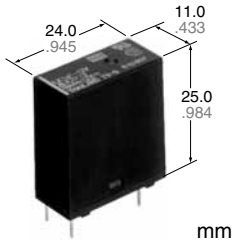
Panasonic
ideas for life

SLIM POWER RELAY WITH HIGH INRUSH CURRENT CAPABILITY

LK RELAYS



mm inch

Compliance with RoHS Directive

FEATURES

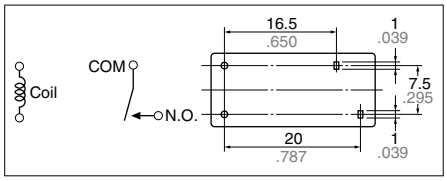
1. High inrush current capability
1) Operating load capability:
inrush 100 A, steady 5 A
2) UL/CSA, TV-5

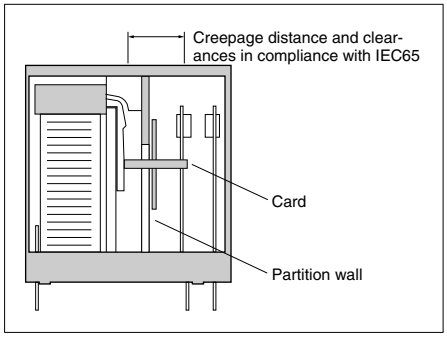
2. High insulation resistance between contact and coil
1) Creepage distance and clearances between contact and coil: Min. 6 mm .236 inch (In compliance with IEC65)
2) Surge withstand voltage between contact and coil: 10,000 V or more

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

4. Popular terminal pitch in AV equipment field

mm inch





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	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		Min. 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	Min. 200 m/s²
	Destructive*6	Min. 1,000 m/s²
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

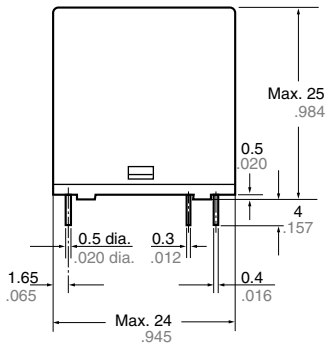
UL/CSA, TÜV, SEMKO, TV-5 approved type is standard.
(Note) Standard packing Carton: 100 pcs. Case: 500 pcs.

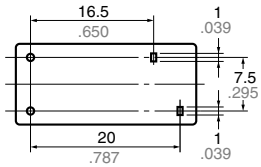
TYPES AND COIL DATA (at 20°C 68°F)

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

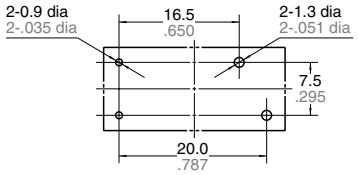
DIMENSIONS

mm inch





PC board pattern (Bottom view)



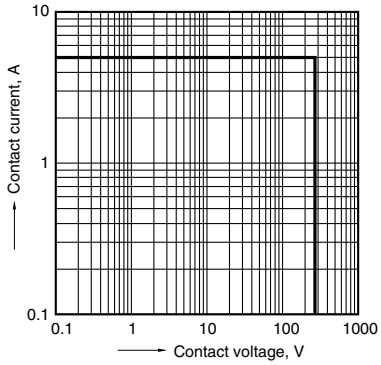
Tolerance: ±0.1 ±.004

Schematic (Bottom view)

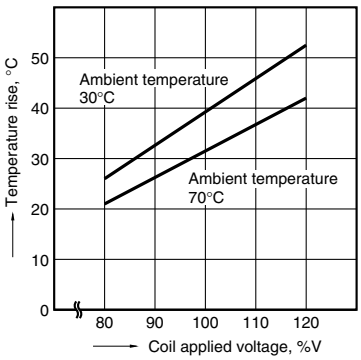
Dimension : General tolerance
Max. 1mm .039 inch: ±0.1 ±.004
1 to 3mm .039 to .118 inch: ±0.2 ±.008
Min. 3mm .118 inch: ±0.3 ±.012

REFERENCE DATA

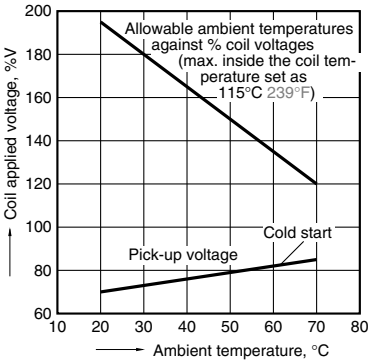
1. Max. switching power (AC resistive load)



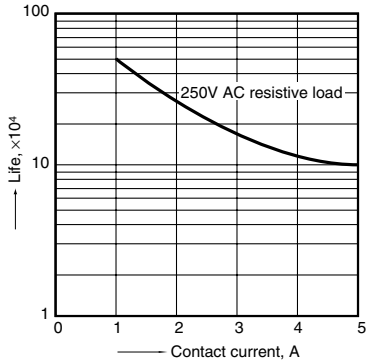
2. Coil temperature rise
Sample: LK1aF-12V, 6 pcs.
Point measured: coil inside
Contact current: 5 A



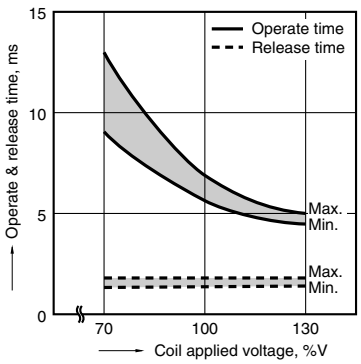
3. Ambient temperature characteristics
Contact current: 5 A



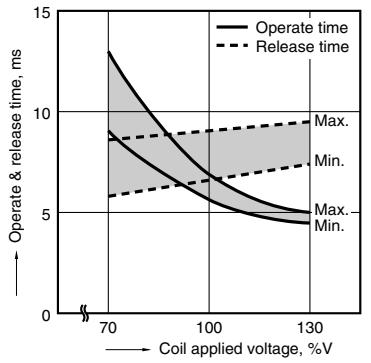
4. Life curve
Operation frequency: 20 times/min.
(ON/OFF = 1.5s: 1.5s)
Ambient temperature: room temperature



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

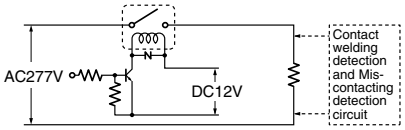


5-2. Operate & release time (with diode)
Sample: LK1aF-12V, 20 pcs.

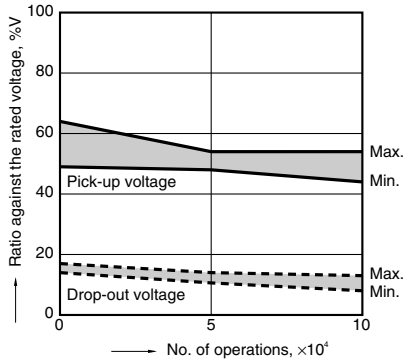


6-1. Electrical life test
(5 A 277 V AC, resistive load)
Sample: LK1aF-12V, 6 pcs.
Operation frequency: 20 times/min.
(ON/OFF = 1.5s: 1.5s)
Ambient temperature: 26°C 79°F

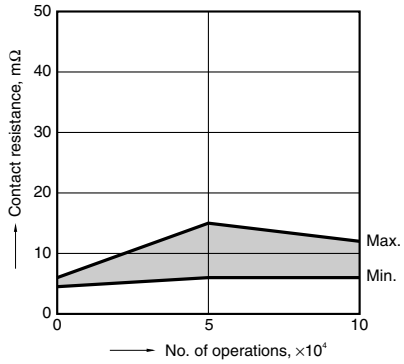
Circuit:



Change of pick-up and drop-out voltage

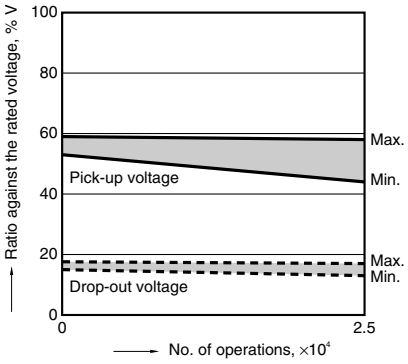


Change of contact resistance

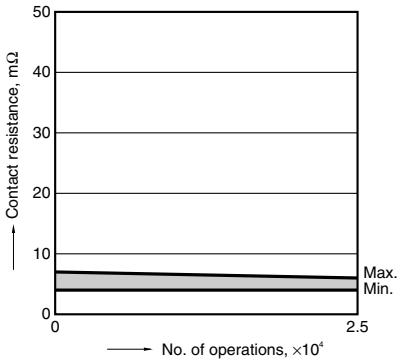


6-2. Electrical life test
(UL lamp load test TV-5)
Tested sample: LK1aF-12V, 6 pcs.
- Overload test
  Load: 7.5 A 120 V AC (60 Hz),
  Inrush: 111 A
  Operation frequency: 10 times/min
  (ON: OFF = 1 s: 5 s)
  No. of operations: 50 ope.
- Endurance test
  Load: 5A 120 V AC (60 Hz),
  Inrush: 78 A
  Operation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