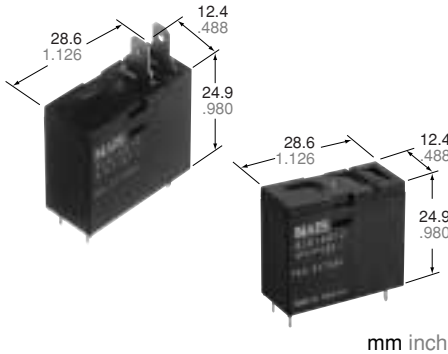


# NAIS

## 16A Power Relay For Micro wave oven

# LE RELAYS (ALE)



### FEATURES

- Ideal for magnetron and heater loads**
- Excellent heat resistance**
  - This satisfies UL coil insulation class B/ class F available
- High insulation resistance**
  - Creepage distance and clearances between contact and coil: Min. 8 mm .315 inch
  - Surge withstand voltage: Min. 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, VDE approved and SEMKO available

## SPECIFICATIONS

### Contact

Arrangement	1 Form A	
Initial contact resistance, max. (By voltage drop 6 V DC 1 A)	100 mΩ	
Contact material	Silver alloy	
Rating (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
Expected life (min. operations)	Mechanical (at 180 cpm)	2 × 10 <sup>6</sup>
	Electrical (at 20 cpm) (Resistive load)	10 <sup>5</sup>

### Coil

Type	Standard	High sensitive
Nominal operating power	400 mW	200 mW

### Remarks

- \* Specifications will vary with foreign standards certification ratings.
- \*<sub>1</sub> Measurement at same location as "Initial breakdown voltage" section.
- \*<sub>2</sub> Detection current: 10mA
- \*<sub>3</sub> Wave is standard shock voltage of  $\pm 1.2 \times 50\mu s$  according to JEC-212-1981
- \*<sub>4</sub> Excluding contact bounce time.
- \*<sub>5</sub> Half-wave pulse of sine wave: 11 ms; detection time: 10  $\mu s$
- \*<sub>6</sub> Half-wave pulse of sine wave: 6 ms
- \*<sub>7</sub> Detection time: 10  $\mu s$
- \*<sub>8</sub> Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT.

### Characteristics

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

## TYPICAL APPLICATIONS

- Microwave ovens
- Refrigerators
- OA equipment

## ORDERING INFORMATION

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

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

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

# LE (ALE)

## 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)
		Part No.	Part No.	Part No.	Part No.
1 Form A	5	ALE12○05	ALE13○05	ALE14○05	ALE15○05
	6	ALE12○06	ALE13○06	ALE14○06	ALE15○06
	9	ALE12○09	ALE13○09	ALE14○09	ALE15○09
	12	ALE12○12	ALE13○12	ALE14○12	ALE15○12
	18	ALE12○18	ALE13○18	ALE14○18	ALE15○18
	24	ALE12○24	ALE13○24	ALE14○24	ALE15○24
	48	ALE12○48	ALE13○48	ALE14○48	ALE15○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 (High sensitivity: 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	7.25
6	4.5	0.3	90	66.7		8.7
9	6.75	0.45	203	44.4		13.05
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

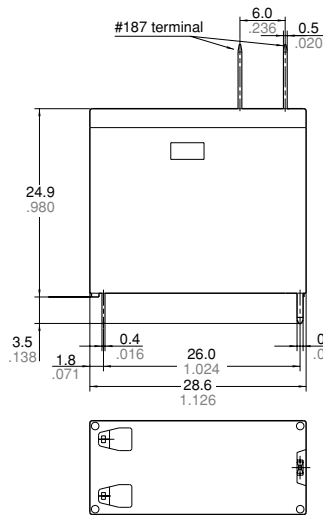
### 2. High sensitive type

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	7.25
6	4.5	0.3	180	33.3		8.7
9	6.75	0.45	405	22.2		13.05
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

### 1. TMP type

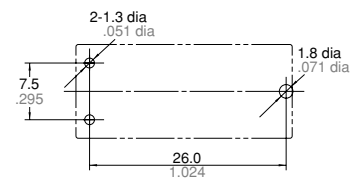
PCB side three terminals  
(includes one dummy terminal)



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

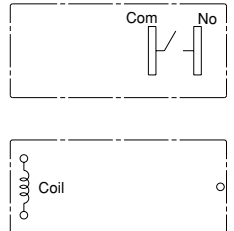
**Tolerance**  
 $\pm 0.1 \pm .004$   
 $\pm 0.2 \pm .008$   
 $\pm 0.3 \pm .012$

PC board pattern (Bottom view)



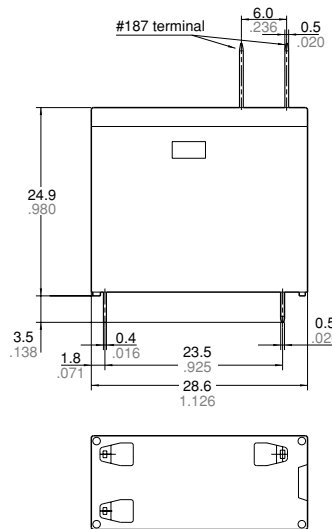
Tolerance :  $\pm 0.1 \pm .004$

Schematic (Bottom view)



PCB side three terminals

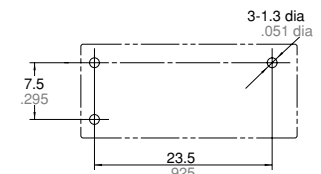
mm inch



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

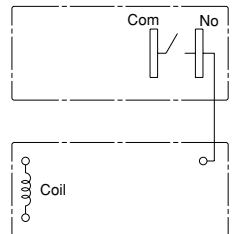
**Tolerance**  
 $\pm 0.1 \pm .004$   
 $\pm 0.2 \pm .008$   
 $\pm 0.3 \pm .012$

PC board pattern (Bottom view)



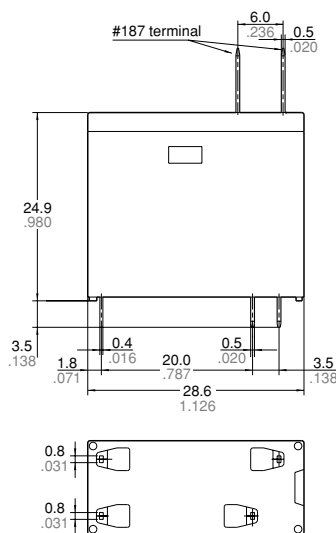
Tolerance :  $\pm 0.1 \pm .004$

Schematic (Bottom view)



PCB side four terminals

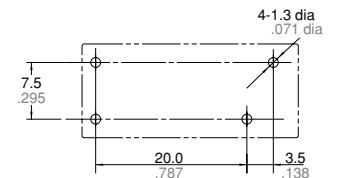
mm inch



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

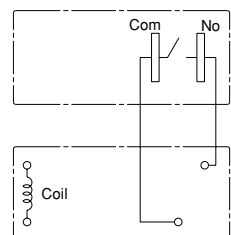
**Tolerance**  
 $\pm 0.1 \pm .004$   
 $\pm 0.2 \pm .008$   
 $\pm 0.3 \pm .012$

PC board pattern (Bottom view)



Tolerance :  $\pm 0.1 \pm .004$

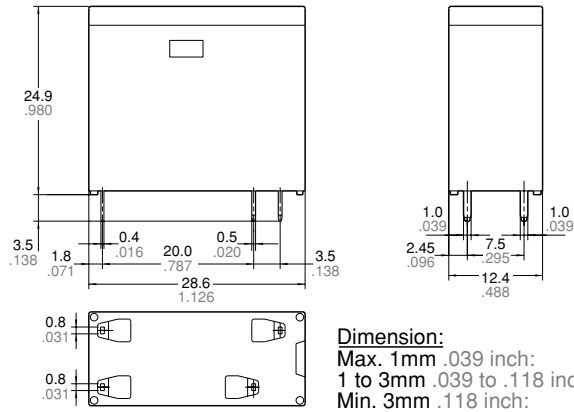
Schematic (Bottom view)



# LE (ALE)

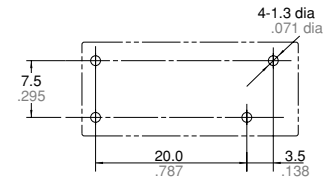
## 2. PCB type

PCB side four terminals  
(No tab terminals)



mm inch

PC board pattern (Bottom view)



Tolerance :  $\pm 0.1 \pm .004$

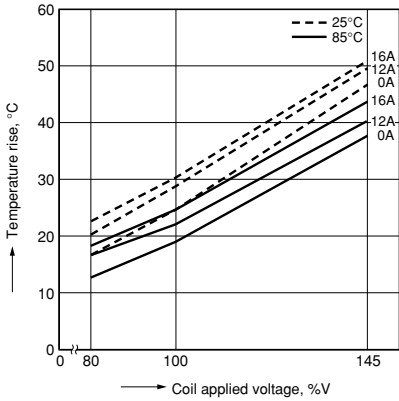
Schematic (Bottom view)



## REFERENCE DATA

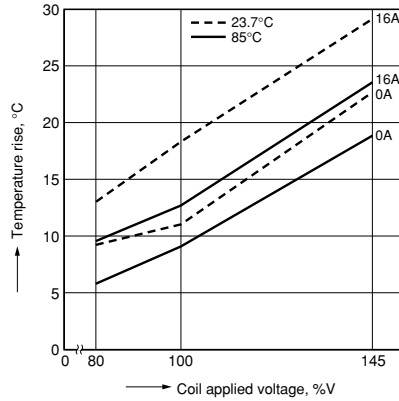
### 1-1. Coil temperature rise (400mW type)

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

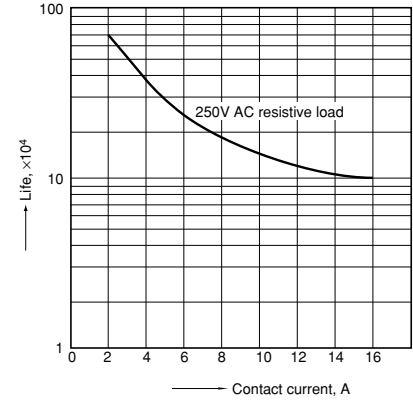


### 1-2. Coil temperature rise (200mW type)

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

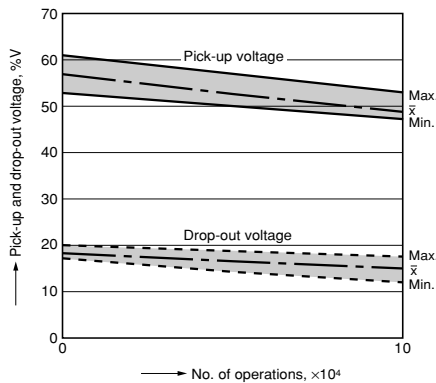
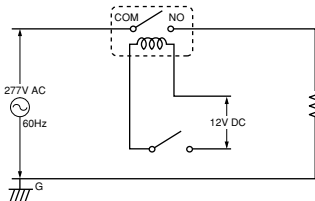


### 2. Life curve



### 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.**