○09                    |
|  | 12                 | ALE72○12  | ALE73○12                          | ALE74○12                         | ALE75○12                    |
|  | 18                 | ALE72○18  | ALE73○18                          | ALE74○18                         | ALE75○18                    |
|  | 24                 | ALE72○24  | ALE73○24                          | ALE74○24                         | ALE75○24                    |
|  | 48                 | ALE72○48  | ALE73○48                          | ALE74○48                         | ALE75○48                    |

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

## COIL DATA (at 20°C 68°F)

### 1. Standard type

| Nominal voltage, V DC | Pick-up voltage, V DC (max.) (at 20°C 68°F) | Drop-out voltage, V DC (min.) (at 20°C 68°F) | Coil resistance, Ω (±10%) (at 20°C 68°F) | Nominal operating current, mA (±10%) (at 20°C 68°F) | Nominal operating power, mW (at 20°C 68°F) | Maximum allowable voltage, V DC (at 20°C 68°F) |
|-----------------------|---|--|--|---|--|--|
| 5                     | 3.75  | 0.25   | 63                                       | 80  | 400  | 7.2  |
| 6                     | 4.5   | 0.3  | 90                                       | 66.7  |  | 8.7  |
| 9                     | 6.75  | 0.45   | 203                                      | 44.4  |  | 13.0   |
| 12                    | 9   | 0.6  | 360                                      | 33.3  |  | 17.4   |
| 18                    | 13.5  | 0.9  | 810                                      | 22.2  |  | 26.1   |
| 24                    | 18  | 1.2  | 1,440                                    | 16.7  |  | 34.8   |
| 48                    | 36  | 2.4  | 5,760                                    | 8.3   |  | 69.6   |

## 2. High sensitive type

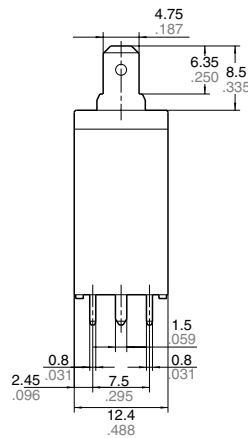
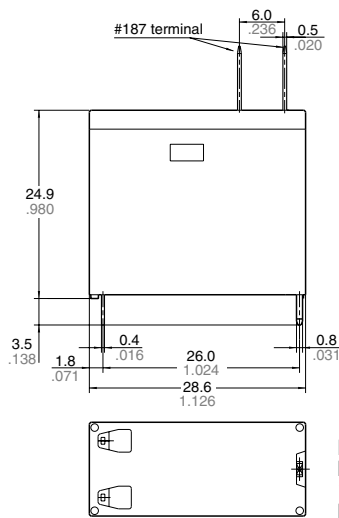
| Nominal voltage, V DC | Pick-up voltage, V DC (max.) (at 20°C 68°F) | Drop-out voltage, V DC (min.) (at 20°C 68°F) | Coil resistance, Ω (±10%) (at 20°C 68°F) | Nominal operating current, mA (±10%) (at 20°C 68°F) | Nominal operating power, mW (at 20°C 68°F) | Maximum allowable voltage, V DC (at 20°C 68°F) |
|-----------------------|---|--|--|---|--|--|
| 5                     | 3.75  | 0.25   | 125                                      | 40  | 200  | 7.2  |
| 6                     | 4.5   | 0.3  | 180                                      | 33.3  |  | 8.7  |
| 9                     | 6.75  | 0.45   | 405                                      | 22.2  |  | 13.0   |
| 12                    | 9   | 0.6  | 720                                      | 16.7  |  | 17.4   |
| 18                    | 13.5  | 0.9  | 1,620                                    | 11.1  |  | 26.1   |
| 24                    | 18  | 1.2  | 2,880                                    | 8.3   |  | 34.8   |
| 48                    | 36  | 2.4  | 11,520                                   | 4.2   |  | 69.6   |

## DIMENSIONS

mm inch

### 1. TMP type

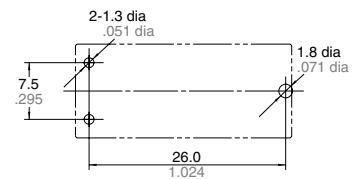
PCB side three terminals  
(includes one dummy terminal)



**Dimension:**  
 Max. 1mm .039 inch:  
 1 to 3mm .039 to .118 inch:  
 Min. 3mm .118 inch:

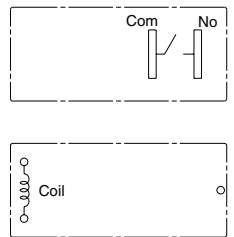
**Tolerance**  
 ±0.1 ±.004  
 ±0.2 ±.008  
 ±0.3 ±.012

PC board pattern (Bottom view)

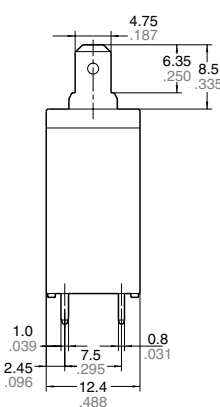
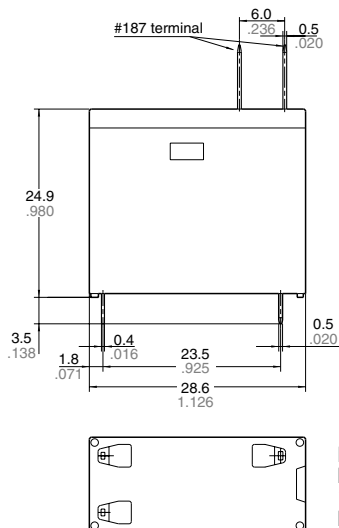


Tolerance : ±0.1 ±.004

Schematic (Bottom view)



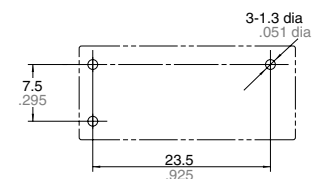
PCB side three terminals



**Dimension:**  
 Max. 1mm .039 inch:  
 1 to 3mm .039 to .118 inch:  
 Min. 3mm .118 inch:

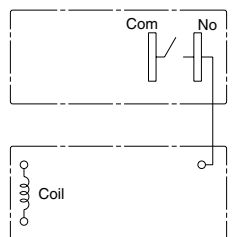
**Tolerance**  
 ±0.1 ±.004  
 ±0.2 ±.008  
 ±0.3 ±.012

PC board pattern (Bottom view)



Tolerance : ±0.1 ±.004

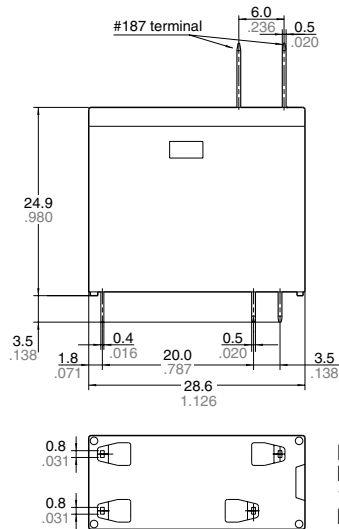
Schematic (Bottom view)



# LE (ALE)

PCB side four terminals

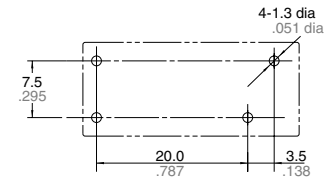
mm inch



**Dimension:**  
 Max. 1mm .039 inch:  
 1 to 3mm .039 to .118 inch:  
 Min. 3mm .118 inch:

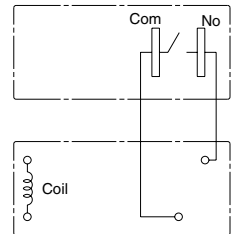
**Tolerance**  
 $\pm 0.1 \pm 0.04$   
 $\pm 0.2 \pm 0.08$   
 $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)



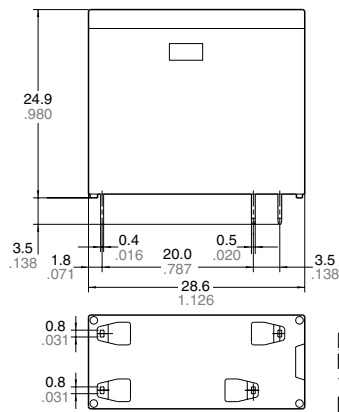
Tolerance :  $\pm 0.1 \pm 0.04$

Schematic (Bottom view)



## 2. PCB type

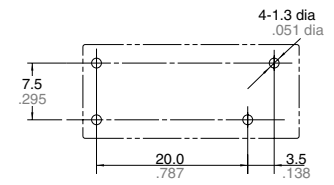
PCB side four terminals  
(No tab terminals)



**Dimension:**  
 Max. 1mm .039 inch:  
 1 to 3mm .039 to .118 inch:  
 Min. 3mm .118 inch:

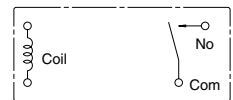
**Tolerance**  
 $\pm 0.1 \pm 0.04$   
 $\pm 0.2 \pm 0.08$   
 $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)

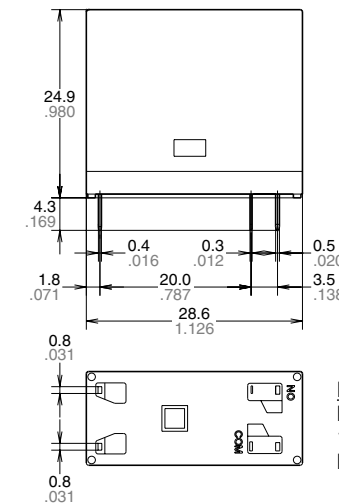


Tolerance :  $\pm 0.1 \pm 0.04$

Schematic (Bottom view)



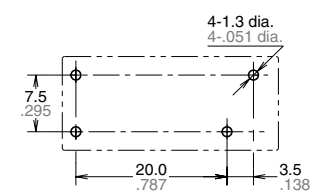
## 3. New PCB type



**Dimension:**  
 Max. 1mm .039 inch:  
 1 to 3mm .039 to .118 inch:  
 Min. 3mm .118 inch:

**Tolerance**  
 $\pm 0.1 \pm 0.04$   
 $\pm 0.2 \pm 0.08$   
 $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)



Tolerance:  $\pm 0.1 \pm 0.04$

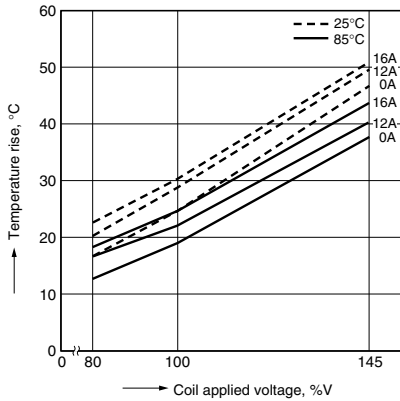
Schematic (Bottom view)



**REFERENCE DATA**

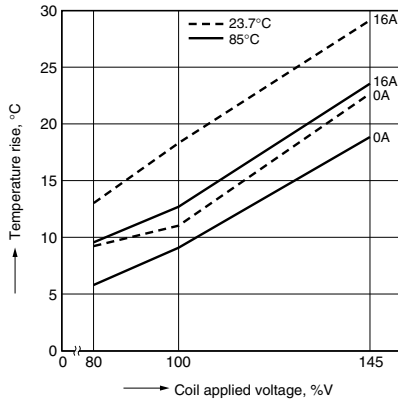
**1-1. Coil temperature rise (400mW type)**

Sample: ALE15B12, 6 pcs.  
 Point measured: coil inside  
 Ambient temperature: 25°C 77°F, 85°C 185°F

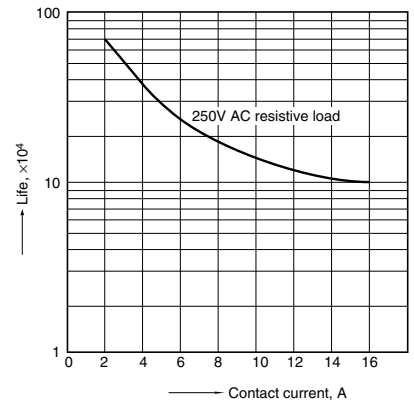


**1-2. Coil temperature rise (200mW type)**

Sample: ALE75B12, 6 pcs.  
 Point measured: coil inside  
 Ambient temperature: 23.7°C 74.66°F, 85°C 185°F

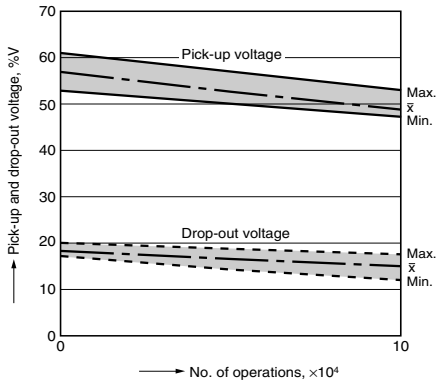
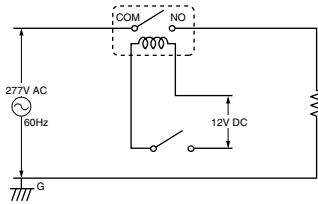


**2. Life curve**



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



Sample: ALE15B12, 6 pcs.  
 Operation frequency: 20 times/min.  
 (ON/OFF = 1.5s: 1.5s)  
 Ambient temperature: Room temperature  
 Circuit:



**For Cautions for Use, see Relay Technical Information.**

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