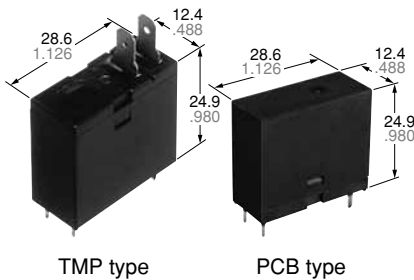




### 1 Form A 16A power relay for micro wave oven

## LE RELAYS (ALE)



**RoHS compliant**

Protective construction: Flux-resistant 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. Long insulation distance

- Creepage distance and clearances between contact and coil:  
 Clearance Min. 8 mm .315 inch  
 Creepage Min. 9.5 mm .374 inch
- Surge withstand voltage: 10,000V

#### 4. Low operating power

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

#### 5. A wide variety of types

Product line consists of 4 types with different shapes and pins

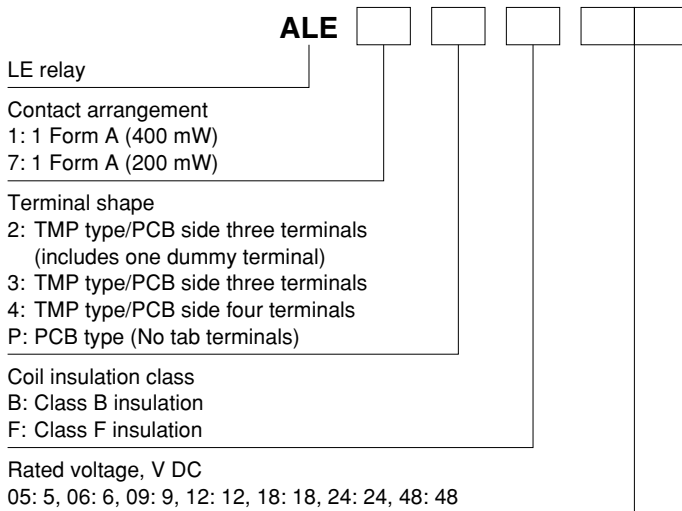
#### 6. Conforms to the various safety standards:

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

### TYPICAL APPLICATIONS

1. Microwave ovens
2. Refrigerators
3. OA equipment

### ORDERING INFORMATION



## TYPES

## 1. Standard type

Contact arrangement	Rated voltage	TMP type			PCB type (No tab terminals)	Standard packing	
		PCB side three terminals (includes one dummy terminal)	PCB side three terminals	PCB side four terminals		Carton	Case
		Part No.	Part No.	Part No.			
1 Form A	5V DC	ALE12○05	ALE13○05	ALE14○05	ALE1P○05	100 pcs.	500 pcs.
	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

## 2. High sensitive type

Contact arrangement	Rated voltage	TMP type			PCB type (No tab terminals)	Standard packing	
		PCB side three terminals (includes one dummy terminal)	PCB side three terminals	PCB side four terminals		Carton	Case
		Part No.	Part No.	Part No.			
1 Form A (High sensitivity: 200mW)	5V DC	ALE72○05	ALE73○05	ALE74○05	ALE7P○05	100 pcs.	500 pcs.
	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

## RATING

## 1. Coil data

## 1) Standard type

Rated voltage	Operate voltage* (at 20°C 68°F)	Release voltage* (at 20°C 68°F)	Rated operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Rated operating power	Max. allowable voltage (at 20°C 68°F)
5V DC	Max. 75%V of rated voltage (Initial)	Min. 5%V of rated voltage (Initial)	80 mA	63Ω	400mW	145%V of rated voltage
6V DC			66.7mA	90Ω		
9V DC			44.4mA	203Ω		
12V DC			33.3mA	360Ω		
18V DC			22.2mA	810Ω		
24V DC			16.7mA	1,440Ω		
48V DC			8.3mA	5,760Ω		

\* Square, pulse drive

## 2) High sensitive type

Rated voltage	Operate voltage* (at 20°C 68°F)	Release voltage* (at 20°C 68°F)	Rated operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Rated operating power	Max. allowable voltage (at 20°C 68°F)
5V DC	Max. 75%V of rated voltage (Initial)	Min. 5%V of rated voltage (Initial)	40 mA	125Ω	200mW	145%V of rated voltage
6V DC			33.3mA	180Ω		
9V DC			22.2mA	405Ω		
12V DC			16.7mA	720Ω		
18V DC			11.1mA	1,620Ω		
24V DC			8.3mA	2,880Ω		
48V DC			4.2mA	11,520Ω		

\* Square, pulse drive

**2. Specifications**

Characteristics	Item	Specifications	
Contact rating	Arrangement	1 Form A	
	Contact resistance (Initial)	Max. 100 mΩ (By voltage drop 6 V DC 1A)	
	Contact material	AgSnO <sub>2</sub> type	
	Contact rating (resistive)	16A 277V AC	
	Max. switching power (resistive)	4,432VA	
	Max. switching voltage	277V AC	
	Max. switching current	16A	
	Min. switching load (reference value)*1	100mA, 5V DC	
Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as "Dielectric strength" section.	
Dielectric strength (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)	
Surge withstand voltage (Initial)*2		Between contact and coil 10,000 V	
Time characteristics	Operate time	Max. 20 ms (at rated voltage), (at 20°C 68°F), (Initial) (excluding contact bounce time.)	
	Release time	Max. 20 ms, Max. 25 ms (200mW type) (at rated voltage), (at 20°C 68°F), (Initial) (excluding contact bounce time) (With diode)	
Mechanical characteristics	Shock resistance	Functional	200 m/s <sup>2</sup> (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)
		Destructive	1,000 m/s <sup>2</sup> (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
Mechanical life (at 180 times/min.)		Min. 2×10 <sup>6</sup>	
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) Air pressure: 86 to 106 kPa	
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 ±1.2×50μs 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 Usage, transport and storage conditions in NOTES.

**3. Electrical life**

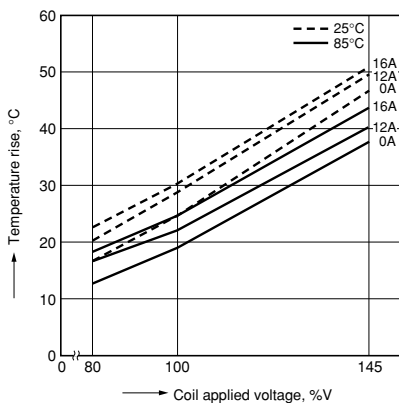
Condition: Resistive, at 20°C 68°F, at 20 times/min.

Type	Contact rating	Number of operation
1 Form A	16A 277V AC	10 <sup>5</sup>

**REFERENCE DATA**

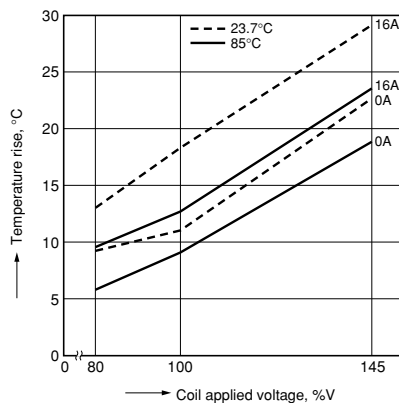
1.-(1) Coil temperature rise (400mW type)

Sample: ALE14B12, 6 pcs.  
Point measured: coil inside  
Ambient temperature: 25°C 77°F, 85°C 185°F

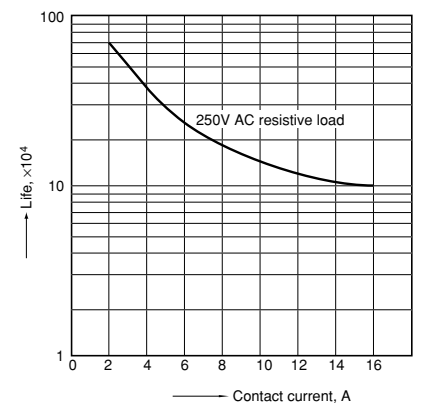


1.-(2) Coil temperature rise (200mW type)

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)

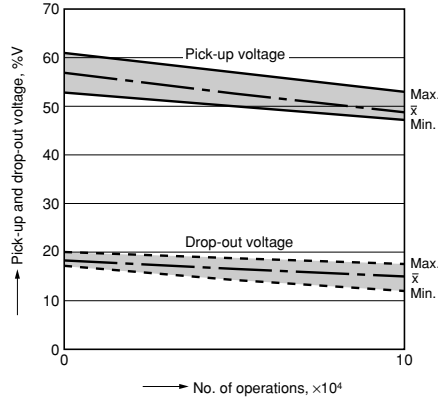
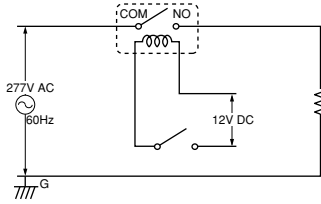
Sample: ALE14B12, 6 pcs.

Operation frequency: 20 times/min.

(ON/OFF = 1.5s: 1.5s)

Ambient temperature: Room temperature

Circuit:



## DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

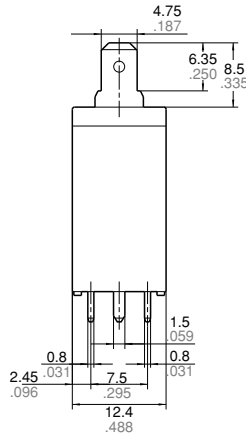
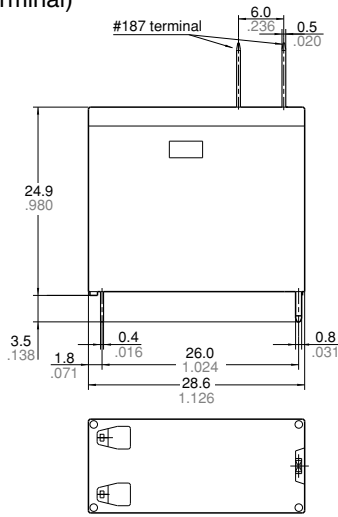
### 1. TMP type

1) PCB side three terminals  
(includes one dummy terminal)

**CAD Data**

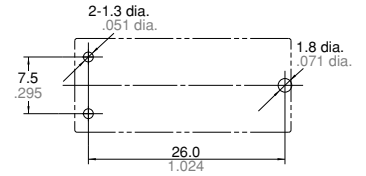


#### External dimensions



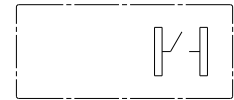
**Dimension:**                      **Tolerance**  
 Less than 1mm .039inch:  $\pm 0.1 \pm .004$   
 Min. 1mm .039inch  
 less than 3mm .118 inch:  $\pm 0.2 \pm .008$   
 Min. 3mm .118 inch:         $\pm 0.3 \pm .012$

#### PC board pattern (Bottom view)



Tolerance:  $\pm 0.1 \pm .004$

#### Schematic (Bottom view)

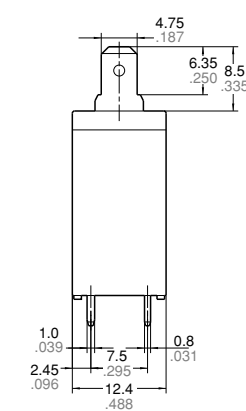
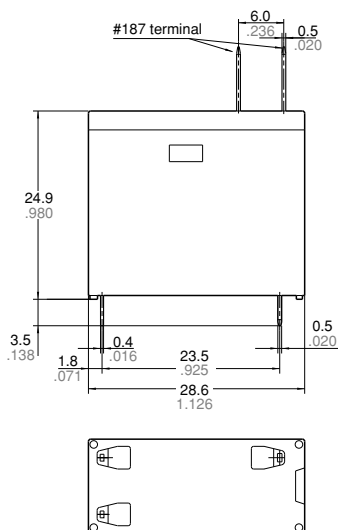


### 2) PCB side three terminals

**CAD Data**

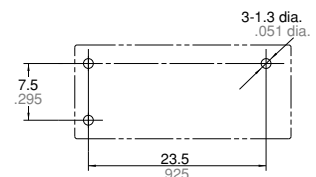


#### External dimensions



**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)

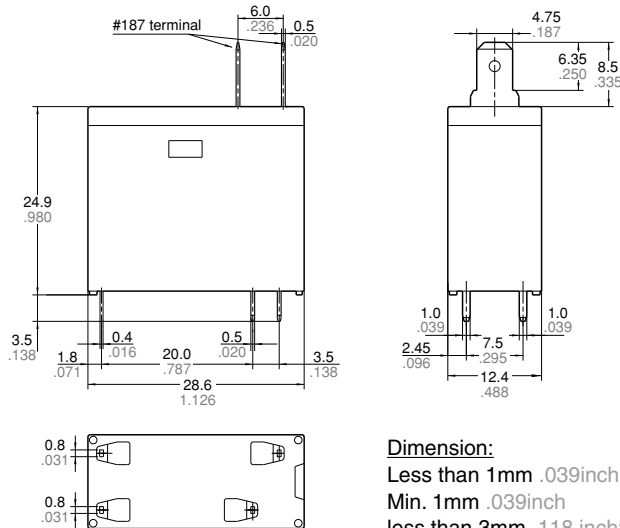


3) PCB side four terminals

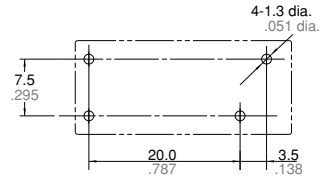
**CAD Data**



External dimensions

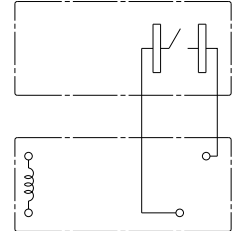


PC board pattern (Bottom view)



Tolerance:  $\pm 0.1 \pm 0.004$

Schematic (Bottom view)



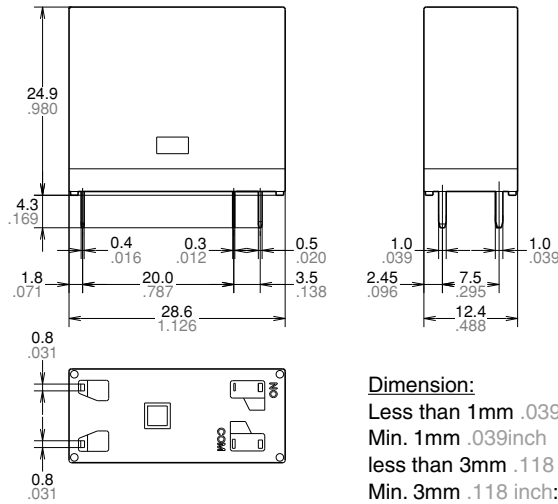
**Dimension:**  
 Less than 1mm .039inch:  $\pm 0.1 \pm 0.004$   
 Min. 1mm .039inch  
 less than 3mm .118 inch:  $\pm 0.2 \pm 0.008$   
 Min. 3mm .118 inch:  $\pm 0.3 \pm 0.012$

2. PCB type  
(No tab terminals)

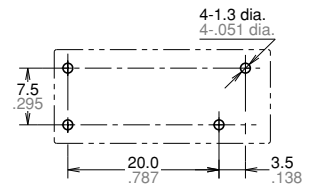
**CAD Data**



External dimensions



PC board pattern (Bottom view)



Tolerance:  $\pm 0.1 \pm 0.004$

Schematic (Bottom view)



**Dimension:**  
 Less than 1mm .039inch:  $\pm 0.1 \pm 0.004$   
 Min. 1mm .039inch  
 less than 3mm .118 inch:  $\pm 0.2 \pm 0.008$   
 Min. 3mm .118 inch:  $\pm 0.3 \pm 0.012$

**SAFETY STANDARDS**

Product name	UL/C-UL			CSA			VDE		TÜV			TV rating		CQC			
	File No.	Contact rating	Cycles	File No.	Contact rating	File No.	Contact rating	File No.	Contact rating	Cycles	File No.	Contact rating	File No.	Contact rating	Temp.		
LE	E43149	16A 277V AC	10 <sup>5</sup>	LR26550	16A 277V AC	4009159	16A 250V AC (cosφ=1.0)	B 12 06 13461 325	16A 250V AC (cosφ=1.0)	10 <sup>4</sup>	UL: E43149	TV-5	CSA: LR26550	TV-5	CQC09002039708	16A 250V AC	85°C
		16A 30 DC	10 <sup>5</sup>		16A 30V AC (0ms)		10 <sup>4</sup>		-	-						-	-
		18A 125V AC	6000		18A 125V AC		-		-	-						-	-

\*1. Certified by UL/C-UL, CSA, TÜV and VDE (TMP type)  
 \*2. Certified by UL/C-UL, CSA and VDE (PCB type)

**EN/IEC VDE Certified  
INSULATION CHARACTERISTIC (IEC61810-1)**

Item	Characteristic
Clearance/Creepage distance (IEC61810-1)	Min. 5.5mm/5.5mm
Category of protection (IEC61810-1)	RT II
Tracking resistance (IEC60112)	PTI 175
Insulation material group	III a
Over voltage category	III
Rated voltage	250V
Pollution degree	2
Type of insulation (Between contact and coil)	Reinforced insulation
Type of insulation (Between open contacts)	Micro disconnection

---

**NOTES**

1. For cautions for use, please read “GENERAL APPLICATION GUIDELINES”.

---

Please contact .....

**Panasonic Corporation**

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

**Panasonic**<sup>®</sup>

©Panasonic Corporation 2016