

RoHS compliant

FEATURES

- Best space savings in its class.
- 2. Compact and high-capacity 30A load switching.
- Full line up (High heat-resistant type and SMD type)
- Terminals for PC board pattern designs are easily allocated.

TYPICAL APPLICATIONS

Defogger, Seat heater, Head lamp, Fog lamp, Fan motor, etc.

ORDERING INFORMATION

ACNM					
Contact arrangement*1					
1: 1 Form C					
3: 1 Form A					
5: 1 Form C high heat-resistant type					
7: 1 Form A high heat-resistant type					
Pick-up voltage					
1: Max. 7.2V DC					
Coil voltage (DC)					
12: 12V					
Terminal shape					
Nil: PC board terminal					
SA: Surface-mount terminal					
Packing style*2					
Nil: Tube packing					
X: Tape and reel packing (Reverse NO terminal direction in pull-out direction)					
Z: Tape and reel packing (Normal NO terminal direction in pull-out direction)					

Notes: *1. Surface-mount terminal type is available in high heat-resistant type only.

*2. Tube packing: PC board terminal type only

Tape and reel packing: Surface-mount type only

TYPES

1. PC board terminal type

Contact arrangement	Nominal coil voltage	Part No.	
		Standard type	High heat-resistant type
1 Form A	12V DC	ACNM3112	ACNM7112
1 Form C		ACNM1112	ACNM5112

Standard packing: Carton (tube): 50 pcs.; Case: 1,500 pcs.

2. Surface-mount terminal type

Contact arrangement	Nominal coil voltage	Part No.	
		High heat-resistant type	
1 Form A	12V DC	ACNM7112SAZ	
		ACNM7112SAZ	
		ACNM5112SAZ	
1 Form C		ACNM5112SAZ	

Standard packing: Carton (tape and reel): 200 pcs.; Case: 600 pcs.

Notes: *1. Surface-mount terminal type is available in high heat-resistant type only.

*2. An "X" at the end of the part number indicates, for tape and reel packing, reverse NO terminal direction in pull-out direction.

A "Z" at the end of the part number indicates, for tape and reel packing, normal NO terminal direction in pull-out direction.

RATING

1. Coil data

Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	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 (at 20°C 68°F)	Usable voltage range
12 V DC	Max. 7.2 V DC (Initial)	Min. 1.0 V DC (Initial)	53.3 mA	225Ω	640 mW	10 to 16 V DC

2. Specifications

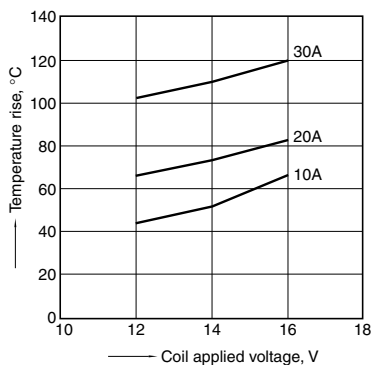
Characteristics	Item		Specifications
Contact	Arrangement		1 Form A, 1 Form C
	Contact resistance (Initial)		Typical 5mΩ (By voltage drop 6 V DC 1 A)
	Contact material		Ag alloy (Cadmium free)
Rating	Nominal switching capacity (resistive load)		N.O.: 30A 14V DC, N.C.: 15A 14V DC
	Max. carrying current (at 14V DC)		N.O. 30A/1 h, 40A/2 min. at 20°C 68°F 25A/1 h, 35A/2 min. at 85°C 185°F 20A/1 h, 30A/2 min. at 110°C 230°F (High heat-resistant type) N.C. 25A/1 h, 30A/2 min. at 20°C 68°F 20A/1 h, 25A/2 min. at 85°C 185°F 15A/1 h, 20A/2 min. at 110°C 230°F (High heat-resistant type)
	Nominal operating power		640 mW
	Min. switching capacity (resistive load)*		1A 14V DC
	Insulation resistance (Initial)		Min. 100 MΩ (at 500V DC, Measurement at same location as "Breakdown voltage" section.)
Electrical characteristics	Breakdown voltage (Initial)	Between open contacts	500 Vrms for 1 min. (Detection current: 10mA)
		Between contacts and coil	500 Vrms for 1 min. (Detection current: 10mA)
	Operate time (at nominal voltage)		Max. 10ms (at 20°C 68°F, excluding contact bounce time) (Initial)
	Release time (at nominal voltage)		Max. 10ms (at 20°C 68°F, excluding contact bounce time) (Initial) (without protective element)
Mechanical characteristics	Shock resistance	Functional	Min. 100 m/s ² {10G} (Half-wave pulse of sine wave: 11ms; detection time: 10μs)
		Destructive	Min. 1,000 m/s ² {100G} (Half-wave pulse of sine wave: 6ms)
	Vibration resistance	Functional	10 Hz to 100 Hz, Min. 44.1m/s ² {4.5G} (Detection time: 10μs)
		Destructive	10 Hz to 500 Hz, Min. 44.1m/s ² {4.5G} Time of vibration for each direction; X, Y direction: 2 hours, Z direction: 4 hours
Expected life	Mechanical		Min. 10 ⁷ (at 120 cpm)
	Electrical	<Resistive load> Min. 10 ⁵ (At nominal switching capacity, operating frequency: ON 1s, OFF 2s)	
		<Motor load> Min. 2×10 ⁵ : at 80 A (inrush), 16 A (steady), 14 V DC (Operating frequency: ON 2s, OFF 6s)	
		<Lamp load> Min. 10 ⁵ : at 84 A (inrush), 12 A (steady), 14 V DC (Operating frequency: ON 1s, OFF 14s)	
Conditions	Conditions for operation, transport and storage		Standard type; Ambient temperature: -40°C to +85°C -40°F to +185°F, Humidity: 5 to 85% R.H. High heat-resistant type; Ambient temperature: -40°C to +110°C -40°F to +230°F, Humidity: 2 to 85% R.H. (Not freezing and condensing at low temperature)
Mass			Approx. 5.5 g .19 oz

Note: *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.

REFERENCE DATA

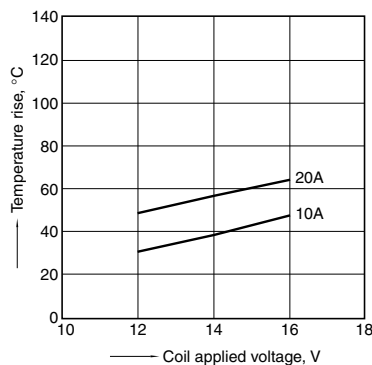
1-(1). Coil temperature rise

Sample: ACNM1112, 3pcs
Measured portion: Inside the coil
Contact carrying current: 10A, 20A, 30A
Ambient temperature: 26°C 78.8°F

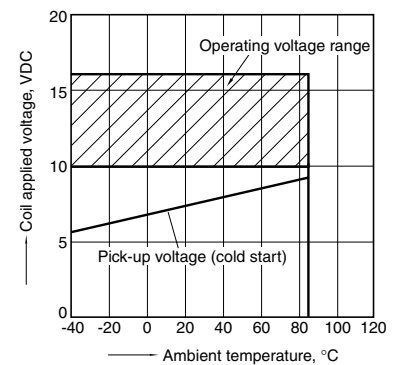


1-(2). Coil temperature rise

Sample: ACNM7112, 3pcs
Measured portion: Inside the coil
Contact carrying current: 10A, 20A
Ambient temperature: 110°C 230°F



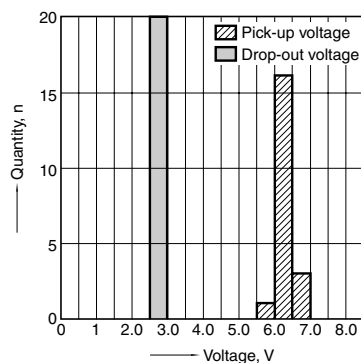
2. Ambient temperature and operating voltage range



CN-M (ACNM)

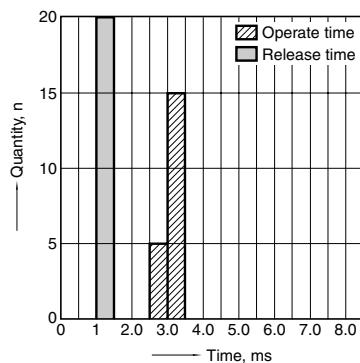
3. Distribution of pick-up and drop-out voltage

Sample: ACNM1112, 20pcs.



4. Distribution of operate and release time

Sample: ACNM1112, 20pcs.



5-(1). Electrical life test (Resistive load)

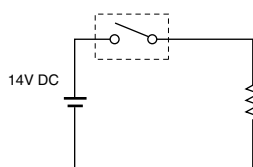
Sample: ACNM1112, 3pcs.

Load: Resistive load (NO side: 30A 14V DC)

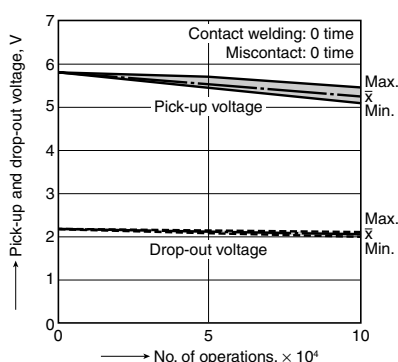
Operating frequency: ON 1s, OFF 1s

Ambient temperature: Room temperature

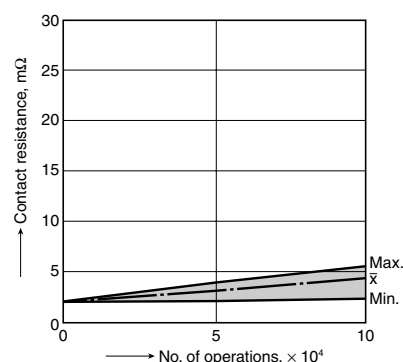
Circuit:



Change of pick-up and drop-out voltage



Change of contact resistance



5-(2). Electrical life test (Motor load)

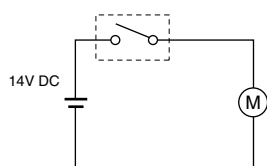
Sample: ACNM7112, 3pcs.

Load: inrush: 80A/steady: 16A

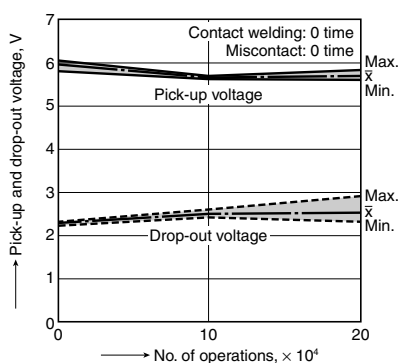
Operating frequency: ON 2s, OFF 6s

Ambient temperature: 110°C 230°F

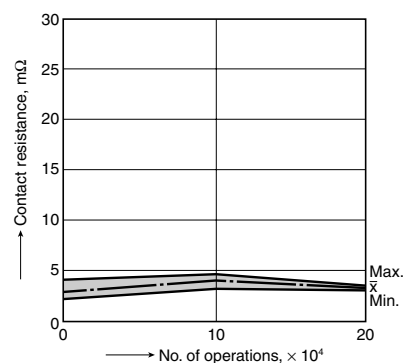
Circuit:



Change of pick-up and drop-out voltage



Change of contact resistance



5-(3). Electrical life test (Lamp load)

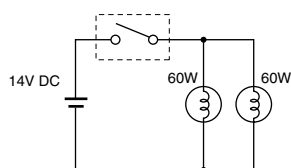
Sample: ACNM3112, 3pcs.

Load: inrush: 84A/steady: 12A

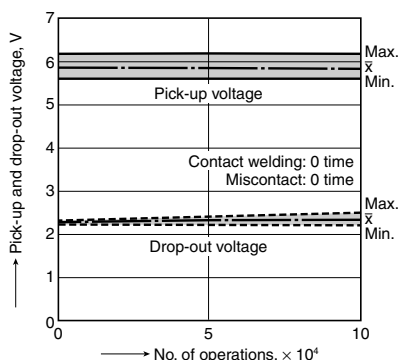
Operating frequency: ON 1s, OFF 14s

Ambient temperature: Room temperature

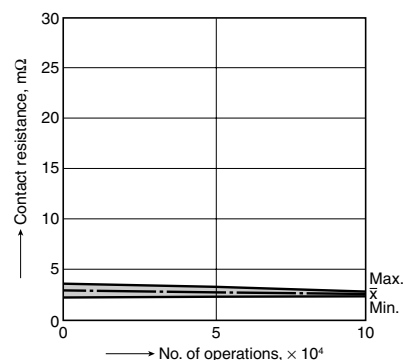
Circuit:



Change of pick-up and drop-out voltage

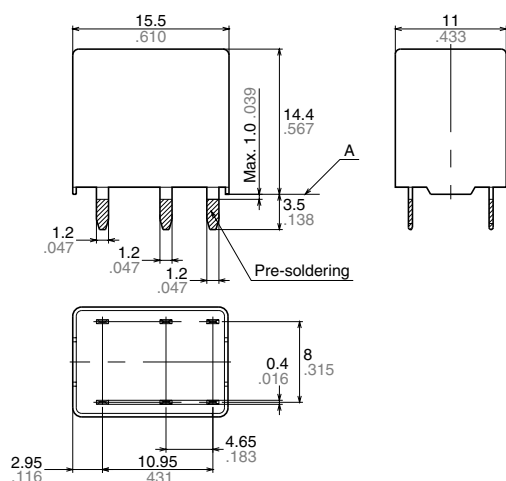
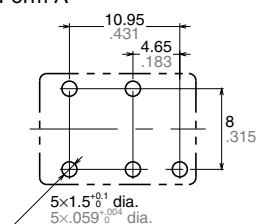
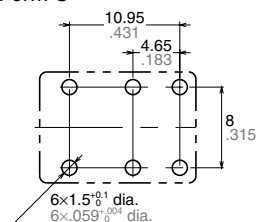
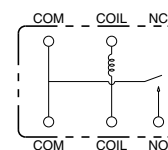
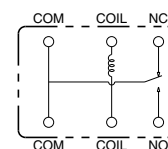


Change of contact resistance



DIMENSIONS (mm inch)**1. PC board terminal type**

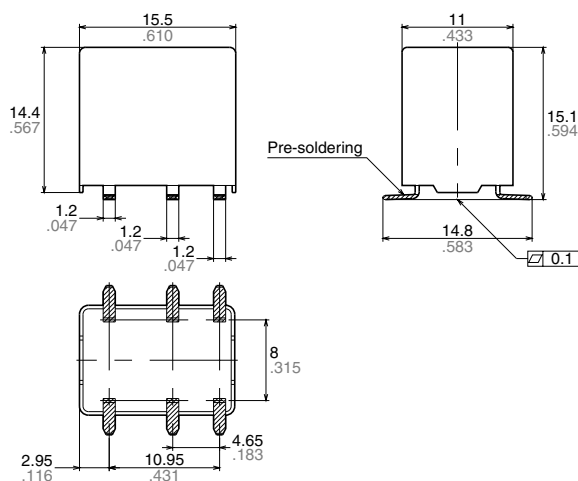
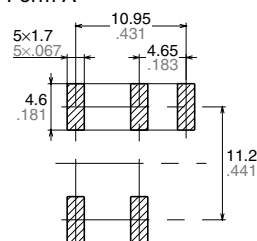
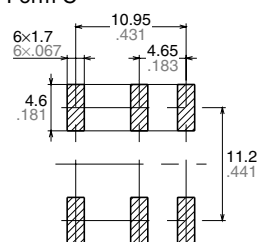
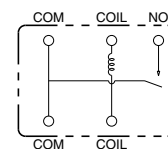
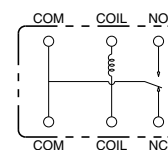
External dimensions

**Dimension:**Max. 1mm .039 inch: $\pm 0.1 \pm 0.04$ 1 to 3mm .039 to .118 inch: $\pm 0.2 \pm 0.08$ Min. 3mm .118 inch: $\pm 0.3 \pm 0.12$ **General tolerance** $\pm 0.1 \pm 0.04$ $\pm 0.2 \pm 0.08$ $\pm 0.3 \pm 0.12$ PC board pattern
(Bottom view)**1 Form A****1 Form C**Schematic
(Bottom view)**1 Form A****1 Form C**

* Dimensions (thickness and width) of terminal is measured before pre-soldering.
Intervals between terminals is measured at A surface level.

Tolerance: $\pm 0.1 \pm 0.04$ **2. Surface-mount terminal type**

External dimensions

**Dimension:**Max. 1mm .039 inch: $\pm 0.1 \pm 0.04$ 1 to 3mm .039 to .118 inch: $\pm 0.2 \pm 0.08$ Min. 3mm .118 inch: $\pm 0.3 \pm 0.12$ **General tolerance** $\pm 0.1 \pm 0.04$ $\pm 0.2 \pm 0.08$ $\pm 0.3 \pm 0.12$ Recommended mounting pad
(Top view)**1 Form A****1 Form C**Schematic
(Top view)**1 Form A****1 Form C**Tolerance: $\pm 0.1 \pm 0.04$

NOTES

1. Usage, transport and storage conditions

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

(1) Temperature:

–40 to +85°C –40 to +185°F

(Standard type)

–40 to +110°C –40 to +230°F

(High heat-resistant type)

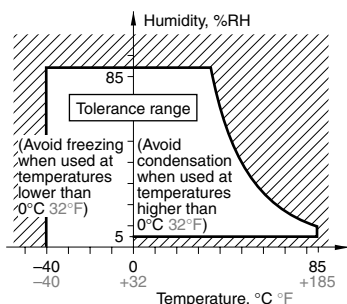
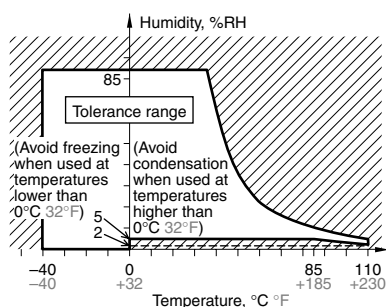
(2) Humidity: 2 to 85% RH

(Avoid freezing and condensation.)

(3) Atmospheric pressure: 86 to 106 kPa

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

(Temperature and humidity range for usage, transport, and storage)



2. Storage condition after opening a moisture-prevention package

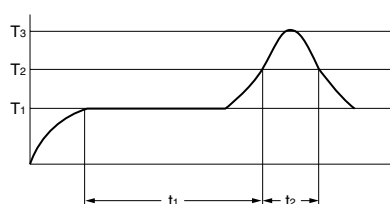
(1) After opening a moisture-prevention package, use the item as soon as possible (within 3 days under an environment of Max. 30°C 86°F, Max. 70% RH).

(2) If products are not used within 3 days after opening a moisture-prevention package, store them in a humidity-controlled desiccator or in a storage bag with silica gel.

3. Mounting and cleaning conditions for surface-mount terminal type relays

1) Recommended reflow condition is:

- Reflow-soldering temperature profile condition (IRS method)



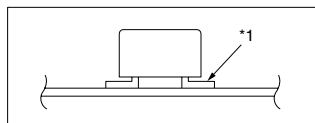
T₁ = 150 to 180°C 302 to 356°F

T₂ = 230°C 446°F or more

T₃ = Less than 250°C 482°F

t₁ = 60 to 120 sec.

t₂ = Less than 30 sec.



- Cautions for mounting operations

Temperature profile indicates the temperature of the soldered part (*1) of terminals on the surface of a circuit board. The exterior temperature of a relay may be extremely high depending on the component density on the board or the heating method of the reflow oven or circuit board type. Sufficient verification under actual processing conditions is required.

2) Avoid cleaning (ultrasonic cleaning, boiling cleaning, etc.) and coating in order to prevent negative impacts on relay characteristics.

For general cautions for use, please refer to the “CAUTIONS FOR USE OF AUTOMOTIVE RELAYS”