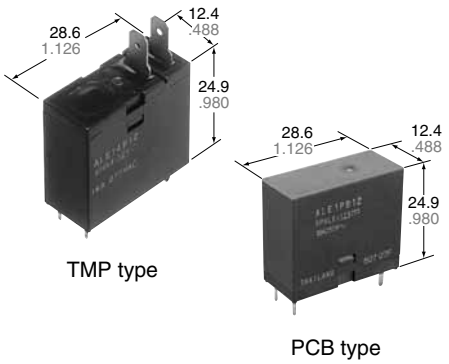
Panasonic
ideas for life

16A POWER RELAY FOR MICRO WAVE OVEN

LE RELAYS (ALE)



RoHS Directive compatibility information
http://www.mew.co.jp/ac/e/environment/

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, VDE approved and SEMKO available (TMP type)
UL/CSA, VDE approved (PCB type)

TYPICAL APPLICATIONS

- **Microwave ovens**
- **Refrigerators**
- **OA equipment**

SPECIFICATIONS

Contact

Arrangement		1 Form A
Initial contact resistance, max. (By voltage drop 6 V DC 1 A)		100 mΩ
Contact material		$AgSnO_2$ type
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
	Min. switching capacity#1 (Reference value)	100 mA, 5 V DC
Expected life (min. operations)	Mechanical (at 180 cpm)	2×10^6
	Electrical (at 20 cpm) (Resistive load)	10^5

Coil

Type	Standard	High sensitive
Nominal operating power	400 mW	200 mW

#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.

Remarks

* Specifications will vary with foreign standards certification ratings.
*1 Measurement at same location as "Initial breakdown voltage" section.
*2 Detection current: 10mA
*3 Wave is standard shock voltage of ±1.2 × 50μs according to JEC-212-1981
*4 Excluding contact bounce time.
*5 Half-wave pulse of sine wave: 11 ms; detection time: 10 μs
*6 Half-wave pulse of sine wave: 6 ms
*7 Detection time: 10 μs
*8 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*1		Min. 1,000 MΩ (at 500 V DC)
Initial breakdown voltage*2	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*3		10,000 V
Operate time*4 (at nominal voltage) (at 20°C 68°F)		Max. 20ms
Release time (with diode)*4 (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*5	200 m/s²{20 G}
	Destructive*6	1,000 m/s²{100 G}
Vibration resistance	Functional*7	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*8 (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 Approx. 15 g .53 oz (PCB type)

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) 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 P: 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 (TMP type). SEMKO approved types are also available, please consult us.
UL/CSA, VDE approved type is standard (PCB type).
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)
		Part No.	Part No.	Part No.	Part No.
1 Form A	5	ALE12❍05	ALE13❍05	ALE14❍05	ALE1P❍05
	6	ALE12❍06	ALE13❍06	ALE14❍06	ALE1P❍06
	9	ALE12❍09	ALE13❍09	ALE14❍09	ALE1P❍09
	12	ALE12❍12	ALE13❍12	ALE14❍12	ALE1P❍12
	18	ALE12❍18	ALE13❍18	ALE14❍18	ALE1P❍18
	24	ALE12❍24	ALE13❍24	ALE14❍24	ALE1P❍24
	48	ALE12❍48	ALE13❍48	ALE14❍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 (High sensitivity: 200mW)	5	ALE72❍05	ALE73❍05	ALE74❍05	ALE7P❍05
	6	ALE72❍06	ALE73❍06	ALE74❍06	ALE7P❍06
	9	ALE72❍09	ALE73❍09	ALE74❍09	ALE7P❍09
	12	ALE72❍12	ALE73❍12	ALE74❍12	ALE7P❍12
	18	ALE72❍18	ALE73❍18	ALE74❍18	ALE7P❍18
	24	ALE72❍24	ALE73❍24	ALE74❍24	ALE7P❍24
	48	ALE72❍48	ALE73❍48	ALE74❍48	ALE7P❍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

LE (ALE)

2. High sensitive type

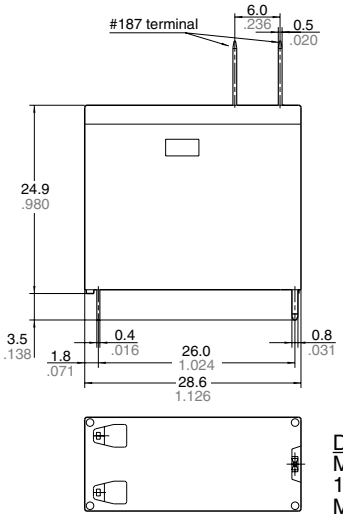
Nominal voltage, V DC	Pick-up voltage, V DC (max.) (at 20°C 68°F)	Drop-out voltage, V DC (min.) (at 20°C 68°F)	Coil resistance, Ω (±10%) (at 20°C 68°F)	Nominal operating current, mA (±10%) (at 20°C 68°F)	Nominal operating power, mW (at 20°C 68°F)	Maximum allowable voltage, V DC (at 20°C 68°F)
5	3.75	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

mm inch

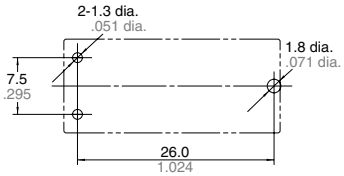
1. TMP type

PCB side three terminals
(includes one dummy terminal)



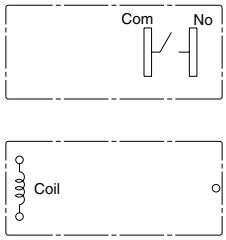
Dimension:	Tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

PC board pattern (Bottom view)

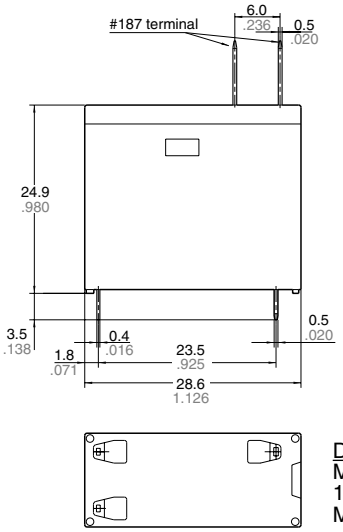


Tolerance : ±0.1 ±.004

Schematic (Bottom view)

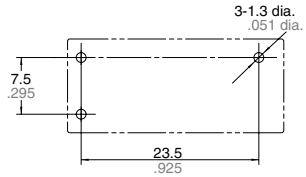


PCB side three terminals



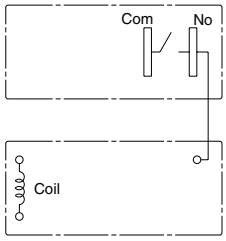
Dimension:	Tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

PC board pattern (Bottom view)



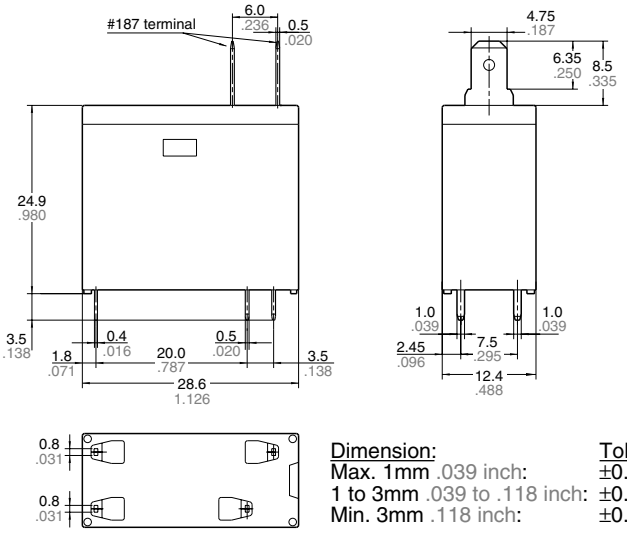
Tolerance : ±0.1 ±.004

Schematic (Bottom view)



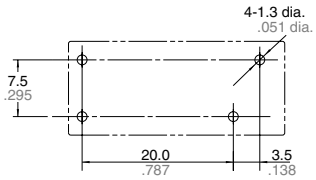
PCB side four terminals

mm inch



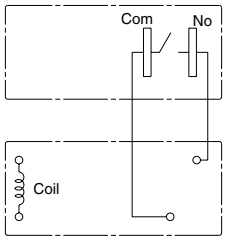
Dimension:	Tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

PC board pattern (Bottom view)

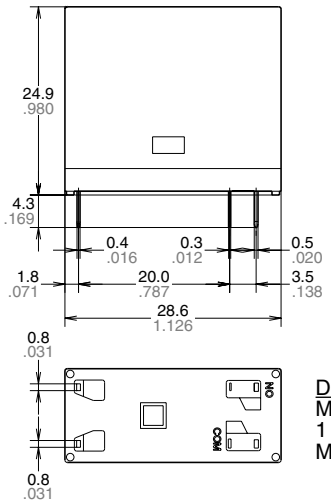


Tolerance : ±0.1 ±.004

Schematic (Bottom view)

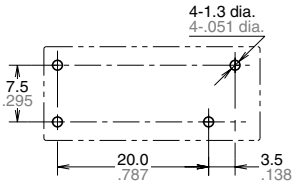


2. PCB type
(No tab terminals)



Dimension:	Tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

PC board pattern (Bottom view)

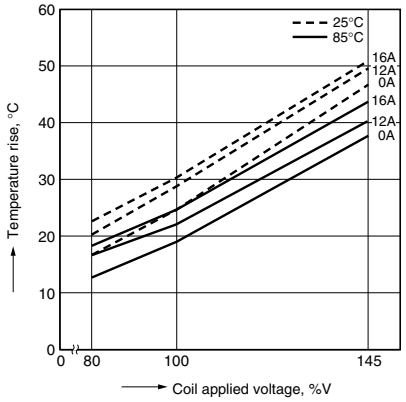


Tolerance: ±0.1 ±.004

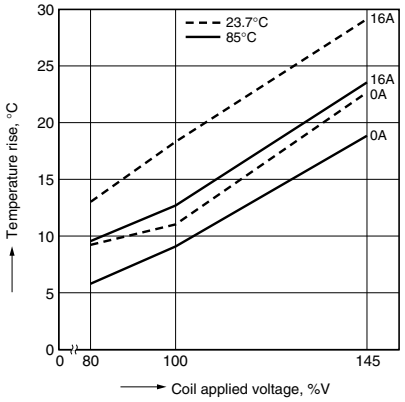
Schematic (Bottom view)

REFERENCE DATA

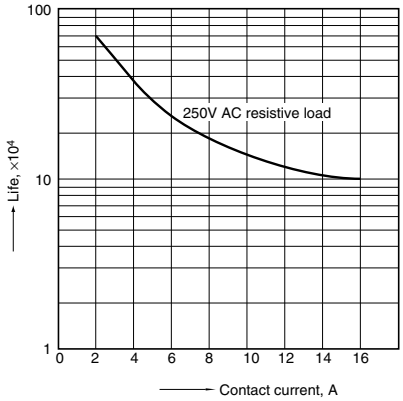
1-1. Coil temperature rise (400mW type)
Sample: ALE14B12, 6 pcs.
Point measured: coil inside
Ambient temperature: 25°C 77°F, 85°C 185°F



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

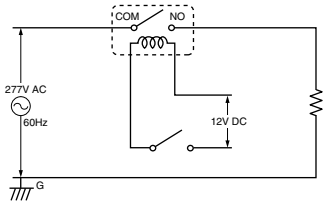


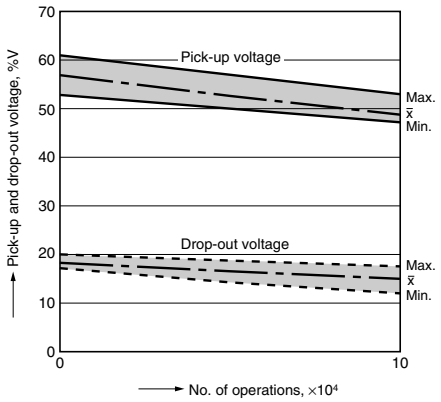
2. Life curve



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:





For Cautions for Use, see Relay Technical Information.