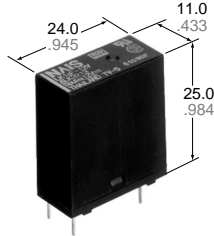


# NAIS

## SLIM POWER RELAY WITH HIGH INRUSH CURRENT CAPABILITY

# LK-RELAYS



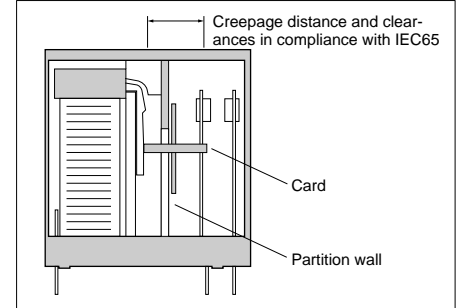
mm inch

### 2. High insulation resistance between contact and coil

- 1) Creepage distance and clearances between contact and coil: Min. 6 mm .236 inch (In compliance with IEC65)
- 2) Surge withstand voltage between contact and coil: 10,000 V or more

### 3. High noise immunity realized by the card separation structure between contact and coil

### 4. Popular terminal pitch in AV equipment field



### 5. Space-saving slim type

Base area: Width 11 × Length 24 mm  
Width .433 × Length .945 inch

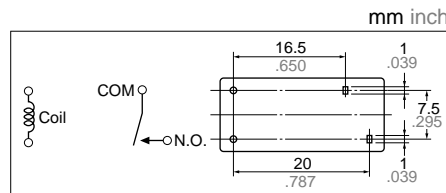
### 6. Conforms to the various safety standards

UL, CSA, VDE, TÜV, SEMKO, SEV, BSI approved

## FEATURES

### 1. High inrush current capability

- 1) Operating load capability:  
inrush 100 A, steady 5 A
- 2) UL/CSA, TV-5



## SPECIFICATIONS

### Contact

Arrangement	1 Form A	
Initial contact resistance, max. (By voltage drop 6 V DC 1 A)	Max. 100 mΩ	
Contact material	Silver alloy	
Rating (resistive load)	Nominal switching capacity	5 A 277 V AC, 5 A 30 V DC
	Max. switching power	1,385 VA, 150 W
	Max. switching voltage	277 V AC, 30 V DC
	Max. switching current	5A (AC), 5 A (DC)
Expected life (min. ope.)	Mechanical (at 180 cpm)	2 × 10 <sup>6</sup>
	Electrical (at 20 cpm) (at rated load)	10 <sup>5</sup>

### Coil

Nominal operating power	530 mW
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### 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  $\pm 1.2 \times 50\mu\text{s}$  according to JEC-212-1981
- \*4 Excluding contact bounce time.
- \*5 Half-wave pulse of sine wave: 11 ms; detection time: 10  $\mu\text{s}$
- \*6 Half-wave pulse of sine wave: 6 ms
- \*7 Detection time: 10  $\mu\text{s}$
- \*8 Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 24).

### Characteristics

Max. operating speed	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	Min. 10,000 V	
Operate time*4 (at nominal voltage)	Approx. 7 ms (at 20°C 68°F)	
Release time (without diode)*4 (at nominal voltage)	Approx. 2 ms (at 20°C 68°F)	
Temperature rise (at 70°C)	Max. 35°C with nominal coil voltage at 5A contact carrying current (resistance method)	
Shock resistance	Functional*5	Min. 200 m/s <sup>2</sup>
	Destructive*6	Min. 1,000 m/s <sup>2</sup>
Vibration resistance	Functional*7	10 to 55 Hz at double amplitude of 1.5 mm
	Destructive	10 to 55 Hz at double amplitude of 1.5 mm
Conditions for operation, transport and storage*8 (Not freezing and condensing at low temperature)	Ambient temp.	-40 to +70°C -40 to +158°F
	Humidity	5 to 85%R.H.
	Air pressure	86 to 106 kPa
Unit weight	Approx. 12 g .42 oz	

## TYPICAL APPLICATIONS ORDERING INFORMATION

- AV equipment: TV's, VTR's, etc.
- OA equipment
- HA equipment

Ex.	LK	1a	F	—	24V
Contact arrangement	Protective construction	Coil voltage (DC)			
1a: 1 Form A	F: Flux-resistant type	5, 9, 12, 24 V			

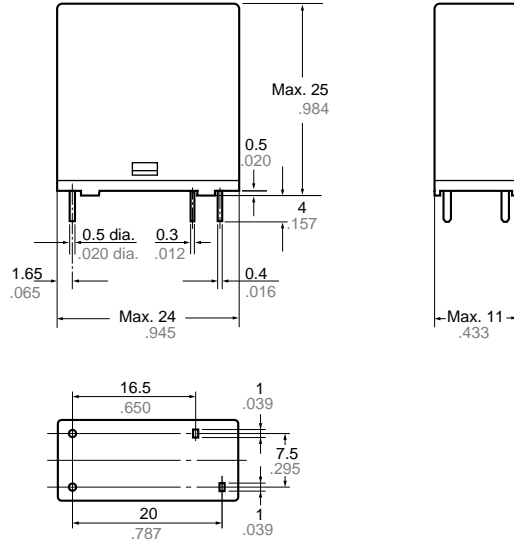
UL/CSA, TÜV, SEMKO, TV-5 approved type is standard.  
(Note) Standard packing Carton: 100 pcs. Case: 500 pcs.

**TYPES AND COIL DATA (at 20°C 68°F)**

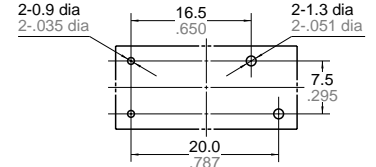
Part No.	Nominal voltage, V DC	Pick-up voltage V DC (max.) (Initial)	Drop-out voltage V DC (min.) (Initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 20°C 68°F)
LK1aF-5V	5	3.5	0.5	47	106.4	530	6.5
LK1aF-9V	9	6.3	0.9	153	58.8	530	11.7
LK1aF-12V	12	8.4	1.2	272	44.2	530	15.6
LK1aF-24V	24	16.8	2.4	1,087	22.1	530	31.2

**DIMENSIONS**

mm inch

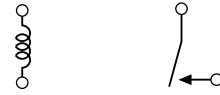


PC board pattern (Copper-side view)



Tolerance ±0.1 ±.004

Schematic (Bottom view)



**Dimension :**

Max. 1mm .039 inch:

1 to 3mm .039 to .118 inch:

Min. 3mm .118 inch:

**General tolerance**

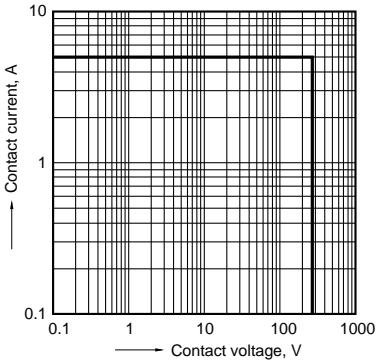
±0.1 ±.004

±0.2 ±.008

±0.3 ±.012

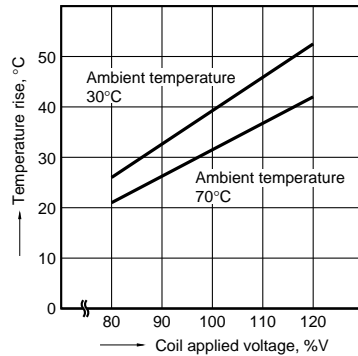
**REFERENCE DATA**

**1. Max. switching power (AC resistive load)**



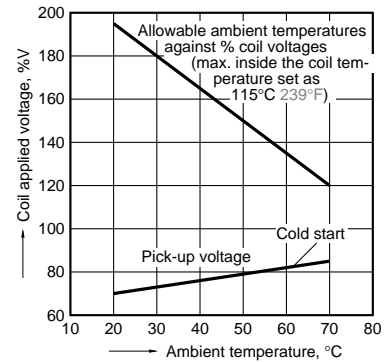
**2. Coil temperature rise**

Sample: LK1aF-12V, 6 pcs.  
Point measured: coil inside  
Contact current: 5 A



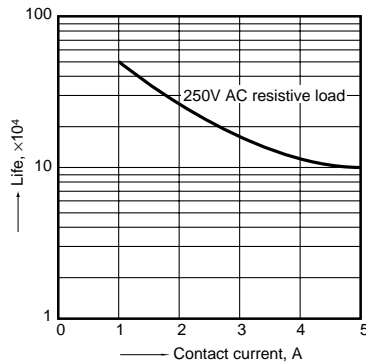
**3. Ambient temperature characteristics**

Contact current: 5 A



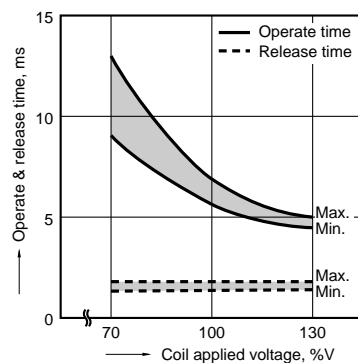
**4. Life curve**

Operation frequency: 20 times/min.  
(ON/OFF = 1.5s: 1.5s)  
Ambient temperature: room temperature



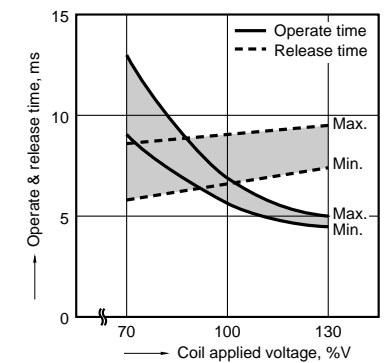
**5-1. Operate & release time (without diode)**

Sample: LK1aF-12V, 20 pcs.



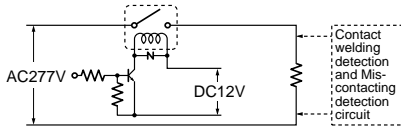
**5-2. Operate & release time (with diode)**

Sample: LK1aF-12V, 20 pcs.

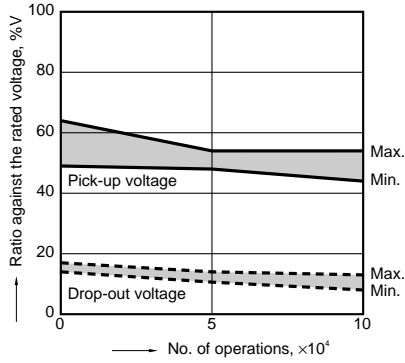


6-1. Electrical life test  
 (5 A 277 V AC, resistive load)  
 Sample: LK1aF-12V, 6 pcs.  
 Operation frequency: 20 times/min.  
 (ON/OFF = 1.5s: 1.5s)  
 Ambient temperature: 26°C 79°F

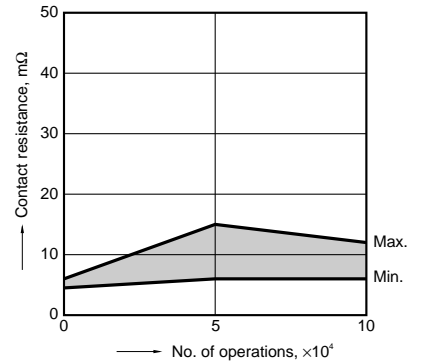
Circuit:



Change of pick-up and drop-out voltage

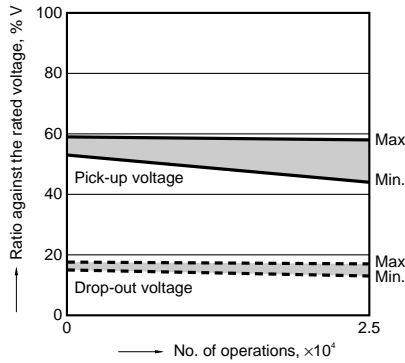


Change of contact resistance

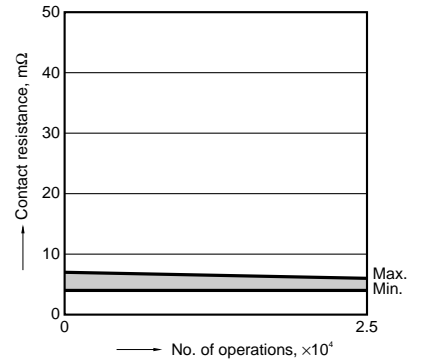


6-2. Electrical life test  
 (UL lamp load test TV-5)  
 Tested sample: LK1aF-12V, 6 pcs.  
 • Overload test  
 Load: 7.5 A 120 V AC (60 Hz),  
 Inrush: 111 A  
 Operation frequency: 10 times/min  
 (ON: OFF = 1 s: 5 s)  
 No. of operations: 50 ope.  
 • Endurance test  
 Load: 5A 120 V AC (60 Hz),  
 Inrush: 78 A  
 Operation frequency: 10 times/min  
 (ON: OFF = 1 s: 5 s)  
 No. of operations: 25,000 ope.

Change of pick-up and drop-out voltage



Change of contact resistance



**NOTES**

**1. Cleaning**

This relay is not the sealed type, so it cannot be immersion cleaned. Be careful that flux does not overflow onto the PC board or penetrate inside the relay.

**2. Soldering**

We recommend the following soldering conditions.

- 1) Automatic soldering
  - \* Preheating: 100°C 212°F, within 2 mins (PC board solder surface)
  - \* Soldering: 260°C 500°F, within 5 s

2) Hand soldering

- \* Iron tip temperature: 280 to 300°C 536 to 571°F
- \* Soldering iron: 30 to 60W
- \* Soldering time: Within 3 s

**For Cautions for Use, see Relay Technical Information (Page 11 to 39).**