

TMF type

PCB type
mm inch

FEATURES

1. Ideal for compressor and inverter loads

- 1) Compressor load: 20A 250V AC
- 2) Inverter load: 20A 100V AC,
10A 200V AC

2. High insulation resistance

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

3. "PCB" and "TMF" types available

4. Conforms to the various safety standards:

UL/CSA, TÜV, VDE approved

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	20 A 250V AC
	Max. switching power	6,250 V A
	Max. switching voltage	250V AC
	Max. switching current	25 A
	Min. switching capacity ^{#1}	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

Nominal operating power	900 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 $\pm 1.2 \times 50\mu s$ 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. Usage, Storage and Transport Conditions" in **AMBIENT ENVIRONMENT** section in Relay Technical Information.

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	5,000 Vrms for 1 min.
Surge voltage between contact and coil*3		Min. 10,000 V
Operate time*4 (at nominal voltage)		Max. 20 ms (at 20°C 68°F)
Release time (without diode)*4 (at nominal voltage)		Max. 15 ms (at 20°C 68°F)
Temperature rise (at nominal voltage)		Max. 45°C (resistance method, contact current 20 A, rated coil voltage, 60°C 140°F)
Shock resistance	Functional*5	Min. 100 m/s²{10 G}
	Destructive*6	Min. 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 +60°C -40°F to +140°F
	Humidity	5 to 85% R.H.
Unit weight		Approx. 23 g .81 oz

TYPICAL APPLICATIONS

- Air conditioner
- Refrigerators
- OA equipment

ORDERING INFORMATION

Ex.

A

LF

1

T

12

Product Name	Contact arrangement	Terminal shape	Coil voltage, V DC
LF	1: 1 Form A	T: TMF type P: PCB type	05: 5 12: 12 06: 6 18: 18 09: 9 24: 24

Note: Standard packing; Carton: 50 pcs. Case 200 pcs.
UL/CSA,VDE, TÜV approved type is standard.

LF (ALF)

TYPES

Contact arrangement	Coil voltage, V DC	TMP type	PCB type
1 Form A	5	ALF1T05	ALF1P05
	6	ALF1T06	ALF1P06
	9	ALF1T09	ALF1P09
	12	ALF1T12	ALF1P12
	18	ALF1T18	ALF1P18
	24	ALF1T24	ALF1P24

COIL DATA

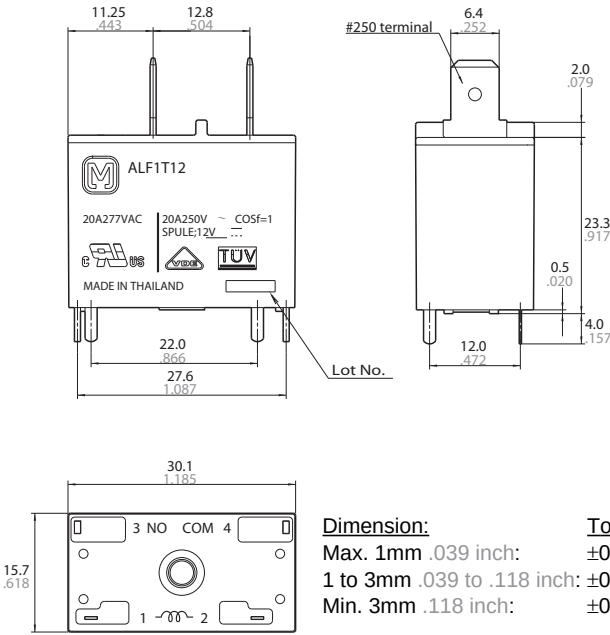
Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (min.)	Coil resistance, Ω(±10%)	Nominal operating current, mA (±10%)	Nominal operating power, W	Maximum allowable voltage, V DC
5	3.5	0.5	27.8	180	0.9	5.5
6	4.2	0.6	40	150		6.6
9	6.3	0.9	90	100		9.9
12	8.4	1.2	160	75		13.2
18	12.6	1.8	360	50		19.8
24	16.8	2.4	640	37.5		26.4

DIMENSIONS(mm inch)

Download [CAD Data](#) from our Web site.

1. TMP type

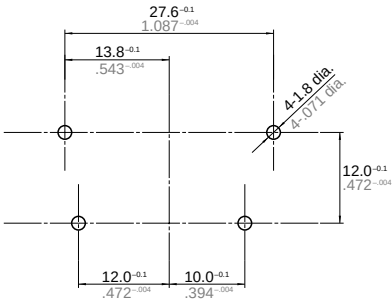
[CAD Data](#)



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

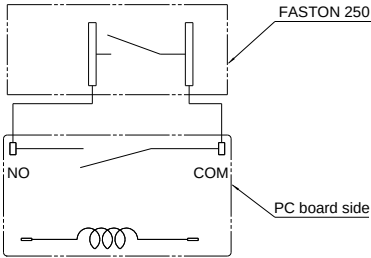
Tolerance
±0.1 ±.004
±0.2 ±.008
±0.3 ±.012

PC board pattern (Bottom view)



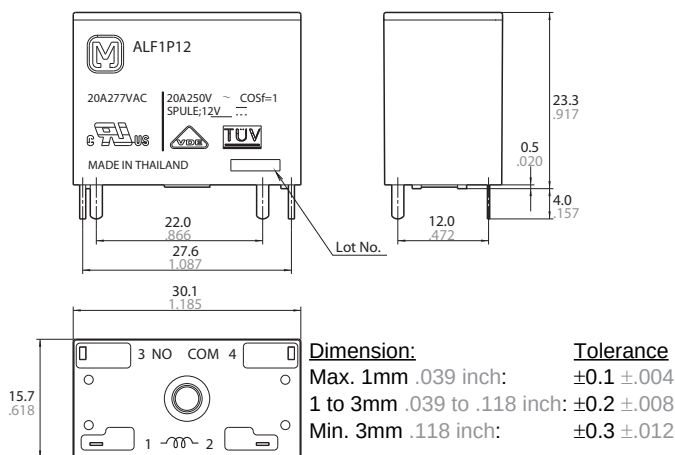
Tolerance: ±0.1 ±.004

Schematic (Bottom view)

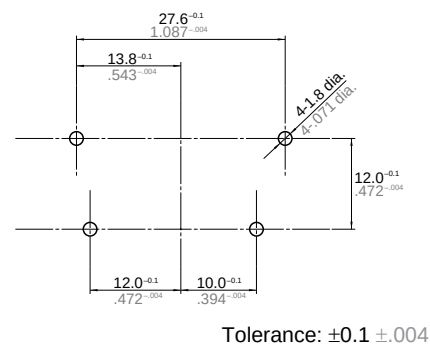


2. PCB type

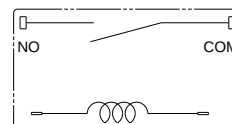
CAD Data



PC board pattern (Bottom view)



Schematic (Bottom view)



REFERENCE DATA

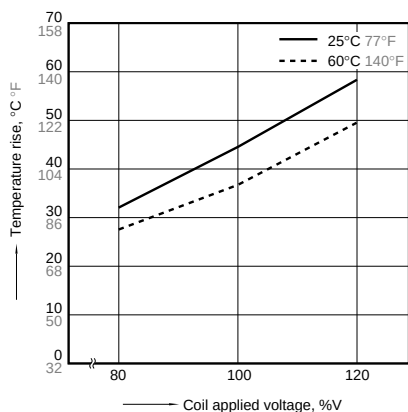
1. Coil temperature rise

Sample: ALF1T12, 6 pcs.

Point measured: coil inside

Contact current: 20A

Ambient temperature: 25°C 77°F, 60°C 140°F



2-(1). 200V AC electrical life test

(200V AC, inverter load)

Sample: ALF1T12, 6 pcs.

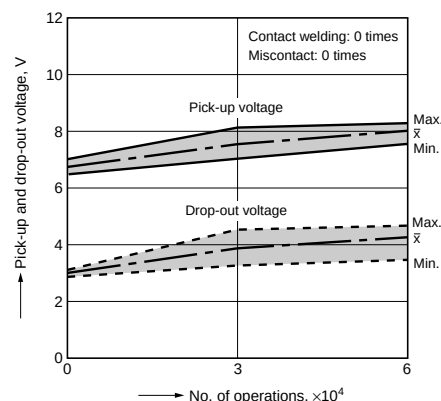
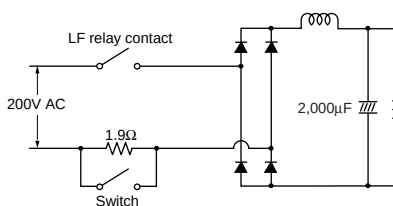
Load: Inrush 102A (wave peak value),

Steady 14.4A (wave peak value)

Inverter dummy 200V AC

Switching frequency: ON 1s, OFF 5s

Circuit:



2-(2). 100V AC electrical life test

(100V AC, inverter load)

Sample: ALF1T12, 6 pcs.

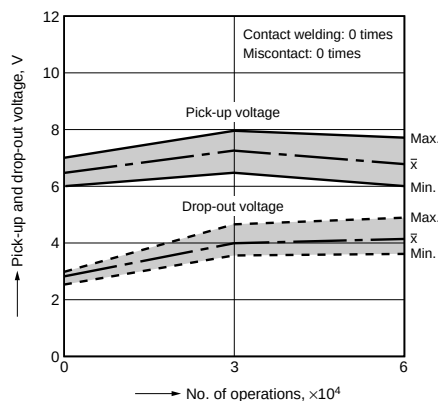
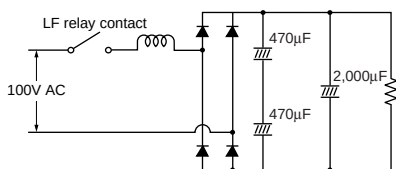
Load: Inrush 224A (wave peak value),

Steady 30.5A (wave peak value)

Inverter dummy 100V AC

Switching frequency: ON 1s, OFF 5s

Circuit:



LF (ALF)

2-(3). Inrush 70.7A, Steady 20A, 250V AC
electrical life test (Compressor dummy load)

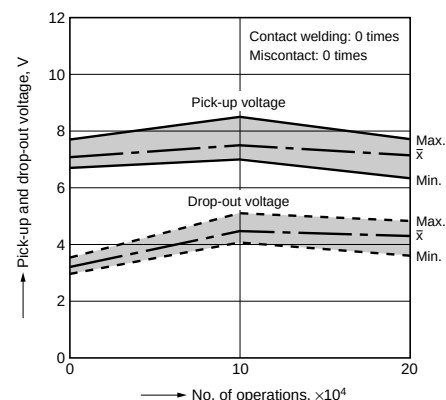
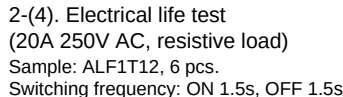
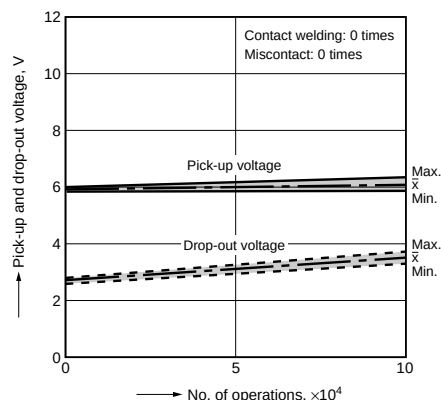
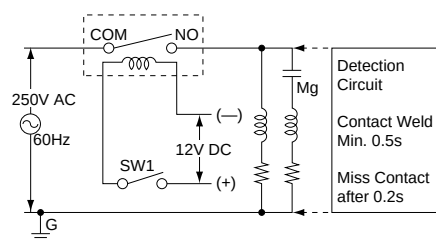
Sample: ALF1T12, 3 pcs.

Load: Inrush 70.7A, $\cos\phi = 0.7$

Steady 20A, $\cos\phi$ 0.9

250V AC compressor dummy

Switching Circuit:



SAFETY STANDARDS

UL/C-UL (Recognized)		VDE (Certified)		TV rating (UL/CSA)		TÜV (Certified)	
File No.	Contact rating	File No.	Contact rating	File No.	Rating	File No.	Rating
E43028	25A 277V AC 20A 277V AC	40009169	20A 250V AC (cos ϕ =1.0)	UL E43028	TV-8	B 08 06 13461 246	20A 250V AC (cos ϕ =1.0)

* CSA standard: Certified by C-UL

For Cautions for Use, see [Relay Technical Information](#).