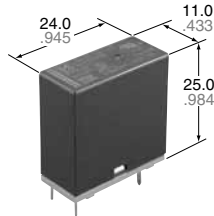


Panasonic
ideas for life

**QUIET TYPE,
HIGH SENSITIVITY 250mW,
SLIM POWER RELAY**

LK-Q RELAYS



mm inch

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

FEATURES

1. High sensitivity

The power-saving relay is highly sensitive at the nominal operating power of 250 mW.

2. Quiet

Approx. 10 dB less sound pressure than previous LK series relay

3. High inrush current capability

Switching capability;

- TV-5 type: inrush 100A, steady: 5A
- TV-8 type: inrush 118A, steady: 8A

4. High insulation resistance

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

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

6. Conforms to the various safety standards

UL, C-UL, TÜV, and SEMKO approved

TYPICAL APPLICATIONS

- Flat-panel TVs
- Audio visual equipment

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	TV-5 type: 5A 277V AC TV-8 type: 8A 277V AC
	Max. switching power	TV-5 type: 1,385 VA TV-8 type: 2,216 VA
	Max. switching voltage	277 V AC
	Max. switching current	TV-5 type: 5A (AC) TV-8 type: 8A (AC)
	Min. switching capacity#1 (Reference value)	100 mA, 5 V DC
Expected life (min. operations)	Mechanical (at 180 cpm)	10 ⁶
	Electrical (at 20 cpm) (at rated load)	TV-5 type: 10 ⁵ TV-8 type: 5 × 10 ⁴

Coil

Nominal operating power	250 mW
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#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 $\pm 1.2 \times 50\mu\text{s}$ according to JEC-212-1981

*4 Excluding contact bounce time.

*5 Half-wave pulse of sine wave: 11 ms; detection time: 10 μs

*6 Half-wave pulse of sine wave: 6 ms

*7 Detection time: 10 μs

*8 The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to 1. Usage, transport and storage conditions in NOTES.

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.
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)		TV-5 type: Max. 35°C with nominal coil voltage and at 5 A contact carrying current (resistance method) TV-8 type: Max. 35°C with nominal coil voltage and at 8 A contact carrying current (resistance method)
Shock resistance	Functional* ⁵	200 m/s ² {approx. 20 G}
	Destructive* ⁶	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

ORDERING INFORMATION

Ex. LKQ 1a F — 12V — TV5

Contact arrangement	Protective construction	Coil voltage(DC)	TV standard
1a: 1 Form A	F: Flux-resistant type	5, 9, 12, 24V	TV-5: TV5, TV-8: TV8

UL/C-UL, TÜV, SEMKO approved type is standard.

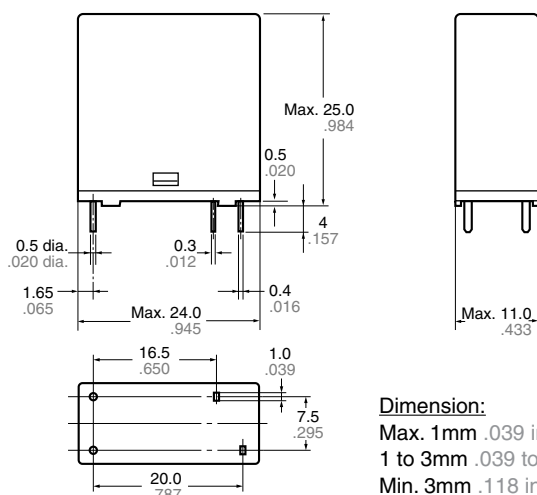
Note: Standard packing Carton: 100 pcs. Case: 500 pcs.

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 ($\pm 10\%$)	Nominal operating current, mA ($\pm 10\%$)	Nominal operating power, mW	Max. allowable voltage, V DC (at 20°C 68°F)
TV-5 type	TV-8 type							
LKQ1aF-5V-TV5	LKQ1aF-5V-TV8	5	4.0	0.5	100	50	250	6.5
LKQ1aF-9V-TV5	LKQ1aF-9V-TV8	9	7.2	0.9	324	27.8	250	11.7
LKQ1aF-12V-TV5	LKQ1aF-12V-TV8	12	9.6	1.2	576	20.8	250	15.6
LKQ1aF-24V-TV5	LKQ1aF-24V-TV8	24	19.2	2.4	2,304	10.4	250	31.2

DIMENSIONS

mm inch



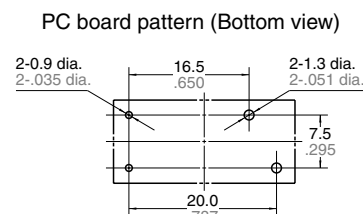
Dimension:

Max. 1mm .039 inch:

1 to 3mm .039 to .118 inch: $\pm 0.2 \pm .008$

Min. 3mm .118 inch:

General tolerance

 $\pm 0.1 \pm .004$ $\pm 0.2 \pm .008$ $\pm 0.3 \pm .012$ 

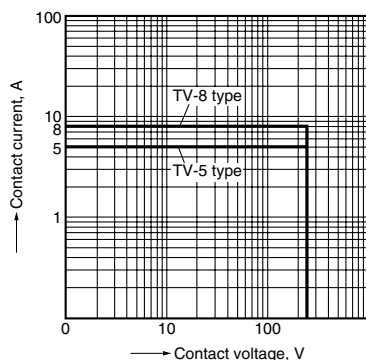
Tolerance: ± 0.1 $\pm .004$

Schematic (Bottom view)



REFERENCE DATA

1. Max. switching power (AC resistive load)

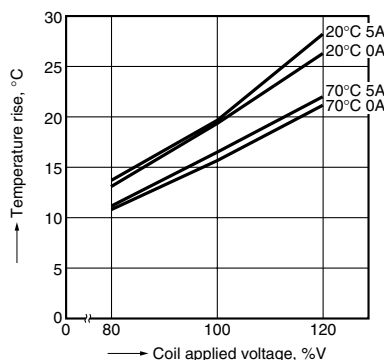


2-(1). Coil temperature rise (TV-5 type)

Sample: LKQ1aF-12V-TV5, 6 pcs.

Point measured: coil inside

Contact current: 0A, 5A

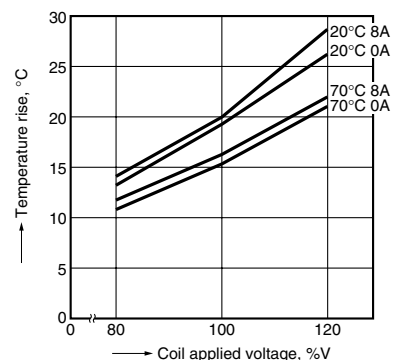


2-(2). Coil temperature rise (TV-8 type)

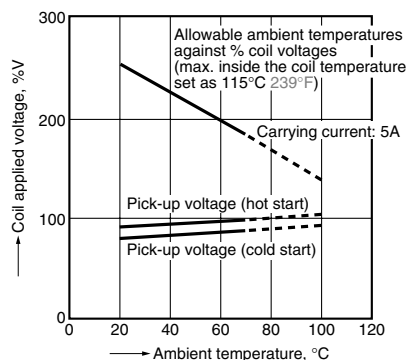
Sample: LKQ1aF-12V-TV8, 6 pcs.

Point measured: coil inside

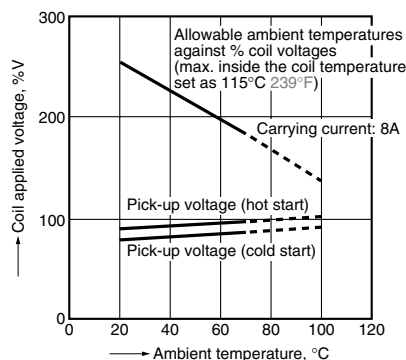
Contact current: 0A, 8A



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

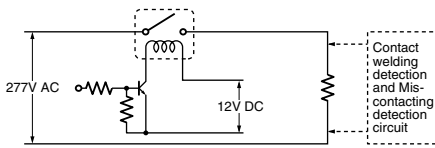


3-(2). Ambient temperature characteristics and coil applied voltage (TV-8 type)

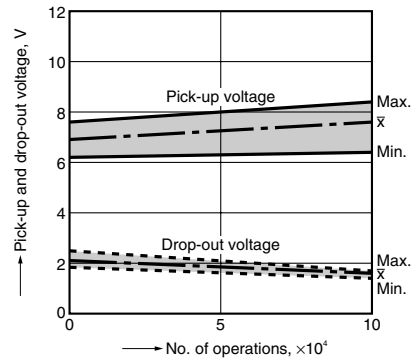


4-(1). Electrical life test (TV-5 type)
 (5A 277V AC, resistive load)
 Sample: LKQ1aF-12V-TV5, 6 pcs.
 Operation frequency: 20 times/min.
 (ON/OFF = 1.5s: 1.5s)
 Ambient temperature: 20°C 68°F

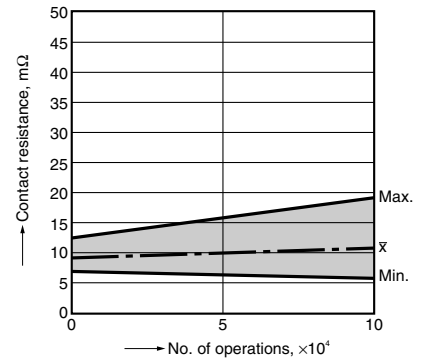
Circuit:



Change of pick-up and drop-out voltage

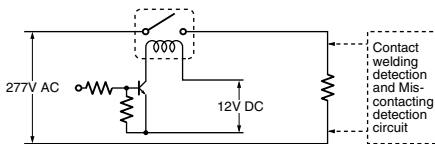


Change of contact resistance

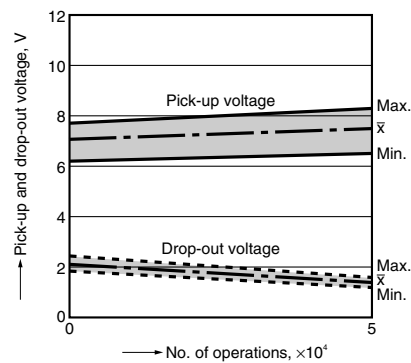


4-(2). Electrical life test (TV-8 type)
 (8A 277V AC, resistive load)
 Sample: LKQ1aF-12V-TV8, 6 pcs.
 Operation frequency: 20 times/min.
 (ON/OFF = 1.5s: 1.5s)
 Ambient temperature: 20°C 68°F

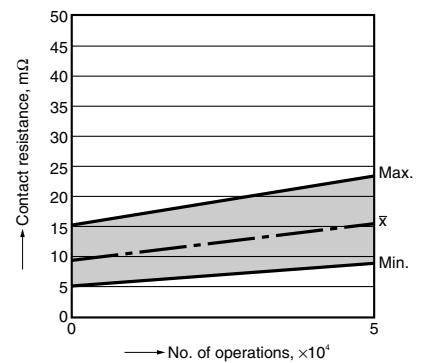
Circuit:



Change of pick-up and drop-out voltage

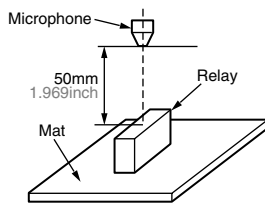


Change of contact resistance

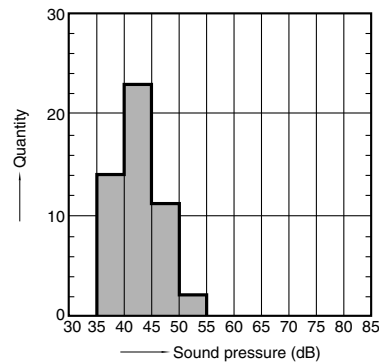


5-(1). Operation noise distribution

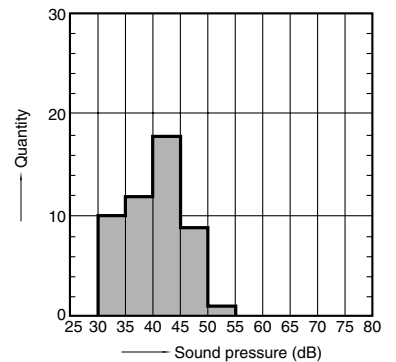
Measuring conditions
 Sample: LKQ1aF-12V-TV5, 50pcs
 Background noise: approx. 20dB
 Coil voltage: 12V DC
 Equipment setting: "A" weighted
 Single part (refer to figure below)
 With diode



When operate

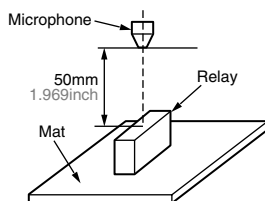


When release

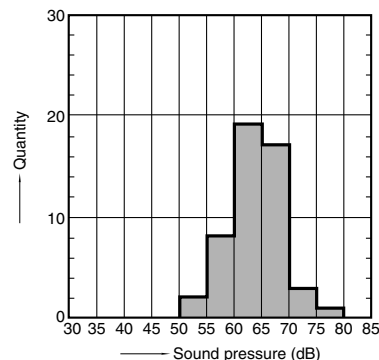


5-(2). Operation noise distribution (refer to comparison)

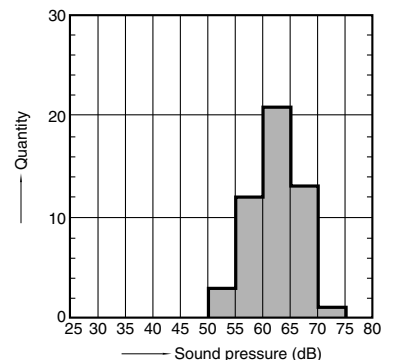
Measuring conditions
 Sample: LKS1aF-12V, 50pcs
 Background noise: approx. 20dB
 Coil voltage: 12V DC
 Equipment setting: "A" weighted
 Single part (refer to figure below)
 With diode



When operate



When release



NOTES

1. Usage, transport and storage conditions

1) Temperature:

-40 to +70°C -40 to +158°F

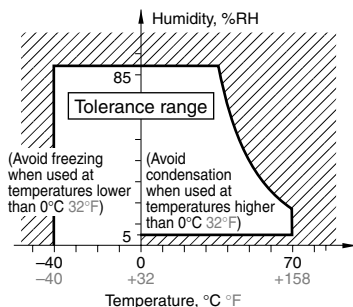
2) Humidity: 5 to 85% RH

(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.

2. Solder and cleaning conditions

1) Please obey the following conditions when soldering automatically.

(1) Preheating: Within 120°C 248°F (solder surface terminal portion) and within 120 seconds

(2) Soldering iron: 260°C±5°C 500°F±41°F (solder temperature) and within 6 seconds (soldering time)

2) Since this is not a sealed type relay, do not clean it as is. Also, be careful not to allow flux to overflow above the PC board or enter the inside of the relay.

3. Certification

1) This relay is UL and C-UL certified.

2) This relay is certified by TUV as an electromagnetic relay that complies with VDE0435.

The terminals of this relay can only be connected with solder.

3) This relay is certified by SEMKO.

4. Others

1) For precautions regarding use and explanations of technical terminology, please refer to "Relay Technical Data Book".

2) To ensure good operation, please keep the voltage on the coil ends to ±5% (at 20°C 68°F) of the rated coil operation voltage. Also, please be aware that the pick-up voltage and drop-out voltage may change depending on the temperature and conditions of use.

3) Keep the ripple rate of the nominal coil voltage below 5%.

4) The cycle lifetime is defined under the standard test condition specified in the JIS C 5442 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 75%).

Check this with the real device as it is affected by coil driving circuit, load type,

activation frequency, activation phase, ambient conditions and other factors.

Also, be especially careful of loads such as those listed below.

(1) When used for AC load-operating and the operating phase is synchronous.

Rocking and fusing can easily occur due to contact shifting.

(2) Highly frequent load-operating

When highly frequent opening and closing of the relay is performed with a load that causes arcs at the contacts, nitrogen and oxygen in the air is fused by the arc energy and HNO₃ is formed. This can corrode metal materials.

Three countermeasures for these are listed here.

- Incorporate an arc-extinguishing circuit.
- Lower the operating frequency
- Lower the ambient humidity

5) Heat, smoke, and even a fire may occur if the relay is used in conditions outside of the allowable ranges for the coil ratings, contact ratings, operating cycle lifetime, and other specifications. Therefore, do not use the relay if these ratings are exceeded.

6) If the relay has been dropped, the appearance and characteristics should always be checked before use.

7) Incorrect wiring may cause unexpected events or the generation of heat or flames.

8) 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.