Panasonic
ideas for life

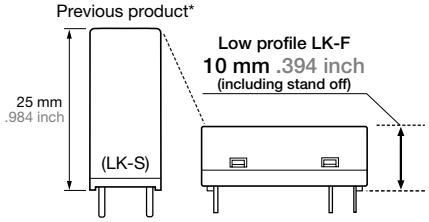
TV-5, TV-8 rated
10mm flat power relays
Silent type is available

LK-F RELAYS

RoHS compliant

FEATURES

• Low profile (10 mm height)
Height reduced 60% compared with previous product*.

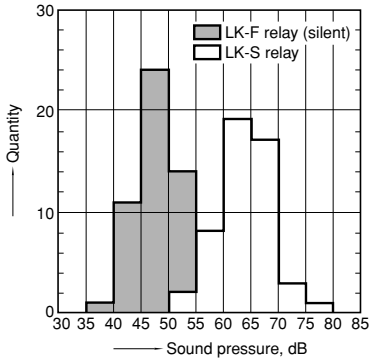


*Previous product: LK-S relay

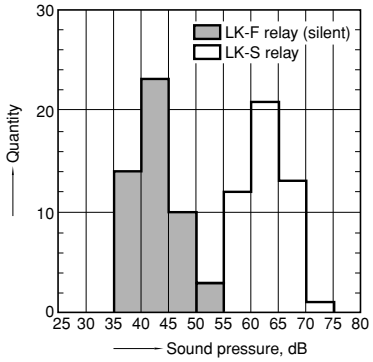
• Nominal switching capacity: 5A, 8A 277V AC

• TV standards compatible: TV-5 and TV-8
• TV-5 type: 78 A inrush current and switching possible at 5 A rated current.
• TV-8 type: 118 A inrush current and switching possible at 8 A rated current.
• Line up includes silent type
Approx. 10 dB less sound pressure than LK-S relay.

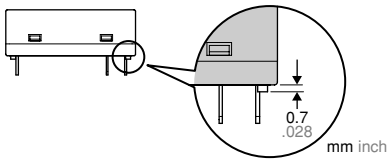
When operate



When release



• High sensitivity: 250mW
Ideal for device power reduction
• 0.7 mm .028 inch stand off height



• Conforms to various safety standards
UL/C-UL, TÜV and SEMKO

TYPICAL APPLICATIONS

• Flat-panel TVs
• Audio visual equipment
• Other slim profile devices

ORDERING INFORMATION

LKF [1a] [M] [ ] - [1] [2] [V] - [1] - [5]

Contact arrangement
1a: 1 Form A

Nominal operating power
M: 250mW

Operation noise
Nil: Standard type
Q: Silent type

Nominal coil voltage (DC)
5, 9, 12, 24V

TV standard
5: TV-5
8: TV-8

Note: Certified by UL/C-UL, TÜV and SEMKO

TYPES

Contact arrangement	Nominal coil voltage	Part No.			
		TV-5 type		TV-8 type	
		Standard type	Silent type	Standard type	Silent type
1 Form A	5V DC	LKF1aM-5V-1-5	LKF1aMQ-5V-1-5	LKF1aM-5V-1-8	LKF1aMQ-5V-1-8
	9V DC	LKF1aM-9V-1-5	LKF1aMQ-9V-1-5	LKF1aM-9V-1-8	LKF1aMQ-9V-1-8
	12V DC	LKF1aM-12V-1-5	LKF1aMQ-12V-1-5	LKF1aM-12V-1-8	LKF1aMQ-12V-1-8
	24V DC	LKF1aM-24V-1-5	LKF1aMQ-24V-1-5	LKF1aM-24V-1-8	LKF1aMQ-24V-1-8

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

RATING

1. Coil data

Nominal coil voltage	Pick-up voltage (at 20°C 68°F) (JIS C 5442* pulse drive.)		Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage (at 20°C 68°F)
	Standard type	Silent type					
5V DC	70%V or less of nominal voltage (Initial)	80%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	50 mA	100Ω	250mW	130%V of nominal voltage
9V DC				27.8mA	324Ω		
12V DC				20.8mA	576Ω		
24V DC				10.4mA	2,304Ω		

*JIS C 5442: JIS C 5442-1986 test method for miniature electromagnetic relays used for control applications.

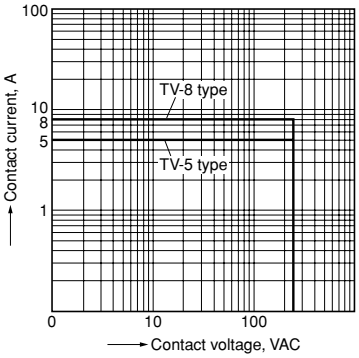
2. Specifications

Characteristics	Item		Specifications	
			TV-5 type	TV-8 type
Contact	Arrangement		1 Form A	
	Contact resistance (Initial)		Max. 100 mΩ (By voltage drop 6 V DC 1A)	
	Contact material		$AgSnO_2$ type	
Rating	Nominal switching capacity (resistive load)		5 A 277 V AC	8 A 277 V AC
	Contact carring power		1,385 VA	2,216 VA
	Max. switching voltage		277 V AC	
	Max. switching current		5 A (AC)	8 A (AC)
	Min. switching capacity (Reference value)*1		100 mA 5 V DC	
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as “Breakdown voltage” section.	
	Breakdown voltage (Initial)	Between open contacts	1,000 Vrms for 1 min. (Detection current: 10 mA)	
		Between contact and coil	4,000 Vrms for 1 min. (Detection current: 10 mA)	
	Surge breakdown voltage*2 (Initial)	Between contact and coil	10,000 V	
	Temperature rise (coil) (at 20°C 68°F)		Max. 45°C 113°F (By resistive method, nominal voltage applied to the coil; contact carrying current: 5 A at 70°C 158°F.)	Max. 45°C 113°F (By resistive method, nominal voltage applied to the coil; contact carrying current: 8 A at 70°C 158°F.)
	Operate time (at 20°C 68°F)		Max. 15 ms (nominal coil voltage, excluding contact bounce time)	
	Release time (at 20°C 68°F)		Max. 5 ms (nominal coil voltage, excluding contact bounce time) (without diode)	
Mechanical characteristics	Shock resistance	Functional	Min. 200 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs.)	
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 6 ms.)	
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 1.5 mm (Detection time: 10 μs.)	
		Destructive	10 to 55 Hz at double amplitude of 1.5 mm	
Expected life	Mechanical		Min. 10^6 (at 180 times/min.)	
	Electrical		Min. 10^5 (at 20 times/min.)	Min. 5×10^4 (at 20 times/min.)
Conditions	Conditions for operation, transport and storage*3		Ambient temperature: –40°C to +70°C –40°F to +158°F; Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature); Atmospheric pressure: 86 to 106 kPa	
	Max. operating speed		20 times/min. (at nominal switching capacity)	
Unit weight			Approx. 12 g .42 oz	

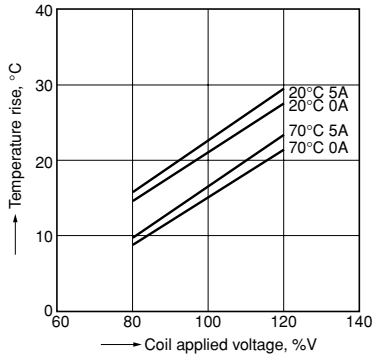
Notes: *1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.
*2. Wave is standard shock voltage of ±1.2×50μs according to JEC-212-1981
*3. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

REFERENCE DATA

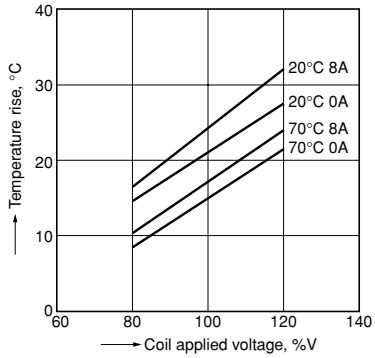
1. Max. switching power (AC resistive load)



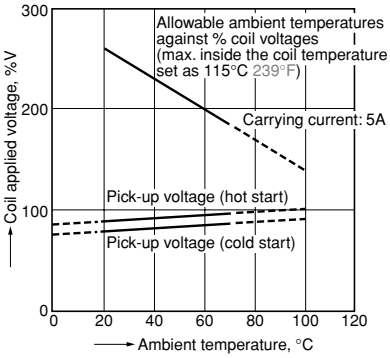
2-(1). Coil temperature rise (TV-5 type)
Sample: LKF1aMQ-12V-1-5, 6 pcs.
Point measured: coil inside
Contact current: 0A, 5A



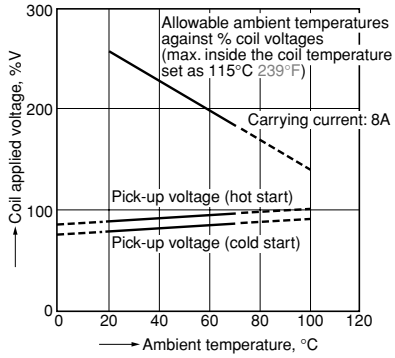
2-(2). Coil temperature rise (TV-8 type)
Sample: LKF1aMQ-12V-1-8, 6 pcs.
Point measured: coil inside
Contact current: 0A, 8A



3-(1). Ambient temperature characteristics and coil applied voltage (TV-5 type)

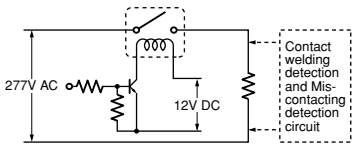


3-(2). Ambient temperature characteristics and coil applied voltage (TV-8 type)

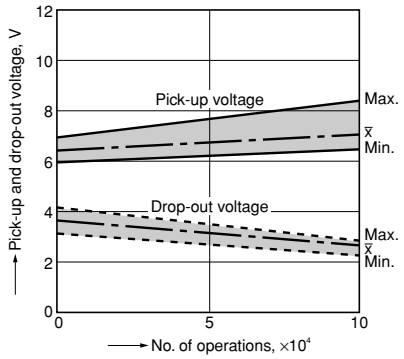


4-(1). Electrical life test
(5A 277V AC, resistive load)
Sample: LKF1aMQ-12V-1-5, 6 pcs.
Operation frequency: 20 times/min.
(ON/OFF = 1.5s: 1.5s)
Ambient temperature: 20°C 68°F

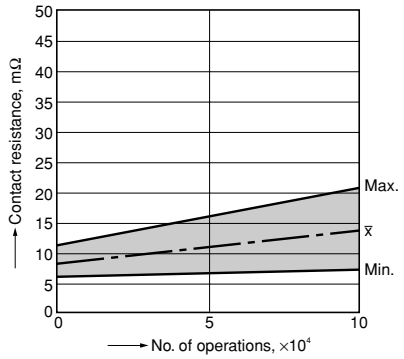
Circuit:



Change of pick-up and drop-out voltage

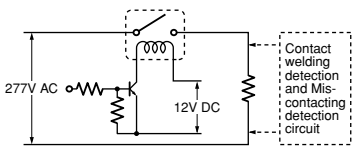


Change of contact resistance

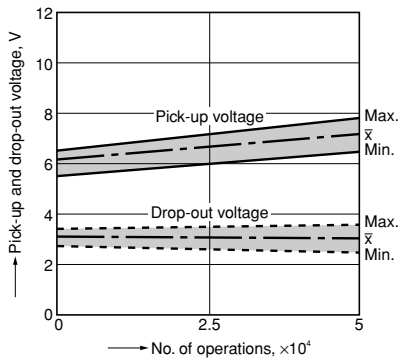


4-(2). Electrical life test
(8A 277V AC, resistive load)
Sample: LKF1aMQ-12V-1-8, 6 pcs.
Operation frequency: 20 times/min.
(ON/OFF = 1.5s: 1.5s)
Ambient temperature: 20°C 68°F

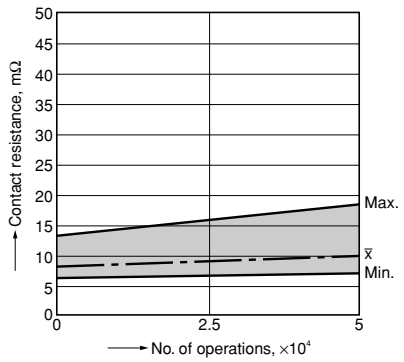
Circuit:



Change of pick-up and drop-out voltage

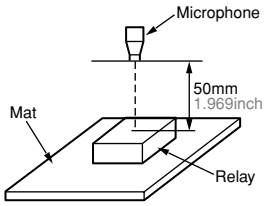


Change of contact resistance

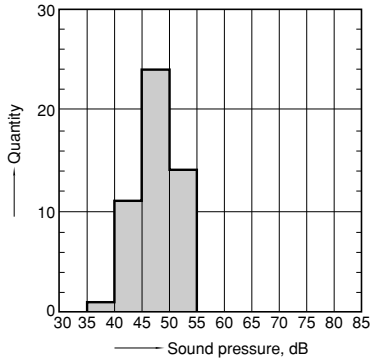


5-(1). Operation noise distribution
LK-F (Height: 10 mm, Silent)

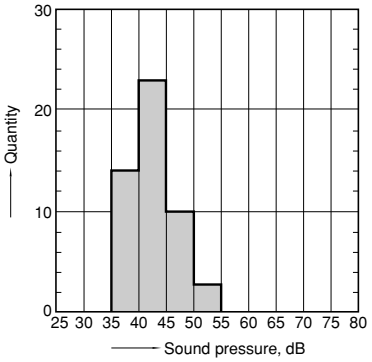
Measuring conditions
Sample: LKF1aMQ-12V-1-5, 50pcs
Background noise: approx. 20dB
Coil voltage: 12V DC
Equipment setting: "A" weighted
Single part (refer to figure below)
With diode



When operate

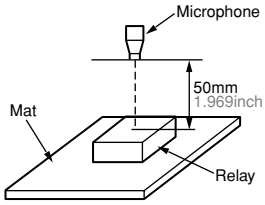


When release

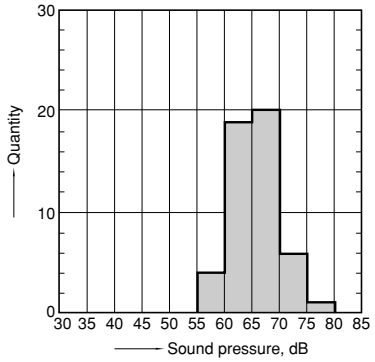


5-(2). Operation noise distribution
LK-F (Height: 10 mm, Standard)

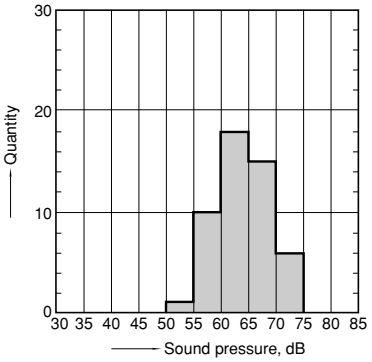
Measuring conditions
Sample: LKF1aM-12V-1-5, 50pcs
Background noise: approx. 20dB
Coil voltage: 12V DC
Equipment setting: "A" weighted
Single part (refer to figure below)
With diode



When operate

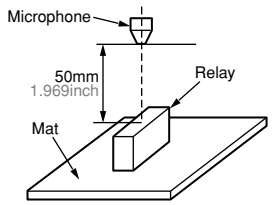


When release

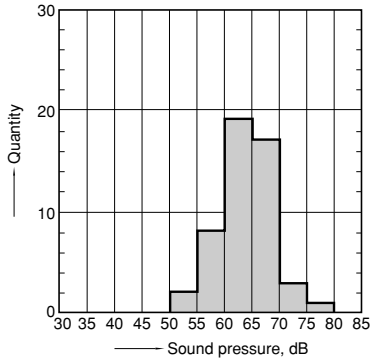


5-(3). Operation noise distribution
LK-S (Height: 25 mm) Refer to comparison

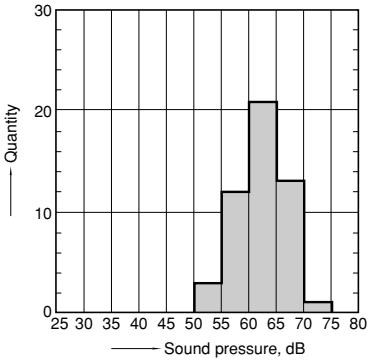
Measuring conditions
Sample: LKS1aF-12V, 50pcs
Background noise: approx. 20dB
Coil voltage: 12V DC
Equipment setting: "A" weighted
Single part (refer to figure below)
With diode



When operate



When release

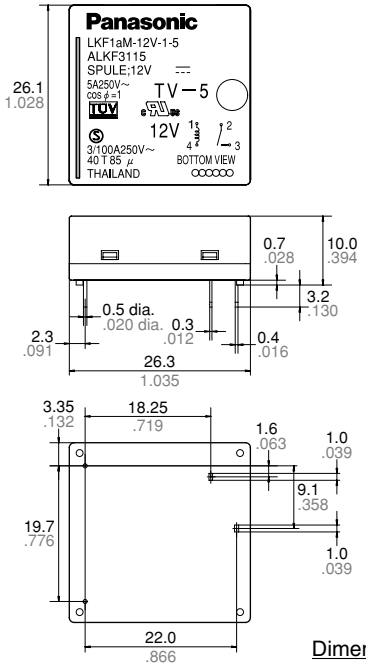


DIMENSIONS (mm inch)

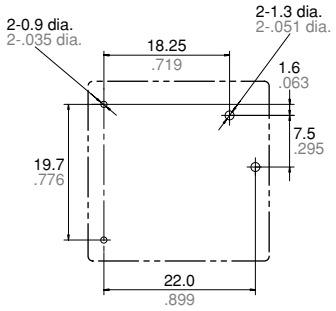
The CAD data of the products with a **CAD Data** mark can be downloaded from: http://industrial.panasonic.com/ac/e

CAD Data

External dimensions



PC board pattern (Bottom view)



Schematic (Bottom view)

Dimension:	General tolerance
Less than 1mm .039inch:	±0.1 ±.004
Min. 1mm .039inch less than 3mm .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

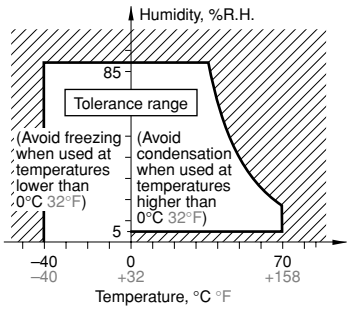
SAFETY STANDARDS

Certification authority	TV-5 type	TV-8 type
UL/C-UL	TV-5 5 A 277 V AC	TV-8 8 A 277 V AC
SEMKO	3/100 A 250 V AC 40T85 μ	
TÜV	EN61810-1 5 A 250 V AC (cosϕ = 1.0)	EN61810-1 8 A 250 V AC (cosϕ = 1.0)

NOTES

■ Usage, transport and storage conditions

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



4) 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.
5) 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.
6) 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.

■ Certification

1) This relay is UL/C-UL certified.
UL/C-UL standards:
TV-5 5 A 277 V AC
TV-8 8 A 277 V AC
2) This relay is certified by TÜV as an electromagnetic relay that complies with EN61810-1.
TÜV standards:
TV-5 type 5 A 250 V~ cosϕ = 1.0
TV-8 type 8 A 250 V~ cosϕ = 1.0
3) This relay is certified by SEMKO.
3/100 A 250 V AC 40T85 μ
Steady-state current: 3A/Inrush current: 100 A, Load voltage: 250 V AC
Ambient temperature: –40 to +85°C –40 to +185°F, Micro-gap

■ Others

1) The amount of relay operation noise will vary depending on the substrate used for mounting. Please use after verifying with the relay mounted on the substrate.
2) There are no restrictions as to how this relay should be oriented during installation. However, due to gravitation there may be slight differences in pick-up/drop-out voltage and operate/release time, etc., depending on the orientation. Therefore, when evaluating the relay, please do so with the relay installed with the actual orientation.

For Cautions for Use.