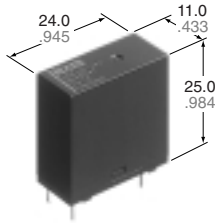


NAIS

250 mW Slim Power Relay

LK-S RELAYS



mm inch

FEATURES

1. High sensitivity: 250mW

The power-saving relay is highly sensitive at the nominal operating power of 250 mW (530 mW power consumption on LK relays).

2. High inrush current capability

- 1) 111A inrush current.
- 2) UL/CSA TV-5 rating.

3. 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

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

- 5. Conforms to the various safety standards**
UL/CSA, TÜV and SEMKO approved
VDE and SEV under application

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
	Max. switching power	1,385 V A
	Max. switching voltage	277 V AC
	Max. switching current	5 A (AC)
Expected life (min. operations)	Mechanical (at 180 cpm)	10 ⁶
	Electrical (at 20 cpm) (at rated load)	10 ⁵ (ON:OFF=1.5s:1.5s)

Coil

Nominal operating power	250 mW
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Remarks

- *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. Usage, transport and storage conditions NOTES (Page 3)

Characteristics

Max. operating speed	20 cpm (at rated load)	
Initial insulation resistance*1	Min. 1,000 MΩ (at 500 V DC)	
Initial *2 breakdown voltage	Between open contacts	1,000 Vrms for 1 min.
	Between contact and coil	4,000 Vrms for 1 min.
Surge voltage between contact and coil*3	Min. 10,000 V (initial)	
Operate time*4 (at nominal voltage)	Max. 15ms (at 20°C 68°F)	
Release time (with diode)*4 (at nominal voltage)	Max. 15ms (at 20°C 68°F)	
Temperature rise (at 70°C)	Max. 35°C with nominal coil voltage and at 5 A contact carrying current	
Shock resistance	Functional*5	Min. 200 m/s ² {approx. 20 G}
	Destructive*6	Min. 1,000 m/s ² {approx. 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 +70°C -40°F to +158°F
	Humidity	5 to 85% R.H.
	Air pressure	86 to 106 kPa
Unit weight	Approx. 12 g .42 oz	

TYPICAL APPLICATIONS

- Audio visual equipment
- Office equipment
- Home appliances

ORDERING INFORMATIONS

Ex. LKS 1a F - 12V

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

(Note) Standard packing Carton: 100 pcs. Case: 500 pcs.

LK-S

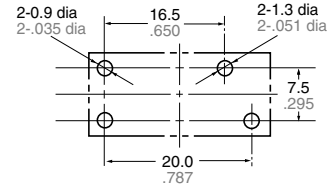
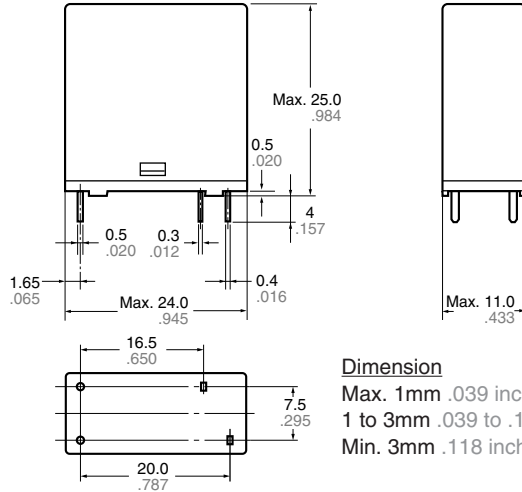
TYPES AND COIL DATA (at 20°C 68°F)

Part No.	Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (min.)	Coil resistance, Ω ($\pm 10\%$)	Nominal operating current, mA ($\pm 10\%$)	Nominal operating power, mW	Maximum allowable voltage, V DC
LKS1aF-5V	5	(Initial) 3.5	(Initial) 0.5	100	50	250	6.5
LKS1aF-9V	9	(Initial) 6.3	(Initial) 0.9	324	27.8	250	11.7
LKS1aF-12V	12	(Initial) 8.4	(Initial) 1.2	576	20.8	250	15.6
LKS1aF-24V	24	(Initial) 16.8	(Initial) 2.4	2,304	10.4	250	31.2

DIMENSIONS

mm inch

PC board pattern (Bottom view)



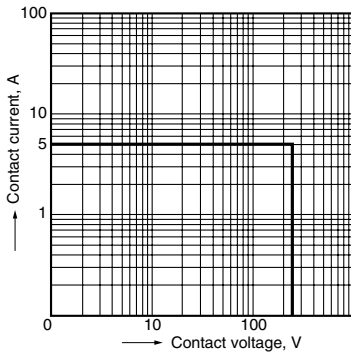
Tolerance : $\pm 0.1 \pm 0.004$

Schematic (Bottom view)



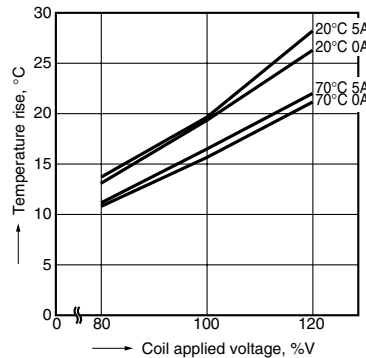
REFERENCE DATA

1. Max. switching power (AC resistive load)



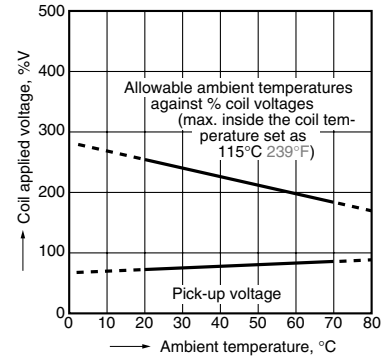
2. Coil temperature rise

Sample: LKS1aF-12V, 6 pcs.
Point measured: coil inside
Contact current: 0 A, 5 A



3. Ambient temperature characteristics and coil applied voltage

Contact current: 5 A



4-1. Electrical life test

(5 A 250 V AC, resistive load)

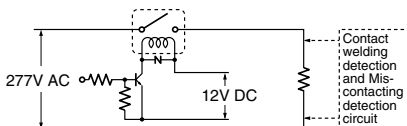
Sample: LKS1aF-12V, 6 pcs.

Operation frequency: 20 times/min.

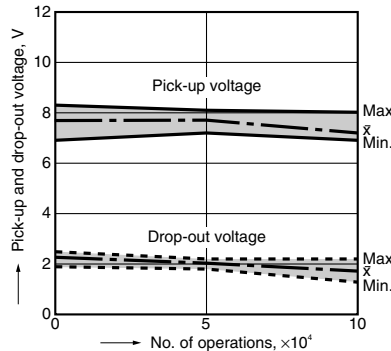
(ON/OFF = 1.5s: 1.5s)

Ambient temperature: 20°C 68°F

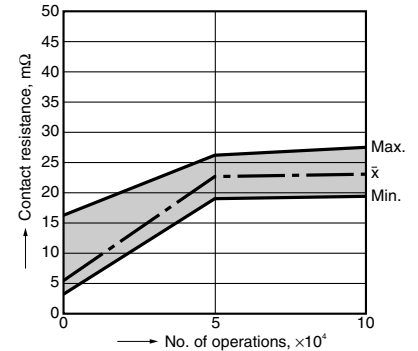
Circuit:



Change of pick-up and drop-out voltage



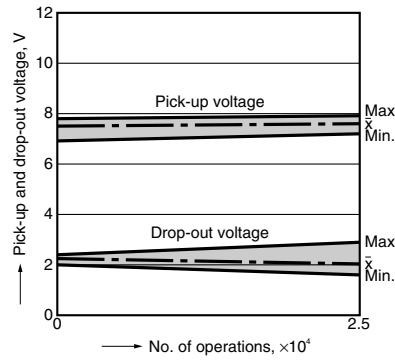
Change of contact resistance



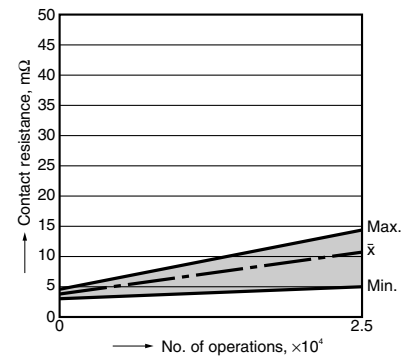
4-2. Electrical life test
 (UL lamp load test TV-5)
 Tested sample: LKS1aF-12V, 6 pcs.

- 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. Coil operating power

Pure DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%. However, check it with the actual circuit since the characteristics may be slightly different.

2. Voltage applied to coil

To ensure reliable operation, please apply nominal voltage to the coil. Beware of the fact that pick-up voltage and dropout voltage vary depending on the ambient temperature and conditions.

3. 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.

4. Operating life

Operating life varies depending on the type and load of the coil drive circuit, as well as factors like the operating frequency, operating phase and ambient atmosphere, so please check with actual equipment.

5. 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 5 s

6. Usage, transport and storage conditions

1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:

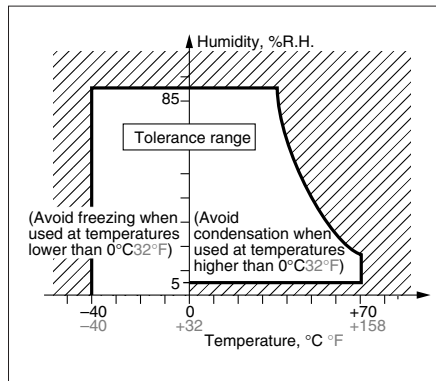
(1) Temperature:

-40 to +70°C -40 to +158°F

(2) Humidity: 5 to 85% RH

(Avoid freezing and condensation.)

The humidity range varies with the temperature. Use within the range indicated in the graph below.



(3) Atmospheric pressure: 86 to 106 kPa
 Temperature and humidity range for usage, transport, and storage:

2) Condensation

Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.

3) Freezing

Condensation or other moisture may freeze on the relay when the temperatures is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.

4) Low temperature, low humidity environments

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

7. Others

1) If in error the relay has been dropped, the appearance and characteristics should be checked before use without fail.

2) Please do not use the coating material of organic system which contains solvents such as xylene and toluene for this product.