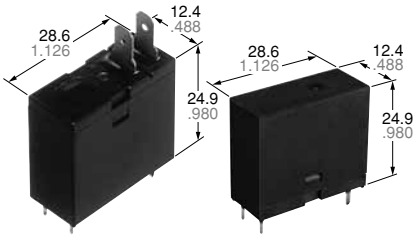
1 Form A 16A power relay for micro wave oven

LE RELAYS (ALE)



TMP type PCB type

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

ALE □ □ □ □ □

LE relay

Contact arrangement
1: 1 Form A (400 mW)
7: 1 Form A (200 mW)

Terminal shape
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
P: PCB type (No tab terminals)

Coil insulation class
B: Class B insulation
F: Class F insulation

Rated voltage, V DC
05: 5, 06: 6, 09: 9, 12: 12, 18: 18, 24: 24, 48: 48

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			
		Part No.	Part No.	Part No.	Part No.	Carton	Case
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			
		Part No.	Part No.	Part No.	Part No.	Carton	Case
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		$AgSnO_2$ 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/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)
		Destructive	1,000 m/s² (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. 2×10^6
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

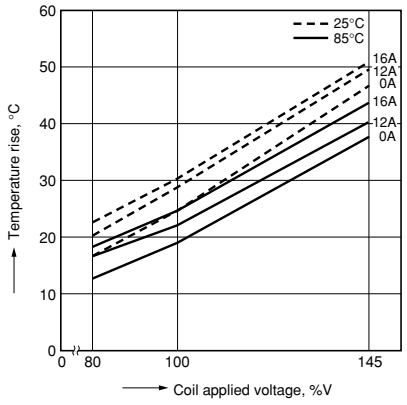
Condition: Resistive, at 20°C 68°F, at 20 times/min.

Type	Contact rating	Number of operation
1 Form A	16A 277V AC	10^5

REFERENCE DATA

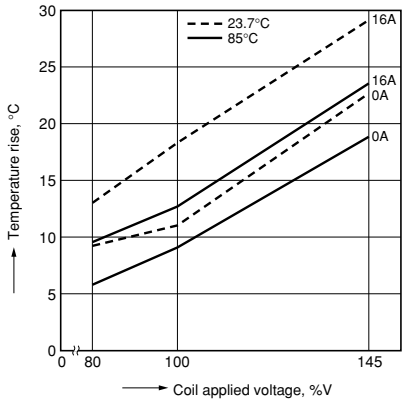
1.-(1) Coil temperature rise (400mW type)

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

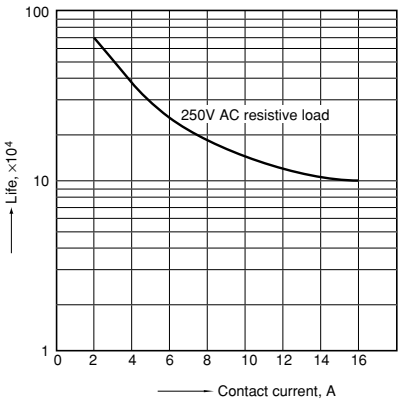


1.-(2) Coil temperature rise (200mW type)

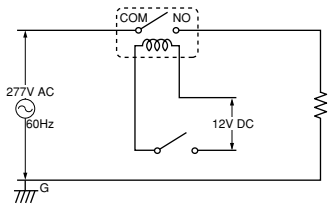
Sample: ALE74B12, 6 pcs.
Point measured: coil inside
Ambient temperature: 23.7°C 74.66°F, 85°C 185°F

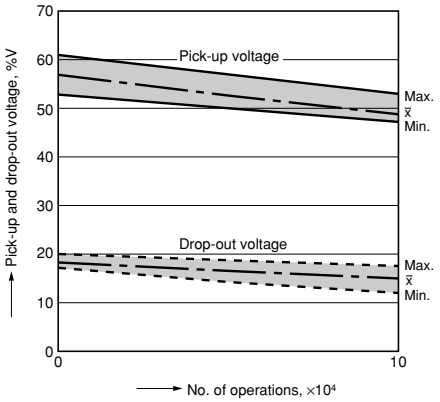


2. Life curve



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)

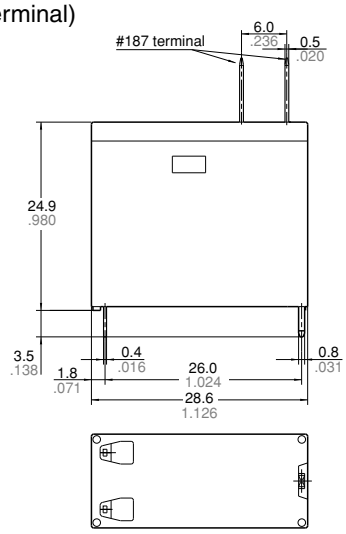
The CAD data of the products with a **CAD Data** mark can be downloaded from: http://industrial.panasonic.com/ac/e/

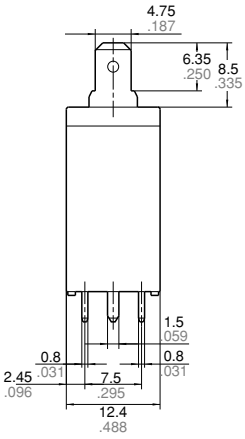
1. TMP type

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

CAD Data

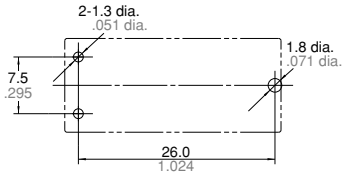
External dimensions





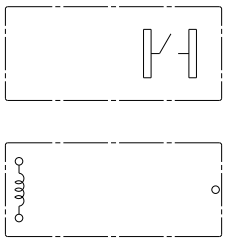
Dimension:	Tolerance
Less than 1mm .039inch:	±0.1 ±.004
Min. 1mm .039inch less than 3mm .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

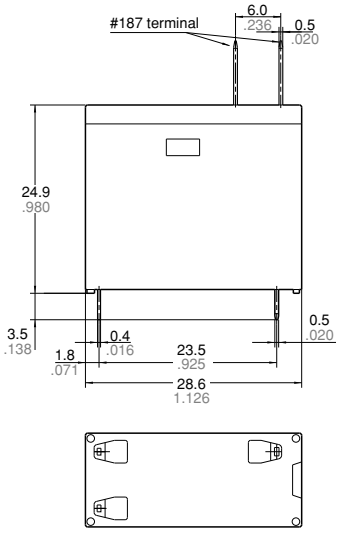
Schematic (Bottom view)

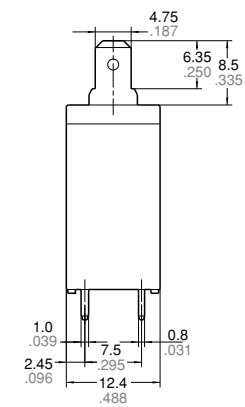


2) PCB side three terminals

CAD Data

External dimensions





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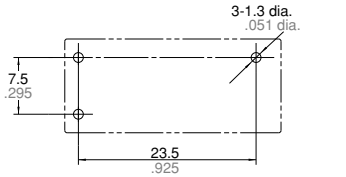
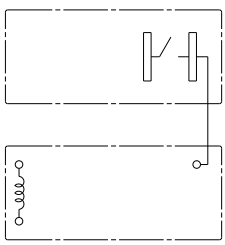
PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

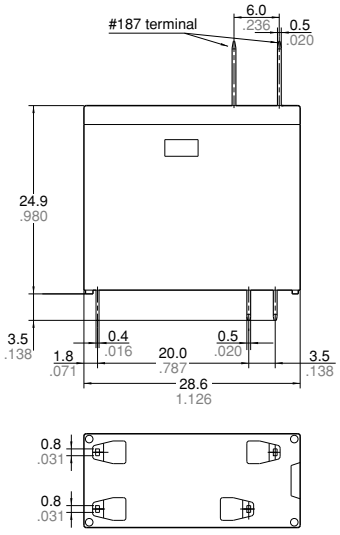
Schematic (Bottom view)



3) PCB side four terminals

CAD Data

External dimensions



Dimension:	Tolerance
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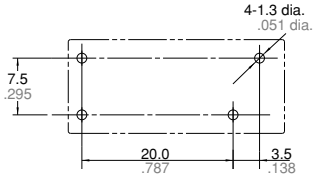
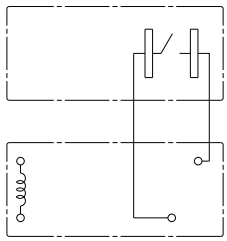
Min. 1mm .039inch less than 3mm .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

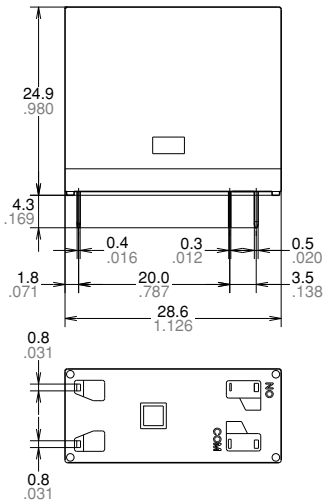
Schematic (Bottom view)



2. PCB type
(No tab terminals)

CAD Data

External dimensions



Dimension:	Tolerance
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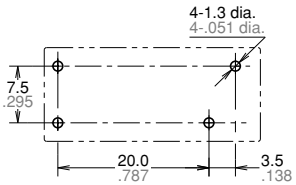
PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

Schematic (Bottom view)

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	10^5	LR26550	16A 277V AC	4009159	16A 250V AC (cosϕ=1.0)	B 12 06 13461 325	16A 250V AC (cosϕ=1.0)	10^4	UL: E43149	TV-5	CQC09002039708	16A 250V AC	85°C 185°F
		16A 30 DC	10^5		16A 30 DC		16A 30V AC (0ms)		16A 30V DC (0ms)	10^4	CSA: LR26550	TV-5		–	–
		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 .....

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Electromechanical Control Business Division
■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

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