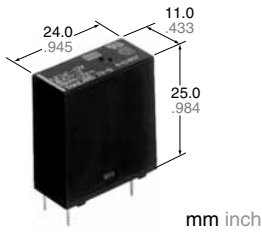


SLIM POWER RELAY WITH HIGH INRUSH CURRENT CAPABILITY

LK RELAYS



RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

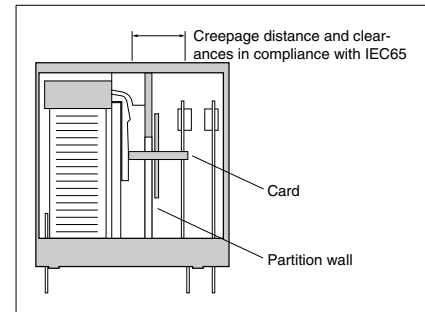
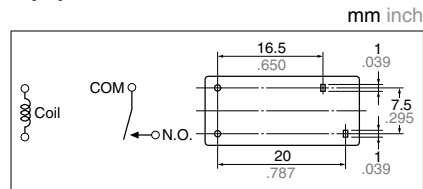
- High inrush current capability**
 - Operating load capability: inrush 100 A, steady 5 A
 - UL/CSA, TV-5

2. High insulation resistance between contact and coil

- Creepage distance and clearances between contact and coil: Min. 6 mm .236 inch (In compliance with IEC65)
- 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

SPECIFICATIONS

Contact

| | | |
|---|---|---------------------------|
| Arrangement | 1 Form A | |
| Initial contact resistance, max. (By voltage drop 6 V DC 1 A) | Max. 100 mΩ | |
| Contact material | AgSnO ₂ type | |
| 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) |
| | Min. switching capacity ^{#1} (Reference value) | 100 mA, 5 V DC |
| Expected life (min. ope.) | Mechanical (at 180 cpm) | 2 × 10 ⁶ |
| | Electrical (at 20 cpm) (at rated load) | 10 ⁵ |

Coil

| | |
|-------------------------|--------|
| Nominal operating power | 530 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 | 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) | Max. 15 ms (at 20°C 68°F) | |
| Release time (without diode)*4 (at nominal voltage) | Max. 5 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 | 200 m/s ² |
| | Destructive*6 | 1,000 m/s ² |
| 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

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

ORDERING INFORMATION

Ex. LK 1a F — 24V

| | | |
|---------------------|-------------------------|-----------------------|
| Contact arrangement | Protective construction | Coil voltage (DC) |
| 1a: 1 Form A | F: Flux-resistant type | 5, 6, 9, 12, 18, 24 V |

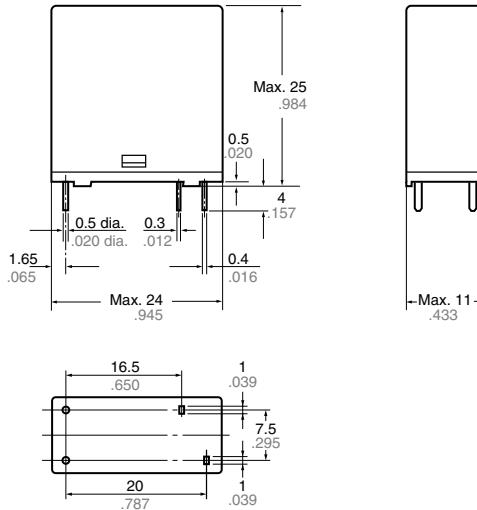
UL/CSA, TÜV, SEMKO, TV-5 approved type is standard.
 (Note) Standard packing Carton: 100 pcs. Case: 500 pcs.

TYPES AND COIL DATA (at 20°C 68°F)

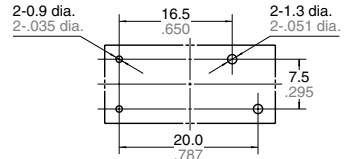
| Part No. | Nominal voltage, V DC | Pick-up voltage V DC (max.) (Initial) | Drop-out voltage V DC (min.) (Initial) | Coil resistance, Ω (±10%) | Nominal operating current, mA (±10%) | Nominal operating power, mW | Max. allowable voltage, V DC (at 20°C 68°F) |
|-----------|-----------------------|---------------------------------------|--|---------------------------|--------------------------------------|-----------------------------|---|
| LK1aF-5V | 5 | 3.5 | 0.5 | 47 | 106.4 | 530 | 6.5 |
| LK1aF-6V | 6 | 4.2 | 0.6 | 68 | 88.3 | 530 | 7.8 |
| 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-18V | 18 | 12.6 | 1.8 | 611 | 29.5 | 530 | 23.4 |
| LK1aF-24V | 24 | 16.8 | 2.4 | 1,087 | 22.1 | 530 | 31.2 |

DIMENSIONS

mm inch



PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

Schematic (Bottom view)

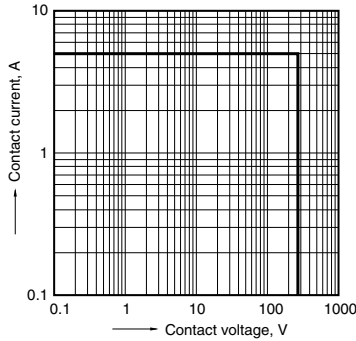


Dimension :
 Max. 1mm .039 inch: ±0.1 ±.004
 1 to 3mm .039 to .118 inch: ±0.2 ±.008
 Min. 3mm .118 inch: ±0.3 ±.012

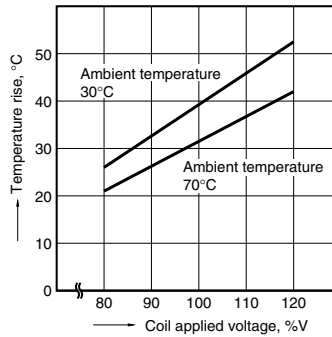
General tolerance
 ±0.1 ±.004
 ±0.2 ±.008
 ±0.3 ±.012

REFERENCE DATA

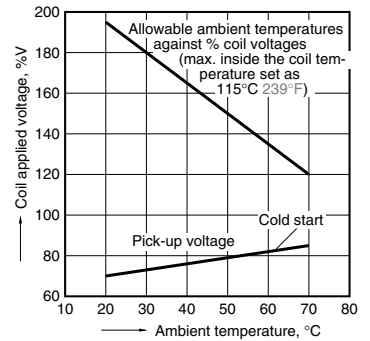
1. Max. switching power (AC resistive load)



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

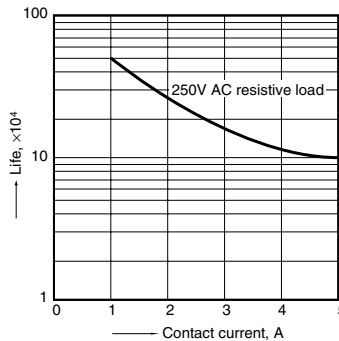


3. Ambient temperature characteristics Contact current: 5 A

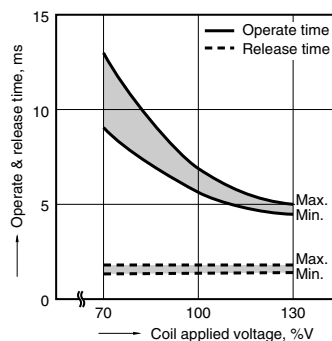


4. Life curve

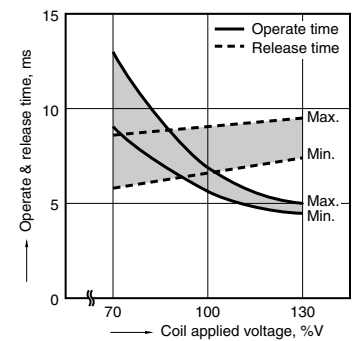
Operation frequency: 20 times/min.
 (ON/OFF = 1.5s: 1.5s)
 Ambient temperature: room temperature



5-1. Operate & release time (without diode) Sample: LK1aF-12V, 20 pcs.

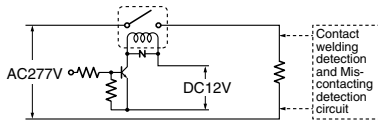


5-2. Operate & release time (with diode) Sample: LK1aF-12V, 20 pcs.

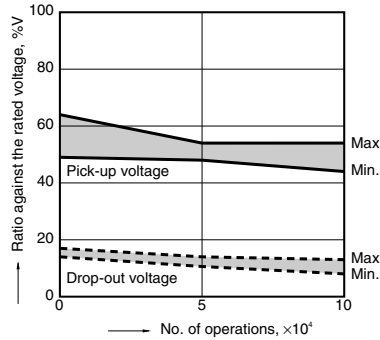


6-1. Electrical life test
 (5 A 277 V AC, resistive load)
 Sample: LK1aF-12V, 6 pcs.
 Operation frequency: 20 times/min.
 (ON/OFF = 1.5s: 1.5s)
 Ambient temperature: 26°C 79°F

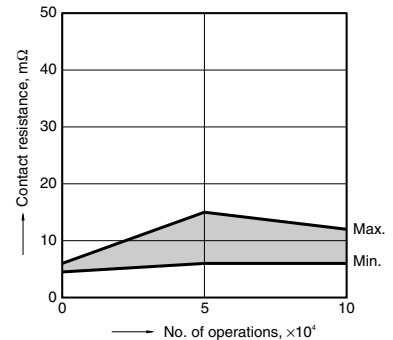
Circuit:



Change of pick-up and drop-out voltage



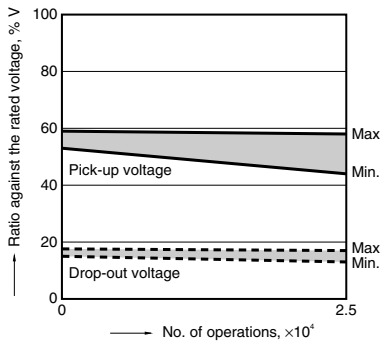
Change of contact resistance



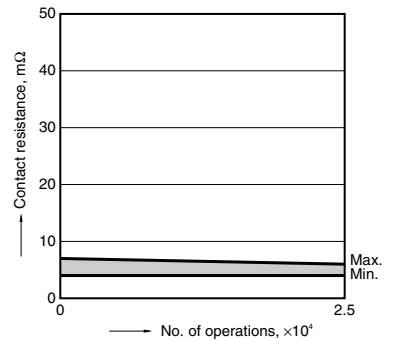
6-2. Electrical life test
 (UL lamp load test TV-5)
 Tested sample: LK1aF-12V, 6 pcs.

- 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